

BID ENVELOPE
MSCAA PROJECT NO. 13-1368-02

NAME OF PROJECT: TERMINAL APRON RECONSTRUCTION (INCLUDING CONCOURSE C SOUTH DEMO) - CONSTRUCTION

BIDS DUE: 6/29/2022 TIME: 2:00 PM Local Time

MEMPHIS SHELBY COUNTY AIRPORT AUTHORITY (MSCAA)
PROCUREMENT DEPARTMENT
MEMPHIS INTERNATIONAL AIRPORT
4150 Louis Carruthers Drive
Memphis, TN 38118 (901) 922-8000

BIDDER IDENTIFICATION:

Bidder _____

Address _____

TENNESSEE CONTRACTOR LICENSE INFORMATION:

License Number _____

License Classification Applicable to Project _____

License Expiration Date _____

Dollar Limit _____

SUBCONTRACTORS (OR PRIME CONTRACTORS) TO BE USED ON THIS PROJECT IN THE BELOW LISTED CAPACITIES:

Note: Where applicable, one contractor/subcontractor performing electrical, plumbing, heating, ventilation, air conditioning, and masonry work must have its license number, applicable classification, expiration date and dollar limit on the BID ENVELOPE containing the BID PROPOSAL. **Prime contractors** who are to perform the electrical, plumbing, heating, ventilation, air conditioning or masonry work MUST list themselves as "Self-Perform" in the Sub-contractor list below.

	Sub-contractor List	License No.	Applicable Classification	Expiration Date	Dollar Limit
Electrical					
Plumbing					
HVAC					
Masonry					

BID ENVELOPE

COMPLETE THIS FORM AND ATTACH IT TO THE OUTSIDE OF THE BID ENVELOPE. PLEASE REVIEW INSTRUCTIONS TO BIDDERS FOR BID PACKAGE DELIVERY AND FOR OTHER INFORMATION AND CONDITIONS. MSCAA RESERVES THE RIGHT, IN ITS SOLE DISCRETION, TO REJECT AND DISQUALIFY YOUR BID IF YOU, YOUR PARENT, SUBSIDIARY, AFFILIATE, OR PREDECESSOR IN INTEREST OR ANY OF YOUR SUBCONTRACTORS, SUPPLIERS, AND/OR THEIR PARENTS, SUBSIDIARIES, AFFILIATES OR PREDECESSORS IN INTEREST HAVE PENDING LITIGATION OR CLAIMS WITH THE MSCAA.

SPECIFICATIONS
FOR
TERMINAL APRON RECONSTRUCTION (INCLUDING CONCOURSE C
SOUTH DEMO) - CONSTRUCTION

MEMPHIS INTERNATIONAL AIRPORT
MEMPHIS, TENNESSEE



MSCAA PROJECT NO. 13-1368-02

DATED: 6/2/22

ISSUED FOR BID

THIS PAGE LEFT BLANK INTENTIONALLY.

SPECIFICATIONS
FOR
TERMINAL APRON RECONSTRUCTION
(INCLUDING CONCOURSE C SOUTH DEMO) - CONSTRUCTION

MEMPHIS INTERNATIONAL AIRPORT
MEMPHIS, TENNESSEE

MSCAA NO. 13-1368-02

May 31, 2022

TECHNICAL SPECIFICATIONS – ISSUED FOR BID

I hereby certify that the Specifications: 02060, 02301, 03250, 04100, 04200, 06100, 06160, 07200, 07600, 07900, 08100, 08400, 08800, 09100, 09250, 09441, 09500, 09900, 13281, 14720 were prepared by me or under my direct supervision and that I am a duly Registered Architect under the laws of the State of Tennessee.

Brian P. Bullard, AIA.

Date: 05/31/2022

Reg. No. 101492



05/31/2022

SPECIFICATIONS
FOR
TERMINAL APRON RECONSTRUCTION
(INCLUDING CONCOURSE C SOUTH DEMO) - CONSTRUCTION

MEMPHIS INTERNATIONAL AIRPORT
MEMPHIS, TENNESSEE

MSCAA NO. 13-1368-02

May 31, 2022

TECHNICAL SPECIFICATIONS – ISSUED FOR BID

I hereby certify that the Specifications: C-100, C-102, C-105, S-100, S-101, S-102, S-103, S-105, P-101, P-150, P-152, P-153, P-155, P-209, P-219, P-220, P-304, P-306, P-501, P-605, P-610, P-620, D-701, D-705, D-751, 03700, 09910, and 055213 were prepared by me or under my direct supervision and that I am a duly Registered Engineer under the laws of the State of Tennessee.

Patrick W. Neal, PE

Date: 05/31/2022 Reg. No. 104504



SPECIFICATIONS
FOR
TERMINAL APRON RECONSTRUCTION
(INCLUDING CONCOURSE C SOUTH DEMO) - CONSTRUCTION

MEMPHIS INTERNATIONAL AIRPORT
MEMPHIS, TENNESSEE

MSCAA NO. 13-1368-02

May 31, 2022

TECHNICAL SPECIFICATIONS – ISSUED FOR BID

I hereby certify that the Specifications: 03300, 05120, 05500 were prepared by me or under my direct supervision and that I am a duly Registered Engineer under the laws of the State of Tennessee.

Mark Enoch

Date: 05/31/2022 Reg. No. 104924



SPECIFICATIONS
FOR
TERMINAL APRON RECONSTRUCTION
(INCLUDING CONCOURSE C SOUTH DEMO) - CONSTRUCTION

MEMPHIS INTERNATIONAL AIRPORT
MEMPHIS, TENNESSEE

MSCAA NO. 13-1368-02

May 31, 2022

TECHNICAL SPECIFICATIONS – ISSUED FOR BID

I hereby certify that the Specifications: 15050, 15195, 15400, 15950 were prepared by me or under my direct supervision and that I am a duly Registered Engineer under the laws of the State of Tennessee.

James K. Fleck

Date: 05/31/2022

Reg. No. 107640



SPECIFICATIONS
FOR
TERMINAL APRON RECONSTRUCTION
(INCLUDING CONCOURSE C SOUTH DEMO) - CONSTRUCTION

MEMPHIS INTERNATIONAL AIRPORT
MEMPHIS, TENNESSEE

MSCAA NO. 13-1368-02

May 31, 2022

TECHNICAL SPECIFICATIONS – ISSUED FOR BID

I hereby certify that the Specifications: 16000, 16050, 16450, 16460, 16720, 16752 were prepared by me or under my direct supervision and that I am a duly Registered Engineer under the laws of the State of Tennessee.

Constance H. Scott

Date: 05/31/2022 Reg. No. 101477



SECTION 00010 - TABLE OF CONTENTS**Division/Section Code****Section Title****NON-TECHNICAL SPECIFICATIONS****DIVISION 0**

00001	Project Title Page
00007	Professional Seals
00010	Table of Contents
00015	List of Drawings
00100	Legal Notice to Bidders
00200	Instructions to Bidders/Proposers
00405	Proposal
00410	Proposal Guarantee
00440	Buy American Certification
00445	Disadvantaged Business Enterprise (DBE) Requirements
00490	Addenda and Modifications
00500	Construction Contract
00605	Certificate of Secretary
00610	Performance Bond & Labor and Material Payment Bond
00630	Application for Payment
00640	Business Diversity Monthly Compliance Report
00661	Davis-Bacon Wage Determination
00663	Labor Standards Interview
00765	Supplemental Provisions
00801	Airport Construction Safety Requirements
00802	Airport Security Requirements

General Provisions

Section 10	Definition of Terms
Section 20	Proposal Requirements and Conditions
Section 30	Award and Execution of Contract
Section 40	Scope of Work
Section 50	Control of Work
Section 60	Control of Materials
Section 70	Legal Regulations and Responsibility to Public
Section 80	Execution and Progress
Section 90	Measurement and Payment
Section 150	FAA General Provisions Addendum

General Construction Items

C-100	Contractor Quality Control Program CQCP
C-102	Temporary Air and Water Pollution, Soil Erosion, and Siltation Control
C-105	Mobilization
C-110	Method of Estimating Percentage of Material Within Specification Limits (PWL)

DIVISION 1 – GENERAL REQUIREMENTS

01100	Summary of Work, Sequence of Construction & Liquidated Damages
01125	Renovation
01210	Allowances

Division/Section Code**Section Title****DIVISION 1 – GENERAL REQUIREMENTS (continued)**

01230	Alternates
01250	Amendment Procedure
01310	Preconstruction Conference & Progress Meetings
01320	Schedules and Reports
01321	Construction Surveying
01322	Aerial Photographs
01325	Delays and Extension of Time
01330	Submittals
01351	Storage and Protection
01353	Radio Communications
01455	Quality Control and Quality Assurance Testing Programs
01500	Construction Facilities and Temporary Controls
01600	Product Requirements
01630	Product Substitution Procedures
01700	Field Engineering
01720	Project Record Documents
01730	Cutting and Patching
01741	Cleaning
01770	Close-Out Procedures
01771	Affidavit of Contractor
01772	Final Waiver and Release of Lien: PRIME
01774	Contractor Warranty Form
01775	Consent of Surety Company to Final Payment
01783	Electrical Characteristics, Capacities, and Wiring Diagrams
01784	Manufacturer's Supervision

TECHNICAL SPECIFICATIONS *(dated 5/31/22)***DIVISION 2 - SITE WORK**

S-100	Special Technical Provisions – Safety & Security
S-101	Underground Utility Markers
S-102	Porous Bituminous Base Course
S-103	Exterior Building Repairs
S-105	Water Distribution
P-101	Preparation / Removal of Existing Pavements
P-150	Demolition
P-152	Excavation, Subgrade, and Embankment
P-153	Controlled Low-Strength Material (CLSM)
P-155	Lime-Treated Subgrade
P-209	Crushed Aggregate Base Course
P-219	Recycled Concrete Aggregate Base Course
P-220	Cement Treated Soil Subbase Course
P-304	Cement-Treated Aggregate Base Course
P-306	Lean Concrete Base Course
P-501	Cement Concrete Pavement
P-605	Joint Sealants for Pavements
P-610	Concrete for Miscellaneous Structures
P-620	Runway and Taxiway Marking

Division/Section Code**Section Title****DIVISION 2 - SITE WORK (continued)**

D-701	Pipe for Storm Drains and Culverts
D-705	Pipe Underdrains for Airports
D-751	Storm Drain Manholes, Inlets and Trench Drains

DIVISION 3 - CONCRETE

03250	Bentonite Waterstop
03300	Cast-in-place Concrete
03700	Concrete Rehabilitation

DIVISION 4 - MASONRY

04100	Mortar
04200	Unit Masonry

DIVISION 5 - METAL

05120	Structural Steel
05500	Metal Fabrications
055213	Pipe Handrail

DIVISION 6 - WOOD AND PLASTIC

06100	Rough Carpentry
06160	Sheathing

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

071416	Cold Fluid-Applied Waterproofing
071616	Crystalline Waterproofing
07200	Insulation
072419	Exterior Insulation and Finish System Class PB
072726	Fluid-Applied Membrane Air Barrier
07600	Flashing and Sheet Metal
07900	Joint Sealers

DIVISION 8 - DOORS AND WINDOWS

08100	Metal Door Frames
08400	Aluminum Storefront
08800	Glass and Glazing

DIVISION 9 - FINISHES

09100	Metal Support Systems
09250	Gypsum Wallboard
09441	Epoxy Terrazzo
09500	Acoustical Ceilings
09900	Painting
09910	Exterior Painting

<u>Division/Section Code</u>	<u>Section Title</u>
-------------------------------------	-----------------------------

DIVISION 10 - SPECIALTIES

Section Not Used

DIVISION 11 - EQUIPMENT

Section Not Used

DIVISION 12 - FURNISHINGS

Section Not Used

DIVISION 13 - SPECIAL CONSTRUCTION

13281	Asbestos Abatement
-------	--------------------

DIVISION 14 - CONVEYING SYSTEMS

Section Not Used

DIVISION 15 - MECHANICAL

15050	General Provisions, Basic Materials and Methods
15195	Mechanical Identification
15400	Plumbing
15950	Testing, Adjusting, and Balancing

DIVISION 16 - ELECTRICAL

16000	Electrical General Provisions
16050	Basic Materials and Methods
16450	Grounding and Bonding of Electrical Systems
16460	Grounding and Bonding of Communications Systems
16720	Fire Alarm System
16752	Structured Cabling System

Appendices

Appendix A MSCAA Design Guide – Construction Standards
 MSCAA Comprehensive Storm Water Pollution Prevention Plan

END OF SECTION 00010

DIVISION 0 – SECTION 00015**LIST OF DRAWINGS**

DRAWINGS, Entitled Terminal Apron Reconstruction (including Concourse C South Demo) - Construction, Issued for Bid/Construction, dated 5/31/2022, with revisions, as noted on the drawing sheets:

<u>SHEET NO.</u>	<u>INDEX OF SHEETS</u>
-------------------------	-------------------------------

CS-000	COVER SHEET
--------	-------------

ARCHITECTURAL

A_DT-000	PROJECT INFO/ DRAWING INDEX
A_DT-001	GENERAL NOTES/ KEY PLANS
A_DT-002	KEY PLANS
A_DT-003	OVERALL SITE DEMOLITION PLAN
A_C-001	CONCOURSE C SITE DEMOLITION PLAN
A_C-100	CONCOURSE C TUNNEL FLOOR PLAN
A_C-110	CONCOURSE C FIRST FLOOR PLAN
A_C-120	CONCOURSE C SECOND FLOOR PLAN
A_C-130	CONCOURSE C ENLARGED TUNNEL PLAN
A_C-131	CONCOURSE C ENLARGED FIRST FLOOR PLAN
A_C-132	CONCOURSE C ENLARGED SECOND FLOOR PLAN
A_C-200	CONCOURSE C EXTERIOR DEMO ELEVATIONS
A_C-201	CONCOURSE C NEW EXTERIOR ELEVATIONS
A_C-300	CONCOURSE C BUILDING SECTIONS
A_C-310	CONCOURSE C BUILDING SECTIONS
A_C-400	CONCOURSE C WALL SECTIONS
A_C-401	CONCOURSE C WALL SECTIONS

CIVIL

G-ID-01	INDEX OF DRAWINGS
G-QT-01	SCHEDULE OF ESTIMATED QUANTITIES
G-LP-01	LOCATION PLAN
G-PN-01	GENERAL PROJECT NOTES
G-PH-01	HAUL ROAD, GUARD HOUSE AND STAGING NOTES
G-SP-01	OPERATIONAL NOTES
G-SP-02	OPERATIONAL PLAN CONTRACTOR ACCESS ROUTE
G-SP-03	OPERATIONAL PLAN SHEET 1 OF 2
G-SP-04	OPERATIONAL PLAN SHEET 2 OF 2
G-SP-05	OPERATIONAL DETAILS AND NOTES
C-EC-01	EXISTING CONDITIONS
C-DP-01	DEMOLITION PLAN, NOTES & DETAILS
C-DP-02	DEMOLITION PLAN
C-PD-01	EXISTING PAVEMENT DEMOLITION NOTES
C-PD-02	EXISTING PAVEMENT DEMOLITION PLAN
C-EW-01	EARTHWORK AND GEOTECHNICAL DETAILS
C-HG-01	HORIZONTAL GEOMETRIC PLAN
C-HG-02	CIVIL DETAILS BOLLARDS GUARDRAIL UTILITY MARKERS
C-HG-03	CIVIL DETAILS CONCRETE APRON CONCRETE ISLAND BUILDING REPAIRS
C-HG-04	CIVIL FLATWORK DETAILS TYPE 2 RAMP
C-HG-05	CIVIL FLATWORK DETAILS TYPE 3 RAMP
C-HG-06	CIVIL FLATWORK DETAILS STEPS HANDRAILS
C-HG-07	EXTERIOR DOOR SCHEDULE AND TREATMENTS

SHEET NO.**INDEX OF SHEETS****CIVIL (cont'd)**

C-CF-01	ENLARGED CIVIL FLATWORK PLAN
C-MK-01	PAVEMENT MAKRING PLAN
C-MK-02	PAVEMENT MAKRING DETAILS
C-EG-01	EXISTING GRADE CONTOUR PLAN
C-GD-01	GRADING AND DRAINAGE PLAN
C-GD-02	GRADING AND DRAINAGE TABULATION
C-GD-03	STORM DRAINAGE PROFILES
C-GD-04	TRNECH DRAIN PROFILES
C-GD-05	STORM DRAINAGE DETAILS CAST IN PLACE TRENCH DRAIN
C-GD-06	STORM DRAINAGE DETAILS CAST IN PLACE TRENCH DRAIN
C-GD-07	STORM DRAINAGE DETAILS PRECAST MANHOLE STRUCTURES
C-GD-08	STORE DRAINAGE DETAILS CAST IN PLACE INLETS AT TRENCH DRAINS
C-GD-09	STORM DRAINAGE DETAILS PIPE BEDDING, PLUGS, COLLARS, AND ENCASEMENT
C-GD-10	EROSION CONTROL NOTES AND DETAILS
C-GD-11	EROSION CONTROL DETAILS
C-GD-12	EROSION CONTROL
C-UD-01	PAVEMENT UNDERDRAIN PLAN
C-UD-02	PAVEMENT UNDERDRAIN DETAILS
C-UD-03	PAVEMENT UNDERDRAIN DETAILS
C-UD-04	PAVEMENT UNDERDRAIN DETAILS
C-CP-01	CONCRETE PAVEMENT JOINTING LAYOUT PLAN
C-CP-02	CONCRETE PAVEMENT DETAILS
C-CP-03	CONCRETE PAVEMENT DETAILS
C-CP-04	CONCRETE PAVEMENT DETAILS
C-PE-01	APRON PAVEMENT FINISHED GRADE ELEVATIONS
C-WT-01	WATER LINE PLAN

STRUCTURAL

S_DT-110	GENERAL NOTES
S_DT-300	SECTIONS
S_DT-301	SECTIONS
S_DT-302	BRIDGE DEMO DETAILS
S_DT-303	DETAILS
S_C-210	PLANS, ELEVATIONS & SECTIONS CONCOURSE C

MECHANICAL

M_DT-000	GENERAL HVAC DETAILS
M_C-100	CONCOURSE C TUNNEL FLOOR PLAN - HVAC
M_C-110	CONCOURSE C FIRST FLOOR PLAN - HVAC
M_C-120	CONCOURSE C SECOND FLOOR PLAN - HVAC

FIRE ALARM

FA-100	FIRE ALARM PLAN
--------	-----------------

ELECTRICAL

E_C-100	CONCOURSE C TUNNEL ELEC. PLAN
E_C-120	CONCOURSE C SECOND FLOOR ELEC. PLAN

SHEET NO.**INDEX OF SHEETS****ELECTRICAL (cont'd)**

E_C-300	CONCOURSE C SWITCHBOARD #4A EXISTING
E_C-301	CONCOURSE C SWITCHBOARD #4A REVISED
E_C-310	CONCOURSE C MCC-E2 DETAILS

PLUMBING

P_DT-000	PLUMBING DETAILS
P_C-100	CONCOURSE C TUNNEL FLOOR PLAN - PLUMBING
P_C-110	CONCOURSE C FIRST FLOOR PLAN - PLUMBING
P_C-120	CONCOURSE C SECOND FLOOR PLAN - PLUMBING

THIS PAGE LEFT BLANK INTENTIONALLY.

LEGAL NOTICE
Request for Bids
MSCAA Project Number 13-1368-02
Terminal Apron Reconstruction (including Concourse C South Demo) - Construction

Sealed bids for Terminal Apron Reconstruction (including Concourse C South Demo) - Construction will be received by the Memphis-Shelby County Airport Authority (Authority), Procurement Department, 4150 Louis Carruthers Drive, Memphis, TN 38118, until **2:00 PM Local Time on 6/29/2022**. Bids will not be received at any other location. Within 30 minutes thereafter, the bids will be opened and publicly read via phone/video conference (Link: <https://us06web.zoom.us/j/81887196884?pwd=VUo4OTBNWIROT1IZbUFOTjRaNUV3UT09>; Phone: 1 (312) 626-6799, Passcode: 240514, Meeting ID: 818 8719 6884). The Bid Documents, including a description of the scope of work, the required response format, and additional instructions may be obtained on or after **June 2, 2022** online at www.flymemphis.com.

A virtual Pre-Bid Meeting will be held Monday, June 13, 2022, at 1:00 PM local time via phone/video conferencing (Link: <https://us06web.zoom.us/j/83619806347?pwd=VWdTbkMOWDZVZEgzM3FteG4zVWhjQT09>; Phone: 1 (312) 626-6799 / Passcode: 703397; Meeting ID: 836 1980 6347). Attendance at the Pre-Bid Meeting is strongly recommended. Information for site visit(s) will be posted on the website.

All Bidders are responsible for checking the Authority's website up to the submission deadline for any updates, addenda or additional information. The successful Bidder must sign a contract with the Authority that includes Federal Aviation Administration provisions, if applicable, regarding the Buy American Preference, Foreign Trade Restriction, Davis-Bacon, Affirmative Action, Debarment and Suspension, and Drug-Free Workplace, all of which are incorporated herein by reference.

Each bid must be made by a contractor licensed in Tennessee and be accompanied by a 5% Bid Guarantee. The successful bidder must execute a Performance Bond and a Payment Bond in the amount of 100% each of the Contract Price and meet the Disadvantaged Business Enterprise (DBE) participation goal for this project, which is 26%.

The Authority reserves the right to reject any or all responses to this Request for Bids in whole or in part; to waive any informalities, technicalities, or omissions related to this Request for Bids; and to reject responses on any other basis authorized by the Authority's purchasing policies.

The Authority is an equal opportunity employer and prohibits discrimination based on the grounds of age, race, sex, color, national origin, disability, marital status, military service, or sexual orientation in its hiring and employment practices and in the admission to, access to, or operation of its programs, services, and activities.

By order of:
Scott A. Brockman, A.A.E.
President and CEO
Memphis-Shelby County Airport Authority

DIVISION 0 – SECTION 00200**INSTRUCTIONS TO BIDDERS / PROPOSERS**

Instruction for the preparation of proposals and the delivery thereof to the Memphis-Shelby County Airport Authority (MSCAA) are contained in General Provision Section 20 and additionally as follows. Prepare and submit proposals accordingly.

1. RESERVATION OF RIGHTS:

MSCAA reserves the right, in its sole discretion, to reject and disqualify the bid of any bidder that has pending litigation or claims with the MSCAA and to reject the bid when a parent, subsidiary, affiliate, or predecessor in interest of the Bidder has pending litigation or claims with the MSCAA.

MSCAA also reserves the right, in its sole discretion, to reject and disqualify the bid of any bidder if the bid includes any subcontractor(s) or supplier(s) of any tier that have pending litigation or claims with MSCAA, and to reject the bid when a parent, subsidiary, affiliate, or predecessor in interest of the subcontractor or supplier has pending litigation or claims with the MSCAA.

Bidders shall request from MSCAA a list of entities that have pending claims or litigation with MSCAA to avoid including such entities or their parents, subsidiaries, affiliates, or predecessors in interest in their proposal or bid. A list of affected entities may be obtained by a written or telephone request to Development Division at MSCAA, 2491 Winchester Road, Suite 113, Memphis, TN 38116-3856, telephone number (901) 922-8033.

2. PRE-BID CONFERENCE:

A virtual Pre-Bid Meeting will be held Monday, June 13, 2022, at 1:00 PM local time via phone/video conferencing (Link: <https://us06web.zoom.us/j/83619806347?pwd=VWdTbkM0WDZVZEgzM3FteG4zVWhjQT09>; Phone: 1 (312) 626-6799 / Passcode: 703397; Meeting ID: 836 1980 6347). Attendance at the Pre-Bid Meeting is strongly recommended.

3. DRAWINGS AND SPECIFICATIONS FURNISHED TO CONTRACTOR:

Electronic set of contract and proposal documents are available at <https://www.flymemphis.com/rfps-rfqs> at no cost. Printed copies are not available.

4. REFUSAL OF ISSUANCE OF PROPOSAL FORM TO BIDDERS IN DEFAULT AND DISQUALIFICATION OF BIDDERS:

See General Provision Section 20 for disqualification of bidders and bidders in default.

5. SUBMIT THE FOLLOWING WITH THE BID IN THE MANNER DESCRIBED BELOW:

- A.
 - (1) Proposal
 - (2) Proposal Guarantee (Required Bid Security)
 - (3) Buy America Certificate
 - (4) DBE Assurance Statement/Letter of Intent on Bidder's / Proposer's Letterhead for each DBE subcontractor, subcontractors' signatures not required.
 - (5) Written quote or proposal or other communication from each DBE upon which the scope of work and dollar value contained in your Assurance Statements is based with items included in the Proposal either circled and/or highlighted.
 - (6) DBE Goals Accomplishment Statement
 - (7) Information on All Firms that Provide Bids or Quotes
 - (8) Signed Addenda (if applicable)

- B. The following must be submitted within 24 hours of the proposal submittal deadline:
- (1) DBE Assurance Statement/Letter of Intent on Bidder's / Proposer's Letterhead for each DBE subcontractor, subcontractors' signatures required.

See General Provision Section 20, PROPOSAL REQUIREMENTS AND CONDITIONS.

- C. By executing the proposal submittal, the Contractor is confirming that (1) neither the Contractor nor any of Contractor's potential subcontractors or suppliers have pending claims or litigation, arbitration, or other dispute resolution proceedings where the Owner and the Contractor or potential subcontractors or suppliers are parties; or (2) the Contractor has disclosed in writing any such pending claims or proceedings to Owner through its own writing and/or the writing of Contractor's potential subcontractors or suppliers and submitted same to Owner with the proposal submittal.
- D. Bids should be delivered to the following address:

Memphis-Shelby County Airport Authority
Procurement Department
Memphis International Airport
4150 Louis Carruthers Drive
Memphis, TN 38118
Project No. 13-1368-02

The bid must be sealed and the project number must be included in the address.

Within 30 minutes thereafter, the bids will be opened and publicly read via phone/video conference at: Link:
<https://us06web.zoom.us/j/81887196884?pwd=VUo4OTBNWlROT1lZbUFOTjRaNUV3UT09;>
Phone: 1 (312) 626-6799, Passcode: 240514, Meeting ID: 818 8719 6884.

6. CONSIDERATION OF BID:

The Owner reserves the right to reject any or all bids in whole or in part and to waive any informalities, technicalities, or omissions therein.

It is intention of the Owner to award a contract based upon the lowest responsive bid on the lump sum base bid. Bidder understands and agrees that, after a review of all the bids, the Owner will select the lump sum base bid that best suits the Owner's needs within the sole discretion of the Owner.

7. NO FINANCIAL INTEREST:

Respondent understands and agrees that no Airport Authority employee or member of the Board of Commissioners shall receive any financial benefit arising out of this proposal or its contract, if awarded, either directly or indirectly. Further, any fees paid to any person or entity by contractor for assistance in obtaining this contract, if awarded, with the Authority must be fully disclosed to the Authority.

8. PROTEST:

- A. Any protest must be filed in writing and received by the Authority within seven (7) calendar days of the date of the occurrence of the event that is the subject of the protest, e.g., the opening of responses, the award, or a determination that a respondent is not responsible or that a response is not responsive. Any protest must be actually delivered to the Authority during the business hours of 7:00 AM – 3:30 PM Local Time in order to be deemed to be received by the Authority as required under this Section. A protest must be submitted in hard copy and addressed as follows:

Memphis-Shelby County Airport Authority
Attention: Director of Procurement
4150 Louis Carruthers Drive
Memphis, Tennessee 38118-6613

Any protest sent by telegraphic or facsimile transmission or by email or other electronic means will not meet the filing requirements set forth herein and will not be deemed to be received by the Authority.

No objections with regard to the application, meaning, or interpretation of the specifications contained herein will be considered after the opening of the subject bid.

END OF SECTION 00200

THIS PAGE LEFT BLANK INTENTIONALLY.

DIVISION 0 – SECTION 00405**PROPOSAL**

Project Identification: **Terminal Apron Reconstruction (including Concourse C South Demo) - Construction**

Contract Number: MSCAA Project No. **13-1368-02**

**For Overnight Courier
or Hand Delivery Submit to:**

Memphis-Shelby County Airport Authority
Memphis International Airport
Procurement Department
4150 Louis Carruthers Drive
Memphis, Tennessee 38118

1. The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an agreement with Owner in the form included in the Contract Documents to perform and furnish all Work as specified or indicated in the Contract Documents for the Contract Price and within the Contract Time indicated in this Bid and in accordance with other terms and conditions of the Contract Documents.
2. Bidder accepts all of the terms and conditions of the Legal Notice to Bidders and Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for seventy-five (75) days after the day of Bid opening. Bidder will sign and submit the Construction Contract with the Bonds and other documents required by the Bidding Requirements, within ten (10) days after the date of Owner's Notice of Award.
3. In submitting this Bid, Bidder represents, as more fully set forth in the Contract that:
 - (a) Bidder has examined copies of all the Bidding Documents and of the following Addenda (receipt of all which is hereby acknowledged):

Date	Number
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

- (b) Bidder has familiarized itself with the nature and extent of the Contract Documents, Work, site, locality, and all local conditions and Laws and Regulations that in any manner may affect cost, progress, performance or furnishing of the Work.

- (c) Bidder has studied carefully all reports and drawings of subsurface conditions and drawings of physical conditions which are identified in Division 0 and Division 1 Specifications, and accepts the determination set forth in General Provision Section 20 paragraph 20-06 of the extent of the technical data contained in such reports and drawings upon which Bidder is entitled to rely.
- (d) Bidder has obtained and carefully studied (or assumes responsibility for obtaining and carefully studying) all such examinations, investigations, explorations, tests and studies (in addition to or to supplement those referred to in (c) above) which pertain to the subsurface or physical conditions at the site or otherwise may affect the cost, progress, performance or furnishing of the Work at the Contract Price, within the Contract Time and in accordance with other terms and conditions of the Contract Documents, including specifically the provisions of General Provision Section 20 paragraph 20-06; and no additional examination, investigations, explorations, tests, reports or similar information or data are or will be required by Bidder for such purposes.
- (e) Bidder has reviewed and checked all information and data shown or indicated on the Contract Documents with respect to existing Underground Facilities at or contiguous to the site and assumes responsibility for the accurate location of said Underground Facilities. No additional examinations, investigations, explorations, tests, reports or similar information or data in respect of said Underground Facilities are or will be required by Bidder in order to perform and furnish the Work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents.
- (f) Bidder has correlated the results of all such observations, examinations, investigations, explorations, tests, reports and studies with the terms and conditions of the Contract Documents.
- (g) Bidder has given Owner or Engineer written notice of all conflicts, errors or discrepancies that it has discovered in the Contract Documents and the written resolution thereof by Owner or Engineer is acceptable to Bidder.
- (h) This Bid is genuine and not made in the interest of or on behalf of any undisclosed person, firm or corporation and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation; Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; Bidder has not solicited or induced any person, firm or corporation to refrain from bidding; and Bidder has not sought by collusion to obtain for itself any advantage over any other Bidder or over Owner.

4. Bidder will complete Base Bid Work for the following price(s).

UNIT PRICE SCHEDULE – BASE BID

ITEM NO.	PAY ITEM	DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	TOTAL EST. PRICE
1		“C” CONCOURSE SOUTH DEMOLITION	LS	1	\$ _____	\$ _____
2		ASBESTOS ABATEMENT	ALLOW	1	\$ N/A	\$ 50,000.00
3		LOW VOLTAGE REPAIRS	ALLOW	1	\$ N/A	\$ 50,000.00
4	C-100-14.1	CONTRACTOR QUALITY CONTROL PROGRAM (CQCP)	LS		\$ _____	\$ _____
5	C-102-5.1	SEDIMENT TUBE	LF	300	\$ _____	\$ _____
6	C-102-5.2	EROSION CONTROL BARRIER	LF	200	\$ _____	\$ _____
7	C-102-5.3	SILT FENCE	LF	1,000	\$ _____	\$ _____
8	C-102-5.4	MANHOLE SEDIMENT TRAP	EA	3	\$ _____	\$ _____
9	C-102-5.5	SEDIMENT BASIN	EA	1	\$ _____	\$ _____
10	C-102-5.6	TEMPORARY CONSTRUCTION EXIT	EA	2	\$ _____	\$ _____
11	S-100-6.1	GUARD HOUSE	EA	2	\$ _____	\$ _____
12	S-100-6.2	FIELD OFFICE TRAILER AND CURRING FACILITIES	LS	1	\$ _____	\$ _____
13	S-100-6.3	CROSSING GATE ARM	EA	4	\$ _____	\$ _____
14	S-100-6.4	PROJECT SAFETY & SECURITY	LS	1	\$ _____	\$ _____
15	S-101-5.1	UTILITY MARKERS	EA	25	\$ _____	\$ _____
16	S-103-5.1	EXTERIOR BUILDING REPAIRS	SF	200	\$ _____	\$ _____
17	S-105-5.1	12" DUCTILE IRON PIPE WITH RESTRAINED JOINTS	LF	300	\$ _____	\$ _____
18	S-105-5.2	6" DUCTILE IRON PIPE WITH RESTRAINED JOINTS	LF	30	\$ _____	\$ _____
19	S-105-5.3	FLUSH MOUNTED FIRE HYDRANT	EA	1	\$ _____	\$ _____
20	SC-30-4	MLGW WATER LINE FEES	ALLOW		N/A	\$ 75,000.00
21	P-101-5.1	PAVEMENT DEMOLITION, CONCRETE (ALL THICKNESS AND TYPES)	SY	14,500	\$ _____	\$ _____
22	P-101-5.2	PAVEMENT DEMOLITION, ASPHALT (ALL THICKNESS AND TYPES)	SY	14,500	\$ _____	\$ _____
23	P-101-5.3	STABILIZED BASE DEMOLITION, CONCRETE (ALL THICKNESS AND TYPES)	SY	14,500	\$ _____	\$ _____
24	P-150-4.1	DEMOLITION OF EXISTING STORM DRAIN PIPE (ALL SIZES)	LF	500	\$ _____	\$ _____
25	P-150-4.2	DEMOLITION OF EXISTING STORM DRAIN MANHOLE	EA	2	\$ _____	\$ _____
26	P-150-4.3	DEMOLITION OF EXISTING SANITARY SEWER PIPE (ALL SIZES)	LF	400	\$ _____	\$ _____
27	P-150-4.4	DEMOLITION OF EXISTING SANITARY SEWER MANHOLE	EA	2	\$ _____	\$ _____
28	P-150-4.5	DEMOLITION OF EXISTING WATER PIPE (ALL SIZES)	LF	1,200	\$ _____	\$ _____
29	P-150-4.6	REMOVE EXISTING FLUSH MOUNTED FIRE HYDRANT	EA	3	\$ _____	\$ _____
30	P-150-4.7	DEMOLITION OF EXISTING METAL GUARDRAIL	LF	150	\$ _____	\$ _____

ITEM NO.	PAY ITEM	DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	TOTAL EST. PRICE
31	P-150-4.8	DEMOLITION OF EXISTING ABANDONED PASSENGER BOARDING BRIDGE FOUNDATIONS	EA	10	\$_____	\$_____
32	P-150-4.9	REMOVE EXISTING WATER CABINET	EA	4	\$_____	\$_____
33	P-150-4.10	REMOVE EXISTING PASSENGER BOARDING BRIDGE CARGO LIFT	EA	3	\$_____	\$_____
34	P-150-4.11	REMOVE EXISTING LIGHT POLE AND FOUNDATION	EA	4	\$_____	\$_____
35	P-152-4.1	UNCLASSIFIED EXCAVATION	CY	2,500	\$_____	\$_____
36	P-152-4.2	UNDERCUT EXCAVATION	CY	200	\$_____	\$_____
37	P-152-4.3	UNSUITABLE MATERIAL EXCAVATION AND DISPOSAL	CY	100	\$_____	\$_____
38	P-152-4.4	BORROW EXCAVATION	CY	1,500	\$_____	\$_____
39	P-152-4.5	SUBGRADE PREPARATION	SY	16,625	\$_____	\$_____
40	P-152-4.6	GRANULAR BACKFILL	CY	100	\$_____	\$_____
41	P-152-4.7	LIME	TON	200	\$_____	\$_____
42	P-209-5.1	CRUSHED AGGREGATE BASE COURSE	CY	300	\$_____	\$_____
43	P-219-5.1	RECYCLED CONCRETE AGGREGATE FOR GENERAL USE	CY	100	\$_____	\$_____
44	P-220-6.1	CEMENT TREATED SOIL BASE COURSE	SY	16,625	\$_____	\$_____
45	P-220-6.2	CEMENT	TON	850	\$_____	\$_____
46	P-304-8.1	CEMENT-TREATED AGGREGATE BASE COURSE (8-INCH THICK)	SY	14,315	\$_____	\$_____
47	P-306-8.1	LEAN CONCRETE BASE COURSE	SY	2,310	\$_____	\$_____
48	S-102-6.1	POROUS BITUMINOUS BASE COURSE (4" THICK)	SY	14,315	\$_____	\$_____
49	P-501-8.1	PORTLAND CEMENT CONCRETE PAVEMENT (18 INCH THICK)	SY	16,625	\$_____	\$_____
50	P-610-6.1	STEEL PIPE BOLLARDS	EA	10	\$_____	\$_____
51	P-610-6.2	PROTECTIVE CONCRETE APRON	SF	1,120	\$_____	\$_____
52	P-610-6.3	TYPE 2 CONCRETE LANDING WITH RAMPS	SF	200	\$_____	\$_____
53	P-610-6.4	TYPE 3 CONCRETE LANDING WITH RAMPS	SF	210	\$_____	\$_____
54	P-610-6.5	PEDESTRIAN HANDRAIL	LF	50	\$_____	\$_____
55	P-610-6.6	WALL-MOUNTED PEDESTRIAN HANDRAIL	LF	25	\$_____	\$_____
56	P-610-6.7	ELEVATED PROTECTIVE CONCRETE APRON	SF	120	\$_____	\$_____
57	P-620-5.1	PAVEMENT MARKINGS WITHOUT REFLECTIVE BEADS	SF	1,250	\$_____	\$_____
58	P-620-5.2	EXISTING PAINT MARKING REMOVAL	SF	4,000	\$_____	\$_____
59	D-701-5.1	18 INCH REINFORCED CONCRETE PIPE (CLASS V)	LF	152	\$_____	\$_____
60	D-701-5.2	24 INCH REINFORCED CONCRETE PIPE (CLASS V)	LF	105	\$_____	\$_____
61	D-701-5.3	CONCRETE FOR PIPE PLUGS AND COLLARS	CY	10	\$_____	\$_____
62	D-705-5.1	4 INCH PERFORATED UNDERDRAIN PIPE	LF	750	\$_____	\$_____

ITEM NO.	PAY ITEM	DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	TOTAL EST. PRICE
63	D-705-5.2	UNDERDRAIN CLEANOUT - CONCRETE	EA	6	\$ _____	\$ _____
64	D-751-5.1	STORM DRAIN MANHOLE (5' DIAMETER, > 4' - 8' DEPTH)	EA	1	\$ _____	\$ _____
65	D-751-5.2	STORM DRAIN MANHOLE (6' DIAMETER, > 4' - 8' DEPTH)	EA	1	\$ _____	\$ _____
66	D-751-5.3	STORM DRAIN INLET (4'x4', > 4' - 8' DEPTH)	EA	2	\$ _____	\$ _____
67	D-751-5.4	TRENCH DRAIN (ALL DEPTHS)	LF	340	\$ _____	\$ _____
68	C-102-5.1	SEDIMENT TUBE	LF	300	\$ _____	\$ _____
69	01100.01	MOBILIZATION (FIXED COST)	LS	1	\$ 530,000.00	\$ 530,000.00
70	01100.02	DEMOBILIZATION (FIXED COST)	LS	1	\$ 320,000.00	\$ 320,000.00

CONTRACT BASE BID TOTAL (TOTAL OF LINE ITEMS 1-70) \$ _____

CONTRACT BASE BID TOTAL (TOTAL OF LINE ITEMS 1-70):

(use words)

(\$ _____)

UNIT PRICE SCHEDULE – ARCHITECTURAL (DEDUCTIVE ALTERNATE NO. 1)

TDOT SPECIFICATIONS						
ITEM NO.	PAY ITEM	DESCRIPTION	UNIT	EST. QUANT.	UNIT PRICE	TOTAL EST. PRICE
1		PAINTED EIFS EXTERIOR INFILL IN LIEU OF GLAZED BRICK VENEER	LS	1	\$ _____	\$ _____

TOTAL DEDUCTIVE ALTERNATE NO. 1 (TOTAL OF LINE ITEM 1) \$ _____

TOTAL DEDUCTIVE ALTERNATE NO. 1 (TOTAL OF LINE ITEM 1):

(use words)

(\$ _____)

5. The Owner reserves the right to reject any or all bids in whole or in part and to waive any informalities, technicalities, or omissions therein.

It is intention of the Owner to award a contract based upon the lowest responsive bid on the lump sum base bid. Bidder understands and agrees that, after a review of all the bids, the Owner will select the lump sum base bid that best suits the Owner's needs within the sole discretion of the Owner.

6. Bidder agrees that the Work: will be completed and ready for final payment within the calendar days (as described in Section 01100) after the date when the Contract Time commences to run. Bidder accepts the provisions of the Contract as to liquidated damages in the event of failure to complete the Work on time.
7. See Section 00200, INSTRUCTIONS TO BIDDERS, for a complete list of documents that are made a condition of this Bid.

8. Communications concerning this Bid shall be addressed to: _____
(Printed Name)

The address of Bidder indicated above, or

the following address: _____

email address: _____

9. The terms used in this Bid which are defined in General Provision Section 10 of the Specifications included as part of the Contract Documents have the meanings assigned to them in the Division 0 and Division 1 Specifications.

Submitted on _____, 20____.

10. The undersigned Bidder confirms that (1) neither Bidder nor any of Bidder's potential subcontractors or suppliers have pending claims or litigation, arbitration, or other dispute resolution proceedings where the Owner and Bidder or Bidder's potential subcontractors or suppliers are parties; or (2) such claims or proceedings are pending and Bidder is disclosing same through its own writing and/or the writing of Bidder's potential subcontractors or suppliers and submitting same to Owner with this proposal submittal.

If Bidder is:

An Individual

(Individual's Printed Name)

(Individual's Signature)

doing business as: _____

Business address: _____

Phone No.: _____ FAX No. _____ E-Mail _____

A Partnership

(Firm Name)

By: _____
(Signature of General Partner and Printed Name)

Business address: _____

Phone No.: _____ FAX No. _____ E-Mail _____

A Corporation

(Corporation Name)

By: _____ Title: _____
(Signature of person authorized to sign)

(Printed Name)

(Corporate Seal)

Attest: _____
(Signature of Secretary) (Printed Name)

(State of Incorporation)

Business address: _____

Phone No.: _____ FAX No. _____ E-Mail _____

A Joint Venture

(Joint Venture)

By: _____
(Signature of Joint Venturer) (Printed Name)

(Address)

Phone No.: _____ FAX No. _____ E-Mail _____

By: _____
(Signature of Joint Venturer) (Printed Name)

(Address)

Phone No.: _____ FAX No. _____ E-Mail _____

(Each joint venturer must sign. The manner of signing for each individual, partnership and corporation that is a party to the joint venture should be in the manner indicated above).

END OF SECTION 00405

ISSUED FOR BID

00405
Page 8

DIVISION 0 – SECTION 00410**PROPOSAL GUARANTEE**

KNOW ALL MEN BY THESE PRESENT, that we, the undersigned, _____

_____ as Principal, and

_____ as Surety, are

hereby held and firmly bound unto Memphis-Shelby County Airport Authority as Owner, in the sum of _____ for the payment of which, well and truly to be made, the said Principal and Surety hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors, and assigns.

Whereas the Principal has submitted to Memphis-Shelby County Airport Authority a certain bid, attached hereto and hereby made a part hereof, to enter into a contract in writing for the Terminal Apron Reconstruction (including Concourse C South Demo) - Construction, MSCAA Project No. 13-1368-02.

NOW, THEREFORE, if said bid shall be rejected, or in the alternate, if said bid shall be accepted and the Principal shall execute and deliver a contract in accordance with the terms of the Contract Documents and shall furnish a bond for its faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said bid, then this obligation shall be void, otherwise the same shall remain in full force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agrees that the obligation of said Surety and its bond shall be in no way impaired or affected by any extension of the time within which the Owner may accept such bid; and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers,

this _____ day of _____, 20_____.

PRINCIPAL

By: _____

(Name and Title)

SURETY

SEAL

By: _____

(Attorney-in-Fact)

END OF SECTION 00410

ISSUED FOR BID

THIS PAGE LEFT BLANK INTENTIONALLY.

DIVISION 0 – SECTION 00440**BUY AMERICAN CERTIFICATION**

The contractor agrees to comply with 49 USC § 50101, which provides that Federal funds may not be obligated unless all steel and manufactured goods used in AIP funded projects are produced in the United States, unless the FAA has issued a waiver for the product; the product is listed as an Excepted Article, Material Or Supply in Federal Acquisition Regulation subpart 25.108; or is included in the FAA Nationwide Buy American Waivers Issued list.

A bidder or offeror must complete and submit the Buy America certification included herein with their bid or offer. The Owner will reject as nonresponsive any bid or offer that does not include a completed Certificate of Buy American Compliance.

Certificate of Buy American Compliance for Manufactured Products

As a matter of bid responsiveness, the bidder or offeror must complete, sign, date, and submit this certification statement with their proposal. The bidder or offeror must indicate how they intend to comply with 49 USC § 50101 by selecting one on the following certification statements. These statements are mutually exclusive. Bidder must select one or the other (not both) by inserting a checkmark (✓) or the letter “X”.

- ☐ Bidder or offeror hereby certifies that it will comply with 49 USC § 50101 by:
- Only installing steel and manufactured products produced in the United States, or;
 - Installing manufactured products for which the FAA has issued a waiver as indicated by inclusion on the current FAA Nationwide Buy American Waivers Issued listing, or;
 - Installing products listed as an Excepted Article, Material or Supply in Federal Acquisition Regulation Subpart 25.108.

By selecting this certification statement, the bidder or offeror agrees:

- To provide to the Owner evidence that documents the source and origin of the steel and manufactured product.
 - To faithfully comply with providing US domestic product.
 - To furnish US domestic product for any waiver request that the FAA rejects.
 - To refrain from seeking a waiver request after establishment of the contract, unless extenuating circumstances emerge that the FAA determines justified.
- ☐ The bidder or offeror hereby certifies it cannot comply with the 100% Buy American Preferences of 49 USC § 50101(a) but may qualify for either a Type 3 or Type 4 waiver under 49 USC § 50101(b). By selecting this certification statement, the apparent bidder or offeror with the apparent low bid agrees:
- To submit to the Owner within 15 calendar days of the bid opening, a formal waiver request and required documentation that support the type of waiver being requested.
 - That failure to submit the required documentation within the specified timeframe is cause for a non-responsive determination that may result in rejection of the proposal.
 - To faithfully comply with providing US domestic products at or above the approved US domestic content percentage as approved by the FAA.
 - To refrain from seeking a waiver request after establishment of the contract, unless extenuating circumstances emerge that the FAA determines justified.

Required Documentation

Type 3 Waiver - The cost of the item components and subcomponents produced in the United States is more than 60% of the cost of all components and subcomponents of the "item". The required documentation for a type 3 waiver is:

- a) Listing of all product components and subcomponents that are not comprised of 100% US domestic content (Excludes products listed on the FAA Nationwide Buy American Waivers Issued listing and products excluded by Federal Acquisition Regulation Subpart 25.108; products of unknown origin must be considered as non-domestic products in their entirety).
- b) Cost of non-domestic components and subcomponents, excluding labor costs associated with final assembly at place of manufacture.
- c) Percentage of non-domestic component and subcomponent cost as compared to total "item" component and subcomponent costs, excluding labor costs associated with final assembly at place of manufacture.

Type 4 Waiver – Total cost of project using US domestic source product exceeds the total project cost using non-domestic product by 25%. The required documentation for a type 4 of waiver is:

- a) Detailed cost information for total project using US domestic product.
- b) Detailed cost information for total project using non-domestic product.

False Statements: Per 49 USC § 47126, this certification concerns a matter within the jurisdiction of the Federal Aviation Administration and the making of a false, fictitious or fraudulent certification may render the maker subject to prosecution under Title 18, United States Code.

Date

Signature

Company Name

Title

END OF SECTION 00440

DIVISION 0 – SECTION 00445**DISADVANTAGED BUSINESS ENTERPRISE
(DBE) REQUIREMENTS**

MSCAA operates a federal Disadvantaged Business Enterprise (DBE) Program and a non-federal Business Diversity Development Program (BDDP) to ensure full and fair opportunities in MSCAA contracting for businesses owned by socially and economically disadvantaged individuals. Memphis-Shelby County Airport Authority (MSCAA) administers both programs according to the regulations that apply to the federal program, primarily 49 CFR Part 26. Because the BDDP program applies to contracts involving non-federal funds, not every aspect of 49 CFR Part 26 is relevant to the BDDP program. In most areas, 49 CFR Part 26 will guide our operation of the BDDP including, but not necessarily limited to, rules dealing with certification and counting participation. Only firms that are certified consistent with 49 CFR Part 26 and by the MSCAA or Tennessee Department of Transportation Unified Certification Program (TN UCP), as identified below, will be considered to be certified as a Disadvantaged Business Enterprise.

This section, entitled “Disadvantaged Business Enterprise Requirements” is provided in an effort to assist Respondents. The information contained in this section is not intended to, nor does it, supplement or amend any federal regulation. All Respondents are responsible for compliance with all applicable federal and MSCAA rules and requirements.

It is a requirement that all Respondents providing services for the MSCAA take all reasonable steps to ensure that DBE have a full and fair opportunity to compete for and perform contract work without discrimination on the basis of age, race, sex, color, national origin, creed, religion, sexual orientation or disability. In order to satisfy this requirement, Respondents will be expected to timely submit documentation as identified below and throughout the contract period if selected, and cooperate with MSCAA. Failure to timely submit requested documentation, cooperate with MSCAA or answer inquiries truthfully will be considered a material contract breach and may result in termination.

The following documents must be submitted with your response to this solicitation:

DBE Assurance Statement/Letter of Intent. The Respondent must submit an Assurance Statement for each DBE whose participation the Respondent is counting toward the goal. This may include first, second, third and so on tier subcontractors and the Respondent and all subcontractors between the Respondent and the DBE should sign the Assurance Statement. The Respondent must submit this Assurance Statement on Company Letterhead.

For each Assurance Statement, the Respondent must also provide the written quote or proposal from the DBE or other communication from the DBE upon which the scope of work and dollar value contained in your Assurance Statement is based (“quote/proposal”).

For all RFQs using federal monies, the Assurance Statement(s) must still be submitted and list the DBE s to be used and their scope of work, but no dollar amount(s) is entered. Dollar amounts(s) will be submitted by the prevailing Respondent upon completion of the selection process.

All portions of the Assurance Statement must be completed (including the description of work, the estimated contract amount, and the estimated dollar value of DBE participation for counting and goal purposes) before the Assurance Statement is signed by either the DBE or the Respondent. If the DBE’s, and if applicable the 2nd/3rd Tier Subcontractor’s, signature(s) can be obtained on the completed Assurance Statement before the bid

submission deadline, the Respondent should submit the fully-completed and fully-signed Assurance Statement. If the Respondent submits an Assurance Statement that is completed except for the DBE's, and if applicable, the 2nd/3rd Tier Subcontractor's signature(s) and a quote/proposal from the DBE as described above, the Respondent will be given 24 hours from the bid submission deadline to submit the completed Assurance Statement signed by the DBE and if applicable the 2nd/3rd Tier Subcontractor. Each Assurance Statement submitted during this 24 hour window must conform to the previously submitted Assurance Statement except for DBE signature. These signed Assurance Statements must be submitted pursuant to the same location and time restrictions that applied to the solicitation response and late signed Assurance Statements will only be accepted for good cause as determined solely by MSCAA.

MSCAA reserves the right to ask questions of the Respondent, investigate and require additional information as it determines necessary in its sole discretion to ensure that the regulations and MSCAA's rules are followed as it relates to DBE participation.

Respondent DBE Goals Accomplishment Statement

Submit on Company Letterhead

Information on All Firms that Provide Bids or Quotes

We ask, but do not require, that **the Respondent** submit the following information with the response to this solicitation:

Voluntary Disclosure of Respondent Data

Definition of Socially and Economically Disadvantaged

The rules that govern eligibility and certification of DBE are found generally at 49 CFR Part 26.5 and 26.61 through 26.73. These rules define a DBE as a for-profit, small business concern which is at least fifty-one percent (51%) owned and controlled by one or more socially and economically disadvantaged individuals. In the case of any publicly owned business, at least fifty-one percent (51%) of the stock must be owned by one or more socially and economically disadvantaged individuals. In addition, the personal net worth of the socially and economically disadvantaged owners of the small business concern must not exceed one million three hundred twenty thousand dollars (\$1,320,000).

As defined by 49 CFR, Part 26.5, a socially and economically disadvantaged individual is any individual who is a citizen (or lawfully admitted permanent resident) of the United States and who is –

- (1) Any individual who a recipient finds to be a socially and economically disadvantaged individual on a case-by-case basis.
- (2) Any individual in the following groups, members of which are rebuttably presumed to be socially and economically disadvantaged:
 - (i) “Black Americans” which includes persons having origins in any of the Black racial groups of Africa;
 - (ii) “Hispanic Americans” which includes persons of Mexican, Puerto Rican, Cuban, Dominican, Central or South American, or other Spanish or Portuguese culture or origin, regardless of race;
 - (iii) “Native Americans” which includes persons who are American Indians, Eskimos, Aleuts, or Native Hawaiians;

- (iv) “Asian-Pacific Americans” which includes persons whose origins are from Japan, China, Taiwan, Korea, Burma (Myanmar), Vietnam, Laos, Cambodia (Kampuchea), Thailand, Malaysia, Indonesia, the Philippines, Brunei, Samoa, Guam, the U. S. Trust Territories of the Pacific islands (Republic of Palau), the Commonwealth of the Northern Marianas Islands, Macao, Fiji, Tonga, Kiribati, Tuvalu, Nauru, Federated States of Micronesia, or Hong Kong;
- (v) “Subcontinent Asian Americans” which includes persons whose origins are from India, Pakistan, Bangladesh, Bhutan, the Maldives islands, Nepal or Sri Lanka;
- (vi) Women;
- (vii) Any additional groups whose members are designated as socially and economically disadvantaged by the SBA, at such time as the SBA designation becomes effective.

DBE Liaison Officer

The DBE Liaison Officer is responsible for developing, implementing, and monitoring the DBE program on a day-to-day basis in coordination with other appropriate officials; carrying out technical assistance for a DBE ; and, disseminating information on available business opportunities so that a DBE is provided an equitable opportunity to bid on MSCAA contracts. The DBE Liaison Officer reports directly to the President of the MSCAA. For questions or information related to the DBE program, contact Joe Claiborne at (901) 922-2556.

DBE Certification

MSCAA certifies all of its DBEs through internal processes. The MSCAA compiles a directory of firms who have met the selection criteria for eligibility as a DBE, including 49 CFR Part 26. You can review the searchable directory of certified firms for MSCAA at our website (<https://mscaa.mwdbe.com/>). In the right hand column, you will find links to both the TN UCP Directory and the MSCAA DBE/ACDBE Directory. The TN UCP is a cooperative of entities which are recipients of federal funds that have developed a “one-stop shop” for certification throughout the State of Tennessee of which MSCAA is a certifying member. In order to be considered as meeting the DBE goal for a contract, each business wishing to participate as a DBE or a joint venture DBE, must either be:

- (1) **certified by the MSCAA or the TN UCP** in accordance with 49 CFR Part 26, or;
- (2) **receive affirmation from the MSCAA or the TN UCP** that their certification from another entity is consistent with and acceptable to the MSCAA or the TN UCP.

Persons or entities who consider themselves a DBE but who are not certified by MSCAA, the TN UCP as a DBE, have not received affirmation from the MSCAA or the TN UCP that their certification from another entity is consistent with and acceptable to the MSCAA or the TN UCP will not be considered. Unless a firm meets the criteria above by the time the responses to this solicitation are due, its participation will not be considered as meeting the DBE goal in the solicitation. Each business wishing to participate as a DBE or a joint venture DBE must be certified at the time of bid opening and a current copy of the DBE’s certification must be attached to the Assurance Statement.

Identification of Contract Goal and Requirements

As an example: “For this contract, the DBE goal is established as **26%**.” In order to be responsive, a Respondent must either meet the goal or make good faith efforts to do so. Good faith efforts are defined in Appendix A to 49 CFR Part 26 and discussed in the following section.

If a Respondent’s DBE Assurance Statement proposes a DBE percentage less than the established goal, the Respondent must, at the time of making the response, submit appropriate documentation justifying its submitted DBE percentage. MSCAA reserves the right to request additional documentation or information from Respondent regarding its DBE Assurance Statement and, if applicable, any good faith efforts documentation. If MSCAA enters into a contract based on the Respondent’s DBE Goals Accomplishment Statement and documentation, the DBE percentage accepted by MSCAA will become a contractual requirement. If the Respondent’s DBE Assurance Statement proposes to attain a DBE percentage higher than the established goal, the established goal will remain the contractual requirement.

Respondents shall not contract with, demand, require or coerce a DBE into any agreement or into the signing of any Assurance Statement or any other document which prohibits the DBE from providing subcontracting quotations or doing business with other Respondents. The DBE shall be free to provide their services to any number of Respondents. To ensure that all obligations under sub-contracts awarded to a DBE are met, the MSCAA will review the agreement between the Respondent and DBE, and Respondent’s DBE involvement efforts during the performance of the contract. The Respondent shall bring to the attention of the MSCAA any situation in which regularly scheduled progress payments are not made to a DBE. If, in the opinion of the MSCAA, the Respondent has made significant deviations from the DBE program commitments, it shall be considered a breach of contract.

Good Faith Efforts Statement and Requirements

In order to be responsive, Respondents must either meet the DBE goal or make good faith efforts to meet the goal. Respondents who do not meet the goal must establish adequate good faith efforts by submitting documentation along with the Respondent DBE Goals Accomplishment Statement. This statement should show that they took all necessary and reasonable steps to achieve the DBE goal, which could reasonably be expected to obtain sufficient DBE participation, even if they were not fully successful. The Respondent’s DBE Goals Accomplishment Statement and supporting documents should conform to the good faith requirements outlined in Appendix A of 49 CFR Part 26.

The following is a list of types of actions that may be part of a Respondent’s efforts to obtain DBE participation and may be included in the Respondent DBE Goals Accomplishment Statement and documentation. This list is not intended to be a mandatory checklist, nor is it intended to be exclusive or exhaustive. Other factors or types of efforts may be relevant in appropriate cases:

- A. Soliciting through all reasonable and available means (e.g. attendance at pre-bid meetings, advertising and/or written notices) the interest of all certified as a DBE who have the capability to perform the work of the contract. The Respondent must solicit this interest within sufficient time to allow the DBE to respond to the solicitation and take appropriate steps to follow-up initial solicitations to determine interest.
- B. Selecting portions of the work to be performed by a DBE in order to increase the likelihood that the goals of the will be achieved.
- C. Providing any interested DBE with adequate information about the plans, specifications, and requirements of the contract in a timely manner to assist them in responding to a solicitation.
- D. Negotiating in good faith with any interested DBE. It is the Respondent’s responsibility to make a portion of the work available to DBE subcontractors and suppliers and to select those

portions of the work or material needs consistent with the available DBE subcontractors and suppliers, so as to facilitate DBE participation.

- E. Not rejecting any DBE as being unqualified without sound reasons based on a thorough investigation of their capabilities.
- F. Making efforts to assist any interested DBE in obtaining bonding, lines of credit, or insurance as required by the recipient or contractor.
- G. Making efforts to assist any interested DBE in obtaining necessary equipment, supplies, materials, or related assistance or services.
- H. Effectively using the services of available minority/women community organizations; minority/women contractors' groups; local, state, and Federal minority/women business assistance offices; and other organizations as allowed on a case-by-case basis to provide assistance in the recruitment and placement of any DBE.
- I. Making efforts to identify and assist eligible firms, which are not yet certified by the MSCAA or the TN UCP as a DBE, to obtain certification. These types of efforts will have special weight where it appears that the relevant firms will be certified in time for the execution of the contract.

If a Respondent has not met the DBE goal and submits Respondent DBE Goals Accomplishment Statement and documentation, the Respondent should summarize in detail all good faith efforts taken by the Respondent, including, but not limited to, the activities listed above in A through I, and supporting documentation. While the Respondent should submit documentation to support its good faith efforts at the time of bid submission, MSCAA may ask questions of Respondent or request additional documentation after review of Respondent's DBE Goals Accomplishment Statement and any documentation. In submitting the information required under this section, Respondent understands and agrees that the determination of whether Respondent has met the DBE goal or established good faith efforts to meet the goal is a judgment call that MSCAA will make.

COUNTING THE DBE PARTICIPATION

DBE participation shall be counted toward meeting the DBE goal as outlined in 49 CFR Part 26, especially 26.55. When **the Respondent** completes an Assurance Statement, **the Respondent** must include not only the total value of the work to be performed and/or the materials to be supplied by the DBE but also the total amount of DBE participation that should be counted toward meeting the goal. For example, if a DBE is a regular dealer or supplier of pipe but does not install the pipe, then **the Respondent** can generally count the dollar value spent on the pipe at 60%. This would mean that if the DBE was supplying \$100,000 of pipe then the contract amount would be \$100,000 but the total amount of DBE participation would be \$60,000 for counting and meeting the goal purposes. If you have any questions about counting, we strongly urge you to consult 49 CFR Part 26. The following may be helpful to you in counting DBE participation and in determining which sections of Part 26.55 you need to review in more detail:

- (a) When a DBE participates in a contract or subcontract, the provider will count only the value of the work actually performed by the DBE toward the DBE goals. In a construction contract (and other similar contracts), this will include the work performed by the DBE's own forces and supplies purchased or equipment leased by the DBE as described below, especially (d) (but not supplies or equipment the DBE subcontractor purchases from the prime contractor or its affiliate.) The Respondent will count the entire amount of fees or commissions charged by a DBE for providing a bona fide service toward goals provided that we determine the fees to

be reasonable and not excessive. When a DBE subcontracts part of the work of its contract to another firm, the value of the subcontracted work may be counted toward DBE goals only if the subcontractor is itself a DBE.

- (b) When a DBE performs as a participant in a joint venture, the Respondent will count a portion of the total dollar value of the contract equal to the distinct, clearly defined portion of the work of the contract that the DBE performs with its own forces toward DBE goals.
- (c) The Respondent will count expenditures to a DBE contractor toward DBE goals only if the DBE is performing a commercially useful function on that contract. A DBE performs a commercially useful function when it is responsible for execution of the work of the contract or subcontract and is carrying out its responsibilities by actually performing, managing, and supervising the work involved. To determine whether a DBE is performing a commercially useful function, the Respondent will evaluate industry practices, the amount of work subcontracted, whether the amount the firm is to be paid under the contract is commensurate with work it is actually performing, and the DBE credit claimed for its performance of the work, and other relevant factors. The Respondent will determine questions of commercially useful function with regard to trucking companies under 49 CFR Part 26.55 (d).
- (d) The Respondent will count expenditures with the DBE for materials or supplies toward DBE goal in the manner described in 49 CFR Part 26.55 (e). Please review Part 26.55(e) carefully. It is important to note that the rule counts expenditures differently based upon whether the DBE is a manufacturer as defined by the rule (normally counted at 100% percent of the cost), a regular dealer as defined by the rule (normally counted at 60% of the cost) or neither of the two (normally counted at the entire amount of fees or commissions, or fees or transportation charges, provided they are reasonable). It is important to note that materials and supplies provided by a DBE that is not a regular dealer in those materials and supplies do not count toward meeting the goal. For example, if the DBE is a regular dealer of piping, the DBE cannot purchase office equipment and then supply that office equipment to the prime and count any portion of the cost of the office equipment toward meeting the goal. Such conduct for DBE counting purposes is prohibited by the rules and is considered to be an impermissible and illegal pass-through.
- (e) If a firm is not currently certified as a DBE, in accordance with the standards of subpart D of this part, at the time of the execution of the contract, the Respondent will not count the Firm's participation toward any DBE goals, except as provided for in 49 CFR Part 26.87(i).
- (f) The Respondent will not count the dollar value of work performed under a contract with a firm after it has ceased to be certified toward any goals except as provided in 49 CFR Part 26.87(j).
- (g) The Respondent will not count the participation of a DBE subcontractor toward a contractor's final compliance with its DBE obligations on a contract until the amount being counted has actually been paid to the DBE.

SANCTIONS FOR NON-COMPLIANCE

In case of the Respondent's non-compliance with DBE and/or BDDP requirements as applicable, including, but not limited to, documentation, cooperation, and truthfulness, MSCAA shall impose such contract sanctions as it may determine to be appropriate. This may include but is not limited to:

- a) Withholding of payments to the Respondent under the Contract until the Respondent complies; and/or

- b) Cancellation, termination, or suspension of the Contract, in whole or in part; and/or
- c) Payment by the Respondent to MSCAA of an amount equal to the difference in the DBE dollar value contracted for and the dollar value achieved in documented DBE participation or any lesser amount or penalty as deemed appropriate by MSCAA, which dollar value shall be considered liquidated damages for failure to perform the requirements of this Contract and for which Respondent and all of its subcontractors agree to be bound.

PROMPT PAYMENT/RETAINAGE

The Respondent agrees to pay each subcontractor under this prime contract for invoices submitted or normal progress payments for work completed satisfactorily or supplies provided satisfactorily pursuant to its contract and no later than fifteen (15) days from the receipt of each payment it receives from the MSCAA.

There is no retainage or other sums allowed to be withheld from progress payments or any other payments and any exceptions to this prompt pay/retainage provision must be requested in writing by Respondent (Contractor) and approved in writing by an MSCAA Vice-President or higher prior to the delay or withholding of any payments under this provision.

Respondent (Contractor) will include the following paragraphs in all contracts and/or agreements related to the work [under this Contract] with subcontractors or suppliers and will require all its subcontractors and suppliers to include this paragraph in any contracts and/or agreements related to the work [under this Contract] with any other third parties and any other lower tier subcontractors or suppliers:

“It is understood and agreed by all involved parties that payment for work completed satisfactorily or supplies provided satisfactorily will be made to the appropriate party no later than fifteen (15) days from receipt of payment for that work or those supplies.

There is no retainage or other sums allowed to be withheld from progress payments or any other payments and any exceptions to this prompt pay/retainage provision must be requested in writing to MSCAA and approved in writing by an MSCAA Vice-President or higher prior to the delay or withholding of any payments under this provision.”

49 CFR Part 26

The Respondent shall carry out the applicable requirements of 49 CFR Part 26 in the award and administration of MSCAA contracts. Respondent agrees to provide all its subcontractors and suppliers and to require all its subcontractors and suppliers on this project to provide a complete copy of the **Disadvantaged Business Enterprise (DBE) Requirements** of this contract to all those who provide supplies or work related to this contract and to require all those providing supplies or work to be bound by these requirements as it relates to their work related to this contract.

Project No. _____

DBE ASSURANCE STATEMENT/LETTER OF INTENT**RESPONDENT:**

Name of Firm: _____

Address: _____

City: _____ State: _____ Zip: _____

Telephone: _____

DBE:

Name of Firm: _____

Address: _____

City: _____ State: _____ Zip: _____

Telephone: _____

Description of work to be performed by DBE:

The Respondent is committed to utilizing the above-named DBE for the work described above. The estimated dollar value of this work is \$ _____, which is _____% the total base bid proposal.

AFFIRMATION

The above-named DBE affirms that it will perform the portion of the contract for the estimated dollar value as stated above.

By: _____
 Signature of DBE and Title Date Name

By: _____
 Signature of 2nd/3rd Tier Subcontractor Date Name
 and Title

If the Respondent does not receive award of the prime contract, any and all representations in this letter of Intent and Affirmation shall be null and void.

By: _____
 Signature of Respondent and Title Date Name

(SUBMIT ON RESPONDENT'S LETTERHEAD FOR EACH DBE SUBCONTRACTOR.)

Project No. _____

RESPONDENT DBE GOALS ACCOMPLISHMENT STATEMENT

The undersigned Respondent has satisfied the requirements of the bid/proposal specification in the following manner (please complete the appropriate spaces):

_____The Respondent is committed to a minimum of 26% DBE utilization on this contract.

_____The Respondent is unable to meet the DBE goal of 26% but is committed to a minimum of _____% DBE utilization on this contract and submits the attached narrative and documentation demonstrating good faith efforts consistent with Appendix A of 49 CFR 26. **The Respondent should attach as many pages as necessary to provide a full and complete narrative and supporting documentation of good faith efforts made. This narrative must be written on company letterhead and signed.**

Please provide an explanation for the percentage quoted above:

Provide an explanation of the dollar value of DBE's participation and compensation and how this has been determined to meet the specific goal requirements of this solicitation in whole or part.

If DBE and company will enter into a Joint Venture, please describe the terms of the relationship and attach a copy of the contract between the parties.

It is the present intent of the Respondent to utilize the specific DBE firms identified in this proposal in the execution of this contract. If for any reason, one or more of the DBE identified here are unable or unwilling to participate, the Respondent will make good faith efforts to replace the DBE with a similar DBE. The Authority DBE Good Faith Procedures are provided in this package and apply to this proposal.

Respondent's Name: _____

State Registration No.: _____

Federal Tax ID No.: _____

By: _____
Signature and Title Date

(SUBMIT THIS PAGE ON RESPONDENT'S LETTERHEAD)

VOLUNTARY DISCLOSURE OF RESPONDENT DATA

For Title VI Compliance, we ask for **voluntary disclosure** of the following information:

Gender: Male

Female

Race: Caucasian

Black American

Hispanic American

Native American

Subcont. Asian American

Asian-Pacific American

Other (please specify) _____

(DO NOT SUBMIT THIS PAGE ON LETTERHEAD)

Information on All Firms that Provided Bids or Quotes to:

This requirement applies to all firms, regardless of whether they are subs or primes, regardless of the gender or race of their owners, and regardless of whether they are ultimately chosen to participate in the contract. Please list below the name, address, phone number and contact person for every firm that provided you a bid or a quote on this project – even if you ultimately decided not to use the firm in preparing your final bid. The first line should be used for the **prime contractor** on this project. All sections must be completed to the best of your ability.

MSCAA Proj./Bid No.: _____

Name of Firm	Selected? Y/N	Full Address of Firm	Point of Contact	Phone No.	DBE? Y/N	Firm Age	AGRR *
						yrs	
						yrs	
						yrs	
						yrs	
						yrs	
						yrs	
						yrs	
						yrs	
						yrs	
						yrs	
						yrs	
						yrs	
						yrs	
						yrs	
						yrs	
						yrs	
						yrs	

*Footnote: Please enter the letter for the category that best identifies your annual gross revenue.

AGRR =Annual Gross Revenue Ranges:

A = Less than \$500,000 **B** = \$500,000 - \$1 Million **C** = \$1 - \$2 Million **D** = \$2 - \$5 Million **E** = Over \$5 Million

DIVISION 0 – SECTION 00490**ADDENDA AND MODIFICATIONS****1. INTERPRETATIONS - ADDENDA AND MODIFICATIONS**

- A. If, during the bidding period Bidder finds discrepancies, ambiguities, omissions, or is in doubt as to meaning or intent of Contract Documents, notify the Owner or Engineer not less than seven (7) days prior to Bid Date. All such necessary clarifications, information, interpretations or amendments shall be answered in the form of written addenda to Drawings and Specifications, and shall be issued simultaneously to all holders of complete sets of Documents.
- B. No Addenda will be issued less than two days prior to the Bid opening date. Neither the Owner nor Engineer shall be responsible for oral interpretations or instructions during the bidding period.
- C. All Addenda are incorporated by reference into the Contract. Failure of any Bidder or sub-bidder to receive any addenda shall not relieve the Bidder of any obligation with respect to the Bid.
- D. All Addenda and Modifications to the Contract Documents shall be inserted and indexed in this location behind this page.

END OF SECTION 00490

THIS PAGE LEFT BLANK INTENTIONALLY.

**LUMP SUM CONSTRUCTION CONTRACT
FOR
TERMINAL APRON RECONSTRUCTION (including Concourse C Demo) – CONSTRUCTION**

**BY AND BETWEEN
THE MEMPHIS-SHELBY COUNTY AIRPORT AUTHORITY
AND
(CONTRACTOR NAME)**

MSCAA PROJECT NO. 13-1368-02

THIS LUMP SUM CONSTRUCTION CONTRACT (hereinafter referred to as “Contract”) is made and entered into as of _____, between MEMPHIS-SHELBY COUNTY AIRPORT AUTHORITY, a body politic and corporate under the laws of Tennessee (hereinafter referred to as “**Owner**” or “**Sponsor**”) doing business at 2491 Winchester Road, Suite 113, Memphis, Tennessee 38116-3856, and {insert **CONTRACTOR NAME**}, a {insert **LEGAL ENTITY TYPE and STATE**} doing business at {insert Contractor address}, (hereinafter referred to as “**Contractor**,” “**Bidder**,” or “**Offeror**”). Owner and Contractor may sometimes be referred to herein individually as “Party” or collectively as “Parties.”

RECITALS

1. **WHEREAS**, the Owner desires to have constructed certain work in Memphis, Tennessee, more particularly described as **Terminal Apron Reconstruction (including Concourse C Demo) - Construction**, MSCAA Project No. **13-1368-02** (herein referred to as “the Project”); and

2. **WHEREAS**, the Contractor desires to enter into this Contract as an independent contractor and is ready, willing and able to construct the Project in accordance with the terms and subject to the conditions of this Contract; and

3. **WHEREAS**, the “Program Manager” is to act as the Owner’s representative, and the Owner will advise the Contractor in writing of the name of the Program Manager; and

4. **WHEREAS**, the “Engineer” is the Owner’s representative with responsibility for design of the technical specifications, and the Owner will advise the Contractor in writing of the name of the Engineer; and

NOW, THEREFORE, in consideration of good and valuable consideration, received or to be received, the sufficiency of which the Parties acknowledge, the Parties agree as follows:

ARTICLE 1

SCOPE OF THE WORK AND TERM OF AGREEMENT

Section 1.01. Scope of the Work. The general scope of the work is more particularly described in Exhibit A, which is attached hereto and incorporated herein by reference. Contractor agrees that the Project shall be constructed in accordance with the terms of this Contract and the “Contract Documents” as defined in Article 2 of this Contract. The term “Work” includes, but is not limited to, all labor, materials, supplies, tools, equipment, and services necessary to construct the Project as described in the Contract Documents, whether or not all materials and equipment are incorporated or will be incorporated in the Project; and all Work deemed necessary to fully close the Project including demobilization.

Section 1.02. Term of Agreement and Completion. The term of this Agreement shall commence upon Owner’s issuance of the Notice to Proceed pursuant to Section 3.01 and shall continue until the Work is completed in accordance with the Contract Documents, unless earlier terminated by the provisions set forth in Section 23 of this Agreement.

ARTICLE 2

CONTRACT DOCUMENTS

Section 2.01. Definition. The "Contract Documents" include this Contract, the Legal Notice, Instructions to Bidders, the Proposal, the Proposal Guaranty, the drawings and the specifications, the Federal Aviation Authority ("FAA") General Provisions ("GP"), all addenda, and exhibits or modifications to any of them, issued prior to or after execution of this Contract. The Contract Documents are more particularly described in Exhibit B, which is attached hereto and incorporated herein by reference. As used in this Contract, a "modification" is either:

- (a) a written and signed Contract Amendment to this Contract; or
- (b) an accepted Request for Proposal ("RFP"); or
- (c) an Engineer's Supplemental Instruction ("ESI"); or
- (d) a Construction Change Directive (as defined in Section 9.02(c) of this Contract).

Section 2.02. Intent of Contract Documents. The intent of the Contract Documents is to include all design, architecture and engineering, except as otherwise expressly provided in the Contract Documents, materials, appliances, labor and services of every kind necessary for the proper execution of the Work and the terms and conditions of payment for the Work. The Contract Documents are to be considered as one document, and whatever is called for by any one of the Contract Documents shall be as binding as if called for by all.

Section 2.03. Coordination of the Contract, Plans and Specifications. This Contract, the plans, specifications, and all referenced standards cited in the Contract Documents are essential parts of the Contract requirements. A requirement occurring in one of the Contract Documents is as binding as though occurring in all. They are intended to be complementary and used to describe and provide for a complete project. In case of dimensional discrepancies, calculated dimensions will govern over scaled dimensions. In the event of conflicts or discrepancies among the Contract Documents, interpretations will be based on the following priorities:

- (a) This Contract.
- (b) The Addenda, with those of later date having precedence over those of earlier date.
- (c) The Technical Specifications.
- (d) The Plans.
- (e) Cited standards for materials or testing and cited FAA General Provisions and advisory circulars.

Section 2.04. Errors in Contract Documents. Prior to commencing the Work, the Contractor shall review all of the Contract Documents for the purpose of identifying any error, inconsistency, omission, discrepancy or variance that may be contained therein. If the Contractor finds any error, inconsistency, omission, discrepancy, or variance in the Contract Documents, it shall notify the Owner at least ten (10) days before beginning the affected portion of the Work. The Owner shall make any correction, interpretation, or clarification promptly, basing its decision on the intent of the Contract Documents. Failure of the Contractor to timely notify the Owner of any such error, inconsistency, discrepancy, or variance within the time provided by this paragraph shall bar the Contractor from making any claim for additional time or compensation caused by any such error, inconsistency, discrepancy, or variance even if the error, inconsistency, discrepancy or variance caused the Contractor to incur additional expense or time of performance.

ARTICLE 3

PROGRESS OF THE WORK

Section 3.01. Commencement and Completion. The Contractor shall commence the Work upon receipt of the written Notice to Proceed, as defined in Section 01100 of the Specifications, from the Owner and shall achieve substantial

completion of the Work, as defined in Section 01100 of the Specifications. The Contractor warrants that it will deliver the Project to the Owner free from any and all mechanics' liens or other encumbrances. Contractor further agrees to promptly (which is defined for purposes of this paragraph as no more than three (3) days from receipt of any lien or other notice) notify the Owner of the existence of any and all mechanics' liens filed by any subcontractors, materialmen, suppliers, or sub-subcontractors. If any mechanics' liens are filed, Contractor shall, at its expense, bond off any such mechanics' liens within three (3) days from receipt of a written request of Owner to do so. Time is of the essence, and the substantial completion date may be altered only as provided in this Contract. Substantial completion shall occur when the Work is sufficiently complete in accordance with the Contract Documents, so the Owner can occupy or utilize the Work for its intended use, and when only minor punch list work remains to be done and a certificate of occupancy has been issued. The Owner will, upon written request of the Contractor, issue a certificate establishing the substantial completion date at any time after substantial completion has occurred.

Section 3.02. The Progress Schedule. Contractor shall fully comply with the requirements for scheduling the Work as set forth in Section 01100 and Section 01320 of the Specifications. The Owner reserves the right to reschedule the Work, or the sequence of the activities of the Contractor, for no additional compensation should Owner deem such rescheduling to be in its best interest. At least fifteen (15) days prior to the due date of the first payment to be made hereunder by the Owner and thereafter on a monthly basis, the Contractor shall submit to the Owner a cash flow projection depicting the projected monthly cash flow for the entire Project.

Section 3.03. Extension of Substantial or Final Completion Date.

(a) Except as otherwise expressly provided herein, the "Substantial Completion Date" or "Final Completion Date" shall be extended only for such number of calendar days that the Work is actually delayed by a casualty, a fire, or a Contract Amendment (hereinafter referred to as "Excusable Delays"). No extensions to the Substantial Completion Date shall be granted due to the negligence or fault of the Contractor or its subcontractors, non-availability of materials or non-availability of labor. No extension to the Substantial Completion Date shall be granted for the period of time during a delay in the performance of the Work, which is caused in part by the Owner, the Engineer, and in part by the Contractor or one for whom the Contractor is responsible ("Concurrent Delay"). A request for a time extension based upon inclement weather shall be governed by the provisions of Section 01320 (3.05) of the Specifications.

(b) In order to obtain an extension of the Final Completion Date or the Substantial Completion Date due to an Excusable Delay, the Contractor in each instance shall give written notice to the Owner within seven (7) days after the occurrence of each Excusable Delay. If the Contractor fails to issue written notice to the Owner, its right to an extension, if any, will be deemed waived. The Owner shall render a written decision, which shall be made in good faith, granting, or refusing the request of the Contractor for an extension within a reasonable time after receipt of the request for a time extension. If a Contract Amendment is agreed to by the Contractor and Owner, any extension of the Substantial Completion Date caused by the Contract Amendment work must be stated in the Contract Amendment and the Contractor will be barred from later seeking an extension to the Substantial Completion Date or Final Completion Date because of the Contract Amendment work. No extension to the Substantial Completion Date or the Final Completion Date shall be granted due to the aggregate number of Contract Amendments.

Section 3.04. No Damage for Delay. Contractor agrees to perform the Work and to require the subcontractors to perform the Work in a timely and proper method so as to meet the dates reflected on the progress schedule. In the event that the Contractor is delayed in the performance of the Work through no fault of the Contractor or its subcontractors, and for causes set forth in Section 3.03(a), and defined therein as Excusable Delay, then the Contractor may seek a time extension in accordance with the provisions of Section 3.03(b). Contractor agrees that such time extension is its sole and exclusive remedy for any damages regardless of the cause of such delays. Contractors also agrees that the Owner shall not be liable for any other monetary damages sustained by Contractor for acceleration, disruption, inefficiencies, suspension or resequencing of the Work or any other damages related to the progress schedule regardless of the cause of such damages. The Owner shall not be liable for consequential damages of any nature for any reason at any time.

Section 3.05. Liquidated Damages. Per Section 01100 of the Specifications, liquidated damages will be assessed for the Project. The Contractor shall proceed with the Work at such rate of progress to ensure full completion within the specified duration.

ARTICLE 4

PAYMENT

Section 4.01. Lump Sum Price. The Owner and Contractor agree that the Contractor shall be paid the following price **Thousand and 00/100 Dollars (\$000.00)** ("Lump Sum Price") for all of the Work and other obligations to be performed by the Contractor in the base bids. The Lump Sum Price shall include all profit and overhead, including without limitation field overhead, general conditions and home office overhead of the Contractor. The Lump Sum Price also includes all allowances specified in the Contract Documents.

Section 4.02. Payment Procedures. As Work proceeds under the Agreement, payments ("Progress Payments") shall be made by the Owner to the Contractor in accordance with the following procedure:

(a) By the 1st day of each calendar month during the performance of the Work, the Contractor shall submit to the Owner an Application and Certificate for Payment, based on the Work completed during the previous month ("previous month" being defined for this Section only as the second calendar day of the prior month through the first calendar day of the current month), using a form approved by the Owner. Contractor shall not be paid any amounts exceeding the Lump Sum Price set forth in Section 4.01 of this Contract, unless modified by a properly executed written Contract Amendment in accordance with the provisions of Article 9 of this Contract.

(b) Each Application and Certificate for Payment shall be accompanied by: (1) lien waivers of the Contractor conditioned upon payment by the Owner of the amount sought in the Application; (2) other documentation as may be requested by the Owner for the proper review of the Application and Certificate for Payment; (3) a list of current subcontractors, sub-subcontractors and material suppliers; (4) the Business Diversity Monthly Compliance Reports; and (5) all documents required by the Owner Controlled Insurance Program ("OCIP") Manual, as applicable.

(c) The Owner or Engineer shall promptly review each Application and Certificate for Payment and recommend for approval such amount as is properly due under the Contract Documents.

(d) Payments by the Owner shall be made within thirty (30) days from the date on which an Application and Certificate for Payment has been submitted and approved by the Owner or the next working day if the thirtieth day is a Saturday, Sunday or holiday.

Section 4.03. Mobilization. The work, which is conducted in preparation for the construction activities, which includes but is not limited to, movement of personnel, equipment, stockpiles, supplies to the project site, (all as more particularly described in Article 3.01 of Section 01100 of the Specifications) shall be designated as "Mobilization." The Mobilization lump sum amount for this Contract shall be **Five Hundred Thirty Thousand and 00/100 Dollars (\$530,000.00)** which is a fixed amount that shall not change for the Term of the Contract.

Section 4.04. Demobilization. The activities which are conducted by the Contractor in order to complete the work and conduct any closeout items, which includes but is not limited to, removal of personnel, equipment, Contractor owned stockpiles, supplies and incidentals from the project site, (all as more particularly described in Article 3.01 of Section 01100 of the Specifications) shall be designated as "Demobilization." The Demobilization lump sum amount for this Agreement shall be **Three Hundred Twenty Thousand and 00/100 Dollars (\$320,000.00)**, which is a fixed amount and shall not change for the Term of the Contract.

Section 4.05. Payment for Material Stored On-Site.

(a) Payment for the actual unit cost of materials suitably stored on the site of the Work ("Work Site") and intended for incorporation in the Work will be made by the Owner to the Contractor subject to the provisions of Section 4.02 of this Contract, Section 90-07 of the FAA General Provisions, and the following conditions:

- (1) The Contractor shall furnish supporting evidence satisfactory to the Owner evidencing the cost of the materials and shipment to the Work Site.
- (2) The materials shall not be stored on the Work Site for more than ninety (90) calendar days before they are installed without the written consent of the Owner.

- (3) The materials shall be stored on the Work Site in accordance with applicable recommendations of the manufacturer and the instructions of the Owner.
- (4) A representative of the Owner or Engineer may inspect and inventory any stored materials.

(b) Payment will not be made for materials stored away from the Work Site without the written consent of Owner. In the event that the Owner consents to payment for materials stored off-site, such payment shall be conditioned upon submission by the Contractor of bills of sale or such other documentation satisfactory to the Owner to establish the title of the Owner to such materials or equipment, and the submission of satisfactory insurance certificates for the stored materials.

(c) Notwithstanding any provision herein to the contrary, if payments are to be made on account of materials or equipment not incorporated in the Work but delivered and suitably stored at the Work Site, such payments shall be conditioned upon submission by the Contractor of bills of sale or such other documentation satisfactory to the Owner to establish the title of the Owner to such materials or equipment, and the submission of satisfactory insurance certificates for the stored materials to protect the interest of the Owner.

(d) Regardless of ownership or insurance, the Contractor shall remain the guardian and protector of all materials and equipment stored or incorporated into the Work.

Section 4.06. Use of Payments. The Contractor shall use all sums paid to it pursuant to this Contract for the performance of the Work in accordance with the Contract Documents. Upon the request of the Owner or Engineer, the Contractor shall furnish satisfactory proof of payment, including, but not limited to, partial release of liens and the Business Diversity Monthly Compliance Report, as to the disposition of any monies paid to the Contractor by the Owner.

Section 4.07. Payment Not a Waiver. Neither the approval or making of any payment to the Contractor, nor the partial or entire use or occupancy of the Work by the Owner, shall be deemed an acceptance of any portion of the Work.

Section 4.08. Final Payment.

(a) "Final Payment," by the Owner shall constitute a waiver of all claims by the Owner for performance of the Work except for claims of the Owner arising from unsettled liens, incomplete or defective workmanship, defective materials, failure to perform in accordance with the progress schedule, or for the breach of any guarantees of warranties provided or to be provided by the Contractor under this Contract. Acceptance of the Final Payment by the Contractor shall constitute a waiver and release of any and all claims which the Contractor may then have or in the future have against the Owner or the Engineer arising from the Work or this Contract.

(b) Final Acceptance of the Work shall occur only after all Work (including punch list items) provided for in the Contract Documents has been finally completed and accepted in writing by the Owner, and only after the Contractor has provided the Owner with instructions and operating manuals, parts lists, "record" drawings and all other items required by the Contract Documents.

(c) Within thirty (30) days after "Final Acceptance" of the Work, the Final Payment of amounts found properly due under the Contract Documents shall be paid to the Contractor.

(d) Final Payment shall not become due until the Contractor submits to the Owner the following:

- (1) An affidavit that all payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or its property might in any way be responsible, have been paid or otherwise satisfied; and
- (2) A consent of surety to Final Payment; and
- (3) Other data establishing payment or satisfaction of all such obligations, such as receipts, releases and waivers of liens arising out of the Work, to the extent and in such form as may be designated by the Owner or Engineer; and
- (4) Any documents required by Article 6 of this Contract.

(e) The Owner shall issue a "Certificate of Final Completion" when, in its sole discretion, the Project has been completed and all conditions required by this Section 4.07 have been complied with by Contractor.

Section 4.09. The Right of Owner to Withhold Payment. The Owner may withhold or, on account of subsequent evidence, nullify, the whole or part of any Progress Payment, including the Final Payment, to such extent as may be necessary to reasonably protect itself from any of the following:

- (a) unacceptable work as further described in Section 50-10 of the FAA General Provisions; or
- (b) third-party claims filed or reasonable evidence indicating probable filing of such claims; or
- (c) reasonable doubt that the Work will be substantially completed by the Substantial Completion Date; or
- (d) failure of the Contractor to make payments properly to subcontractors or for equipment, materials, services or labor; or
- (e) reasonable evidence of fraud, over-billing or overpayment; or
- (f) failure of the Contractor to perform the Work in accordance with the Contract Documents; or
- (g) a reasonable doubt that the Work can be completed for the unpaid balance of the Lump Sum Price; or
- (h) damage to the Owner, or to another contractor, subcontractor or sub-subcontractor caused by the Contractor; or
- (i) failure to provide certified payroll records; or
- (j) failure to provide any documents required by the Owner Controlled Insurance Program (OCIP); or
- (k) failure to keep the record drawings current each month in accordance with Article 6 of this Contract.

ARTICLE 5

EQUIPMENT AND MATERIALS

Section 5.01. Materials Provided by Contractor.

(a) Unless otherwise provided in the Contract Documents, the Contractor shall provide all equipment, materials, labor, services, water, and power to the Work Site, as well as all tools, equipment, lights, transportation, and other facilities necessary for the performance of the Work.

(b) All equipment, machinery, material, and articles incorporated in the Work shall be new and unused unless otherwise specified in the Contract Documents. When not specified in detail in the Contract Documents, the equipment, machinery, material, and articles incorporated in the Work shall be of the most suitable grade and quality for the purpose intended.

Section 5.02. Type of Equipment Used.

(a) When any equipment, machinery, material, or article is referred to by trade name, make, or catalog number followed by the words "or equal," the reference shall be regarded as establishing the minimum standard of quality and performance required and shall not be construed as limiting competition. The Contractor may, with the prior written approval of the Owner, use other equipment, machinery, materials, or articles which are at least equal in quality and performance to that named in the Contract Documents; provided, however, that in no event shall such approval be construed as a waiver of the right of the Owner to require equipment, machinery, materials, or articles which conform to the standard of quality and performance established by reference to the trade name, make, or catalog number of the equipment, machinery, materials, or articles for which the substitution has been approved. Any cost of redesign and additional expense resulting from the substitution shall be at the sole expense of the Contractor.

(b) The name of the manufacturer, model number, and other identifying information respecting the performance, capacity, nature, and rating of equipment, machinery, materials, and articles proposed in substitution of those specified in the Contract Documents shall be submitted to the Owner in sufficient time to avoid delays in the Work.

Section 5.03. Non-Conforming Materials.

(a) Equipment, machinery, materials, or articles installed or used in the Work which do not comply with the requirements of the Contract Documents, and which have not been previously approved in writing by the Owner shall be installed or used at the risk of the Contractor of subsequent rejection by the Owner.

(b) The Contractor shall be fully and solely responsible for quality control for all equipment, machinery, materials, or articles used in the performance of the Work.

Section 5.04. Owner Furnishing Equipment or Fixtures. The Owner may directly furnish any and all of the equipment or fixtures required for the Project. In the event the Owner elects to do so, the Lump Sum Price shall be reduced by the amount which was to be charged by Contractor for such equipment or fixtures as set forth and included in the Contract Documents. A Contract Amendment reducing the Lump Sum Price for that item of Work shall be executed by Owner and Contractor to reflect a reduction in the Lump Sum Price for that item of Work and that the Owner is to furnish the equipment or fixtures. The Contractor shall assume responsibility for and be fully responsible for the care, custody, and control of all Owner furnished equipment or fixtures after said equipment or fixtures arrives on the Work Site or in any approved offsite storage facility, as set forth in Section 60-08 of the FAA's General Provisions.

ARTICLE 6

RECORD DRAWINGS AND DATA

Section 6.01. Record Drawings. A complete set of drawings shall be maintained by the Contractor at the Work Site for the purpose of accurately indicating all record conditions. The drawings shall be kept up-to-date and marked each day to show all changes and variations and each entry shall be dated and verified as made. At the completion of the Work and prior to Final Payment, a complete set of marked record drawings shall be furnished by the Contractor to the Owner. If the record drawings are not kept current each month, the Owner shall have no obligation to pay the Contractor until the record drawings are made current.

Section 6.02. Operation and Maintenance Data.

(a) The Contractor shall furnish complete and necessary data for the operation, repair, and maintenance of each operating component of the Work (hereinafter referred to as "the Data"). The Data shall include prints of shop drawings, "as-installed" conditions, sources of equipment and principal materials, specified tests and performance data, repair and maintenance data, lubrication instructions and recommendations, parts lists, and other catalog data or information required to operate and maintain any part of the Work. Care shall be taken to include all pertinent data and to exclude inapplicable or duplicative information.

(b) Prior to Final Payment, a set of Data shall be furnished to the Owner in an electronic PDF format. In addition, three (3) complete sets of the Data in a form directed by the Owner shall be provided to the Owner, indexed alphabetically by components, grouped together and securely bound in a durable folder or binder that is labeled and indexed to show its contents.

(c) Installation information for all machinery and equipment also shall be kept on the site of the Work during construction but used or marked prints or data sheets are not to be used in assembling the final maintenance and operating manuals described in paragraph (b) of this Section 6.02.

(d) Operations and maintenance demonstrations by the manufacturer of all machinery and equipment shall be complete in all respects and shall specify the appropriate and inappropriate uses of the machinery and equipment.

Section 6.03. Information from Suppliers. The Contractor shall make it a requirement or condition of purchase from its suppliers of equipment and/or materials: (1) to furnish complete and adequate operating and maintenance data pertaining to their equipment and/or materials; (2) to assign to the Owner any warranty, express or implied, furnished by the manufacturer of the equipment and/or materials; and, (3) to assign to the Owner any customary maintenance or repair

service, spare parts supply service, or personnel support service furnished by the manufacturer of the equipment and/or materials. If the terms and conditions of any warranty, maintenance or repair service, spare parts supply service, or personnel support service furnished by manufacturer of the equipment and/or materials are negotiable, they shall be negotiated by the Owner and the manufacturer.

ARTICLE 7

SUBCONTRACTS

Section 7.01. Definition.

(a) As used in the Contract Documents, a “subcontractor” is a person or organization that has a contract with the Contractor to perform any portion of the Work or to furnish any equipment or materials to the Project.

(b) As used in the Contract Documents, a “sub-subcontractor” is a person or organization that has a contract with a subcontractor to perform any portion of the Work or to furnish any equipment or materials to the Project.

Section 7.02. No Contractual Relationship with Owner. Nothing contained in the Contract Documents or otherwise shall create any contractual relationship between the Owner and any subcontractor or sub-subcontractor, and no subcontract or sub-subcontract shall relieve the Contractor of its responsibilities and obligations should any subcontractor or sub-subcontractor fail to perform its work in a satisfactory manner. The Contractor agrees to be as fully responsible to the Owner for the acts and omissions of its subcontractors and their sub-subcontractors and of persons either directly or indirectly employed by them as it is for the acts and omissions of persons directly employed by Contractor.

Section 7.03. Award of Subcontracts.

(a) Unless the Owner gives its written approval to Contractor, the Contractor shall not enter into a subcontract or purchase order with any entity that is a party in any litigation, arbitration, or other dispute resolution proceeding with the Owner. The Contractor shall request written confirmation from any potential subcontractor or supplier prior to the execution of any subcontract or purchase order that there is no pending litigation, arbitration, or other dispute resolution proceeding where the Owner and the potential subcontractor or supplier are parties. Such written confirmation shall be sent to the Owner within seven (7) days from the receipt of bids.

(b) If the Owner refuses to accept any subcontractor or material supplier (or sub-subcontractor) or person or organization because of such pending litigation, arbitration, or other dispute resolution proceeding, the Contractor shall submit an acceptable substitute at no additional cost to Owner.

Section 7.04. Change of Subcontractors. The Owner may require a change of any subcontractor. The Lump Sum Price shall be adjusted accordingly due to the Owner’s requiring a change of any subcontractor, sub-subcontractor, or material supplier previously approved in writing by the Owner, unless the change was required because the subcontractor, sub-subcontractor or material supplier was unable to timely or properly perform its work in accordance with the Contract Documents.

Section 7.05. No Substitution of Subcontractors. The Contractor shall not make any substitution for any subcontractor nor allow the substitution of any sub-subcontractor who has been accepted by the Owner unless the substitution is required and previously approved by the Owner. Acceptable reasons for substitution (other than where required by the Owner) shall be limited to the following:

- (a) Inability of the subcontractor or sub-subcontractor to provide bonds, if required; or
- (b) Failure of the subcontractor or sub-subcontractor to perform according to approved schedules or other provisions of the Contract Documents; or
- (c) Other reasons which would reasonably render the subcontractor or sub-subcontractor unable to perform its work according to the Contract Documents as evidenced in writing by the Contractor.

Section 7.06. Subcontract Terms. All portions of the Work performed by a subcontractor or sub-subcontractor shall be pursuant to an appropriate agreement between the Contractor and the subcontractor (and where appropriate between subcontractors and sub-subcontractors) which shall contain provisions that:

- (a) Preserve and protect the rights of the Owner under the Contract Documents, including, but not limited to, the obligation to indemnify the Owner as set forth in Article 21 of this Contract with respect to the portion of the Work to be performed under the subcontract (or sub-subcontract) so that the subcontracting will not prejudice such rights; and
- (b) Require that such Work be performed in accordance with the requirements of the Contract Documents; and
- (c) Require submission to the Contractor of applications for payment under each subcontract to which the Contractor is a party; and
- (d) Require that all requests for additional compensation, extensions of time or otherwise with respect to subcontracted portions of the Work be submitted to the Contractor (via any subcontractor or sub-subcontractor where appropriate) in sufficient time so that the Contractor may comply in the manner provided in the Contract Documents for like requests by the Contractor upon the Owner; and
- (e) Name the Owner as an additional insured under all applicable insurance policies; and
- (f) Require compliance with the federal Disadvantaged Business Enterprise ("DBE") requirements, including, but not limited to, non-discrimination and prompt pay provision.

Section 7.07. Subcontractor Relations Requirements. By appropriate written agreement, the Contractor shall require each subcontractor, to the extent of the Work to be performed by the subcontractor, to be bound by the obligations, terms and conditions of this Contract and the Contract Documents, and to assume toward the Contractor all the obligations, terms, conditions, and responsibilities which the Contractor, by this Contract and the Contract Documents, assumes toward the Owner and the Engineer. Each subcontract agreement shall preserve and protect the rights of the Owner and the Engineer under this Contract and the Contract Documents with respect to the Work to be performed by the subcontractor so that subcontracting thereof will not prejudice the rights of the Owner or the Engineer. The Contractor shall require each subcontractor to enter into similar agreement with sub-subcontractors. The Contractor shall make available to each proposed subcontractor, prior to the execution of the subcontract agreement, copies of this Contract and the Contract Documents to which the subcontractor will be bound. Subcontracts shall similarly make copies of this Contract and the Contract Documents available to their respective proposed sub-subcontractors.

ARTICLE 8

PAYMENT TO SUBCONTRACTORS

Section 8.01. Payments to Subcontractors from the Contractor. The Contractor shall pay each subcontractor an amount equal to the percentage of completion allowed to the Contractor on account of the work of each subcontractor. The Contractor shall also require each subcontractor to make similar payments to its sub-subcontractors.

Section 8.02. Withholding of Payment by the Owner. If the Owner withholds monies for any cause which is the fault of the Contractor and/or the fault of a particular subcontractor, the Contractor shall pay all other subcontractors, in accordance with the terms of their applicable subcontract, if not in conflict with this Contract and applicable law, any time after the progress payment by the Owner should otherwise have been issued, for its Work to the extent completed. Notwithstanding this Section 8.02, Contractor may withhold funds from any subcontractor that is not performing its work in accordance with the Contract Documents.

Section 8.03. Independent Obligation to Pay. The obligation of the Contractor to pay its subcontractors (and their obligation to pay sub-subcontractors) is an independent obligation from the obligation of the Owner to make payment to the Contractor. The Owner shall have no obligation to pay or to see to the payment of any monies to any subcontractor or sub-subcontractor. The provisions of this Contract are solely intended for the benefit of the Owner and Contractor and not for any other person. Nothing in this Contract is intended to create any third-party rights against the Owner.

Section 8.04. Payments to Sub-Subcontractors. This Contract is governed by federal prompt pay provisions

where applicable and as set forth in Exhibit "E" to this Contract. To the extent that Tennessee statutes are not superseded by applicable federal statutes in this area, state statutes also will apply. Contractor agrees to require each of its subcontractors (1) to pay their subcontractors for invoices submitted or normal progress payments for work completed satisfactorily pursuant to its contract with each subcontractor and (2) to make such payments to their respective subcontractors no later than ten (10) days after any such subcontractors receive payment from the prime contractor or their respective subcontractor, as applicable.

ARTICLE 9

CHANGES

Section 9.01. Changes in the Work.

(a) The Owner, without invalidating this Contract, may order extra work or make changes by altering, adding to or deducting from the Work by executing a Contract Amendment or a Construction Change Directive in a form provided by the Owner or Engineer. All Work performed pursuant to a valid Contract Amendment, or a Construction Change Directive shall be performed under the conditions of this Contract and the Contract Documents.

(b) The Owner shall have authority to make changes in the Work not involving extra cost, not involving an extension to the Substantial Completion Date, and not inconsistent with the purposes of the Work, but otherwise, no extra Work or change in the Work shall be made unless pursuant to a Contract Amendment or a Construction Change Directive and no claim by Contractor for additional cost or fee or any extension of the Substantial Completion Date shall be valid unless so ordered in a written Contract Amendment or a Construction Change Directive.

(c) Engineer's Supplemental Instructions (ESI) are written instruments prepared by the Owner or Engineer to issue additional instructions or interpretations or to order changes in the Work not involving extra costs or fees, or any extension of the scheduled Substantial Completion Date. Contractor shall give prompt written notice to Owner if it believes that the contents of an ESI require extra costs or fees or affect the Substantial Completion Date.

Section 9.02. Construction Change Directive.

(a) A Construction Change Directive is a written order prepared by the Owner, Program Manager, or Engineer and signed by the Owner, Engineer or Program Manager directing a change in the Work and stating a proposed basis for adjustment, if any, in the Lump Sum Price or the Substantial Completion Date, or both. The Owner may, by Construction Change Directive, without invalidating this Contract, order changes in the Work consisting of additions, deletions, or other revisions.

(b) A Construction Change Directive shall be used in the absence of an agreement on the terms of a Contract Amendment.

(c) If the Construction Change Directive provides for an adjustment to the Lump Sum Price, the adjustment shall be based on one of the following methods:

- (1) Mutual acceptance of a lump sum properly itemized and supported by sufficient documentation to permit evaluation; or
- (2) Unit prices stated in the Contract Documents or subsequently agreed upon; or
- (3) Cost to be determined in a manner agreed upon by the Parties and a mutually acceptable fixed or percentage fee; or
- (4) As provided in paragraph (f) of this Section 9.02.

(d) Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Owner of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Lump Sum Price or the Substantial Completion Date.

(e) A Construction Change Directive signed by the Contractor indicates the agreement of the Contractor therewith, including adjustment in the Lump Sum Price, the Substantial Completion Date or the method of determining the adjustment. Such agreement shall be effective immediately and shall be recorded as a Contract Amendment.

(f) If the Contractor does not respond promptly or disagrees with the method for adjustment in the Lump Sum Price, the method and the adjustment shall be determined by the Owner on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Lump Sum Price, a reasonable allowance for overhead and profit. In such case, the Contractor shall keep and present, in such form as the Owner may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purpose of this paragraph shall be limited to the following:

- (1) The actual cost for labor, including social security and unemployment insurance, fringe benefits required by agreement, and workers' or workmen's compensation insurance; and/or
- (2) The actual cost of materials, supplies, machinery, and equipment, including cost of transportation, whether incorporated or consumed; and/or
- (3) The actual cost of subcontractors and sub-subcontractors; and/or
- (4) The actual cost of premiums for all bonds and insurance, permit fees and sales, use or similar taxes related to the Work; and/or
- (5) The actual additional costs of supervision and field office personnel, if any, directly attributable to the change.

(g) Pending final determination of cost to the Owner, amounts not in dispute may be included in Certificates and Applications for Payment. The amount of credit to be allowed by the Contractor to the Owner for a deletion or change which results in a net decrease in the Lump Sum Price shall be actual net cost, as confirmed by the Owner. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be calculated on the basis of net increase, if any, with respect to that change.

Section 9.03. Contract Amendment Procedure. If the Owner desires extra Work or changes in the Work, the Owner shall submit a Request for Proposal ("RFP") to the Contractor. The Contractor shall furnish to the Owner a statement setting forth in detail the proposal of the Contractor for performing the extra Work or changes and the effect of the extra Work or changes, if any, in the Lump Sum Price and the Substantial Completion Date attributable to the extra Work or changes set forth in the request of the Owner. If the Owner approves in writing the proposal of the Contractor, a Contract Amendment in the form provided by the Owner shall be executed by the Parties and the Lump Sum Price and the Substantial Completion Date shall be adjusted accordingly. In preparing Lump Sum quotes in response to an RFP, the Contractor shall prepare a cost breakdown that provides sufficient detail for the Owner or Engineer to determine that the quoted costs are reasonable and allowable and to verify that markups are properly calculated according to the terms of this Contract.

Section 9.04. Changes in the Lump Sum Price. Any increase or decrease in the Lump Sum Price attributable to a Contract Amendment performed by the Contractor or any of its subcontractors shall be governed by the provisions of Section 90-05 of the FAA's General Provisions.

Section 9.05. Time and Materials. In the event that the Owner and the Contractor cannot agree on the amount or time extension, if any due, to the Contractor for a Contract Amendment, the Owner may, in writing, direct the Contractor to proceed with the performance of such Work. The Contractor agrees to comply with any such directive issued by the Owner. If any additional compensation is due to the Contractor as a result of a directive, it will be calculated pursuant to the provisions of Section 150-90 of the FAA General Provisions Addendum.

Section 9.06. Unconditional Obligation to Proceed. Notwithstanding anything herein to the contrary, the Contractor will proceed with the Work so as to complete the Work on or before the Substantial Completion Date even if it has a dispute with the Owner concerning a Construction Contract Amendment, a Construction Change Directive or any extension of time which is or could be due to the Contractor pursuant to a Contract Amendment, a Construction Change Directive or otherwise.

Section 9.07. Request for Additional Compensation. If for any reason the Contractor believes that additional compensation is due for work not clearly provided for in the Contract Documents, the Contractor shall provide written notice to the Owner at least three (3) days before beginning the work which is not clearly provided for in the Contract Documents. If such notification is not given, then the Contractor hereby agrees to waive any claim for such additional compensation. Such notice by the Contractor shall not in any way be construed as proving or substantiating the validity of the request for additional compensation. When the work, which is the basis for the Contractor's request for additional compensation, has been completed, the Contractor shall, within ten (10) calendar days, submit evidence of costs incurred by the Contractor and a narrative which provides the basis for the request for additional compensation.

ARTICLE 10

THE UNDERSTANDING OF THE CONTRACTOR

Section 10.01. Examination of Work Site. The Contractor acknowledges that it has, by careful examination, satisfied itself as to the nature and location of the Work, the conformation of the ground conditions, the character, quality and quantity of the materials, equipment, supplies, machinery, and facilities needed preliminary to and during the performance of the Work, the general and local conditions, and all other matters which can in any way affect the Work.

Section 10.02. Sufficiency of Contract Documents and Representations of Contractor.

(a) The Contractor acknowledges that the Contract Documents are sufficient to enable it to determine the cost of all of the Work and that the Work can be completed in accordance with the Contract Documents for the Lump Sum Price.

(b) The Contractor acknowledges that any observed errors, discrepancies, omissions, ambiguities, or conflicts in the Contract Documents will be brought to the attention of the Owner, as set forth in Section 2.04 of this Contract, and in a timely manner in order to ensure substantial completion of the Work by the Substantial Completion Date. The Contractor shall be responsible for using its best efforts to discover and observe errors, discrepancies, omissions, ambiguities, or conflicts in the Contract Documents. In addition, the Contractor acknowledges that the Owner has not made nor shall it be deemed to have made any warranties, guarantees, or representations of any kind whatsoever regarding the sufficiency of the Contract Documents or any conditions relating to the Work.

(c) Contractor represents that it has reviewed and checked all information and data shown or indicated on the Contract Documents with respect to existing underground use facilities at or contiguous to the Work Site and, subject to the provisions of Section 10.03 of this Contract, assumes responsibility for the accurate location of said underground use facilities. No additional examinations, investigations, explorations, tests, reports, studies or similar information or data in respect of said underground use facilities are or will be required by Contractor in order to perform and furnish the Work for the Lump Sum Price and substantially complete the Work by the Substantial Completion Date. However, notwithstanding anything herein to the contrary, the Contractor may, at its sole expense after receiving written permission from the Owner, and subject to any limitations specified by the Owner or Engineer, conduct any additional testing it deems necessary.

Section 10.03. Differing Work Site Conditions. If conditions are encountered at the Work Site that are: (1) subsurface physical conditions, which differ materially from those indicated in the Contract Documents; or (2) unknown physical conditions of an unusual nature, which differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, then notice by the observing Party shall be given to the other Party promptly before conditions are disturbed and in no event later than seven (7) days after the first observance of the conditions. The Owner or Engineer will promptly investigate such conditions and, if they differ materially and cause an increase or decrease in the Contractor's cost, or time required, for performance of any part of the Work; will recommend an equitable adjustment in the Lump Sum Price or the Substantial Completion Date, or both. However, any equitable adjustment in the Lump Sum Price shall not include additional general conditions costs. If the Owner determines that the conditions at the Work Site are not materially different from those indicated in the Contract Documents and that no change in the terms of this Contract is justified, the Owner shall so notify the Contractor in writing, stating the reasons. Claims by either Party in opposition to such determination must be made within fourteen (14) days after the Owner has given notice of the decision.

Section 10.04. No Oral Modification. No oral agreement or conversation with any officer, agent or employee of the Owner or its representatives, including the Engineer, either before or after the execution of this Contract, shall affect or modify any of the terms or obligations contained in this Contract or the Contract Documents.

ARTICLE 11

SUPERVISION OF THE WORK; SAFETY AND SECURITY

Section 11.01. The Superintendent of the Contractor. The Contractor shall designate in writing to the Owner and keep on the Project during its progress a competent employee who has responsibility to oversee the Work ("Superintendent"). The Superintendent shall be satisfactory to the Owner. The Superintendent shall be changed upon written request of the Owner but shall not be changed by the Contractor except with the consent of the Owner, unless the Superintendent ceases to be in its employ. The Superintendent shall represent the Contractor, and all directions given to him by the Owner shall be as binding as if given to the Contractor directly. The Superintendent shall devote his full time to the Work and shall maintain an office on the Work Site. The Superintendent shall direct, coordinate and supervise all Work, inspect all materials delivered to the Work Site to ascertain whether or not they comply with the requirements of the Contract Documents, and reject all non-conforming materials or workmanship.

Section 11.02. Order and Discipline. The Contractor shall at all times be responsible for enforcing strict discipline and good order among its employees, and all employees of its subcontractors and sub-subcontractors. If any person on the Work Site shall appear to be incompetent, disorderly or intemperate, in any way disrupts or interferes with the Work, or is in any other manner not qualified for or unfaithful to the job entrusted to him, such person shall be discharged from the Project immediately and shall not again be employed on the Work Site without the prior written consent of the Owner.

Section 11.03. Cleaning Up.

(a) During the performance of the Work, the Contractor shall keep the Work Site clean and free of all rubbish, waste materials, debris and other materials in accordance with the instructions set forth in the Contract Documents. At the end of each working day, the Contractor shall remove all waste materials, rubbish, debris, and other materials from and about the Work Site as well as all surplus materials and shall leave the Work Site clean in accordance with the Contract Documents.

(b) The Contractor shall establish an active ongoing program to eliminate any foreign objects from the Work Site that may cause damage to aircraft or cause personal injury to other persons.

(c) The Contractor shall pay particular attention to haul routes used to and from the Work Site to prevent any construction debris from being dropped or tracked that may present a hazard.

(d) The Contractor, upon written notice from the Owner, shall promptly cut the grass and clean debris around the Work Site. If the Contractor fails to clean up any debris which is deposited as a result of construction operations, the Owner will, after notice, immediately do so. The cost thereof will be charged to the Contractor at actual cost per hour, but not less than the minimum rate of Two Hundred Fifty Dollars (\$250.00) per hour. The Contractor shall assume full responsibility for failure to perform cleanup operations required by this Section 11.03.

(e) All materials delivered to the Work Site shall be stored and handled so as to preclude inclusion of any foreign substances, and to prevent any discoloration or damage which might reduce its effectiveness as part of the Work.

Section 11.04. Safety and Security.

(a) The Contractor shall be solely responsible for and oversee all safety orders, precautions and programs necessary for the safety of the Work. The Contractor shall take the precautions set forth in the Contract Documents in order to ensure the safety of all persons involved in the Work, all other persons whom the Work might affect, all equipment and materials incorporated in the Work, all property on the Work Site and adjacent to it, and the Owner's business operations which are functioning on the Work Site or in the vicinity of it.

(b) The Contractor shall keep an accurate record of all persons who are on the Work Site and shall provide a copy of such list to the Owner with each monthly Application and Certificate for Payment. The Contractor, its subcontractors, their sub-subcontractors and all employees of same, shall comply with all security rules made by the Owner and the Federal Aviation Administration. In addition, Contractor shall comply with the construction safety and health guidelines which are set forth in Exhibit D.

(c) The Contractor shall conform to Owner's rules and regulations for airport operations.

(d) Prior to the commencement of the Work, the Contractor shall provide to the Owner a list of all of its employees who will perform any portion of the Work.

Section 11.05. Observation of the Work.

(a) The Engineer, the Owner and persons designated by the Owner, shall at all times have access to the Work Site whenever it is in preparation or progress and the Contractor shall provide proper facilities for such access and for observation. If the Owner or the Engineer discovers any defective Work in connection with any observation, it shall be reported to the Contractor in writing and the Contractor shall correct it.

(b) If the Contract Documents, the written instructions of the Owner, laws, ordinances, rules or regulations, or any public authority require any of the Work to be specifically tested or inspected, the Contractor shall give the Owner timely notice of its readiness for inspection and testing, and of the date set for such test or inspection. Inspections by the Owner or Engineer shall be promptly made. If any of the Work should be covered up without the approval or consent of the Owner, the Engineer or any public authority, it shall be uncovered for examination, if required by the Owner, the Engineer, or such other public authority, at the sole expense of the Contractor.

(c) Re-examination of questioned Work that has been previously tested or inspected by the Engineer or the Owner may be ordered by the Engineer or the Owner and, if so ordered, the questioned Work shall be uncovered by the Contractor. If such Work is found to be in compliance with the Contract Documents, the Owner shall pay the actual cost of the re-examination. If such Work is found not to be in compliance with the Contract Documents, the Contractor shall bear the costs of the re-examination.

(d) The Contractor shall not be required to provide professional services which constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. The Contractor shall not be required to provide professional services in violation of applicable law. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents, then the Contractor shall promptly and at its expense secure such services. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, shop drawings and other submittals prepared by such professional. Shop drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Owner or Engineer. The Owner and the Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals.

ARTICLE 12

PERMITS, LICENSES, LAWS AND REGULATIONS

Section 12.01. Contractor to Secure All Permits. The Contractor shall secure and pay for all construction related permits, including the building permit. The Contractor shall be responsible for all inspections required by governmental authorities in conjunction with the issuance of said permits. Contractor shall secure and pay for all governmental fees, licenses and other permits necessary for the lawful and proper execution and completion of the Work.

Section 12.02. Compliance with Laws. The Contractor shall give all notices and shall comply with all laws, ordinances, rules, regulations, and orders of any public authority having jurisdiction over the Work, which have any bearing on the execution of the Work. If the Contractor observes that any of the Contract Documents are at variance in any respect with any such laws, ordinances, rules, regulations, and orders, it shall promptly notify the Owner and the Engineer in writing and any necessary changes shall be made by the Contractor. If the Contractor fails to give such notice or executes any of the Work in a manner contrary to any such laws, ordinances, rules, regulations or orders, the Contractor shall bear all resulting costs to correct said Work to comply with such laws and regulations and be liable for any resulting fines, penalties, judgments or damages imposed on or incurred by the Owner.

ARTICLE 13

TAXES AND OTHER FEES AND COSTS

Section 13.01. Payment of Taxes by Contractor.

(a) Any and all taxes, excises, duties and assessments in any manner levied, assessed or imposed by any government or subdivision or agency having jurisdiction over the Work shall be the sole responsibility and liability of the Contractor.

(b) The Contractor shall promptly pay and discharge when due, unless the validity or application is being contested by the Contractor in good faith, any and all taxes, excises, duties and assessments, together with any interest and penalties, if any, the responsibility and liability for which the Contractor has assumed pursuant to the provisions of paragraph (a) of this Section 13.01, unless any such tax, excise, duty or assessment is levied, assessed or imposed upon the Owner, in which case the Owner shall promptly give the Contractor notice of such levy, assessment or imposition, whereupon the Contractor shall promptly pay and discharge the same. Upon the written request and at the sole expense of the Contractor, the Owner shall assist the Contractor in contesting the validity or application of any such levy, assessment or imposition, and in the event a refund of all or any part of any tax, excise, duty or assessment (including interest and penalties, if any), said refund shall be refunded to the Contractor (less the amount of expenses associated with such contest not previously reimbursed by the Contractor to the Owner).

(c) The Contractor shall pay all applicable fees, and for all damage to sidewalks, streets, Owner's property, and other public property or to any public utilities caused by the performance of this Contract.

Section 13.02. Damage to Owner Property. Contractor agrees to promptly notify Owner of any damage caused to Airport property arising from Contractor's activities at the Airport. Contractor also agrees to comply with any request made by the Owner for reimbursement of costs associated with any damage to Airport property arising from work performed at the Airport by Contractor or any of Contractor's representatives, managers, employees, agents, contractors, subcontractors, licensees or invitees or from the conduct of same. This provision shall survive the termination of this Contract.

ARTICLE 14

SHOP DRAWINGS AND SAMPLES; MATERIAL TESTING

Section 14.01. Definitions.

(a) As used in this Contract, "shop drawings" are drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are prepared by the Contractor, any subcontractor, sub-subcontractor, manufacturer, supplier or distributor, and which illustrates some portion of the Work.

(b) As used in this Contract, "samples" are physical examples furnished by the Contractor to illustrate materials, equipment or workmanship.

Section 14.02. Submissions.

(a) Contractor shall submit to Owner all shop drawings in electronic format or as hard copies in accordance with the specifications. Contractor shall review, stamp with its approval and submit, in orderly sequence so as to cause no delay in the Work or the work of any other contractor, all shop drawings and samples required by the Contract Documents or subsequently by the Owner or Engineer. Shop drawings and samples shall be properly identified as specified in the Contract Documents or as the Engineer or Owner may require. At the time of submission, the Contractor shall inform the Engineer and the Owner by separate written correspondence of any deviation in the shop drawings or samples from the requirements of the Contract Documents.

(b) By approving and submitting shop drawings and samples, the Contractor represents that it has determined and verified all field measurements, field construction criteria, materials, catalogue numbers and other data, and that it has checked and coordinated each shop drawing and sample with the requirements of the Work and the Contract Documents.

Section 14.03. Review of the Engineer.

(a) The Engineer will review and act upon shop drawings and samples with reasonable promptness so as to cause no unreasonable delay in the Work, but only for conformance with the design concept of the Work and with the information given in the Contract Documents. The review of the Engineer or its agents of a given item shall not indicate approval of an assembly in which the item functions.

(b) The approval of the Engineer of shop drawings or samples shall not relieve the Contractor of its responsibility for any deviation from the requirements of the Contract Documents unless the Contractor has informed the Engineer and the Owner by separate written letter of such deviation at the time of submission and the Owner or Engineer has given written approval of the specific deviation, nor shall the approval of the Engineer relieve the Contractor from responsibility for errors or omissions in the shop drawings or samples.

Section 14.04. Corrections Made by Contractor. The Contractor shall make any corrections required by the Owner or Engineer and shall submit the required number of corrected copies of shop drawing or new samples until approved by Owner. The Contractor shall direct specific attention in writing or on resubmitted shop drawings or samples to revisions other than the corrections requested by the Engineer or the Owner on previous submissions.

Section 14.05. Prior Approval Required. No portion of the Work requiring a shop drawing or sample submission shall be commenced until the submission has been approved by the Owner or Engineer. All such portions of the Work shall be performed in accordance with approved shop drawings and samples and the Contract Documents.

Section 14.06. Submittal Schedule. Within seven (7) days after execution of this Contract, the Contractor shall provide the Owner and the Engineer with a preliminary submittal schedule of the dates that each shop drawing or sample will be submitted for approval. Within thirty (30) days after execution of this Contract, the Contractor shall provide the Engineer and the Owner with a final schedule of the dates that each shop drawing or sample will be submitted for approval. The sequence of the submittals of the Contractor shall be scheduled so as to permit an orderly review by the Engineer. The schedule shall allow reasonable added time according to the number or complexity of shop drawings or samples in each submittal for the checking, correction and rechecking of corrections, as well as for return of approved or rejected shop drawings and samples to the Contractor. The submittal schedules shall allow not less than fourteen (14) calendar days for the Engineer to review any shop drawing or sample.

Section 14.07. Material Testing.

(a) If the Contract Documents, laws, ordinances, rules, regulations, or orders of any public authority having jurisdiction require any portion of the Work to be inspected, tested or approved, the Contractor shall give the Owner timely notice of its readiness so the Owner or Engineer may observe such inspection, testing or approval. The Contractor shall bear all costs of such inspections, tests or approvals required by public authorities. Unless otherwise provided, the Owner shall bear all costs of other inspection, tests or approvals.

(b) If the Owner or Engineer determines that any Work requires special inspection, testing or approval which paragraph (a) of this Section 14.07 does not include, the Owner or Engineer will instruct the Contractor to order such special inspection, testing or approval, and the Contractor shall give notice as provided in paragraph (a) of this Section 14.07. If such special inspection or testing reveals a failure of the Work to comply with the requirements of the Contract Documents, the Contractor shall bear all costs thereof, including compensation for the Owner's or Engineer's additional services made necessary by such failure; otherwise, the Owner shall bear such costs and an appropriate Contract Amendment shall be issued.

(c) Required certificates of inspection, testing or approval shall be secured by the Contractor and promptly delivered to the Owner.

(d) If the Owner or Engineer is to observe the inspections, tests or approvals required by the Contract Documents, they will do so promptly.

ARTICLE 15

THE RIGHT OF THE OWNER TO INSPECT AND AUDIT

Section 15.01. Right to Audit. The Contractor shall keep full and accurate records of all costs incurred and items billed in connection with any Work which records shall be open to audit by the Owner, or any authorized representative of the Owner, including but not limited to the Federal Aviation Administration and the Comptroller General of the United States during the course of the Project and until four (4) years after the final payment by the Owner to the Contractor. In addition, the Contractor shall make it a condition of all subcontracts and sub-subcontracts entered into in furtherance of the Work that any and all subcontractors and sub-subcontractors will keep accurate records of costs incurred and items billed in connection with the subcontract (or sub-subcontract) and that such records shall be open to audit by the Owner, or any authorized representative of the Owner, including but not limited to the Federal Aviation Administration and the Comptroller General of the United States during the course of the Work and until four (4) years after final payment by the Owner to the Contractor.

Section 15.02. Review of Subcontracts. Upon request of the Owner or Engineer, the Contractor shall provide the Owner with an executed copy of all subcontracts, sub-subcontracts and purchase orders entered into in furtherance of the Work.

ARTICLE 16

SEPARATE CONTRACTS

Section 16.01. The Right of the Owner to Award Separate Contracts. The Owner reserves the right to award other contracts in connection with work at or in the vicinity of the Work and the Contractor agrees to cooperate fully and not to unreasonably interfere with the work of such other contractors.

Section 16.02. Cooperation. The Contractor shall afford the other contractors of Owner the opportunity for the introduction and storage of their materials and equipment to their work sites and for the execution of their work. The Contractor shall properly connect and coordinate the Work with work of any other contractors of the Owner.

Section 16.03. Inspection of Work of Other Contractors. If any part of the Work depends, for proper execution or result upon, the work of another contractor of Owner, the Contractor shall inspect and promptly report to the Engineer and the Owner any discrepancies or defects in such work that render it unsuitable for such proper execution or results. Failure of the Contractor to so inspect and report shall constitute an acceptance of the Work of the other contractor as fit and proper to receive the Work.

Section 16.04. Responsibility for Damage. Should the Contractor cause damage to the work or property of any other contractor of the Owner, including, but not limited to, delay, disruption, suspension of work and/or acceleration damages, the Contractor shall settle all claims with such other contractor if the other contractor will so settle. If such other contractor sues the Owner on account of any damage alleged to have been so sustained, the Owner shall notify the Contractor who shall defend such proceedings at the expense of the Contractor, or provide counsel of Owner's choice for Owner at the expense of Contractor, and if any judgment or award against the Owner results, the Contractor shall pay or satisfy it and shall reimburse the Owner for all attorney's fees and other litigation costs which the Owner has incurred.

ARTICLE 17

WARRANTIES OF THE CONTRACTOR

Section 17.01. Warranty of Title. The Contractor warrants and guarantees that title to all Work, materials and equipment covered by an Application and Certificate for Payment, whether incorporated in the Work or not, will pass to the Owner, free and clear of all liens, claims, security interests or encumbrances (hereinafter "Liens") and that none of the Work, materials or equipment covered by an Application and Certificate for Payment will have been acquired by the Contractor, or by any other person performing any part of the Work or furnishing materials and equipment for the Work, subject to an agreement under which a Lien is retained by the seller or supplier.

Section 17.02. Special Warranties. When special guarantees or warranties are required by the Contract Documents for specific parts of the Work, the Contractor shall procure certified copies of such guarantees or warranties,

countersign them, and submit them to the Owner in triplicate. Delivery of such guarantees or warranties will not relieve the Contractor from any obligations assumed under any provision of this Contract or the Contract Documents.

Section 17.03. Assignment of Warranties. The Contractor hereby assigns to the Owner any and all existing assignable warranties, service life policies and patent indemnities of manufacturers of materials, equipment or items incorporated in the Work. Upon the request of the Owner or the Engineer, the Contractor shall give the Owner assistance in enforcing the rights of the Owner arising under such warranties, service life policies and patent indemnities. At the request of the Owner or the Engineer, the Contractor shall give notice (with copies to the Owner) to any such manufacturers of the assignment of such warranties, service life policies and patent indemnities.

Section 17.04. General Warranty and Correction of Work.

(a) In addition to any special guarantees or warranties contained in the Contract Documents, the Contractor warrants to the Owner that all materials and equipment furnished in performance of the Work will be new unless otherwise specified, and that all Work will be of good quality, free from faults and defects and in conformance with the Contract Documents. All work not so conforming to these standards shall be considered defective.

(b) The Contractor shall promptly correct all defective Work to comply with the Contract Documents whether observed before or after the substantial completion date and whether or not fabricated, installed, or completed. The Contractor shall bear all costs of correcting defective Work.

(c) If, within one (1) year after the substantial completion date, or within such longer period of time as may be prescribed by law or by the terms of any applicable special guarantee or warranty required by the Contract Documents, any of the Work is found to be defective and not in accordance with the Contract Documents, the Contractor shall correct it promptly after receipt of a written notice from the Owner, or the Engineer, to do so.

(d) All defective or non-conforming Work shall be removed from the site of the Work if necessary, and the Work shall be corrected to comply with the Contract Documents without cost to the Owner. The Contractor also shall bear the cost of making good all work of other contractors destroyed or damaged by removal or correction of the defective Work of Contractor.

(e) If the Contractor fails to timely and properly correct defective Work, the Owner may correct it and hold the Contractor liable for all costs, expenses, and damages, including attorney's fees and litigation costs incurred by Owner in correcting it.

(f) In addition to the foregoing warranty, a warranty period of one (1) year shall apply under the same terms and conditions as the original warranty, to any work, supplied in correction of defective work under warranty pursuant to the provisions of this Section 17.04 and the Contractor shall assign to the Owner any warranties, including extended warranties, which are available in connection with the performance of such correction of defective Work. The warranty period shall commence on the date the Owner accepts the corrective Work of the Contractor.

ARTICLE 18

RIGHT OF THE OWNER TO DO WORK

Section 18.01. Right of the Owner to do Work. If the Contractor should neglect to perform the Work properly or fails to do anything required by the Contract Documents, and the Contractor does not correct the untimely or improper performance within seven (7) days after written demand is made, the Owner may, without prejudice to any other remedy it may have under this Contract or at law or in equity, make good any deficiencies in the Work, including, but not limited to, supplementing the workforces of the Contractor and deduct all costs of doing so from the payment then due or thereafter due the Contractor. The Owner shall not be required to give multiple notices to the Contractor in order to exercise its rights under this paragraph.

Section 18.02. Deduction for Uncorrected Work. If the Owner deems it inexpedient to correct deficiencies in the Work pursuant to Section 18.01 of this Contract, the Owner may deduct the reasonable cost of correcting the deficiencies, including any attorney's fees and additional fees and expenses of the Engineer, from the payment then due or thereafter due to the Contractor, but the making of such a deduction shall in no way be deemed an election of remedies by the Owner.

Section 18.03. Correction of Work before Final Payment.

(a) The Contractor shall promptly remove from the Work Site all materials, equipment or other items rejected by the Engineer or the Owner as failing to conform to the Contract Documents, whether incorporated in the Work or not, and the Contractor shall promptly replace and re-execute its original work to comply with the Contract Documents without expense to the Owner. In addition, the Contractor shall bear the expense of making good all work of other contractors destroyed or damaged by such removal or replacement.

(b) If the Contractor does not remove rejected material, equipment or other items within a reasonable time (as fixed by written notice from the Owner, or the Engineer), the Engineer or the Owner may remove such items and store them at the expense of the Contractor, or dispose of such material, equipment or other items at the sole discretion of the Owner. If the Contractor does not pay the expense of such removal or storage within ten (10) days, the Owner may, upon ten (10) days written notice, sell such items at auction or at private sale and shall account for the net proceeds of such sale, after deducting all the costs and expenses of removal that should have been borne by the Contractor.

ARTICLE 19

INSURANCE

Section 19.01. Insurance Requirements. The Contractor shall fully comply with all requirements relating to insurance for the Project as set forth in this Article 19.

Section 19.02. Owner Controlled Insurance Program. The Owner has established an Owner Controlled Insurance Program (OCIP). To the extent required by the Owner, Contractor shall fully participate in and comply with all requirements of the OCIP. A copy of the OCIP Manual is attached hereto as Exhibit C and incorporated herein by reference. However, if the OCIP is not used, Contractor agrees to meet the requirements for Insurance coverage referenced in Section 19.03. A copy of the Construction Safety and Health Guidelines is attached hereto as Exhibit D and incorporated herein by reference.

Section 19.03. Contractor Provided Insurance Coverage. During the Term of this Agreement, Contractor shall comply with the insurance requirements set forth in Exhibit C ("Insurance Requirements").

Section 19.04. Survival. The insurance provisions of this Article 19 shall survive any termination of this Contract.

ARTICLE 20

SURETY BONDS

Section 20.01. Surety Bonds Required. The Contractor shall furnish and keep in force throughout the performance of the Work a separate performance bond and separate labor and material payment bond, each in the amount of the total of the Lump Sum Price (as the same may be modified from time to time) conditioned upon the faithful performance of the Work by the Contractor and payment of all obligations arising in connection with the Work by the Contractor. The bonds shall also guarantee to the Owner that the Work shall be free of all liens. The bonds shall name the Owner as obligee and shall be in such form and with such sureties as the Owner may approve prior to commencement of the Work.

ARTICLE 21

INDEMNIFICATION

Section 21.01. Indemnification of the Contractor.

(a) Without limiting any insurance required herein and to the fullest extent permitted by law, Contractor, on behalf of itself, its subcontractors, their agents, their employees or any entity or person for which the Contractor is or may be responsible (hereinafter collectively referred to as "Indemnitors"), shall fully defend, indemnify, save and hold the Owner, the Board of Commissioners of the Owner, the Program Manager, the Engineer, their agents, employees, officers, directors, partners and related entities (hereinafter collectively referred to as "Indemnitees") harmless from and against all liability,

damages, loss, claims, demands, actions and expenses of any nature whatsoever, including, but not limited to reasonable attorney's fees which arise out or are connected with: (1) any negligent act, error or omission by any Indemnitor, or (2) the failure of the Indemnitor to comply with any applicable laws, statutes, ordinances, rules or regulations of any governmental or quasi-governmental authority, or (3) the material breach of any term or condition of this Contract by any of the Indemnitors.

(b) Without limiting the generality of the foregoing, the indemnity set forth in this Article 21 shall include all liability, damages, loss, claims, demands and actions on account of personal injury, death or property loss to any third party, any Indemnitees, any of the Indemnitees' employees, agents, licensees or invitees relating to the Project and which results from the negligent act, error or omission of Contractor.

(c) When the Contractor is obligated to provide the Owner a defense hereunder, it shall do so with qualified counsel that is selected by the Contractor and approved by the Owner. Such approval shall not be unreasonably withheld. In light of the Owner and Contractor's continuing relationship, however, the potential for conflicts of interests exists if the same counsel represents both the Owner and Contractor when the Contractor accepts the Owner's tender of defense under the indemnity provision of this Agreement. Therefore, the Owner retains the right to select its own counsel from a list of qualified attorneys provided by Contractor or Contractor's insurer. The selected counsel's fees and expenses shall be paid for by Contractor or its insurer, and the counsel shall be different from that selected by Contractor to represent it in the same matter.

(d) The indemnity set forth in this Article 21 shall survive any termination of this Contract.

Section 21.02. Labor Indemnity. The Contractor shall indemnify, defend and hold harmless the Owner, the Board of Commissioners of the Owner, the Program Manager, and the Engineer, their agents, employees, officers, directors, partners and related entities, from any and all administrative and judicial actions (including reasonable attorney's fees related to any such action), incurred by the Owner, the Program Manager, or the Engineer in connection with any labor related activity arising from the wrongful acts or omissions of the Contractor or its subcontractors in the performance of the Work of the Contractor. As used in this Contract, "labor related activity" includes, but is not limited to, strikes, walk-outs, informational or organizational picketing, use of placards, or distribution of hand-outs or leaflets at or in the vicinity of any facility where the Owner conducts business. The Owner shall advise the Contractor if any labor related activity occurs and the Contractor shall arrange for the legal representation necessary to protect the Owner, the Program Manager, and the Engineer provided such representation is previously approved by Owner.

Section 21.03. Royalties and Patents. The Contractor shall pay all royalties and license fees in anyway relating to the Work, shall defend all suits or claims for infringement of any patent or copyrights, and shall indemnify and hold the Owner, the Board of Commissioners of the Owner, their agents, officers, directors, partners and related entities, harmless from loss on account of such suit or claim.

Section 21.04. Attorney's Fees. In the event it becomes necessary for Owner to employ an attorney to enforce any provision of this Contract or to defend against any claim or litigation initiated by the Contractor, then the Contractor shall be liable for all attorney's fees and litigation expenses of Owner.

ARTICLE 22

RIGHT TO OCCUPY BY OWNER

Section 22.01. Early Occupancy by Owner. The Owner has the right to occupy or use ahead of schedule, at no additional cost nor obligation to Owner, all or any substantially completed or partially completed portion of the Work when such occupancy and use are in its best interest, notwithstanding the time of completion for all of the Work. Maintenance of occupied portion will remain the Contractor's responsibility.

Section 22.02. Corrections after Occupancy. After the Owner has taken occupancy of all or any portion of the Work, the Contractor shall not disrupt the use and occupancy of the Owner to make corrections in the Work.

ARTICLE 23

DEFAULT: RIGHT TO TERMINATE BY OWNER

Section 23.01 Breach of Contract Terms. (Required by FAA) Any violation or breach of terms of this contract on the part of the contractor or its subcontractors may result in the suspension or termination of this contract or such other action that may be necessary to enforce the rights of the parties of this agreement.

Owner will provide Contractor written notice that describes the nature of the breach and corrective actions the Contractor must undertake in order to avoid termination of the contract. Owner reserves the right to withhold payments to Contractor until such time the Contractor corrects the breach or the Owner elects to terminate the contract. The Owner's notice will identify a specific date by which the Contractor must correct the breach. Owner may proceed with termination of the contract if the Contractor fails to correct the breach by deadline indicated in the Owner's notice.

The duties and obligations imposed by the Contract Documents and the rights and remedies available thereunder are in addition to, and not a limitation of, any duties, obligations, rights and remedies otherwise imposed or available by law.

Section 23.02. Default and Termination by Owner. (Required by FAA)

(a) The Contractor shall be considered in default of his or her Contract and such default will be considered as cause for the Owner to terminate the Contract for any of the following reasons if the Contractor:

- (1) Fails to begin the Work under the Contract within the time specified in the Notice to Proceed, or
- (2) Fails to perform the Work or fails to provide sufficient workers, equipment and/or materials to assure completion of Work in accordance with the terms of the Contract, or
- (3) Performs the Work unsuitably or neglects or refuses to remove materials or to perform anew such Work as may be rejected as unacceptable and unsuitable, or
- (4) Discontinues the execution of the Work, or
- (5) Fails to resume Work which has been discontinued within a reasonable time after notice to do so, or
- (6) Becomes insolvent or is declared bankrupt, or commits any act of bankruptcy or insolvency, or
- (7) Allows any final judgment to stand against the Contractor unsatisfied for a period of 10 days, or
- (8) Makes an assignment for the benefit of creditors, or
- (9) For any other cause whatsoever, fails to carry on the Work in an acceptable manner.

Should the Engineer consider the Contractor in default of the Contract for any reason above, the Engineer shall immediately give written notice to the Contractor and the Contractor's surety as to the reasons for considering the Contractor in default and the Owner's intentions to terminate the Contract.

(b) If the Contractor or surety, within a period of 10 days after such notice, does not proceed in accordance therewith, then the Owner will, upon written notification from the Engineer of the facts of such delay, neglect or default and the Contractor's failure to comply with such notice, have full power and authority without violating the Contract, to take the execution of the Work out of the hands of the Contractor. The Owner may appropriate or use any or all materials and equipment that have been mobilized for use in the Work and are acceptable and may enter into an agreement for the completion of said Contract according to the terms and provisions thereof or use such other methods as in the opinion of the Engineer will be required for the completion of said Contract in an acceptable manner.

(c) All costs and charges incurred by the Owner, together with the cost of completing the Work under contract, will be deducted from any monies due or which may become due the Contractor. If such expense exceeds the sum which would have been payable under the Contract, then the Contractor and the surety shall be liable and shall pay to the Owner the amount of such excess.

Section 23.03. Termination for Convenience by Owner. (Required by FAA) The Owner may terminate this Contract without cause at any time by providing fifteen (15) days prior written notice to Contractor. Upon receipt of a written notice of termination, except as explicitly directed by the Owner, the Contractor shall immediately proceed with the following obligations regardless of any delay in determining or adjusting amounts due under this clause:

- (a) Contractor must immediately discontinue work as specified in the written notice;
- (b) Terminate all subcontracts to the extent they relate to the work terminated under the notice;
- (c) Discontinue orders for materials and services except as directed by the written notice;
- (d) Deliver to the Owner all fabricated and partially fabricated parts, completed, and partially completed Work, supplies, equipment and materials acquired prior to termination of the Work and as directed in the written notice;
- (e) Complete performance of the Work not terminated by the notice; and
- (f) Take action as directed by the Owner to protect and preserve property and work related to this Contract that Owner will take possession.

Owner agrees to pay Contractor for:

- (1) Completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination;
- (2) Documented expenses sustained prior to the effective date of termination in performing Work and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work;
- (3) Reasonable and substantiated claims, costs and damages incurred in settlement of terminated contracts with Subcontractors and Suppliers; and
- (4) Reasonable and substantiated expenses to the Contractor directly attributable to Owner's termination action.

Owner will not pay Contractor for loss of anticipated profits or revenue or other economic loss arising out of or resulting from the Owner's termination action.

The rights and remedies this clause provides are in addition to any other rights and remedies provided by law or under this Contract.

Section 23.04. Suspension by the Owner.

(a) The Owner may order the Contractor in writing to suspend, delay, or interrupt the Work in whole or in part for such period of time as the Owner may determine (hereinafter referred to as "Suspension").

(b) Provided the Suspension lasts for more than ninety (90) days, an adjustment to the Lump Sum Price ("Adjustment") shall be made as set forth in paragraph (c) of this Section 23.02. The Substantial Completion Date shall be extended by written Contract Amendment to the extent that substantial completion is actually delayed by this Suspension. No Adjustment shall be made to the extent:

- (1) That performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is in full or in part responsible; or
- (2) That an equitable adjustment is made or denied under another provision of this Contract.

(c) The amount of the Contractor's compensation for a Suspension pursuant to this Section 23.02 shall be limited to any properly documented costs of maintaining personnel and equipment in the field provided such costs are pre-approved by the Owner in writing. The Owner shall not be liable at any time for home office overhead or consequential damages. At

the Owner's option, the Contractor may be ordered to demobilize its forces because the Project is suspended. In such event, the Owner will reimburse the Contractor for the reasonable cost of demobilization and remobilization.

Section 23.05. Assignment of Subcontracts. In the event of termination by the Owner pursuant to this Article 23 or Exhibit E to this Contract, the Owner may require the Contractor to promptly assign to it all or some of the subcontracts, materials, tools, and equipment to be installed under this Contract, or rental agreements, and any other commitments which the Owner, in its sole discretion, chooses to take by assignment. In such event, the Contractor shall promptly execute and deliver to the Owner written assignments of such commitments.

ARTICLE 24

HAZARDOUS MATERIALS

Section 24.01. Hazardous Materials Covenants.

(a) Contractor hereby represents and warrants to and for the benefit of Owner that the Project or Work Site will not be used or operated in any manner that will result in the storage, use, treatment, manufacture, or disposal of any Hazardous Materials (hereinafter defined) upon the Project or Work Site or any portion thereof or which will result in Hazardous Materials Contamination (hereinafter defined). For purposes of this Article 24, the term "Hazardous Materials" shall mean and refer to: (1) any "hazardous waste" as defined by the Resource Conservation and Recovery Act of 1976 (42 U.S.C. § 6901 *et seq.*), as amended from time to time, and regulations promulgated thereunder; (2) any "hazardous substance" as defined by the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (42 U.S.C. § 9601 *et seq.*) ("CERCLA"), as amended from time to time, and regulations promulgated thereunder; (3) asbestos; (4) polychlorinated biphenyls; (5) urea formaldehyde; (6) any substance the presence of which on the premises is prohibited by any applicable environmental laws or regulations ("Laws") or by any other legal requirements affecting the Project or the Work Site; (7) petroleum based materials (with the exception of tires affixed to vehicles); and, (8) any other substance which is defined as hazardous, toxic, infectious or radioactive by any Laws or by any other legal requirements affecting the Project or Project site. For purposes of this Article 24, the term "Hazardous Materials Contamination" shall mean and refer to the contamination of the Project or Project site, soil, surface water, ground water, air, or other elements on, or of, the buildings, facilities, soil, surface water, ground water, air, or other elements on or off any other property as a result of Hazardous Materials at any time emanating from the Project or Work Site.

(b) In addition to and without limiting the generality of any other provision of this Contract, Contractor shall and hereby does indemnify and hold Owner, the Board of Commissioners of the Owner, the Program Manager, the Engineer, their agents, employees, officers, directors, partners and related entities harmless from and against any and all losses, damages, expenses, fees, claims, demands, causes of action, judgments, costs and liabilities, including, but not limited to, attorney's fees and costs of litigation, and costs and expenses of response, remedial and corrective work and other cleanup activities, arising out of or in any manner connected with: (1) the "release" or "threatened release" (as those terms are defined in CERCLA and the rules and regulations promulgated thereunder, as from time to time amended) by Contractor or Contractor's employees, agents, delegees, invitees, licensees, concessionaires, subcontractors or representatives, of any Hazardous Materials; or (2) any occurrence of Hazardous Materials Contamination affecting the Project or Work Site caused by or resulting from, in whole or in part, the operations of the Contractor or Contractor's employees, agents, delegees, invitees, licensees, concessionaires, subcontractors or representatives. The provisions of this paragraph shall survive any payment or satisfaction of this Contract and such provisions shall remain in full force and effect.

(c) When use or storage of hazardous materials or equipment or unusual methods of construction are necessary, the Contractor shall obtain prior written approval from the Owner. The use of explosives is strictly prohibited provided, however, powder activated fasteners are permitted.

(d) If Contractor encounters on the Work Site any substance or material reasonably believed by Contractor to be hazardous, Contractor immediately shall (i) stop work in the area affected, (ii) take measures appropriate to the condition to keep people away from the suspected Hazardous Material and, (iii) report the condition to Owner in writing. If the Work is so stopped and Hazardous Material is found, the Work in the affected area shall not thereafter be resumed except by the issuance of a Construction Change Directive pursuant to Section 9.02 of this Contract. Any such Construction Change Directive shall be limited to, an adjustment to the Substantial Completion Date appropriate. If no Hazardous Material is found after the Work is stopped, no Construction Change Directive is required to resume the Work in the affected area.

ARTICLE 25

MISCELLANEOUS

Section 25.01. No Waiver. No consent or waiver, express or implied, by either party to this Contract or of any breach or default by the other in the performance of any of its obligations hereunder shall be deemed or construed to be a consent or waiver to or of any other breach or default by such party. Failure on the part of the Owner to complain of any act or failure to act of the Contractor or to declare the Contractor in default, irrespective of how long such failure continues, shall not constitute a waiver of the rights of Owner.

Section 25.02. Assignment. This Contract shall not be assigned, delegated or transferred in whole or in part by the Contractor nor shall the Contractor assign any monies due or to become due to it without the prior written consent of the Owner.

Section 25.03. Governing Law. This Contract is entered into in Tennessee and shall be governed by and construed according to the laws of Tennessee. Any and all disputes arising out of this Contract, and/or the Project shall be decided by a state or federal court of competent jurisdiction in Memphis, Shelby County, Tennessee.

Section 25.04. Execution of Contract. The parties hereby agree and express their intent to execute this Contract electronically if Owner has a designated information processing system. The parties also hereby agree that this Contract may be executed in counterparts, each of which shall be deemed to be an original, but all of which, taken together, shall constitute one and the same agreement.

Section 25.05. Article and Section Headings. Article and section headings contained in this Contract are for ease of reference only and shall not affect the interpretation or meaning of this Contract.

Section 25.06. Parties in Interest. This Contract shall inure to the benefit of and be binding upon the Parties and their respective successors, assigns and legal representatives. It is specifically agreed between the Owner and the Contractor that the Parties do not intend to create any third-party beneficiary rights by the execution of this Contract.

Section 25.07. Severability. If any one or more of the provisions contained in this Contract shall for any reason be held invalid, illegal or unenforceable in any respect, such invalidity, illegality or unenforceability shall not affect any other provision of this Contract, but it shall be construed as if such invalid, illegal or unenforceable provision had never been contained herein.

Section 25.08. Written Notices. Whenever by the terms of this Contract notice shall be given either to Owner or to Contractor, such notice shall be in writing and shall be sent by regular United States Postal Service, by hand-delivery, by registered or certified mail, by a nationally recognized overnight delivery service or by electronic mail with a delivery receipt. Notice intended for Owner shall be addressed to the Vice President of Operations as follows with a copy to Owner's General Counsel at the address for regular mail:

If to the Owner, address to:

Regular Mail or Hand Delivery
Vice President of Operations
Memphis-Shelby County Airport Authority
2491 Winchester Rd., Suite 113
Memphis, Tennessee 38116-3856

Certified Mail or Overnight Delivery
4150 Louis Carruthers Drive
Memphis, TN 38118
(901) 922-8000

If to the Contractor, address to:

Either Party, from time to time, may change its address by giving written notice to the other Party.

Section 25.09. Exhibits. All exhibits described in this Contract shall be deemed to be incorporated into and made a part of this Contract. If there is any inconsistency between this Contract and the provisions of any exhibits, the provisions of this Contract shall control to the extent of the inconsistency.

Section 25.10. Entire Contract. This Contract, together with the exhibits and the other Contract Documents, constitutes the entire agreement between the Owner and the Contractor and supersedes all prior written or oral agreements, understandings, representations, negotiations, and correspondence between the Parties. This Contract shall not be supplemented, amended or modified by any course of dealing, course of performance or usage of trade and may only be amended or modified by a written instrument duly executed by officers of both Parties.

Section 25.11. Non-Federally Assisted Projects. Regardless of the funding source for the Project, Contractor hereby agrees to comply with all nondiscrimination provisions of this Contract.

Section 25.12. Disadvantaged Business Enterprise Participation.

(a) The Project is subject to the requirements of Owner's Business Diversity Development Program (BDDP) and Small Business Participation Program (SBPP). It is the responsibility of the Contractor to see that all requirements of the BDDP and SBPP are met. The Disadvantaged Business Enterprise (DBE) participation goal for the Project is **TWENTY-SIX PERCENT (26%)**. This percentage is defined as the dollar value of subcontracts awarded to certified DBEs divided by the base bid or alternate amount. To qualify, a firm must be included on the Owner's list of certified DBE firms.

(b) Proposed changes to the designated participating DBEs during performance of the Work must be submitted to the Owner. Contractors must make every effort to replace a DBE subcontractor with another certified DBE, based on said DBEs' availability. All substitutes for DBE subcontractors or joint ventures require prior approval of the Owner, such approval not to be unreasonably withheld; and said approval may be granted for reasons including, but not limited to, the following: (1) subcontractor requests that its subcontract or joint venture agreement with the prime contractor be voided; (2) subcontractor is unable to perform the Work; and/or (3) subcontractor has consistently performed unacceptable work.

(c) A determination by the Owner that the Contractor has either failed to comply with this Section 25.12, to timely submit to Owner requested documentation related hereto, to cooperate with Owner, or to answer inquiries truthfully shall subject the Contractor to any or all of the following penalties:

- (1) Withholding from the Contractor all future payments under this Contract until the Contractor is in compliance; and/or
- (2) Cancellation, termination, or suspension of this Contract, in whole or in part; and/or
- (3) Payment by the Contractor to the Owner of an amount equal to the difference in the DBE dollar value achieved in documented DBE participation or any lesser amount or penalty as deemed appropriate by the Owner, which dollar value shall be considered liquidated damages for failure to perform the requirements of this Contract and for which the Contractor and all of its subcontractors agree to be bound.

(d) A violation of this provision shall be considered a material breach of this Contract. If, in the opinion of the Owner, the Contractor has made significant deviations from the DBE program commitments, such deviations shall be considered a breach of this Contract.

Section 25.13. No Financial Benefit. Contractor understands and agrees that no Owner employee or member of the Board of Commissioners, Memphis City Council or Shelby County Commission shall receive any financial benefit arising out of this Contract, either directly or indirectly. Further, any fees paid to any person or entity by Contractor for assistance in obtaining this Contract with Owner must be fully disclosed to Owner. Notwithstanding any term, condition, obligation or provision in this Contract, any other writing, any other agreement, any oral understanding or agreement, or any conduct or failure to act by the Owner, Contractor stipulates and agrees conclusively that Contractor has against

the Owner no right, entitlement or claim for any payment, compensation, cost or remuneration of any type other than pursuant to the terms of this Contract.

ARTICLE 26

FEDERAL AVIATION ADMINISTRATION (FAA) **REQUIRED CONTRACT PROVISIONS**

Section 26.01. FAA Required Provisions. Federal laws and regulations require that specific contract provisions be included in certain contracts and subcontracts. All such provisions are set forth in Exhibit E, which is attached hereto and incorporated herein by reference. Contractor hereby agrees to insert these provisions in each contract and subcontract (to the extent applicable) related to the performance of this Contract and to require each of its subcontractors to do the same. Contractor also hereby agrees to incorporate these provisions by reference for work done under any purchase order, rental agreement or other agreement for supplies or services related to the performance of this Contract. Contractor further agrees to be responsible for compliance with these provisions by any subcontractor, lower-tier subcontractor, or service provider. Contractor acknowledges that the FAA prevents any modification to these provisions that creates a conflict with federal laws and regulations or changes the intent of the required provision.

ARTICLE 27

STATE REQUIRED CONTRACT PROVISIONS

Section 27.01. State of Tennessee Laws and Regulations - Grant Contract Provisions. State laws and regulations require that specific contract provisions be included in certain contracts and subcontracts. All such provisions are set forth in Exhibit E, which is attached hereto and incorporated herein by reference.

*The remainder of this page intentionally left blank.
[Signature page to follow.]*

IN WITNESS WHEREOF, the Parties have made and executed this Contract as of the day and year first above written.

**MEMPHIS-SHELBY COUNTY
AIRPORT AUTHORITY**

CONTRACTOR

By: _____

By: _____

Title: President and CEO

Title: _____

Approved as to Content:

By: _____

Title: Vice President of Operations

Approved as to Form and Legality:

By: _____

Title: General Counsel

Reviewed and Approved:

By: _____

Title: Director of Development

**EXHIBIT A
TO
LUMP SUM CONSTRUCTION CONTRACT
FOR
TERMINAL APRON RECONSTRUCTION (including Concourse C Demo) – CONSTRUCTION

BY AND BETWEEN
THE MEMPHIS-SHELBY COUNTY AIRPORT AUTHORITY
AND
(CONTRACTOR NAME)**

SCOPE OF WORK

The project includes reconstruction of approximately 8,500 SY of existing apron pavement, and the demolition of the south end of Concourse C. The scope of work for the apron reconstruction includes removal of existing pavement, subgrade preparation, installation of underdrain piping, utility demolition and installation, abandonment of existing fuel line and fuel pits, and new airfield pavement. The scope of work for the Concourse C demolition project includes mechanical demo/termination of duct work, plumbing demo/termination of sanitary sewer lines, electrical demo/termination of existing circuits and low voltage data cabling. Reconnection of chilled water, hot water, and domestic water lines. Hauling of demolished material/rubble and backfilling of existing tunnel. Masonry and Glass/Glazing work to close off new end of Concourse C. The scope of work is more specifically described in the Contract Documents, as defined in Article 2 of this Contract.

**EXHIBIT B
TO
LUMP SUM CONSTRUCTION CONTRACT
FOR
TERMINAL APRON RECONSTRUCTION (including Concourse C Demo) – CONSTRUCTION

BY AND BETWEEN
THE MEMPHIS-SHELBY COUNTY AIRPORT AUTHORITY
AND
(CONTRACTOR NAME)**

CONTRACT DOCUMENTS

NON-TECHNICAL SPECIFICATIONS

DIVISION 0

00001	Project Title Page
00007	Professional Seals
00010	Table of Contents
00015	List of Drawings
00100	Legal Notice to Bidders
00200	Instructions to Bidders/Proposers
00405	Proposal
00410	Proposal Guarantee
00440	Buy American Certification
00445	Disadvantaged Business Enterprise (DBE) Requirements
00490	Addenda and Modifications
00500	Construction Contract
00605	Certificate of Secretary
00610	Performance Bond & Labor and Material Payment Bond
00630	Application for Payment
00640	Business Diversity Monthly Compliance Report
00661	Davis-Bacon Wage Determination
00663	Labor Standards Interview
00765	Supplemental Provisions
00801	Airport Construction Safety Requirements
00802	Airport Security Requirements

General Provisions

Section 10	Definition of Terms
Section 20	Proposal Requirements and Conditions
Section 30	Award and Execution of Contract
Section 40	Scope of Work
Section 50	Control of Work
Section 60	Control of Materials
Section 70	Legal Regulations and Responsibility to Public
Section 80	Execution and Progress
Section 90	Measurement and Payment
Section 150	FAA General Provisions Addendum

General Construction Items

C-100	Contractor Quality Control Program CQCP
C-102	Temporary Air and Water Pollution, Soil Erosion, and Siltation Control
C-105	Mobilization
C-110	Method of Estimating Percentage of Material Within Specification Limits (PWL)

DIVISION 1 – GENERAL REQUIREMENTS

01100	Summary of Work, Sequence of Construction & Liquidated Damages
01125	Renovation
01210	Allowances
01230	Alternates
01250	Amendment Procedure
01310	Preconstruction Conference & Progress Meetings
01320	Schedules and Reports
01321	Construction Surveying
01322	Aerial Photographs
01325	Delays and Extension of Time
01330	Submittals
01351	Storage and Protection
01353	Radio Communications
01455	Quality Control and Quality Assurance Testing Programs
01500	Construction Facilities and Temporary Controls
01600	Product Requirements
01630	Product Substitution Procedures
01700	Field Engineering
01720	Project Record Documents
01730	Cutting and Patching
01741	Cleaning
01770	Close-Out Procedures
01771	Affidavit of Contractor
01772	Final Waiver and Release of Lien: PRIME
01774	Contractor Warranty Form
01775	Consent of Surety Company to Final Payment
01783	Electrical Characteristics, Capacities, and Wiring Diagrams
01784	Manufacturer's Supervision

TECHNICAL SPECIFICATIONS

DIVISION 2 - SITE WORK

C-100	Contractor Quality Control Program (CQCP)
C-102	Temporary Air and Water Pollution, Soil Erosion, and Siltation Control
C-105	Mobilization
S-100	Special Technical Provisions – Safety & Security
S-101	Underground Utility Markers
S-102	Porous Bituminous Base Course
S-103	Exterior Building Repairs
S-105	Water Distribution
P-101	Preparation / Removal of Existing Pavements
P-150	Demolition
P-152	Excavation, Subgrade, and Embankment
P-153	Controlled Low-Strength Material (CLSM)
P-155	Lime-Treated Subgrade
P-209	Crushed Aggregate Base Course
P-219	Recycled Concrete Aggregate Base Course

P-220	Cement Treated Soil Subbase Course
P-304	Cement-Treated Aggregate Base Course
P-306	Lean Concrete Base Course
P-501	Cement Concrete Pavement
P-605	Joint Sealants for Pavements
P-610	Concrete for Miscellaneous Structures
P-620	Runway and Taxiway Marking
D-701	Pipe for Storm Drains and Culverts
D-705	Pipe Underdrains for Airports
D-751	Storm Drain Manholes, Inlets and Trench Drains

DIVISION 3 - CONCRETE

03250	Bentonite Waterstop
03300	Cast-in-place Concrete
03700	Concrete Rehabilitation

DIVISION 4 - MASONRY

04100	Mortar
04200	Unit Masonry

DIVISION 5 - METAL

05120	Structural Steel
05500	Metal Fabrications
055213	Pipe Handrail

DIVISION 6 - WOOD AND PLASTIC

06100	Rough Carpentry
06160	Sheathing

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

071416	Cold Fluid-Applied Waterproofing
071616	Crystalline Waterproofing
07200	Insulation
072419	Exterior Insulation and Finish System Class PB
072726	Fluid-Applied Membrane Air Barrier
07600	Flashing and Sheet Metal
07900	Joint Sealers

DIVISION 8 - DOORS AND WINDOWS

08100	Metal Door Frames
08400	Aluminum Storefront
08800	Glass and Glazing

DIVISION 9 - FINISHES

09100	Metal Support Systems
09250	Gypsum Wallboard
09441	Epoxy Terrazzo
09500	Acoustical Ceilings

09900	Painting
09910	Exterior Painting

DIVISION 10 - SPECIALTIES

Section Not Used

DIVISION 11 - EQUIPMENT

Section Not Used

DIVISION 12 - FURNISHINGS

Section Not Used

DIVISION 13 - SPECIAL CONSTRUCTION

13281 Asbestos Abatement

DIVISION 14 - CONVEYING SYSTEMS

14720 Passenger Boarding Bridge Removal/Storage

DIVISION 15 - MECHANICAL

15050 General Provisions, Basic Materials and Methods
15195 Mechanical Identification
15400 Plumbing
15950 Testing, Adjusting, and Balancing

DIVISION 16 - ELECTRICAL

16000 Electrical General Provisions
16050 Basic Materials and Methods
16450 Grounding and Bonding of Electrical Systems
16460 Grounding and Bonding of Communications Systems
16720 Fire Alarm System
16752 Structured Cabling System

Appendices

Appendix A MSCAA Design Guide – Construction Standards
MSCAA Comprehensive Storm Water Pollution Prevention Plan

LIST OF DRAWINGS

DRAWINGS, Entitled Terminal Apron Reconstruction (including Concourse C South Demo) - Construction, Issued for Bid/Construction, dated 6/1/2022, with revisions, as noted on the drawing sheets:

<u>SHEET NO.</u>	<u>INDEX OF SHEETS</u>
C0.00 / 1 OF 14	COVER SHEET
C0.01 / 2 OF 14	GENERAL NOTES
C0.02 / 3 OF 14	SUMMARY OF QUANTITIES
C1.11 / 4 OF 14	PROJECT ACCESS & SAFETY NOTES
C3.01 / 5 OF 14	GRADING & DRAINAGE PLAN
C3.61 / 6 OF 14	EROSION CONTROL PLAN
C6.01 / 7 OF 14	DRAINAGE PLAN & PROFILE
C9.01 / 8 OF 14	CONSTRUCTION DETAILS
C9.02 / 9 OF 14	CONSTRUCTION DETAILS
C9.03 / 10 OF 14	CONSTRUCTION DETAILS
C9.04 / 11 OF 14	FLUME DETAILS

C9.05 / 12 OF 14	WET WELL / PUMP DETAILS
C9.06 / 13 OF 14	WET WELL / PUMP DETAILS
C9.07 / 14 OF 14	GENERATOR DETAILS

**EXHIBIT C
TO
LUMP SUM CONSTRUCTION CONTRACT
FOR
TERMINAL APRON RECONSTRUCTION (including Concourse C Demo) – CONSTRUCTION

BY AND BETWEEN
THE MEMPHIS-SHELBY COUNTY AIRPORT AUTHORITY
AND
(CONTRACTOR NAME)**

OWNER CONTROLLED INSURANCE PROGRAM

C.1. Owner Controlled Insurance Program

The Owner has elected to implement an Owner Controlled Insurance Program (OCIP) that will provide **Workers' Compensation, Employer's Liability, Commercial General Liability, Excess Liability and Builders' Risk insurance** for Contractors and Subcontractors of every tier who have been properly enrolled and are providing direct labor to the Project. A general summary of coverage provided by the OCIP is included in the MSCAA OCIP Manual, (hereinafter called the Manual), a copy of which is attached hereto and made a part of this Agreement and should be attached to and incorporated in every subcontract. All terms and conditions of Exhibit C will apply during the term of the contract. The Owner agrees to pay all premiums associated with the OCIP.

While the OCIP provides uniform coverages and reasonable limits, the OCIP is not intended to meet all the insurance needs of the Contractor and eligible Subcontractors who have been properly enrolled. In addition to any insurance provided by Owner, the Contractor and all Subcontractors working on the Project will be responsible for providing certain insurance as specified in paragraph C.2. Contractors and eligible Subcontractors should discuss the OCIP with their insurance agent or consultant to assure that other proper coverages are maintained. Contractor and eligible Subcontractors enrolled in the OCIP agree that the insurance company policy limits of liability, coverage terms and conditions shall determine the scope of coverage provided by the OCIP.

C.1.1. Applicability of the OCIP

Participation in the OCIP by the Contractor and all eligible Subcontractors is mandatory but not automatic. The Contractor and each eligible Subcontractor (as defined below) must follow the enrollment procedures shown in the Manual. The Contractor shall comply with all requirements of the OCIP as outlined in the OCIP Manual and shall require all eligible Subcontractors to comply with requirements of the OCIP manual. The Manual may be updated and revised during the course of construction to reflect any changes in State Law, Rules and/or Regulations or Procedures that may be necessary or appropriate, and said revisions will replace all previous versions. Copies of any revised Manual will be distributed by the OCIP Administrator.

- If the Contractor or any eligible Subcontractor fails to enroll any of its eligible Subcontractors of any tier, it will be subject to a penalty charge of the full and complete deduct as shown in C.1.2.c or 3% of the subcontract cost, whichever is greater. Note: Collection of the penalty charge of any non-enrolled contractor(s) of any tier does not provide automatic coverage in the program.
- If any Contractor or any eligible Subcontractor enrolls in the OCIP more than 30 days after its start date, it will have to provide a No Known Loss Letter to the Carrier along with the enrollment documentation.

Eligible Subcontractor includes all Subcontractors providing or subcontracting for direct labor on any Designated Project (see definition of ineligible Subcontractors below).

Ineligible Subcontractor includes (but is not limited to) subcontractors performing any type of environmental remediation work (example: asbestos or underground tank removal), consultants, suppliers (that do not perform or subcontract installation), vendors, materials dealers, guard services, janitorial services, truckers (including trucking to any Designated Project where delivery is the only scope of work performed), employee leasing companies, temporary labor services and

other temporary project services. However, such Employee leasing and temporary labor service companies can be insured by the OCIP but must be submitted for review to the OCIP administrator prior to acceptance.

A Designated Project is a project designated and approved by the Owner as a Designated Project and enrolled by the OCIP Administrator with the insurance company. This project is a Designated Project. A Designated Project includes operations necessary or incidental to the Work. The Contractor's/Subcontractor's regularly established workplace, plant, factory, office, shop, warehouse, yard, or other property even if such operations are for fabrications of materials to be used at the job site or training of apprentices will be considered off-site and not covered by the OCIP.

Unless otherwise directed by the Owner, the Contractor, eligible Subcontractors, and all Subcontractors not enrolled in the OCIP, will be required to maintain at least the insurance coverages set forth in paragraph C.2 and are required to participate in the MSCAA OCIP Safety Program. Contractor will promptly furnish the Owner, or their designated representative, certificates of insurance giving evidence that all required insurance is in force.

C.1.2. Contractor Insurance Cost Identification

The Contractor and eligible Subcontractors will exclude their cost for all insurance coverages to be provided by the Owner for the work at any Designated Project from their bid. The Contractor and each Subcontractor of any tier warrant that all insurance premium calculations for work performed at the Designated Project Site have been correctly identified and removed from their bids.

C.1.3. Change Order Pricing

Contractor and all enrolled Subcontractors will price each change order to exclude the cost of insurance.

C.1.4. Assignment of Return Premiums

The Owner will be responsible for the payment of all premiums associated solely with the OCIP and will be the sole recipient of any dividend(s) and/or return premium(s) generated by the OCIP. In consideration of the Owner's provision of said coverages under the OCIP program, the Contractor and eligible Subcontractors agree to:

- 1) Exclude all applicable insurance costs for coverage provided by the Owner associated with their contract work and excluded from their bid; and cooperate with the OCIP Administrator in the administration of the OCIP.
- 2) Irrevocably assign to and for the benefit of the Owner, all return premiums, premium refunds, premium discounts, dividends, retentions, credits, and any other monies in connection with the OCIP insurance. Contractor also assigns its right of cancellation of all insurance policies provided by Owner. Contractor agrees to evidence such assignment by executing and delivering the Form-2. Contractor further agrees to require each eligible Subcontractor to execute the assignment on the Form-2, for the benefit of the Owner.

C.1.5 Audit of Contractor and/or Subcontractor Payroll

For insurance purposes, the Contractor and all tiers of Subcontractors agree to keep and maintain accurate and classified records of their payroll for operations at any Designated Project. Contractor and all eligible Subcontractors agree to furnish a copy of the Monthly Payroll Reporting Form, Form 5, to the OCIP Program Administrator by the 20th of each month and attach a copy of the Form-5, to their monthly pay application. If this report (Form-5) is not attached to the monthly pay application, payment may be held until the report is received.

The Contractor and all eligible Subcontractors will permit the Owner and its representative to examine and/or audit its books and records pertaining to any Designated Project. Contractor and eligible Subcontractor will also provide any additional information to the Owner, or its appointed representatives as may be required. At the end of each contract, an audit may be performed of the reported payroll by the OCIP Carrier.

Upon Final Completion of each contract, the Contractor and eligible Subcontractors will furnish a completed and signed Form-4 - Notice of Anticipated Completion Form (a copy of which is attached hereto as "Form-4") to the OCIP Administrator, together with all required documentation.

Demobilization payments will not be released until all closeout documentation has been received and approved.

C.1.6. OCIP Deductibles

General Liability:

If a claim arises under the Owner provided Commercial General Liability OCIP policy from the partial or sole negligence of a Contractor or Subcontractor, or for violation of any OCIP Safety Requirements, such Contractor or Subcontractor shall be responsible for reimbursing the Owner's deductible to the extent of their respective negligence, as determined solely by owner, up to a maximum of \$10,000 per occurrence per Contractor.

Builders Risk:

The Contractor shall be responsible for a deductible of \$25,000 for each and every loss.

C.1.7. Termination/Modification of the OCIP

The Owner reserves the right to terminate or to modify the OCIP or any portion thereof. To exercise this right, the Owner will provide thirty (30) days advance written notice of termination or material modification to the Contractor and all eligible Subcontractors covered by the OCIP. In such event, the Contractor will promptly obtain appropriate replacement insurance coverage acceptable to the Owner. Written evidence of such insurance will be provided to the Owner prior to the effective date of the termination or modification of the OCIP coverages. The reasonable cost of such replacement insurance will be reimbursed by the Owner to the Contractor.

SPECIAL NOTE: The Contractor and eligible Subcontractors who have completed their work at any Designated Project and whose insurance as provided by MSCAA OCIP has been terminated, and who returns to the site to perform warranty work does so under its own insurance coverages and not under those provided by MSCAA OCIP.

C.2 Contractor Provided Coverages

All insurance obtained by the Contractor pursuant to this Agreement shall be written by insurance companies licensed to do business in Tennessee and acceptable to Owner.

Prior to the commencement of any operations by or on behalf of the Contractor relating to the Project, and with respect to any and all such operations, the Contractor shall procure, maintain and provide to Owner and the Program Manager:

- 1) Evidence of Contractor's **Commercial Automobile Liability Insurance**. A certificate of insurance and copy of endorsement shall be provided as evidence of:
 - a) Coverage for Owner, their officers, directors and employees as additional insureds.
 - b) Coverage to apply to all liability arising out of the ownership or use of all vehicles owned by, hired by, or used on behalf of the Contractor.
 - c) Waiver of Subrogation to be provided in favor of the Owner, the Design Professional, the Program Manager and their officers, directors, and employees.
 - d) If hazardous materials or waste are to be transported, the policy will be endorsed with the MCS-90 endorsement in accordance with the applicable legal requirements.This insurance shall be for an amount not less than \$1,000,000 combined single limit liability.

- 2) Evidence of Contractor's **Workers' Compensation and Employer's Liability Insurance**. A certificate of insurance or, at Owner's request, a certified policy copy shall be provided as evidence of:
 - a) Coverage for claims for damages arising out of bodily injury, occupational sickness or disease or death of Contractor's employees under any applicable workers' compensation statute or any other applicable employers' liability law. Certificate of insurance or policy must clearly identify that coverage applies in the state of Tennessee.
 - b) A waiver of subrogation by the insurer against the Owner the Design Professional, the Program Manager and their officers, directors and employees.
 - c) This insurance shall include Employer's Liability limits of not less than \$1,000,000 bodily injury each accident, \$1,000,000 bodily injury by disease each employee and \$1,000,000 bodily injury by disease in the aggregate.
 - d) All Enrolled Contractors must provide Workers' Compensation and Employer's Liability insurance covering all employees for injuries that occur AWAY from the Designated Project Site or after OCIP termination, expiration, or cancellation.
 - e) Ineligible subcontractors or subcontractors not enrolled must provide coverage for ALL operations.

- 3) Evidence of Contractor's **Commercial General Liability Insurance**. Certificate of insurance and copies of endorsements to Contractor's primary commercial general liability policy and shall be provided as evidence of:
- a) Coverage for Owner and the Design Professional, Program Manager, their officers, directors and employees as additional insureds as respects claims or liabilities arising from or connected with Contractor's work, operations and completed operations. The additional insured endorsements shall be at least as broad as the ISO CG 2010 (1001) during the course of construction and CG2037 (1001) until the expiration of the statute of repose, or its carrier equivalent.
 - b) Coverage shall be primary and non-contributing with any coverage Owner maintains in its own name and on its own behalf.
 - c) Coverage shall be written on an occurrence coverage form, with coverage at least as broad as that provided under the current edition of the ISO Commercial General Liability coverage form, CG 0001. Other than standard exclusions applicable to pollution, asbestos, mold, employment practices, ERISA and professional liability, there shall be no limitations or exclusions beyond those contained in the standard policy forms which apply to property damage, products and completed operations, contractual liability or construction defects. In addition to procuring and maintaining this insurance during the duration of the contract, contractor agrees to continue to procure and maintain products and completed operations liability insurance coverage for a minimum of six (6) year(s) after the date the contract is completed or terminated or in accordance with the applicable statute of limitations under state law, whichever is longer.
 - d) Waivers of subrogation by insurers against Owner, Design Professional, Program Manager and their officers, directors and employees.
 - e) Contractual Liability Insurance applicable to the indemnification agreement contained in Section 21.01 of this Agreement.
 - f) The required amounts of primary Commercial General Liability Coverage in the amount of:

\$1,000,000	Bodily Injury and Property Damage Limit for each occurrence
\$1,000,000	Personal & Advertising Injury
\$2,000,000	General Aggregate (Annual)
\$2,000,000	Products/Completed Operations Aggregate (annual)

 The general aggregate limit shall apply separately to each project.
 - g) All Enrolled Contractors must provide General Liability insurance covering third-party losses that occur AWAY from the Project Site (including products liability for any product manufactured, assembled or otherwise worked upon away from the Designated Project Site) or after OCIP termination, expiration or cancellation.
 - h) Ineligible contractors or subcontractors not enrolled must provide coverage for ALL operations.
 - i) The policy will be endorsed to exclude any "Designated Project" for onsite coverage only, if you are a participant in the OCIP.
- 4) Evidence of Contractor's **Excess or Umbrella Liability Insurance**. Certificate of insurance and copies of endorsements to Contractor's Excess or Umbrella liability policy and shall be provided as evidence of this excess liability or umbrella insurance with an annual aggregate amount of not less than \$25,000,000 for the Contractor and \$1,000,000 limits required of subcontractors unless otherwise stated in the Contract Documents and shall be excess and follow form over primary coverages included herein. Such coverage will be excess and "drop down" for defense and indemnity in the event of exhaustion of the underlying insurances of Commercial, Automobile, Liability, Employer's Liability and the Commercial General Liability policies.
- 5) Evidence of **Professional Liability Insurance** (If Applicable):
 Per Claim and in the Aggregate: Not Applicable
 All professional services firms must provide professional liability insurance appropriate for their profession. Architectural and engineering firms must provide coverage for liability arising out of design errors and omissions. The policies shall provide a three (3) year extended reporting period.
- 6) Evidence of **Contractors Pollution Liability Insurance** (If Applicable):
 Each Occurrence Limit and in the Aggregate: \$2,000,000
 Coverage applies to third-party bodily injury and property damage claims (including natural resource damage), and clean-up costs, caused by pollution conditions which result from covered operations performed by, or on behalf of,

contractors and subcontractors of all tiers at the Designated Project Site. Coverage shall apply to claims for mold and fungus damage that result from the work as well as gradual and sudden and accidental pollution incidents arising from activities of the contractors working at the project site.

Coverage must be evidenced for on-site and off-site transportation which may result in a pollution incident/event and non-owned disposal site coverage (if applicable to the project).

The policy shall be endorsed to provide a Waiver of Subrogation in favor of the Owner, Design Professional and Program Manager. In addition, the Owner, their officers, directors, and employees shall be included as Additional Insureds.

7) **Evidence of Contractor's Equipment Insurance:**

The Contractor is responsible for their tools and equipment including, but not limited to, construction trailers and their contents and temporary scaffolding at the project site, whether owned, leased, rented or borrowed. Contractor acknowledges and agrees that the Owner will not be responsible for any loss or damage to their tools and equipment. If insured, the Contractor's insurance policies covering tools and equipment will include a waiver of subrogation and any other rights of recovery in favor of the Owner. If uninsured, the Contractor will hold harmless the Owner, Program Manager and Design Professional for loss or damage to their tools and equipment.

8) **Aircraft/Aviation Liability Insurance** (If Applicable): Not Applicable

Each Occurrence Limit and in the Aggregate (including passenger liability):

The operator of an aircraft of any kind, whether manned or unmanned, must maintain liability insurance covering bodily injury and property damage on a Combined Single Limit basis. If non-employee passengers are carried, there cannot be a per-passenger sublimit.

Prior to commencing operations, the operator must provide the Owner with a certificate of insurance naming the Owner, their officers, directors and employees as additional insureds on a primary and non-contributory basis. Operator and their insurer(s) must hold the Owner harmless and waive subrogation with respect to damage to the aircraft

If aircraft is to be used to perform lifts at the Designated Project Site, a "slung cargo" endorsement must be included to cover the full replacement value of any equipment being lifted.

NOTE: If the Contractor and / or eligible Subcontractor participating in the OCIP choose(s) to have the policy endorsed to include any "Designated Project" site during the construction period, coverage should be Excess and/or Difference in Conditions (DIC) of the OCIP and this cost should not be passed back to the Owner. Inclusion of any "Designated Project" Site on such insurance policies shall not replace the OCIP coverage or otherwise affect the cost identification requirement in paragraph C.1.2.

C.2.2. Contractor's Insurance Primary.

Any coverage applicable to Owner under Contractor's insurance policies shall be primary and non-contributing with any insurance maintained by Owner in its own name and on its own behalf. Copies of endorsements to Contractor's policies shall be provided to Owner.

C.2.3. Cancellation.

All such insurance shall be in form and substance satisfactory to the Owner and shall provide that not less than thirty (30) days' notice of cancellation or non-renewal, other than non-payment of premium which shall be ten (10) days' notice, be provided to Owner. If unavailable, Contractor must provide Owner with thirty (30) days' advance written notice of cancellation, other than non-payment of premium, which shall be ten (10) days' notice. Contractor must notify Owner of any material change or reduction in coverage to the Contractor's insurance policies.

C.2.4. Certificates of Insurance - Contractor Provided Insurance Coverage Requirements

As shown in Section C.2

Description of Operations for contractors participating in the OCIP shall read:

Workers' Compensation and Commercial General Liability coverages shown above do not apply to any Designated Project at the Memphis International Airport.

Additional Insured Wording for Contractors shall read:

Memphis-Shelby County Airport Authority, Program Manager, Design Professional and their officers, commissioners, agents and employees as now or hereafter exist as respect to the services / work to be performed under this Agreement, for coverages as required by contract.

Additional Insured Wording for Subcontractors shall read:

For Subcontractors participating in the OCIP

The Memphis-Shelby County Airport Authority, Program Manager, Design Professional and their officers, commissioners, representatives, agents, and employees ATIMA are additional insureds for coverages as required by contract 13-1368-02.

For Subcontractors not participating in the OCIP

The Memphis-Shelby County Airport Authority, Program Manager, Design Professional and their officers, commissioners, representatives, agents and employees ATIMA and Awarding Contractor are additional insureds as respect to the services / work to be performed under this Agreement for coverages as required by contract 13-1368-00.

IN THE EVENT THAT THE LAW OF THE STATE IN WHICH THE PROJECT IS LOCATED (OR APPLICABLE LAW) LIMITS THE ADDITIONAL INSURED COVERAGE THAT OWNER MAY REQUIRE FROM CONTRACTOR AND SUBCONTRACTORS, THEN CONTRACTOR AND SUBCONTRACTORS SHALL BE REQUIRED TO OBTAIN ADDITIONAL INSURED COVERAGE TO THE FULLEST EXTENT OF COVERAGE AND LIMITS ALLOWED BY APPLICABLE LAW AND THIS CONTRACT SHALL BE READ TO CONFORM TO SUCH LAW.

Filing of Certificates

Certificates of insurance acceptable to the Owner shall be filed with the Owner by furnishing to the OCIP Administrator, prior to commencement of the Work. If any of the foregoing insurance coverages are required to remain in force after final payment and are reasonably available, an additional certificate evidencing continuation of such coverage shall be submitted with the final Application for Payment.

A sample is provided of a certificate of insurance is provided in the OCIP Manual.

MSCAA OCIP

c/o Willis Towers Watson National Project Insurance Practice.

Attn: OCIP Administrator

15305 North Dallas Parkway, Suite 1100

Addison, TX 75001

C.2.5. The Right of the Owner to Maintain Insurance.

In the event the Contractor fails to furnish and maintain the required insurance or to furnish certificates of insurance, the Owner shall have the right, at its option, to terminate this Agreement or to take out and maintain such insurance and hold the Contractor liable for the cost. Compliance by the Contractor with the requirements of this Article shall in no way relieve the Contractor from liability under any provision of this Agreement or the Contract Documents.

C.2.6. Other Insurance

Any type of insurance or any increase of limits of liability not described in this section which the Contractor or any Subcontractor requires for their own protection or on account of any statute will be their own responsibility and their own expense. Any type of insurance or any increases of limits of liability not described herein that the Contractor or any Subcontractor requires for its own protection or on account of statute shall be its own responsibility and its own expense. If the Contractor or the Subcontractors maintain any insurance policies covering owned, leased or borrowed, equipment, such policies shall contain a waiver of subrogation against the Owner. Each item must be shown as a line item and approved by the Owner.

C.2.7. Deductibles

The Contractor shall be responsible for the payment of the deductible amounts for any insurance in force pursuant to this Agreement whether such insurance is furnished by the Owner or the Contractor.

C.2.8. Insurance for Project Property While outside the United States and Canada.

If any project property is in transit or is located outside the continental United States or Canada for any reason, Contractor shall arrange to insure such property for its full replacement value separate from the other insurance described herein.

C.2.9. Subcontractors Flow-Down Clause.

Subcontractors of all tiers are subject to the same insurance requirements as Contractor. Contractor shall cause each Subcontractor employed by Contractor to purchase and maintain such insurance and upon request, must promptly furnish Owner with copies of certificates of insurance evidencing coverage for each Subcontractor.

C.2.10. No Representation of Coverage Adequacy.

In specifying minimum Contractor insurance requirements, Owner does not represent that such insurance is adequate to protect Contractor for loss, damage or liability arising from its work. Contractor is solely responsible to inform itself of the types or amounts of insurance it may need beyond these requirements to protect itself. The insurance requirements set forth in minimum amounts shall not be construed to relieve Contractor for liability in excess of such coverage, nor shall it preclude Owner from taking such other actions as is available to it under any other provision of the contract.

C.2.11. Contractor Responsibilities

The Contractor will cooperate with and will require all eligible Subcontractors to cooperate with The Owner and/or the OCIP Administrator with regards to the administration and operation of the OCIP. The Contractor and eligible Subcontractors responsibilities will include, but not be limited to:

- 1) Compliance with all rules and regulations of the applicable State Insurance Bureau/Board; failure to meet state requirements may result in fines being assessed, and, if this occurs, the Owner shall deduct from monies due or to become due under the provisions of this contract for any applicable fines that are assessed against the Owner, the Contractor or any eligible Subcontractor;
- 2) Compliance with applicable Construction Safety Program;
- 3) Provision of necessary contract, operations and insurance information, including verification of current Worker's Compensation Experience Modifier;
- 4) Cooperation with any insurance company or OCIP Administrator with respect to requests for claims, payroll or other information required under the program;
- 5) The Contractor and all eligible Subcontractors shall adhere to and perform all reporting requirements as set forth in the Claims Procedures portion of the OCIP Program Manual.

C.2.12. Contractor's Responsibility for its Subcontractors.

The Contractor will include this Exhibit and the Manual with the bid documentation. The Contractor will require that all eligible Subcontractors participate in the OCIP and comply with all rules and procedures as outlined in MSCAA Enrollment Process Summary. It will be the Contractor's responsibility to submit to The Owner and its designated representative all bid documentation for approval. If Contractor fails to comply with this section and any eligible Subcontractors do not enroll in the program, the Owner has the right to retain the 3% of subcontracted work as a penalty from the awarding Contractor/Subcontractor as set out in C.1.2.c.

C.2.13. Approval of Forms and Companies

All insurance described in this Section will be written by an insurance company or companies satisfactory to the Owner and licensed to do business in Tennessee and will be in a form and content satisfactory to the Owner. No party subject to the provisions of this contract will violate or knowingly permit to be violated any of the provisions of the policies of insurance described herein.

C.2.14. Coverage to be provided by Contractor during Warranty Period

During the period following the final acceptance date and prior to expiration of the warranty period hereunder, Contractor will maintain in full force and effect all insurance as specified in paragraph C.2 covering all Work performed during such

period.

C.3. Waiver of Subrogation and Waiver of Rights of Recovery

Owner Controlled Insurance Program

Except as respects any deductibles identified above, Owner waives all rights of subrogation and recovery against the Contractor and all Subcontractors of all tiers to the extent of any loss or damage, which is insured under the OCIP. Except as respects the deductibles identified above, Contractor waives all rights of subrogation and recovery against the Owner, Design Professional and Program Manager, other Contractors and Subcontractors of all tiers to the extent of any loss or damage, which is insured under the OCIP. The Contractor and each Subcontractor will require all Subcontractors to similarly waive their rights of subrogation and recovery in each of their respective construction contracts with respect to their work on any Designated Project.

Contractor Provided Coverages

Contractor waives all rights of subrogation and recovery against the Owner, Design Professional and Program Manager, to the extent loss or damage is insured under the Contractor's policies. The Contractor and each Subcontractor will require all Subcontractors to similarly waive their rights of subrogation and recovery in each of their respective construction contracts with respect to their work on any Designated Project.

C.4. Project Safety Administration

It is the responsibility of the Contractor to maintain total control of safety to ensure that its employees and the general public will be provided an environment free of recognized hazards during construction activities. In carrying out this policy it is clear the only accepted level of performance is to be "Incident Free" on this project each and every day.

A. Project Safety Manual

The safety requirements of any Designated Project Safety Manual are a supplementary document to all Government rules, codes and regulations. It is understood that the ultimate responsibility for providing a safe place to work rests with each individual Contractor. All Contractors are responsible for full compliance with the requirements and standards referenced in the manual.

B. New Employee Orientation

Each new Contractor or Subcontractor employee will be required to attend an orientation program. This orientation is designed to communicate all project specific safety policies, procedures, and expectations of "the Safety Team" in regard to the construction of any Designated Project.

C. Contractor Safety Program Review

To proactively monitor the safety, health and environmental performance of Contractors and Subcontractors the Owner and/or his Representative, will be conducting a periodic review of Contractor or Subcontractor safety programs. This will be a formal process, which will be done with or without advanced notice. Upon completion of the Safety Program Review, a list of recommendations will be provided to the Contractor or Subcontractor. There will be a timeline developed and agreed upon for the purpose of abating any deficiencies in the Contractor or Subcontractor safety program.

C.5. No Release

The provision of the OCIP by The Owner will in no way be interpreted as relieving the Contractor or any Subcontractor of any other responsibility or liability under this agreement or any applicable law, statute, regulation or order.

C.6. CIP Exclusion Limitation

If any party's insurance includes an exclusion tied to Controlled Insurance Programs (a.k.a. "wrap-ups" or "CIPs") or other project-specific insurance, it may apply only to the extent of coverage available to that party under the CIP or other Sponsor-provided insurance. Such exclusion may not be broader than what the CIP or such other Sponsor-provided insurance actually covers.



MSCAA OCIP IV

An Owner Controlled Insurance Program Manual for Construction Projects

Revision	Revision Summary	Date
0	First Issue for OCIP IV Projects	4-26-17
1	Update to Zurich Claims Team	4-5-18
2	Update to Zurich Claims Team	10-18-18
3	Update to Willis Towers Watson Service Team	9-22-21

MSCAA OCIP – ENROLLMENT SUMMARY

Contract Bid – All Contractors/Subcontractors

Bid package will be furnished to bidders

1. All eligible Contractors/Subcontractors of every tier will exclude their cost of insurance for coverage provided by the Owner from their bid. Contractors and eligible Subcontractors should discuss the OCIP with their insurance agent or consultant to assure that the OCIP insurance identification cost is accurate.
2. Contractors and Subcontractors at any tier shall not charge any eligible Subcontractor for its participation in the OCIP.
3. Workers' Compensation – Tennessee Payroll Rules are applicable to WC payroll. First dollar coverage is given to all Contractors on WC.
4. General Liability – Mandatory deductible not to exceed \$10,000 will apply to any loss as described in the OCIP manual. 5% credit will be applied to Contractor's premium for this deductible

Contract Award

Once notification of contract award has been received, all eligible Contractors/Subcontractors of every tier will complete and submit Form 2 with the required certificate of insurance. Any Contractors or Subcontractors who enroll in the OCIP 30 days after their start date will have to provide a No Known Loss Letter to the Carrier along with the enrollment documentation. The OCIP Administrator will:

- 1) Assign a location code for this contract, forward the **Form 2** to the insurance carrier for enrollment into program
- 2) Issue a certificate of insurance which will reflect all OCIP coverages. The original copy will be sent to the enrolled contractor/Subcontractor with a copy to their awarding contractor.

Change Order

Contractor and all enrolled Subcontractors will price each change order to exclude the cost of insurance provided by the Owner.

Monthly Payroll Reporting

The Enrolled Contractor/Subcontractor will receive a Payroll Request e-mail from the following email address "On behalf of Willis Admin(noreply-144@servmax.com)" at the beginning of each month during construction reminding them to complete their payroll report via the link in the email by the payroll due date. The payroll link will expire in 30 days. If the payroll link expires please contact your Willis Towers Watson CIP Administrator or call the toll free number (844) 260-9015 to receive an updated link.

If Contractor/Subcontract receives additional contracts

Once the contractor/Subcontractor has enrolled in the OCIP, all additional contract bids must also exclude the Contractor's cost of insurance for coverage provided by the Owner. **Form 2** must be submitted to the OCIP Administrator to receive confirmation of enrollment in the OCIP for the additional contract. (Contact the OCIP Administrator if you have questions). The OCIP Administrator will:

- 1) Assign a location code for this contract, forward the **Form 2** to the insurance carrier for enrollment into program
- 2) Issue a certificate of insurance which will reflect all OCIP coverages. The original copy will be sent to the enrolled contractor/Subcontractor, a copy to their awarding contractor.

When Contractor/Subcontract reaches Substantial Completion

Notice of Anticipated Completion - **Form 4** – Prior to completion of all work being performed under the contract. This will initiate Closeout Procedures. Payroll and Receipts may be audited.

When Contractor/Subcontractor has completed the Work

Contractor should notify their insurance agent/broker to remove any exclusion for this Designated Project from their primary policies.

Claims

All Contractors/Subcontractors must follow claims rules and procedures outlined in the MSCAA OCIP Manual.

Safety

All Contractors/Subcontractors must follow safety rules and procedures outlined in the MSCAA OCIP Site Specific Safety Plan.

Notice to All Contractors/Subcontractors

Failure to follow the Enrollment or Claims procedures outlined in MSCAA OCIP Manual may result in fines being assessed by the State Bureau/NCCI, State's Workers' Compensation Commission or the Owner against the Contractor or Subcontractor. If the Owner or Carrier is assessed fines due to Contractor's or Subcontract's failure to follow State rules or regulations, the Owner will deduct from monies due or to become due for any applicable fines.

CHANGES TO ANY OCIP REQUIREMENT OR PROCEDURE MUST BE APPROVED BY THE OWNER AND OCIP ADMINISTRATOR. NO CONTRACTOR OR SUBCONTRACTOR HAS THE AUTHORITY TO AMEND THE OCIP

REQUIREMENTS.

INTRODUCTION

This manual identifies, defines, and assigns responsibilities related to the administration of the Memphis-Shelby County Airport Authority (MSCAA) Owner Controlled Insurance Program (OCIP).

This manual:

- Describes the OCIP and details the insurance-related responsibilities of the various parties involved.
- Provides a basic description of the OCIP structure and operation, with an overview of coverage provided by the OCIP and guidelines for carrying out specific administrative and audit procedures.
- Provides answers to questions that are likely to arise during the course of the project.

Because it is impossible to anticipate every question or situation that may arise, the directory lists those involved in the administration of the OCIP and their areas of expertise. Please feel free to call with any questions.

This Manual will be updated as changes dictate during the course of this project.

NOTE

- This Manual does not, and is not intended to, provide coverage interpretations or complete information about coverages.
- The terms and conditions of the insurance policies govern how coverage is applied.
- The information herein is not intended to alter any provisions of the actual contract documents of the Contractors, and if any such conflict occurs, the contract documents will govern.

CHANGES TO ANY OCIP REQUIREMENT OR PROCEDURE MUST BE APPROVED BY THE SPONSOR AND OCIP ADMINISTRATOR. NO CONTRACTOR OR SUBCONTRACTOR HAS THE AUTHORITY TO AMEND THE OCIP REQUIREMENTS.

ADMINISTRATION

Program Management

OCIP Program Coordinator

Willis Towers Watson

John Shorten

8285 Tournament Drive, Suite 130
Memphis, TN 38125

Phone: (901) 248-3102

Fax: (901) 248-3101

E-mail: john.shorten@willistowerswatson.com

OCIP Program Unit Manager

Willis Towers Watson

Nancy Jarmon

500 North Akard St., Suite 4300
Dallas, TX 75201

Phone: (972) 973-2394

Fax: (972) 386-5561

E-Mail: nancy.jarmon@willistowerswatson.com

OCIP Administration

Willis Towers Watson

Sharyn Malachi

Five Concourse Parkway 18th Floor
Atlanta, GA 30328

Phone: (770) 548-3702

E-Mail: Sharyn.malachi@willistowerswatson.com

On-Site Safety

Willis Towers Watson

Wes Shelby

4225 Airways Blvd.
Memphis, TN 38116

Phone: (901) 344-1659

Fax: (901) 345-6636

Cell: (901) 604-2136

E-Mail: wes.shelby@willistowerswatson.com

Claims Management

Zurich North America

PO Box 968077
Schaumburg, IL 60196-8077

FAX NUMBER FOR REPORTING CLAIMS: (877) 967-2567

GENERAL CLAIMS FAX NUMBER: (615) 872-1303

GENERAL PHONE NUMBER: (800) 366-8366

Leadership	Title	Phone	Email
Tammy Fike	GL Sr. Specialist	(404) 851-3616	tammy.fike@zurichna.com
Ginny Howard	WC Team Manager	(615) 872-1315	ginny.howard@zurichna.com
Karen Kingo	WC Pension Manager	(847)413-5868	karen.kingo@zurichna.com
Vea Storey	WC Claims Specialist	(615) 872-1241	veatrice.storey@zurichna.com
Patricia Painter	WC Claims Specialist	(615) 391-7501	patricia.painter@zurichna.com
Nat Woodruff	Claims Customer Service Executive	(404) 851-3278	nathaniel.woodruff@zurichna.com

Insurance Policy References

Workers Compensation

Insurance Company: Zurich American Insurance Company

Master Policy Number: WC 0183275-00

Each Contractor and/or Subcontractor will be issued their own Workers' Compensation Policy

Part One - Workers' Compensation TN State Limits

Part Two - Employers' Liability

Bodily Injury by Accident – Each Accident \$1,000,000

Bodily Injury by Disease – Policy Limit \$1,000,000

Bodily Injury by Disease – Each Employee \$1,000,000

Part Three – Other States Insurance

All States except those listed in Part One and Monopolistic States (OH,ND,WA,WY)

Commercial General Liability

Insurance Company: Zurich American Insurance Company

Master Policy Number: GLO 0183276-00

General Aggregate Limit (Other than Products – Completed Operations) \$4,000,000

Product-completed Operations Aggregate Limit \$4,000,000

Personal and Advertising Injury Limit (Any One Person or Organization) \$2,000,000

Each Occurrence Limit \$2,000,000

Fire Legal Liability (Any One Fire) \$250,000

Medical Expense Limit (Any One Person) \$10,000

Umbrella Liability

Insurance Company: ACE Property and Casualty Insurance Company

Master Policy Number: XCQ G46622029 001

Limits: \$25,000,000 excess of primary

Excess Liability – Layer 1

Insurance Company: Allied World National Assurance Company

Master Policy Number: 0310-6256

Limits: \$25,000,000 excess of \$25,000,000

Excess Liability – Layer 2

Insurance Company: Endurance Risk Solutions Assurance Co.

Master Policy Number: XSC30000293300

Limits: \$25,000,000 excess of \$50,000,000

Excess Liability – Layer 3

Insurance Company: Westchester Fire Insurance Company

Master Policy Number: G46621116001

Limits: \$25,000,000 excess of \$75,000,000

Program Definitions

Owner Controlled Insurance Program (OCIP)	The Insurance Program under which Workers' Compensation, Employer's Liability, Commercial General Liability and Excess Liability are procured or provided on a project "wrap-up" basis for Contractors/Subcontractors(s) of any tier, who have been properly enrolled, while performing operations on a designated Project Site for Memphis-Shelby County Airport Authority.
Insured	The Memphis-Shelby County Airport Authority, Contractors(s) and Subcontractors of any tier who are enrolled in the OCIP and who have been named in a policy, certificate of insurance, or advice of insurance.
Enrolled Contractors	"Enrolled Contractors", mean "Eligible Contractors" who, prior to the commencement of their work on the covered project, have completed the appropriate enrollments documents for the "designated project site".
Insurer	Insurance Company, as identified in the Insurance Policy Reference section.
OCIP Coordinator and Administrator	The firms responsible for the insurance broker and administration of the OCIP.
OCIP Safety Consultants	These representatives are employees of the Insurer and Willis Towers Watson who will provide safety consulting services to MSCAA and its contractors enrolled in the OCIP.
Project Description	All Designated Projects identified and approved by the Owner and on file with the Insurance Company.
On-Site Activities/ Designated Project	<p>Zurich's designated project means:</p> <p>"The project shown in this Schedule, including operations on the project site or location that are necessary or incidental to the project as described in contract documents. "Designated Project" includes the work site(s) associated with such "designated project(s)" and any offsite staging areas, as long as they are dedicated solely to the "designated project(s)" and the sponsor agrees to provide coverage. Also included are those areas immediately adjacent to the "designated projects", including boundaries of local streets or public easement, in which the enrolled subcontractors at any tier perform work under their respective contracts."</p> <p>The OCIP does not provide insurance coverage for permanent yards or other locations of any Contractors/Subcontractors, except as specifically requested by Contractors and, if accepted by insurer, endorsed to the policy.</p>
Eligible Contractors	Insured by the OCIP: Eligible Contractors include all contractors providing direct labor on the Designated Project (see definition of ineligible contractors below). Temporary labor services and leasing companies are to be treated as subcontractors.
Ineligible Contractors	Not insured by the OCIP: Includes (but is not limited to) contractors performing any type of environmental remediation work (example: asbestos or underground tank removal), consultants, suppliers (that do not perform or subcontract installation), vendors, materials dealers, guard services, janitorial services, truckers (including trucking to any Designated Project where delivery is the only scope of work performed), Blasting Contractors or Any Person or organizations that manufactures or fabricates products or components outside the designated project that does not also install the product or component at the designated project, employee leasing companies, temporary labor services and other temporary project services. However, such Employee leasing and temporary labor service companies can be insured by the OCIP but must be submitted for review to the OCIP administrator prior to acceptance.

Certificate of Insurance

Written evidence of the existence of coverage terms of a particular insurance policy.

COVERAGE SUMMARY

The OCIP coverage applies only to work performed under the Agreement at any Designated Project Site for eligible enrolled contractors. Contractor and Subcontractors must provide their own insurance as detailed in the contract.

Through a combination of insured and self-insured insurance programs the Owner, at its sole expense, will provide and maintain in force the types of insurance listed in subsection (1) through (4) below as a part of the OCIP for Contractor and eligible Subcontractors who have been enrolled. Contractor and eligible Subcontractors enrolled in the OCIP agree that the insurance company policy limits of liability, coverage terms and conditions shall determine the scope of coverage provided by the OCIP.

This section provides a brief description of the coverages provided under the OCIP. The Contractor shall refer to the actual policies for details concerning coverages, exclusions, and limitations. Policies are available for review upon request.

While the OCIP is intended to provide uniform coverages and reasonable limits, the OCIP is not intended to meet all the insurance needs of the Contractor and all eligible Subcontractors who have been properly enrolled. Contractor and eligible Subcontractors enrolled in the OCIP agree that they will discuss the OCIP with their insurance agent or consultant to ensure that proper coverages are maintained. It is the contractors' responsibility to notify their agent that the work performed on-site will be insured under an OCIP.

1) **Workers' Compensation and Employers' Liability Insurance** (Off-site operations are excluded unless locations are scheduled & approved by the Owner and OCIP insurance carriers) with Statutory Limits with All States Endorsement and minimum Employer's Liability Limits will be provided as follows:

- a) \$1,000,000 Bodily Injury with Accident - Each Accident;
- b) \$1,000,000 Bodily Injury by Disease - Policy Limit
- c) \$1,000,000 Bodily Injury by Disease - Each Employee; and

Each Enrolled Contractor will be issued a separate Workers' Compensation policy. The premium and loss experience on the Project Site will be reported to the appropriate rating authorities in the normal manner for use in calculating Enrolled Contractors' future experience modifiers. OCIP loss experience will impact Contractor's future insurance costs and, therefore, compliance with the project safety guidelines will directly benefit all Contractors.

2) **Commercial General Liability Insurance**, (Off-site operations are excluded unless locations are scheduled & approved by the Owner and OCIP insurance carriers) will be provided on an "occurrence" form under a single liability policy. Certificates of insurance will be provided to the Contractor and all tiers of eligible Subcontractors reflecting the following Limits of Liability, Coverages, and Terms:

a) Limit of Liability: Limits of Liability Shared by all Enrolled Contractors

General Aggregate Limit (Other than Products – Completed Operations)	\$4,000,000
Product-completed Operations Aggregate Limit	\$4,000,000
Personal and Advertising Injury Limit (Any One Person or Organization)	\$2,000,000
Each Occurrence Limit	\$2,000,000
Fire Legal Liability (Any One Fire)	\$250,000
Medical Expense Limit (Any One Person)	\$10,000

b) Coverage and Terms:

- i) Occurrence Basis;
- ii) Products;
- iii) Contractual Liability specifically designating the indemnity provision of this agreement as an insured contract;
- iv) Completed Operations (Six Year Term);
- v) Independent Contractor/Subcontractor's Liability;
- vi) Personal Injury; Explosion, Collapse, and Underground (X, C, U) exclusion deleted;
- vii) Coverage limited to any Designated Project;
- viii) General Aggregate Limits will apply per project and annually;
- ix) Products and Completed Operations Aggregate Limit applies once or all projects and applies once for the policy period and extended completed operations period combined; and

- x) Policy Exclusions include (but are not limited to) asbestos, pollution, mold, professional liability, employment practices, EIFS, impaired property and work or operations performed away from any Designated Project Site.
 - c) If a claim arises under the Owner provided Commercial General Liability OCIP policy from the partial or sole negligence of a Contractor or Subcontractor, or for violation of any OCIP Safety Requirements, such Contractor or Subcontractor shall be responsible for reimbursing the Owner's deductible to the extent of their respective negligence, as determined solely by owner, up to a maximum of \$10,000 per occurrence per Contractor.
 - d) The limits of liability detailed under 2) a) apply to construction operations within the property boundary of the applicable Airport under the management of MSCAA and as per the issued policies' definitions.
- 3) **Umbrella and Excess Liability Insurance** (Off-site operations are excluded)
- a) Limits of Liability Shared by all Enrolled Contractors
 - i) \$100,000,000 per Occurrence
 - ii) \$100,000,000 Aggregate
 - iii) \$100,000,000 Products / Completed Operations Aggregate
- 4) **Builder's Risk Insurance** will be provided on "All-Risk" coverage on a replacement cost basis, subject to the limits of the insurance policy. This insurance will include the interests of the Owner the Contractor and all tiers of Subcontractors in the Work. The Builders Risk policy will not provide coverage against loss by theft or disappearance of any materials (unless the materials are to be incorporated into the Project), tools, or equipment of the Contractor or any tier of Subcontractor, or any other person furnishing labor or materials for the Work. The Contractor shall be responsible for a deductible of \$25,000 for each and every loss.

ACCIDENT REPORTING AND CLAIMS PROCEDURES

When accidents happen, everyone needs to work together. Even though the Contractors and each Subcontractor has instituted tough safety measures, work-related accidents are bound to occur. When they do, the OCIP Insurers stand ready to serve the Contractors and Subcontractors, but they need help if they are to perform this service in the most effective and efficient manner.

Each Contractor/Subcontractor should have the claims procedures and emergency numbers posted on the jobsite and in all vehicles.

The Insurer will have a claims adjuster available to handle all Commercial General Liability and Workers' Compensation claims.

The Insurer will arrange for legal counsel to handle all lawsuits emanating from the project.

Never discuss any accident or claim with anyone except authorized representatives of MSCAA, Contractor, the Insurer(s), and the Owners Insurance Broker or Law Enforcement agencies.

MSCAA Emergency Procedures (Serious Injuries)

1. Contact MSCAA Emergency Dispatch at **(901) 922-8333 (DO NOT call 911)**. Specific directions should be given to the accident scene. If the accident occurred in the SIDA area, give location in relation to an active taxiway/runway. If outside the SIDA, give location relative to a street or construction gate. Explain the extent of injuries.
2. Notify the on-site OCIP Safety Coordinator, Wes Shelby, (901) 604-2136 (cell).
3. Methodist South Hospital Emergency Room, 1300 Wesley Drive, Memphis, TN, will be used (901) 516-3700, the decision on the treating medical facility will be made by the EMT, in serious cases, Regional One Medical Center may be used.
4. Contractors must have currently qualified First Aid personnel on site at all times. First Aid supplies must be readily available and maintained, including rubber gloves to protect First Aid personnel against blood borne pathogens, etc.
5. After the call for emergency unit is made to MSCAA, the contractor should send escorts to all locations where the emergency unit could enter the site.
6. If the injured employee does not speak English, send a good interpreter to the treating medical facility.
7. The Contractor should provide the Medical Facility with a completed Authorization for Treatment form (sample provided in the OCIP Manual).

A. Workers' Compensation Claims

1. Seek immediate medical attention for the injured person(s).
2. Immediately notify your supervisor and project manager of the situation.
3. Notify the on-site OCIP Safety Coordinator, Wes Shelby, (901) 604-2136 (cell). If you cannot reach Wes, please leave a voice mail message.
4. Complete a **First Report of Injury form** and the **Claim Reporting Cover Sheet** (include appropriate Location Code) and forward to **Zurich Insurance Company** via fax **877-967-2567** or email usz_carecenter@zurichna.com immediately. If not possible, then send before the end of the business day.
5. MSCAA the Contractor's safety representative or designated person will transport the injured worker to

Concentra Medical Center
2831 Airways Boulevard
Suite 102
Memphis, TN 38132
Phone: (901) 348-0200
Hours: 8a.m. to 8p.m. (Mon. – Fri.)

If accident occurs and Concentra Medical Center is not open:

Methodist South Hospital
1300 Wesley Drive
Memphis, TN 38116
Phone: (901) 516-3700
24 Hours, 7 days per week

Or

Baptist Memorial Hospital DeSoto
7601 Southcrest Parkway
Southaven, MS 38671
Phone: (662) 349-4000
24 Hours, 7 days per week

6. Complete the **Accident Investigation Form** and forward it along with the **Claim Reporting Cover Sheet** to Wes Shelby, OCIP Safety Coordinator (e-mail: Wes.Shelby@willis.com, fax: (901) 345-6636, or mail: 4225 Airways Blvd., Memphis, TN 38116 before the end of the day.
7. Receipt of Acknowledgement of Claim and claim number from Zurich Insurance Company will be sent to the contact person provided on the Claim Reporting Cover Sheet and to Wes Shelby, OCIP Safety Coordinator. The claim number should be used for future reference.
8. All medical bills, hospital bills, etc. should be forwarded to Zurich Insurance Company identifying the injured employee and claim number.

After Hours / Close of Business Claims Reporting

1. Call Zurich Insurance Company at (800) 987-3373.
2. Tell the Zurich representative that an injury just occurred and that you need to be routed to the on call specialist to authorize treatment.
3. You will either be placed directly in touch with the on-call person, or the on-call person will be paged and will return your call within two hours.
4. If hospital needs to speak with Zurich directly, the contractor will have to supply the hospital name and phone number to Zurich and they will call the hospital directly.

B. Commercial General Liability Claims

Any occurrence involving Bodily Injury or Property Damage to members of the public that is NOT caused by an automobile accident.

1. Seek immediate medical attention for any injured person(s).
2. Immediately notify your supervisor and project manager of the situation.
3. Notify the on-site OCIP Safety Coordinator, Wes Shelby, (901) 604-2136 (cell). If you cannot reach, please leave a voice mail message.
4. Complete the **Claim Reporting Cover Sheet** (include appropriate Location Code) and forward to Zurich Insurance Company via fax **(866) 691-7068** or email usz_carecenter@zurichna.com immediately. If not possible, then send before the end of the business day.
5. Complete the Accident Investigation Form and Claim Reporting Cover Sheet (include appropriate Location Code) and forward to Wes Shelby, OCIP Safety Coordinator, (e-mail: wes.shelby@willis.com, fax: (901) 345-6636, or mail: 4225 Airways Blvd., Memphis, TN 38116.
6. Receipt of Acknowledgement of Claim and claim number from Zurich Insurance Company will be sent to the contact person provided on the Claim Reporting Cover Sheet and to Wes Shelby, OCIP Safety Coordinator. The claim number should be used for future reference.
7. All investigation reports, pictures, medical bills, hospital bills, etc should be forwarded to Zurich Insurance Company identifying the injured individual, claimant and claim number.

C. Duties in the event of a claim or suit

1. Follow the claims reporting procedures above.
2. You must see to it that the OCIP Safety Coordinator, Wes Shelby, is notified promptly of an "occurrence" which may result in a claim. Notice should include:
 - a. How, when and where the "occurrence" took place, and;
 - b. The names and addresses of any injured persons and witnesses.
3. If a claim is made or "lawsuit" is brought against any insured, you provide written notice of the claim or "lawsuit".
4. You and any other involved insured must:
 - a. Cooperate with the Insurer in their investigation, settlement or defense of the claims or "suit"; and
 - b. Assist the Insurer, upon their request, in the enforcement of any right against any person or organization which may be liable to the insured because of injury or damage to which this insurance may also apply.
5. No Insureds will, except at their own cost, voluntarily make a payment, assume any obligation or incur any expense, other than for first aid, without Insurer's consent.

D. Automobile Claims

Even though no Automobile Liability or Physical Damage coverage is provided under the OCIP, the Contractor/Subcontractor must notify Wes Shelby, OCIP Safety Coordinator, in writing of any automobile accident which could be related to the project. This should be done as soon as possible following the accident.

E. Contractor's Equipment Claims

Even though no coverage is provided under the OCIP for loss of or damage to Contractor's or Subcontractor's owned equipment the Contractor/Subcontractors must notify Wes Shelby, OCIP Safety Coordinator, in writing, of any loss or damage to their equipment at the project. This should be done as soon as possible, following first knowledge of loss or damage.

F. Miscellaneous Claims Notes

1. Any incident that involved injury to persons or property is to be reported to Wes Shelby, OCIP Safety Coordinator's office immediately.
2. Any claims adjuster representing a Contractor/Subcontractor's normal insurer who seeks to come onto Any Designated Project site must obtain written authorization from Wes Shelby, OCIP Safety Coordinator, prior to coming on the site. There will be no exceptions to this stipulation.

FORMS

Zurich Claim Reporting Cover Sheet

Incident Investigation Report

Workers' Compensation Referral Slip for Injured Employees

Authorization to Treat

Form 1 – Notice of Sub-contract Award

Form 2 – Enrollment Form

Form 4 – Notice of Anticipated Completion

Certificate of Insurance

ZURICH CLAIM REPORTING COVER SHEET

Email to: USZ_CARECENTER@ZURICHNA.COM

OR

Fax to: (866) 691-7068

Account Name: **Memphis Shelby County Airport OCIP IV**

Master WC policy #: **WC 0183275-00**

Master GL Policy #: **GLO 0183276-00**

Project Location: _____

Subcontractor/Employer: _____

Subcontractor/Employer Policy Number: _____

Contact Name: _____

Contact Phone Number: _____

Contact Fax Number: _____

Location Code: _____

Injured Worker: _____

Attention Zurich Representative – Please fax the receipt and claim number immediately to the contact above.

Incident Investigation Report

(To be completed within 24 hours by Supervisor at time of incident)

INJURED EMPLOYEE INFORMATION

Employee Name	Male	Female	Date of Birth	Ht.	Wt.
<hr/>					
Employee Address	Street	City	State	Zip Code	Home Phone
<hr/>					
Employer Name	Address		Jobsite/Area		
Date of Incident	Time	AM/PM	Length of Employment		
Employee Job Title	Shift		Supervisor		
Weather Condition	<hr/>				

UNSAFE ACTS

What actions caused or contributed to the incident?

- ☐ Operating equipment without authority
- ☐ Failure to warn/signal
- ☐ Failure to secure/lock out/tag out
- ☐ Reaching into/servicing equipment in operation
- ☐ Making safety devices inoperable
- ☐ Used defective equipment
- ☐ Took unsafe/improper position
- ☐ Horseplay, disruptive actions
- ☐ Improper lifting or movement
- ☐ Other:

- ☐ No unsafe action

What actions caused or influenced above unsafe acts?

- ☐ Unaware of job hazards
- ☐ Inattention to hazards
- ☐ Unaware of safe method/procedure
- ☐ Tried to gain or save time
- ☐ Influence of fatigue/illness
- ☐ Influence of emotions/stress
- ☐ Defective vision/bodily defects
- ☐ Under influence of alcohol or drugs
- ☐ Failure to enforce procedures/rules
- ☐ Other:

UNSAFE CONDITIONS

What conditions of tools, equipment, or environment contributed to incident?

- ☐ Inadequate guard/barrier/safety device
- ☐ Inadequate/improper protective equipment
- ☐ Inadequate warning system
- ☐ Defective or work tools/equipment materials
- ☐ Congestion or restricted area
- ☐ Fire or explosion hazard
- ☐ Hazardous storage method
- ☐ Unsecured against movement
- ☐ Lighting/noise/visual obstruction
- ☐ Environmental/atmospheric conditions
- ☐ Other:

- ☐ No unsafe condition

What caused or influenced above unsafe condition?

- ☐ Defective/worn from normal use
- ☐ Defective/worn from abuse/misuse
- ☐ Housekeeping/cleaning failure
- ☐ Lack of preventative maintenance
- ☐ Inadequate maintenance
- ☐ Exposure to environment
- ☐ Inadequate purchasing
- ☐ Safety inspection failure
- ☐ Other:

- ☐ Unknown

INJURY/ILLNESS DATA

Describe the nature and extent of injury/illness (body part affected, type of injury, etc.)

Was first aid administered?	Yes	No	If yes, what type and by whom
Was employee taken to hospital/clinic?	Yes	No	If yes, list name, address and phone number of
hospital/physician/nurse attending <hr/>			

List any eyewitnesses to the incident and others who might provide information about the incident

INCIDENT/ILLNESS EVALUATION

How did the incident occur? Describe in detail the task the employee was doing when injured or became ill. Include specifics such as equipment, structure tools, materials, objects (size, shape, and weight), people involved in the task, positions, distances, rate of movement, sequence of events, etc.

(Attach any additional information comments, documentation of interviews, sketches, pictures, etc. as necessary)

Incident Investigation Report

Incident/Illness Evaluation (continued)

Type of exertion/body motion during injury: Pull _____ Lift _____ Bend _____ Reach _____ Twist _____ Other _____
Was this the employee's regular job? Yes _____ No _____ How much experience does this employee have on this job? _____
Was the employee trained in this job or task? Yes _____ No _____ When was last training on this task? _____
Was this the employee's first job-related injury or illness? Yes _____ No _____ If no, briefly describe previous injuries (date, nature, extent, etc.) _____

Hours of overtime worked in last 24 hours _____ Did this possibly contribute to incident? If so, describe _____

Does a safety rule or policy apply to this task? Yes _____ No _____ If yes, describe rule and how employee followed or violated _____

Does a specific procedure for task exist? Yes _____ No _____ If yes, describe procedure briefly and if it was followed _____

Is protective equipment required for this task? Yes _____ No _____ If yes, describe equipment, if it was used, if it was adequate/functioned properly, and if the employee(s) were trained on it. _____

Is there possibly any third party which contributed to the incident? (Other contractors, employee, etc.) Yes _____ No _____
If yes, describe. _____

Did any unsafe physical/environmental conditions exist? Yes _____ No _____ If yes, describe conditions (physical, mechanical, electrical, etc.) which contributed to the incident _____

Is material handling equipment required for this task? Yes _____ No _____ If yes, was it used and did it function properly? _____

Possible actions to be taken to prevent reoccurrence

_____ Reinstruction of employee(s) involved	_____ Do/revise Job Safety Analysis	_____ Repair/replace/modify equipment
_____ Preventative instruction of others who do job	_____ Revise/establish safety rule	_____ Improve clean-up procedure
_____ Training of employee(s)	_____ Reassign employee to another job	_____ Improve inspection procedure
_____ Action to improve enforcement	_____ Require/replace protective equipment	_____ Eliminate/reduce congestion
_____ Reprimand/discipline of employee(s) involved	_____ Install safety guard device	_____ Improve design/construction
		_____ Improve environmental conditions

CORRECTIVE ACTION(S) TAKEN OR PLANNED

What was/will be done	By Whom	Estimated Completion Date	Completion Confirmed	
			Date	Initials

Incident discussed with employee to prevent reoccurrence? Yes _____ No _____ Date _____
Any disciplinary action taken? Yes _____ No _____ If yes, describe what type. _____

FOLLOW UP COMMUNICATION

YES _____ NO _____ Incident site reviewed by supervisor with employee (and safety coordinator if applicable.)
YES _____ NO _____ Incident review meeting conducted. Attended by _____
YES _____ NO _____ Employee or supervisor reviewed incident with work group.
YES _____ NO _____ Employee reviewed injury with safety committee
YES _____ NO _____ Project Safety informed of incident

Date of Report _____ Prepared by _____ Title _____

Reviewed by _____ Superintendent _____

Signature

MSCAA OCIP IV

4225 Airways Blvd.
Memphis, TN, 38116

WORKER'S COMPENSATION REFERRAL SLIP FOR INJURED EMPLOYEES

On-Site EMT: (901) 922-8333

Authorized Clinic: **Concentra Medical Center**
2831 Airways Boulevard
Suite 102
Memphis, TN 38132
(901) 348-0200 (Phone)
(901) 348-0046 (Fax)

Clinic Hours: 8 a.m. to 8 p.m. (Mon. – Fri.)

Authorized After- **Methodist South Hospital**

Hours Clinics: **1300 Wesley Drive**
Memphis, TN 38116
(901) 516-3700

Baptist Memorial Hospital DeSoto
7601 Southcrest Parkway
Southaven, MS 38671
(662) 349-4000

Employee Name: _____ Date: _____

Employer: _____ Employer Policy Number: _____

Location Code (if known): _____ Claim Number (if known): _____

Account Name: **Memphis Shelby County Airport Authority OCIP IV**
Insurer: **Zurich**
Master Policy Number: **WC 0183275-00**

Instructions for medical facility:

The person listed above has been injured on the job. Please provide the employee with medical treatment per OCIP protocol.

MSCAA OCIP IV
Authorization to Treat

Local Office Information

Company Name: _____
Designated Representative: _____
Address: _____
Phone: _____ **Fax:** _____ **E-mail:** _____

Billing Information for Drug Screens

Company Name: **Zurich North America**
Address: PO Box 968077
Schaumburg, IL 60196-8077
Phone: (800) 366-8366 **Fax:** (615) 872-1303

Insurance Information for Work Comp Carrier

Company Name: Zurich American Insurance Company **Master Policy #: WC 0183275-00**
Address: PO Box 968077
Schaumburg, IL 60196-8077
Phone: (877) 928-4531 **Fax:** (866) 691-7068

Services Required

Worker's Comp Injuries _____

Drug Screen Required For (employer to check necessary testing):

____ Pre-Employment	____ Random
____ Probable Cause	____ Post Accident
____ Urine (collection only)	____ Breath Alcohol
____ Test Cup (Cocaine, PCP, etc.)	

Treating Medical Center: Please be advised if negative, DO NOT send out. Be sure to mark on the Chain of Custody (COC) the information for the employer:

Employer: _____ **Fax:** _____

Special Instructions: Use TEST CUP. Do NOT send out unless the test reads positive.

Fax results to designated employer listed above.

Company Authorized Signature:

Date:

MSCAA IV - FORM 1

MSCAA OCIP IV
Notice of Subcontract Award and Request For Insurance

Willis Towers Watson

Sharyn Malachi

500 N. Akard Street Suite 4300

Dallas, TX 75021

Phone: (770) 548-3702

E-mail: sharyn.malachi@willistowerswatson.com

RE: Project Name: _____

This is to inform you that we have awarded the following subcontract to the following Subcontractor:

Name of Firm: _____

Address: _____ City: _____ State: _____ Zip: _____

Phone: (____) _____ Fax: (____) _____

Office Contact: _____ E-Mail: _____

Type of Work: _____ Job # _____ Contract Value: \$ _____

Award Date: _____ Estimated Start Date: _____

Awarding Contractor: _____

By: _____

Title: _____

Date: _____

Prime Contractor (if different) _____

DO NOT complete this form for your own company.

A Form-1 should be completed on each of your Subcontractors.

- **Award Date – date Notice to Proceed was given (Verbally or in Writing)**

- **Start date is mandatory – date shown will be the effective date of coverage.**

Any Contractors or Subcontractors who enrolls in the OCIP 30 days after their start date will have to provide a No Known Loss Letter to the Carrier along with the enrollment documentation.

- ☐ New Award
☐ Additional Contract
☐ Time & Material Contract
☐ Short Term (< 30 days)
☐ Small Contract (< \$30,000)

MSCAA OCIP IV ENROLLMENT FORM

Project: _____

CONTRACTOR'S INFORMATION

Contractor: _____ Indv _____ Ptshp _____ Corp _____ J/V _____
 Address: _____ FEIN: _____
 Office Contact: _____ Phone: _____ Email: _____
 Site Contact: _____ Phone: _____ Email: _____
 Safety Contact: _____ Phone: _____ Email: _____
 Insurance Contact: _____ Phone: _____ Email: _____
 Payroll Contact: _____ Phone: _____ Email: _____
 Address (if different): _____

CONTRACT INFORMATION

Contract Value: \$ _____

Job Name/Description: _____ Contract/JOB #: _____
 Awarding Contractor: _____ Prime Contractor: _____
 Award Date: _____ Start Date: _____ Est Completion Date: _____
 Self Performed: _____ %, Est. CV \$: _____ Subcontracted _____ %, Est. CV \$: _____
 Est. # of Subcontractors _____ Est. Man hours _____ DBE/MBE/WBE: _____

CURRENT INSURANCE INFORMATION;

Contractors' Insurance Broker or Agent:

PLEASE PRINT

Company Name: _____ Contact: _____
 City/State/Zip: _____ Phone: (_____) _____

WORKERS' COMPENSATION

Current Experience Modifier: ____ (Provide documentation confirming)

W.C. Classification	W.C. Class Codes	Estimated Payroll
1.		
2.		
3.		
4.		

It is each Contractor's responsibility to notify its own insurance carrier to exclude all work to be done under this contract from your current insurance program. Any Contractors or Subcontractors who enrolls in the OCIP 30 days after their start date will have to provide a No Known Loss Letter to the Carrier along with the enrollment documentation.

Contractor warrants that the insurance costs for coverages provided by the Owner have been removed from the bid and no eligible Subcontractor has been charged by the Contractor for its participation in the OCIP. The OWNER, or their Agent, is granted permission by Contractors to inspect the insurance and payroll records. At completion of the Work, Owner's Agent shall have the right to audit the project payroll records of Contractors. Any and all returns of premiums, dividends, discounts or other adjustments to any OCIP policy, including rights of cancellation, is assigned, transferred and set over absolutely to OWNER. This assignment is valid for insurance policies whose premiums have been paid by the OWNER on behalf of such Contractors.

Signed _____ Title _____ Date _____

Send this Form to:

Willis Towers Watson
 Sharyn Malachi
 500 N. Akard St., Suite 4300
 Dallas, TX 75021

Phone: (770) 548-3702
 E-Mail: Sharyn.Malachi@willistowerswatson.com

MSCAA OCIP IV

NOTICE OF ANTICIPATED COMPLETION

(to be submitted with Final Pay Request)

Send this Form to:

Willis Towers Watson
Sharyn Malachi
500 North Akard St., Suite 4300
Dallas, TX 75201

Phone: (770) 548-3702

E-mail: sharyn.malachi@willistowerswatson.com

Please be advised, we, _____ are scheduled to complete our work for:
 Awarding Contractor: _____ Prime Contractor: _____

Project Description: _____ Actual Start Date: _____ Completion Date: _____

Reported Contract Value: _____ Final Contract Value: _____

Self Performed Work: _____ Subcontracted Work: _____

Estimated WC On Site Payroll: _____ Final WC On Site Payroll: _____

We used the following enrolled subcontractors, who will also complete their work on the date shown above:

<u>Subcontractors</u>	<u>Reported Contract Value</u>	<u>Final Contract Value</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

This is our contract: YES ☐ NO ☐

We are still working on the following contracts:

<u>Location Code</u>	<u>Awarding Contractor</u>	<u>Prime Contractor</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Your Company's Name: _____ Date: _____

By: _____ Title: _____

Final insurance audits may be made under the applicable policies. Please show who in your office (or another location if applicable) is responsible for this information:

Name: _____ Phone: _____ Fax: _____ E-Mail: _____

Address: _____ City: _____ State: _____ Zip _____



CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER Agent Company Name Address City, State ZIP Attn:	CONTACT NAME:	
	PHONE (A/C, No. Ext):	FAX (A/C, No):
INSURED OCIP Enrolled Contractor	E-MAIL ADDRESS:	
	INSURER(S) AFFORDING COVERAGE	
	NAIC#	
	INSURER A : AM BEST Rating A- VII or better	
	INSURER B :	
	INSURER C :	
	INSURER D :	
INSURER E :		
INSURER F :		

COVERAGES

CERTIFICATE NUMBER:

REVISION NUMBER:

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN. THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSR	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YY)	LIMITS
	GENERAL LIABILITY <i>Applies to Off Site Risks</i>	X	X				EACH OCCURRENCE \$1,000,000
X	COMMERCIAL GENERAL LIABILITY						DAMAGES TO RENTED PREMISES(Ea occurrence) \$
	CLAIMS-MADE <input checked="" type="checkbox"/> OCCUR						MED EXP (Any one person) \$
	GEN'L AGGREGATE LIMIT APPLIES PER:						PERSONAL & ADV INJURY \$1,000,000
	POLICY <input checked="" type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC						GENERAL AGGREGATE \$2,000,000
							PRODUCTS-COMP/OP AGG \$2,000,000
	AUTOMOBILE LIABILITY <i>Applies to Off and On Site Risks</i>	X	X				COMBINED SINGLE LIMIT (Ea accident) \$1,000,000
X	ANY AUTO						BODILY INJURY(Per person) \$
X	ALL OWNED AUTOS						BODILY INJURY(Per accident) \$
X	HIRED AUTOS						PROPERTY DAMAGE (Per accident) \$
	SCHEDULED AUTOS						\$
	NON-OWNED AUTOS						\$
X	UMBRELLA LIAB	X	X				EACH OCCURRENCE \$1,000,000
	EXCESS LIAB						AGGREGATE \$1,000,000
	DED <input type="checkbox"/> RETENTION \$ <input type="checkbox"/>						\$
	WORKERS' COMPENSATION AND EMPLOYERS' LIABILITY <i>Applies to Off Site Risks</i>	N/A	X				X WC STATUTORY LIMITS OTH-ER
	ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH)						E.L. EACH ACCIDENT \$1,000.00
	If yes, describe under DESCRIPTION OF OPERATIONS below						E.L. DISEASE - EA EMPLOYEE \$1,000.00
	OTHER						E.L. DISEASE - POLICY LIMIT \$1,000.00

DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES (Attach ACORD 101, Additional Remarks Schedule, if more space is required)

Workers' Compensation and Commercial General Liability coverages shown above do not apply to any Designated Project at the Memphis International Airport – only for off-site activities/operations. The Memphis-Shelby County Airport Authority, its officers, commissioners, representatives, agents and employees ATIMA and [AWARDING CONTRACTOR] are additional insureds applicable to the Auto Liability Insurance and off-site Commercial General Liability insurance policies including Excess Umbrella. 30 Day Notice of Cancellation or Non-Renewal other than 10 days for non-payment of premium is provided to MSCAA. Waiver of Subrogation in favor of MSCAA is provided by all policies.

CERTIFICATE HOLDER

MSCAA OCIP
c/o Willis Towers Watson
Attn: OCIP Administrator
500 North Akard St., Suite 4300
Dallas, TX 75201

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

EXHIBIT D
TO
LUMP SUM CONSTRUCTION CONTRACT
FOR
TERMINAL APRON RECONSTRUCTION (including Concourse C Demo) – CONSTRUCTION

BY AND BETWEEN
THE MEMPHIS-SHELBY COUNTY AIRPORT AUTHORITY
AND
(CONTRACTOR NAME)

CONSTRUCTION SAFETY AND HEALTH GUIDELINES

Memphis-Shelby County Airport Authority

Construction Safety and Health Guidelines



Revision	Date
1	11/30/2012
2	05/02/2016
3	02/06/2017

Confirmation of these Project Safety & Health Guidelines

It is the responsibility of the Contractor to maintain total control of safety to ensure that employees and the general public are provided with an environment free of hazards during construction and renovation activities. This program does not relieve the Contractor of their responsibilities regarding the safety of their employees, the employees of their Subcontractors and sub-subcontractors, protection of the general public and the preservation of property.

Contractors shall develop their own written site-specific safety and health plans for the Memphis-Shelby County Airport Authority. At minimum, the safety and health plan shall meet the requirements of 29CFR1926 – Federal OSHA Construction regulations and the requirements established in the **Memphis-Shelby County Airport Authority Construction Safety Guidelines**. In short, as required by law, each Contractor is responsible for protecting the health and safety of its employees and the employees of each subcontractor and sub-subcontractor while ensuring they have a safe and healthful place to work. The site-specific safety and health program shall be submitted for approval within fifteen (15) days after the Notice to Proceed for approval to the Project Safety Manager, Wes Shelby, 4225 Airways Blvd., Memphis, TN.

The Safety Requirements of these safety guidelines are a supplementary document to all Government rules, codes and regulations. It does not negate, abrogate, alter or otherwise change any provisions of these rules, codes and/or regulations, and is intended to supplement and enforce the individual program of each contractor and the overall safety effort. It is understood that the ultimate responsibility for providing a safe place to work rests with each individual Contractor.

In the event of a conflict between the provisions of these guidelines and applicable local, State or Federal safety and health laws, regulations and/or standards, contract documents or the Contractor's Safety Plan the more stringent shall apply.

By Signature, each individual confirms their understanding of the contents of this manual and shall conform to the standards of safety outlined in this manual.

Contractor – Project Manager

Contractor – Field Supervisor

Date

Date

POLICY STATEMENT

Memphis-Shelby County Airport Authority is committed that all construction workers have the best possible working environment while working on this project. It shall be the responsibility of each Contractor/Subcontractor to abide by the Safety and Health Provisions listed in OSHA 29 CFR 1926.

In addition, each Contractor, Subcontractor and Sub-Subcontractor shall abide by **Memphis-Shelby County Airport Authority** Construction Safety Guidelines, Federal Regulations, State laws and regulations, local and county laws and regulations which are applicable.

The primary goal established for the **Memphis-Shelby County Airport Authority** is to safely perform work with “**ZERO ACCIDENTS**”; totally free from lost time injuries for the mutual benefit of the worker, environment, and community.

The safety goals and objectives established for the Project can only be achieved when everyone commits to perform their tasks safely and efficiently. This commitment to achieve these goals will result in both increased productivity and the PREVENTION of job related injuries and illnesses. This will be considered as safe construction.

Definitions

OCIP Team – Means the Owner **Memphis-Shelby County Airport Authority**, Willis Towers Watson and all applicable insurance carrier representatives or the representative of defined such agencies and firms working together to implement the OCIP insurance program.

Construction Managers – Means the Management Group or General Contractor that has direct contract with the Owner **Memphis-Shelby County Airport Authority** to provide the overall control of the construction at the project.

General Contractor – Means the Contractor that has direct contract with the owner or Construction Managers as bid for the project. The General Contractor is also the controlling contractor on the construction site when a Construction Manager is not present.

Subcontractor – Means the contractor and or contractors that carry contracts with the General Contractor or Construction Managers. Subcontractors bid portions of the scope of work to be completed.

Sub-Subcontractors – Means any subcontractors of a subcontractors working or contracted to do work on the project.

Critical Lift – A lift that exceeds 75% of the rated capacity of the crane or requires the use of more than one crane. Also, relates to the installation of equipment and or materials that are critical to the completion of the project and damage to such equipment and/or material could result in delays to the project.

The General Public – Is defined as all persons not employed by or under contract, subcontract, or sub-subcontract to the **Memphis-Shelby County Airport Authority**.

PREFACE

From the inception of **Memphis-Shelby County Airport Authority** there has been a determination and commitment to provide a safe environment for all workers and for the public from hazards associated with the construction of the Project.

All Contractors shall implement measures that will create safety awareness, promote safe work practices at the job site and pursue the contract objectives in the safest possible manner. Each Contractor shall bear sole and exclusive responsibility for safety in all phases of their work. Nothing contained herein shall relieve such responsibility.

Each Contractor shall be responsible for all its subcontractors' and sub-subcontractors' compliance with the project safety requirements.

Contractors shall develop their own written site-specific safety and health plan for the MSCAA OCIP. At minimum, the safety and health plan shall conform to the requirements addressed in the Occupational Safety and Health Act of 1970 and all additions and revisions thereto, and the requirements established in the **Memphis-Shelby County Airport**

Authority Construction Safety Guidelines. In short, as required by law, each Contractor is responsible for protecting the health and safety of its employees while ensuring they have a safe and healthful place to work.

Contractor developed plans/program(s).

Programs will be reviewed and approved by OCIP Team. Example(s) of such OSHA mandated plans/programs are shown below.

Site Traffic Control Plan	Fall Protection Plan
Fire Protection Plan	Trench Safety Plan
Respiratory Protection Plan	Hazard Communication Program
Confined Space Entry	Scaffold Safety Program
Hearing Conservation Program	Ladder Safety Training
Dust Control Plan	

Emergency Procedures shall be made part of the Contractor's Safety Program. The following provisions shall be included in the emergency plan:

- a. Highest ranking supervisor automatically becomes responsible for the handling any emergency that occurs during his working hours; they may call upon the assistance of any available worker. A responsible supervisor must be designated for each shift.
- b. On a regular basis, at both supervisory and "weekly toolbox meetings" instruct and update all employees in any course of action for emergencies.
- c. Establish teams to handle each of the various emergencies.
- d. Following an emergency, ranking personnel shall secure the area as expediently as possible and provide access and an account of the emergency to authorized representative(s) of MSCAA. Questions from the media should be referred to MSCAA.

Emergency procedures that may occur during any 24-hour period in the following categories must be established by each contractor:

- a. Fire
- b. Employee injury
- c. Pedestrian injury due to work activity of any kind
- d. Property damage and damage to above ground and buried utilities
- e. Public demonstrations
- f. Bomb threats

On a regular basis, the Contractor shall review and, when necessary, update Emergency Procedures for maximum effectiveness. The contractor should provide MSCAA, the Construction manager, and the on-site safety rep a telephone list of key management personnel, for after-hours emergency contact.

Should a serious accident or emergency occur, the contractor shall contact the Construction Manager immediately. If an emergency requires the presence of an ambulance or the Fire Department, including nights, weekends and holidays, the contractor shall call MSCAA emergency dispatch at (901)922-8333. Non injury accidents need to be reported to the airport police at (901)922-8298. **DO USE 911**

Site Access

1. ***Use only designated haul routes/crossings.***
2. ***Stay in assigned work area as identified on plans and as defined by fences and barricades. Barricades/fences must not be crossed.***
3. ***Instructions from guards and escort personnel must be obeyed.***

Contractors, Subcontractors, and Sub-Subcontractors will be monitored for implementation and application of their respective safety programs at the work site. Members of the OCIP Team shall have the authority to stop work when either site conditions and/or work practices present an imminent danger until those conditions and/or practices are corrected. Contractors will be notified of any non-compliance and corrective action required. This notice, when delivered to the contractor or their representative at the site of the work, shall be deemed sufficient notice of non-compliance and corrective action required. After receiving the notice, the contractor shall immediately take corrective action. If the contractor fails or

refuses to take corrective action promptly, a stop work order may be issued. The cost to bring the work activity into compliance shall be incurred by the Contractor, Subcontractor or Sub-subcontractor. The Contractor, Subcontractor or Sub-Subcontractor shall not submit a request for extension of time or increased costs as a result of any such stop work order. Members of the OCIP Team shall not be liable for any damages experienced by the Contractor due to the work stoppage. Progress payments may also cease until the Contractor and/or its Subcontractor and Sub-Subcontractors is in full compliance with all applicable safety and health rules, standards, and regulations.

Each Contractor and their subcontractors and sub-subcontractors shall establish and enforce an effective disciplinary program (Appendix B). Contractors shall discipline and/or dismiss employees who violate established rules and regulations. This includes immediate termination for serious violations, repeated violations, or the refusal to follow safety and health rules.

OCIP Team members shall have the authority to effectively remove from the site, any person (employees including supervisors and management of any contractor) who is regarded as a frequent violator of safe work practices, or who fails to ensure persons working under their supervision or in a work place they control are not exposed to serious work hazards. Any Competent Person assigned to identify existing and predictable hazards and authorized to eliminate them, which fails to perform this duty for any reason shall be replaced by the employer.

The Contractor shall not receive additional payment or reimbursement for safety items and procedures which have been identified as required by the Project Safety and Health Guidelines.

Failure to comply with the contract safety requirements will be considered as non-compliance with the contract and may result in remedial action including withholding of progress payments due the Contractor and/or termination of the Contractor from the site.

In the event the work or any portion thereof is shut down by either an outside agency or because of an unsafe condition as determined by the OCIP Team, the responsible Contractor shall bear the total cost caused by that shut down.

In no case shall the Contractor be relieved of overall responsibility for compliance with the requirements of federal, state and local safety and health laws for all work to be performed under the contract

For any construction equipment working near operating right of way and in aircraft safety areas that could encroach into MSCAA's operating right of way and aircraft safety areas shall submit to MSCAA (and obtain approval from the MSCAA) a plan describing the use of such equipment, and the necessary precautions to be taken to preclude any accidental encroachment unto the right of way or aircraft safety area.

INTRODUCTION

Construction Safety and Health Guidelines, Purpose and Scope

These guidelines are established to aid in the prevention of job-related accidents and health problems during the construction of the **Memphis-Shelby County Airport Authority**. These guidelines set forth elements which all Contractors, subcontractors and sub-subcontractors shall include in their safety plan. This manual is not all-inclusive. Other elements may be added or conveyed individually to Contractors to whom they expressly apply. There are other essentials which some Contractors, by nature of the specific type of work being performed, must integrate within their own safety plan.

These guidelines set forth basic rules and regulations for all personnel involved in the construction of the Project. The intent of these guidelines is to enhance and supplement the safety and health standards which are required by law, in contract documents, and are applicable to the construction projects for which it is applied. These guidelines do not cover the full spectrum of published safety and health standards mandated by law, and Contractors shall not assume that they are responsible only for those which are referenced in this manual, nor that they are current and quoted as published. It is the responsibility of the Contractor and its employees to ensure that they are in compliance and their safety plan is in compliance with all safety directives required by law.

In the event of a conflict between the provisions of these guidelines and applicable local, State or Federal safety and health laws, regulations and/or standards, contract documents or the Contractor's Safety Plan the more stringent shall apply.

RESPONSIBILITIES

General

Each participant involved in the construction of the Project is individually responsible for conducting their activities to ensure compliance with all applicable safety and health requirements. Construction activities of the Contractor and their Subcontractors and sub-subcontractors will be monitored for compliance with FAA, MSCAA, Federal, State, County, and local safety and health regulations and contract safety and health requirements.

Contractors

The Contractor shall be responsible for the safety and health of employees, subcontractors, sub-subcontractors, visitors, and vendors in accordance with State, Local and Federal regulations, and the Contract Documents. Each Contractor shall establish and submit for review a written Safety and Health Plan which includes details commensurate with the work to be performed. The Contractor's Safety and Health Plan shall clearly describe the contractor's commitments for meeting its obligations to provide a safe and healthful work environment for its employees and subcontractor employees, to protect vendors, visitors, and members of the general public. The Contractor's Safety and Health Plan shall reference Federal OSHA standards, and any other rules or regulations applicable to construction activities.

Each Contractor shall designate an on-site Safety Representative who is charged with the responsibility of on-site safety management. The Safety Representative's sole duty shall be safety management and shall not have other collateral duties. At minimum the safety representative shall meet the requirements of a "competent person" as defined by OSHA for all phases of construction and have a minimum of three (3) years construction safety experience. A resume shall be provided that outlines such items as: work experience, education, training completed and professional organizations, etc. The safety representative shall remain on the Project until contract acceptance (full-term of contract). Safety representative must be knowledgeable on SC-230, SC-240, and other safety requirements as outlined in GP-200, the safety plan and site safety manual. The safety representative shall be interview by the OCIP Team.

As a condition of this contract, a safety improvement team shall be established for this project. The following guidelines (Appendix H) shall be followed.

As a condition of their contract, all Contractors shall submit to the Project Safety Manager or designee:

- A site-specific safety plan within fifteen (15) days after receipt of Notice to proceed and prior to start of any construction activities.
- The name and qualifications (resume) of designated on-site safety person;
- An immediate copy of all citations and/or warning of safety violations received from any state or federal jurisdiction, agency, insurance company, or by any of its subtier contractor.

The Contractor shall:

- Ensure that all employees, subcontractors', and sub-subcontractors' employees are given a comprehensive Safety and Health orientation. This orientation shall include general Safety and Health procedures and policies as well as the project specific rules, regulations, and specific hazards. Employees shall be advised that disregard for these rules, or any other applicable Safety and Health regulations shall be subject to company disciplinary action and/or removal from the project. All workers shall complete an acknowledgment that indicates the worker has read, understood, and will abide by the rules and regulations. The following information shall be obtained from all employees: worker's name, date of orientation, Contractor's name, and project name (Appendix A).
- Investigate all accidents and incidents that result in personal injury or illness to workers, damage to buildings or equipment and any incident with the general public.
- Conduct daily job inspections, identify unsafe conditions, or work practices and assure they are corrected, and maintain documentation.
- Conduct weekly, documented, safety meetings with Contractor supervisory personnel.
- Attend monthly Safety committee meetings and participate
- Assure that employees acting in a supervisory capacity understand and enforce all safe work practices. **Foreman and supervisors are required to have completed a 10-hour OSHA Outreach hazard recognition course within Two (2) years prior to directing work on the project.** Documentation must be made available for review

- Assure that employees acting in a supervisory capacity understand and enforce all safe work practices. **Foreman and supervisors are required to have completed a 10-hour OSHA Outreach hazard recognition course within Two (2) years prior to directing work on the project.** Documentation must be made available for review.
- Assure a Competent Person is provided at work locations where required by OSHA.
- Assure that all Personal Protective Equipment (PPE) is available and being used as required.
- Assure all construction equipment and motor vehicles certification, inspection, repair, and controls are in compliance with the safety requirements of the project and OSHA. Annual crane certification shall be available for review for each to a crane on the project.
- Prior to making critical crane lift, detailed lift plan shall be submitted. (See Appendix C, "Critical Lift Checklist")
- Assure that all hand and power tools are in safe working order.
- Assure that all work areas are kept clear of debris and trash and that adequate trash barrels are placed throughout the work area and emptied frequently.
- Provide the appropriate number and types of sanitary facilities for employees.
- Assure that fall protection equipment is provided and used. Inspections of this equipment shall be documented and on file for review.
- Assure that all perimeter cables, barricades, or any other safety-related items are installed correctly and maintained. If another Contractor must remove a safety item, coordinate this activity with the Contractor who installed the device and other Contractors who may be exposed. **Safety devices shall be replaced by the Contractor removing them.** Warning signs, tags, or barricades shall be installed if other safety devices are removed.
- Assure that employees receive adequate training as required by the Project and OSHA. Additional training for foreman and safety representative may be required based on unique hazards involved in a task.

WORKPLACE SUBSTANCE ABUSE POLICY

The contractor shall submit as a part of their overall Safety and Health Plan a copy of their company Workplace Substance Abuse policy. This policy shall at minimum comply with Appendix D, "Substance Abuse".

The Contractor shall ensure that all subcontractors and sub-subcontractors are in compliance. The Contractor shall submit a monthly notarized letter stating they and their subcontractors are in compliance with the Project's Substance Abuse Policy.

Contractors should contact the State of Tennessee, at 1-800-332-2667, if there are questions concerning the Tennessee Drug Free Workplace Program. Contractors should also consult their own legal counsel.

INSTRUCTION AND TRAINING

Safety Orientation Program

Newly employed, promoted, and/or transferred personnel shall receive an orientation regarding the general safety and health rules and regulations as well as the site-specific policies and hazards prior to starting work on the construction site. The Contractor shall be responsible for the orientation of their employees, Subcontractors and sub-subcontractors, and visitors. Documentation of this orientation shall be maintained on file for review (Appendix A). Hard hat stickers (provided by the Project) are to be issued to an employee following their orientation, and then documented on training Log Sheet. It is the responsibility of the contractor to ensure that non-English speaking employees receive these same instructions in a language they understand. Safety orientation of all personnel shall include at a minimum the following topics Safety orientation of all personnel shall include at a minimum the following topics:

- Unique hazards of the project
- Employer/personnel responsibilities under OSHA Standards – location of required posters
- Personal protective equipment, including appropriate work attire
- Confined space entry
- 6-Foot fall rule - 100% continuous fall protection (***including steel erection and scaffolds***)
- 100% eye protection, 100% hard hat protection
- Appropriate guarding and other warning devices
- Housekeeping
- Fire protection

- Accident reporting procedures - First-aid facilities - Emergency procedures
- Crane and lifting hazards
- Scaffolding tagging requirements
- Hazard communication/ Right-to-Know, location of MSDS's
- Substance abuse policy
- Disciplinary procedures
- Trenching & excavation
- Electrical hazards

PROTECTION OF THE PUBLIC

All necessary precautions to prevent injury to the public or damage to property of others shall be taken. The "Public" is defined as all persons not employed by or under contractor or subcontractor to **Memphis-Shelby County Airport Authority**. Installation of temporary barriers and/or fencing designated to protect the Public shall be reviewed and approved by the Owner and/or their representative. Precautions shall include but not be limited to the following:

1. Work shall not be performed in any area occupied by the Public unless specifically permitted according to the terms of the contract or in writing.
2. When necessary to maintain public use of work areas involving vehicular roadways, etc., the contractor shall protect the Public in accordance with the applicable regulations.
3. Appropriate warnings, signs and instructional safety signs shall be conspicuously posted where necessary. In addition, a signal person shall control the moving of motorized equipment in areas where the public might be endangered. All signage warnings and traffic control shall comply with the particular agency that takes judicial precedence.
4. Each project work area shall be protected by a fence constructed and erected per MSCAA requirements.
5. Barricades for the general public or public roadways shall be secured against accidental displacement and in place at all times, except when temporary removal is required. As such times, a flag person shall be assigned to control the unprotected area. Barricades used on the airfield will be reconstructed erected and maintained per MSCAA/FAA requirements.
6. Required signs and symbols shall be visible at all times when work is being performed and shall be removed or covered promptly when the hazards no longer exist.

Group Tours and Site Visitors

It is particularly important that a high degree of protection be afforded to all persons on the authorized tours of construction worksites. The following instructions shall be complied with, as applicable, by the Contractor and those responsible for arranging such tours. The following procedures shall be followed:

- a) Group tours shall be cleared through the site **Memphis-Shelby County Airport Authority** office, allowing maximum advance notice.
- b) If visitors to the site will be on foot or out of the vehicle/bus, the individual or organization requesting the tour shall ensure that:
 - In all cases, the Construction Manager, MSCAA and the contractor shall advise of any tour in a timely manner prior to the tour taking place.
 - Release and Hold Harmless Agreement – Each visitor shall be required to sign a release and hold harmless agreement prior to the commencement of the tour.
 - MSCAA will coordinate the tour arrangements and ensure notification to the Construction Manager
 - Tour groups are limited to no more than (25) twenty-five persons.
 - Visitors are required to wear appropriate clothing and shoes.
 - Children under 18 years of age are not permitted on the Project tours.
 - All visitors shall comply with Contractor safety requirements.
 - Site **Memphis-Shelby County Airport Authority** or designee personnel will escort Tours.

HARASSMENT-FREE WORK POLICY

Employee Harassment

It is the policy of **Memphis-Shelby County Airport Authority** to provide a workplace free from employee harassment on the basis of race, color, religion, sex, national origin, age, handicap, disability, etc. Improper interference with the ability of an employee to perform their work activities will not be tolerated. Harassment can appear in many forms, including derogatory comments, jokes, slurs, unwanted physical contact, derogatory drawings or threats.

Sexual Harassment

Unwanted sexual advances, requests for sexual favors and other verbal physical conduct of a sexual nature will not be tolerated. Sexual harassing conduct includes, but is not limited to:

- ☐ Unwelcome sexual flirtation, touching, advances or propositions
- ☐ Verbal abuse of a sexual nature, including graphic or suggestive comments about an individual's dress or degrading words used to describe and individual
- ☐ The display in the workplace of sexually suggestive objects or pictures, including nude photographs
- ☐ Other verbal or physical conduct of a sexual nature can affect an employee's work performance

Reporting of Harassment

It is the policy of **Memphis-Shelby County Airport Authority** to actively investigate any alleged incidence of harassment. Anyone who believes they have been harassed should contact the project manager. Any allegation or complaint will be held in the strictest confidence.

Any employee who commits a wrongful act of harassment shall be subject to disciplinary action, up to and including termination.

REPORTING, ACCIDENT INVESTIGATION, AND RECORDKEEPING

Contractors shall provide an American Red Cross and CPR Certified First Aid representative and designate an appropriate area for the first aid and medical care to treat injured employees at the job site. A copy of the First Aid Representative's qualifications shall be submitted to the Project Safety Manager.

The contractor must designate an individual to coordinate injury treatment with the workers' compensation carrier. The contractors' designated representative should also coordinate return to work and availability of modified work.

To coordinate medical services, the contractor will complete "Employee Medical Data Sheet" and "Company Drug Screen Request" forms.

Reporting

All accidents resulting in employee injury, property damage, or involving the general public shall be reported immediately to the designated project representative and the Project Safety Manager.

The Contractor and their subcontractors and sub-subcontractors shall complete a Supervisor's Incident Report Form (See Appendix E) and submit the report to the Project Safety Manager for all job-related accidents involving any of the following:

1. Any employee injury of the contractor, any subcontractor or sub-subcontractor.
2. Any injury and/or incident with the general public (including any alleged injuries reported by a member of the general public).
3. Equipment
4. Property

A formal accident investigation report and "First Report of Injury" shall be submitted within 24 hours. Pertinent facts that are not available within the above time shall be submitted as soon as available in a supplemental report.

A drug and alcohol test shall be administered to employee(s) injured and/or any employees in a work crew involved in an accident involving bodily injury.

Record-Keeping and Files

The Contractor and all Subcontractors and sub-subcontractors shall maintain a master or central file for safety and health related documentation on the jobsite. Files shall be maintained in such a manner that distinguishes each contractor and their subcontractors from other subcontractors and sub-subcontractors.

See Insurance manual for claim reporting procedures.

Accident Investigation

All accident/incidents shall be investigated by the contractor's safety supervisor and/or their safety designee. An accident investigation report must be submitted to the Designated Project Representative, OCIP Administrator/Willis Towers Watson and OCIP Insurance Carrier within twenty-four (24) hours of the occurrence.

The accident investigation should generate appropriate recommendations for corrective actions to prevent recurrence of similar accidents. Depending upon severity of the accident, the foreman of the injured worker may be requested to appear at the job safety and coordination meeting to:

1. Describe the cause of accident.
2. Report as to what corrective action has been initiated to avoid future accidents.

The Contractor and all Subcontractors shall maintain a current OSHA 300 log. The log shall be available for review by any OCIP team member at any time.

The Contractor and all Subcontractors and Sub-Subcontractors shall submit on a monthly basis a monthly summary of accident/incidents for the project. The summary shall follow the format contained within (Appendix G).

Under the direction of MSCAA AD HOC Committee may be appointed for investigation of serious accidents that result in loss of life, injury to several workers on pedestrians or major property loss. The committee will submit a report to MSCAA at the conclusion of the investigation.

RETURN-TO-WORK

Under the OCIP Program, every effort shall be made to **return employees to work as soon as possible** after an accident and under the direction of the physician. The insurance carrier will be in contact with the physician to determine the employee's physical demands and limitations.

A return-to-work program shall be developed and implemented by each Contractor to assist workers who are temporarily disabled due to an injury or illness. The Contractor and all subcontractors shall participate in the return-to-work program.

The Contractor, Subcontractor or Sub-subcontractor shall agree that their injured employees shall be treated by an authorized medical treating facility. The medical facility shall be utilized for initial treatment and evaluation of all injured employees. Follow-up care will be provided in accordance with applicable Workers' Compensation statutes.

When employees report a work related illness or injury, they shall be taken to the approved medical facility for examination and/or treatment. If the doctor determines that the employee qualifies for "Return to Work" ("light-duty"), the doctor will complete appropriate forms indicating the restrictions and conditions for transitional work.

The Contractor, Subcontractor or Sub-subcontractor shall provide modified work until the employee is able to resume regular

duties. All modified work is temporary in nature and is designed to facilitate a return to regular duties as soon as possible. Modified duty positions may be offered at any location of the project or on any shift. Modified work can also be provided at other work locations of the Contractor with approval from the OCIP Team.

In no case shall an injured employee be laid-off or terminated from a "alternative work" position, unless first discussed with the Owner and it's representatives.

WORK PRACTICE CONTROL

Overview

The primary focus of these Safety and Health Guidelines is to provide guidance for Contractors. Each Contractor shall have on site and available for employee review a written safety and health plan. This plan shall cover work exposures the contractors work operations. It is a project requirement that each and every employee conduct their operations in accordance with OSHA and all other applicable standards for all project operations

Memphis-Shelby County Airport Authority prohibits the use, possession, concealment, transportation, promotion or sale of the following controlled items:

- a. Firearms, weapons, and ammunition – except when authorized for security reasons.
- b. Switchblades.
- c. Unauthorized explosives, including fireworks.
- d. Stolen or contraband.

Hazard Communication Program

The Contractor shall develop a written Hazard Communication Program that contains at minimum the following elements:

- The name of the program coordinator.
- A list of hazardous substances present within the Contractor's workplace.
- A written system that ensures MSDS's are obtained and made readily accessible to all employees, including lower tier subcontractor personnel, on each shift. In the event of an emergency, MSDS's shall be made available on an immediate basis.
- A labeling program that ensures that containers of hazardous substances in the workplace are properly labeled with the name of the substance and any applicable hazard warnings.
- A training program regarding hazards of substances that are used in the workplace and the protective measures that must be taken by the empl0oyee or any other persons potentially exposed to the hazardous substances.

The Contractor shall ensure that each employee, prior to working with, or being potentially exposed to hazardous substances, receives initial training on the Hazard Communication Program and the safe use of the hazardous substances. Additional training shall be provided to employees whenever new substances are introduced to the workplace.

Permanent records shall be maintained by the Contractor, describing all Hazard Communication Program training.

Record-Keeping and Files

The Contractor and all Subcontractors and sub-subcontractors shall maintain a master or central file for safety and health related documentation on the jobsite. Files shall be maintained in such a manner that distinguishes each contractor and their subcontractors from other subcontractors and sub-subcontractors.

Contractors shall submit and/or have available on site:

REPORT NAME	Annual	Immediately	24 Hr.	Weekly ¹	Monthly ²	Per Occurrence	Per Request
Annual Crane Inspection	x						x
Chemical Inventory					x		x
Contractor Weekly Inspection				x			x

Critical Lift Checklist						X	X
First Report of Injury		X				X	
Incident Investigation		X				X	
MSDS's					X		X
OSHA 300 Log					X		X
OSHA Citations		X				X	
Safety Observation				X			
Safety Plan of Action or JSA ³				X		X	X
Safety Statistics					X		X
Safety Training					X		X
Substance Abuse Policy compliance notarized letter					X		X
Toolbox Safety Meetings				X			X
Daily equipment / Vehicle Inspections							X

Daily -- Daily inspections are required on all equipment / vehicles.

¹ Weekly -- Weekly reports are due the following Tuesday morning

² Monthly -- Monthly reports are due by the 6th of the following month.

³ Safety Action Plan or JSA -- As required by contract or specification

The Owner and its Representatives shall have the right to review all documentation at any time upon request. The Contractor shall give full cooperation during these reviews.

The following documentation shall be in the safety files:

- A written project site specific Safety & Health Plan
- Hazard Communication Program, including current MSDS's. A project specific MSDS file shall be maintained on-site for employee review
- Site emergency plans
- All required safety & health permits
- Weekly safety meeting reports - including meeting topic(s) and employee attendance sheets
- Specific job hazard worker training
- Daily jobsite safety inspection reports - including documentation of corrective measures
- Equipment inspection reports
- Crane inspection reports - daily and monthly (annual certification reports required prior to equipment operation)
- Employee orientation training records
- Accident investigation reports, including near misses
- Job hazard analysis
- Competent person qualifications
- Written safety violations
- Noise and air quality monitoring

Job Safety Analysis (JSA)

In order to provide Contractor employees with a safe workplace through pre-planning hazardous work, a Job Safety Analysis (JSA) shall be prepared. JSA's shall be required when thorough pre-job planning, it is determined that the process, equipment or procedure indicates potential for serious injury and/or property damage. The Contractor shall also prepare a JSA upon request by an OCIP Team member. JSA's will be done daily. JSA's should be kept in the work area, possibly at the toolbox and/or where they are readily available to the workers. JSA's will also be on file with the contractor.

The JSA shall be used by Contractors to analyze the jobs they perform, to identify the existing and potential hazards associated with each job step and establish controls for them. These JSA's shall be used as a task specific training tool to instruct employees, inspectors, and visitors of potential hazards and required safety precautions. Each employee working on the project shall sign a training log indicating that they understand the hazards of the project as indicated on the JSA.

Examples of activities that may require a JSA:

- Potential for collapse, (work-in trenching, tunneling. This may include demolition, etc).
- Potential release of stored energy, (electrical, pressure, explosive, etc).
- Crane supported work plate form use.
- Critical crane lifts (two cranes used to lift one load).
- Unusual crane operation as defined by the CIP Team.
- Potential exposure to uncontrolled hazardous materials or wastes.
- Blasting operations
- Abrasive /Sandblasting, Hydro blasting, etc.
- Potential injury from burns, both chemical and thermal.
- Respirator use.
- Potential oxygen-deficient environments.
- Entry into confined space.
- Potential of entanglement in, on, or between objects.
- Work in public streets and highways.
- Lockout/Tagout.
- Operations involving fall exposure.
- Structural Steel Erection.
- Use of new or Hazardous Materials, procedures, equipment.
- Material Storage & Handling.
- Powder actuated tool use.
- Suspended scaffolds.
- Scaffold erection.
- Scaffold dismantlement
- Rock drilling.
- Work on live electrical systems.

SPECIFIC PROJECT SAFETY REQUIREMENTS

Controls for possible conflicts between construction operations and aircraft

- 1) Contractor must request that a notice to Airmen (NOTAM) be issued prior to start of any construction that might affect navigable airspace or surface movement.
- 2) Barricades and temporary lighting must be installed and maintained per specs.
- 3) Operators of equipment/vehicles must be instructed on routes and haul procedures.
- 4) All personnel must stay in defined work areas. Fences/barricades are not to be crossed.
- 5) No access to active taxiways/runways will be allowed without prior authorization and direction/escort by MSCAA personnel.

Scaffolds, Stair Towers and Work Platforms

The Project requires **100% continuous fall protection** during the erection and dismantling of scaffolds where employees may be exposed to a fall greater than (6) six feet. A competent person must be present during erection, dismantling or moving of scaffold. The Contractor/Subcontractor shall develop and use a scaffold tagging system similar to the following:

Tagging

The tagging procedure, at minimum, shall consist of three (3) tags. The appropriate tag will be placed on a scaffold approved by the competent person. Each tag must have at least the following information and be visible by all employees:

- Date tag was placed - date of the last inspection.
- Name of person inspecting. All tags must be weather resistant.

A **GREEN** tag means the scaffold complies with federal OSHA regulations and can be used by any person.

A **YELLOW** tag indicates the scaffold is complete but does not meet all federal OSHA specifications. This tag will be used only in special circumstances. Special precautions, such as wearing a safety harness may be required because any accessory, such as a handrail, could not be installed due to the location of the scaffold.

A **RED** tag shall be placed on a scaffold that is being erected, dismantled, damaged and/or defective. No employees except members of the erection/dismantling crew shall work from a red tagged scaffold.

Employees will be instructed to read tags before using scaffolds. If a tag is not attached to the scaffold, **DO NOT USE** the scaffold.

Exceptions: Single buck or Baker scaffolds need not be tagged.

Walking and Working Surfaces

Barrier Identification Tape

Barrier identification tape is strictly prohibited from being used for any form of personnel fall protection. Barricade tape around excavations can be used for short term (24-hours), after this period physical barriers are required.

- **YELLOW** barricade tape shall be used for **CAUTION/WARNING**
- **RED** barricade tape shall be used for **DANGER DO NOT ENTER**

Note: Once the area barricaded is free of the hazard(s) for which it was erected the tape will be removed and properly discarded.

Fall Protection

Employees shall not be exposed to fall hazards. When an employee observes a fall hazard, they will notify their supervisor of the hazard. The responsible Contractor will immediately correct the hazard. **100% continuous fall protection, for fall hazards greater than six (6') feet, shall be implemented on this Project - including steel erection and scaffold use, erection and dismantling.**

Each Contractor shall be responsible for meeting fall protection requirements in their overall safety and health program.

Each Contractor shall evaluate ALL fall exposure conditions or tasks and must develop a Fall Protection Plan which outlines what methods, procedures and/or devices will be used in their program.

Each Contractor shall be responsible for implementing the requirements to achieve fall protection in accordance with all Federal, State, local rules, regulations, and the OCIP Safety and Health Guideline.

All fall protection systems used on this project shall comply with OSHA regulations and the project safety guidelines. Fall protection shall provide a positive means of protection. **Controlled Access Zones and Safety Monitoring Systems are not considered positive means of fall protection and shall not be permitted.** Any employee exposed to a fall greater than six (6) feet shall use approved fall protection equipment or devices. Fall protection systems shall be designed and installed under the direction of a Registered Professional Engineer or Qualified Person. Fall protection is required, as a minimum, under the following examples:

- Formwork and reinforcing steel. Each employee on the face of formwork or reinforcing steel shall be protected from falling 6 feet or more to lower levels by Personal Fall Arrest Systems, safety net systems, or positioning device systems.
- When working from a telescoping, articulating, or rotating type lifts and scissors lifts, personnel shall wear a safety harness with shock absorbing lanyard, secured to an approved anchorage point.
- When working on a ladder higher than six (6) feet from a solid surface if the employee's torso extends past the side rails or if a vertical ladder extended a total of 20' or greater.
- When working on a platform or other support not equipped with an adequate guardrail, which is higher than six (6) feet from a solid surface.
- When working from a crane-suspended work platform, a safety harness with shock absorbing lanyard is mandatory.
- When an employee may have to be lowered into or raised from a confined space, a personal fall arrest system will be worn. The employee will be supported by an approved platform or a boatswain's chair, with certified hoisting device and fall arrest device.

- When working adjacent to an unguarded floor opening or sloped roof, a lifeline system is desirable for mobility. A positive means of fall protection must be provided unless it can be proven infeasible.
- When working adjacent to a deep excavation, pit or trench. Employees will be instructed on the proper wearing and use of personal Fall Protection Arresting Device Systems.
- **Barricade tape is not adequate fall protection.**

The Fall Protection Plan shall detail in writing when fall protection is required and exactly how this protection is to be provided. This written plan is required for any Contractor exposing workers to falls six (6) feet or greater.

The Contractor shall prepare a written training program to ensure that each employee who might be exposed to fall hazards is knowledgeable of the Fall Protection Plan requirements. The program shall enable each employee the ability to recognize the hazards of falling and shall train each employee in the procedures to be followed in order to eliminate or minimize these hazards.

The Contractor shall assure that each employee has been trained.

Personnel, who have been trained, then re-trained and continue to violate the established fall protection plan/regulations shall be removed from the project IMMEDIATELY.

Confined Space Entry

All employees required to enter a confined space shall be knowledgeable of the hazards involved with confined space entry. Prior to the start of such an entry the Contractor involved in the work will develop a Confined Space Entry Procedure. The Contractor shall train all personnel who will enter the confined space. No one shall enter a confined space area until properly instructed. Contractors shall identify all confined spaces within their work area with a sign identifying the area as a confined space.

A Confined Space Entry procedure shall be used to:

- Prevent inadvertent operation of equipment and/or work process while people are working in the confined space.
- Eliminate unexpected exposure to hazardous materials, oxygen deficient or inert/toxic gaseous atmosphere while working in confined spaces.
- Plan for a timely and effective response to an emergency during a confined space entry.

Confined Spaces are considered to be areas with limited entry and exit, or poor natural ventilation, and not intended for human occupancy. Examples of a confined space include: tanks, covered basins, vaults, columns, mixers, manholes, pipelines, sumps, ditches or excavations. All spaces shall be considered permit-required confined spaces until the pre-entry procedures demonstrate otherwise.

Safety considerations include but are not limited to: atmosphere testing for gaseous conditions/lack of oxygen, appropriate personal protective and emergency equipment, and additional personnel as needed to assure communications and assist the individual conducting the entry.

A Permit Required Confined Space means confined space that has one or more of the following:

- May or may not potentially contain a hazardous atmosphere;
- Contains a material that has potential for engulfing entrant;
- Has internal configuration that could trap the entrant;
- Contains any other recognized serious health or safety hazard;

Contractors shall provide their own permit.

A Non-Permit Required Confined Space is a confined space that does not contain or with respect to atmospheric hazards, the potential of causing death or serious physical harm.

Employee Ground Transportation

The purpose of this section is to establish minimum acceptable guidelines for the safe transportation of all personnel traveling within the Project confines. Eliminate personal accidents and injuries resulting from improper equipment use.

Contractors are responsible for assuring that all personnel follow the requirements of this section and prohibit improper transportation of employees and visitors. Transporting employees in cargo beds of pick-ups, vans, etc. is prohibited, unless approved seats and seat belts are provided and used.

- Operators must be qualified. Vehicle operators must have valid state operator's license
- All equipment/vehicles must be identified (company logo) per specifications.
- Safe speed must be maintained and adjusted to site conditions.
- Use flashers/headlamps as directed.
- Mobile cranes, forklifts, winch trucks, front-end loaders, tractors, and other materials handling equipment are not permitted to transport passengers.
- Trucks
 - A maximum of three passengers are permitted to ride inside of the truck cab unless the cab is specifically designed to accommodate additional passengers.
 - Passengers shall ride with all portions of their bodies inside the truck body or frame.
 - Passengers shall be in the seated position, with the seat belts secured and adjusted properly before the vehicle is set in motion.
 - Riding on a vehicle's bumper or tailgate is prohibited.
 - Tailgates will be closed and latched before the vehicle is operated.
 - Passengers are not permitted to ride in the body of a dump truck, in the bed of a pickup truck or in trailers.
 - Passengers are not permitted to ride on top of the load or to hold materials from shifting.
 - Vehicles must be designed to accommodate passenger transportation, or the vehicle shall not be used for that purpose.
 - Drivers transporting passengers shall follow the posted speed limit and Project traffic rules.
 - The Contractor shall establish a designated employee parking area. Employee vehicles shall not be allowed on the construction project.

Housekeeping - MUST BE A CONTINUING PROCESS

The purpose of this section is to incorporate into the day-to-day work activity a good housekeeping action plan that will be followed by all Contractors working on the project.

- Contractors, through inspection and example, are responsible for assuring that trash and debris remain out of the work areas. Contractors are responsible for all of their work areas and the work areas of their subcontractors and sub-subcontractors. If poor housekeeping practices are observed, corrective action will be discussed with the appropriate Contractor to remind them that cluttered work areas will not be tolerated and that their work area(s) pose a hazard to his employees and other personnel.
- Should the Contractor fail to address and correct their poor housekeeping upon 24 hour written notification, the "owner" may at its option, cause the same to be removed and charge the expense of such removal to the appropriate Contractor.
- Specific attention is needed for operations to the Aircraft Operation Area (AOA).
- Contractors shall monitor their work areas daily or more frequently if needed to assure that all debris is removed to minimize hazards.
- Immediately available vacuum sweeper for cleaning taxiway/runway crossings.
- Personnel immediately available for taxiway and runway cleanup. (Provide brooms to supplement cleanup by sweeper.)
- Access to taxiway/runway crossings for cleanup only at the direction of MSCAA guard.
- Loading of haulage vehicles to minimize spillage.
- Maintenance of vehicles/equipment so that no fluids will leak.
- Provide waste containers at the direction of the Construction Manager.

Project Electrical Requirements

- The Contractor shall implement an electrical safety program. This safety program element shall include safe installation, work practices, maintenance, and special equipment considerations. All electrical installations, either temporary or permanent, shall be in conformance with the National Electrical Safety Code, NFPA-70, ANSI-C1, and low and high voltage electrical safety orders OSHA code requirements. Only qualified employees shall install electrical tools and equipment, defective and/or improperly installed equipment shall be repaired immediately.

- Only qualified electricians familiar with code requirements shall be allowed to perform electrical work.
- Extension cords used with portable electrical tools and appliances shall be heavy duty (minimum 12 AWG) and of the three-wire type. Cords shall be covered, elevated, or otherwise protected from damage that would create a hazard to construction site personnel.
- Electrical cords and equipment shall be visually inspected before each shift for external defects. All damaged and defective cords shall be removed from service immediately (this includes cords with the ground prong missing). Cords shall be repaired with approved heat-shrink methods, electrical tape is not permitted.
- All temporary electrical tools, cords and equipment shall be properly protected by ground fault circuit interrupters (GFCI). All portable generators shall have properly functioning GFCI outlets. GFCI receptacles shall be tested monthly with a multi-range GFCI tester (the tests shall be documented) to insure the GFCI is properly functioning and protecting the worker.
- A "task-specific" lockout/tagout safety plan shall be established to ensure power sources to equipment and/or machinery are isolated and de-energized. This plan shall establish minimum steps necessary to disable equipment and machinery to prevent the unexpected release of potentially hazardous energy. Lockout/Tagout shall be performed in accordance with 29 CFR 1910.147.

Cranes and Hoisting Equipment

- Cranes and hoists shall not be used without a current annual certificate of examination and testing issued by an accredited crane examiner. **Annual inspection certificates shall be available when cranes arrive on-site. Operators manual shall be in the cab of each crane prior to crane operation.**
- Only qualified and designated personnel shall operate cranes or hoisting equipment. Crane operators must have current (Certified Crane Operator) CCO certification and/or local or state certification.
- Rated load capacities and recommended operating speeds, special hazard warnings, or instructions, shall be conspicuously posted on all equipment; they shall be visible to the operator from his/her control station, and an accessible fire extinguisher of 10:ABC rating, shall be available at all operator stations or cabs of equipment. Crane operations position shall be kept clear of loose tools or material.
- Outrigger cribbing shall be used for all crane operations. The size of the cribbing shall be determined by taking the cranes capacity and dividing by 5 (example: 40 to crane divided by 5 = 8 sq. ft. per outrigger).
- All cranes working over shafts or lifting personnel platforms shall have anti-two block devices installed and operating properly.
- Radio or other positive means of communication shall be used to direct the operator when the point of operation is not in direct view of the operator.
- The operator shall respond to signals from only one person. The operator shall not follow any signal which is not understood, but shall always obey a stop signal.
- The operator shall be responsible for the operations and load under their control at all times. Whenever there are doubts about the safety of movement, the operator shall stop operations until safety is assured.
- A warning signal, such as a horn, shall be sounded to alert personnel to proximity of moving loads. Loads should not be passed over personnel, and personnel should not be permitted to work in the area directly under a suspended load.
- Concrete buckets - Employees shall be permitted to work under concrete buckets while the buckets are elevated.
- **Employees shall keep out from under suspended loads at all times.**
- Employees shall not ride on loads, slings, hooks, buckets or other load handling attachments.
- All repairs, adjustments, modifications, rigging assembly or dismantling shall be conducted only by qualified and authorized personnel.
- The swing radius shall be barricaded, or other positive means shall be taken to prevent personnel from entering the area between the counter weight/swing radius and any stationary and/or outside obstructions.
- A critical lift checklist will be completed and submitted anytime:
 - 2 cranes are used to make a lift
 - when a lift exceeds 75% of the load chart
 - or any unusual conditions are encountered
 (See Appendix C, "Critical Lift Checklist")
- Crane suspended work platforms shall only be used if there is no other safe means to reach the work area. The Contractor shall complete a JSA prior to the lift.
- Any overhead wire shall be considered to be energized unless and until the person owning such line or operating officials of the electrical utility supplying the line assures that it is NOT ENERGIZED, and it has been visibly grounded at the work site.
- Taglines shall be used to control all loads

- Daily inspection of all cranes shall be completed and documented prior to crane use

Rigging

- Major rigging operations shall be planned and supervised by Competent Personnel to ensure that the best methods and most suitable equipment and tackle are employed. This should be the superintendent or foreman in charge.
- Job site management shall ensure that:
 - Proper rigging equipment is available.
 - All rigging is inspected before use. Documented inspections are required.
 - Correct load ratings are available for the material and equipment used for rigging.
 - Rigging material and equipment are maintained in proper working condition.
- The supervisor of the hoisting operation shall be responsible for:
 - Proper rigging of the load.
 - Supervision of the rigging crew.
 - Ensuring that the rigging material and equipment have the necessary capacity for the job and are in safe condition.
 - Ensuring correct assembly of rigging material or equipment as required during the operation, such as the correct installation of lifting bolts.
 - Safety of the rigging crew and other personnel as they are affected by the rigging operation.

Excavation (Any process which disturbs soil)

- A. Contact MSCAA/FAA thru the Construction Manager at least 72 hours prior to proposed work for location of underground hazards (cables, ducts, fuel lines, etc.). A request form will be provided to the contractor.
- B. The contractor must contact Tennessee one call at least 72 hours prior to proposed excavation for location of utilities. Contractor must make arrangements to have personnel at the site when utilities are located. Documentation of the control number must be maintained on site.
- C. **Utilities must be located/marked prior to any process that disturbs the soil.**

Earthmoving Equipment and Trucks

- All earthmoving equipment shall be maintained in safe working condition and shall be appropriate and adequate for the intended use.
- Only authorized personnel shall operate equipment. Operators of equipment, machinery or vehicles shall be qualified and properly licensed for the operation involved.
- Equipment maintenance shall be performed only by qualified mechanics.
- Equipment operators and truck drivers shall make a documented pre-shift safety inspection of their equipment. Any conditions that effect safe operation will be corrected before use.
- Equipment shall not be operated unless all required safety devices are in place and functioning properly.
- Careless, reckless or otherwise unsafe operation or use of equipment shall result in discipline and may constitute grounds for dismissal.
- Before performing any service or repair work, all equipment shall be stopped and positively secured against movement or operation, locked and tagged out of service, unless it is designed to be serviced while running, following the manufacturer's instructions.
- When equipment is serviced or repaired, the operator shall dismount until the service or repair is completed and then make a complete walk-around safety check before remounting.
- All heavy equipment including: cranes, forklifts, dozers, end-loaders, skid-steers, etc., shall have a reverse signal/back-up alarm audible above surrounding background noise.
- All off-highway earthmoving equipment and trucks such as loaders, dozers, scrapers, motor graders, rock trucks, tractors, rollers and compactors shall be equipped with roll-over protective structures (ROPS) and seat belts.
- Seat belts shall be used and adjusted properly by operators of all heavy equipment.
- Mobile equipment shall not be left unattended unless parked securely to prevent movement, with all ground engaging tools lowered to the ground, brakes set and the engine off.
- Equipment parked at night shall be lighted, barricaded or otherwise clearly marked when exposed to traffic. Keys shall not be left in equipment overnight.
- Personnel shall not be transported or ride on equipment or vehicles that are not equipped with seats for passengers.

- When fueling equipment or vehicles with gasoline or liquefied petroleum gas (LPG) the engine shall be shut down.
- All equipment and vehicles shall be equipped with appropriate fire extinguisher or fire suppression system.
- Haul roads shall be designed, constructed and maintained for safe operation consistent with the type of haulage equipment in use. Standard traffic control signs shall be used where necessary.
- Elevated roadways shall have axle high beams or guards maintained on their outer banks.
- Equipment, tools, and materials hauled on pickups and flat bead trucks must be secured to prevent them from falling onto the road.

Welding & Cutting

- Welding leads and cutting hoses shall be kept clear of walkways and stairways.
- Flash arrestors shall be installed provided in both oxygen and acetylene hoses at the regulator connection.
- Welders shall wear approved eye and head protection when welding. Personnel assisting the welder shall also wear approved eye protection.
- Prior to welding or cutting a "20-ABC" rated fire extinguisher shall be within easy reach of the worker. A fire watch shall be stationed at all locations where sparks and/or flames may fall to a lower floor/work area or to another side of a wall.
- A suitable cylinder truck, with chain shall be used to keep cylinders from being knocked over while in use.
- Spent welding rods shall be picked up and disposed of daily.
- When practical all welding and cutting operations shall be shielded by non-combustible or flame-proof screens.
- Oxygen and acetylene cylinders shall not be stored inside buildings.
- Rubber boot protectors shall be provided on all welding leads where they make connections at the welding machine

Personal Protective Equipment

Eye and Face Protection

All employees shall wear safety glasses 100% of the time while on the construction site. Minimum eye protection shall include approved safety glasses **with side shields** which meet the standards specified in ANSI Z-87.1-1989 (this shall also include prescription eye wear).

Additional eye and face protection in combination shall be worn when:

- Welding, burning or cutting with torches
- Using abrasive wheels, portable grinders, or files
- Chipping concrete, stone or metal
- Working with any materials subject to scaling, flaking or chipping
- Drilling or working under dusty conditions
- Using explosive actuated fastening or nailing tools
- Working with compressed air or other gases

Only clear safety glasses shall be worn inside any building(s).

Head Protection

All construction workers shall wear hard hats which meet ANSI Z 89.1-1986, 100% of the time while on the construction site. Hard hats shall display the company decal where the employee works.

All delivery personnel, vendors and visitors shall wear approved hard hats while on the project.

Hearing Protection

Work areas shall be monitored to identify areas of high noise exposure (85 dBA and higher). All work areas identified as high noise exposure shall be properly posted to warn employees of the exposure.

Appropriate hearing protection shall be worn in work areas where noise levels are 85 dBA or greater.

Respiratory Protection

Contractors whose work activities warrants that employees wear respiratory protection, shall establish and implement a respiratory protection program. The program shall meet the requirements set forth in 29 CFR 1926.134.

Foot Protection

All personnel on the construction site shall wear leather hard-soled work boots. No one is permitted to wear sneakers (including ANSI approved), tennis shoes or athletic shoes of any type, sandals, high heels, or thongs on the construction site.

Clothing

Suitable clothing for construction shall be worn on the construction site. Shirts with sleeves (at least t-shirt (4 inches) in length), full length pants and reflective safety vests shall be required. Shorts, sweatpants or tank-tops are not allowed.

Appendix A - Safety Orientation

Check each box when completed - To be completed by all employees on the jobsite. To be completed by site supervision and employee prior to beginning work.

- ☐ Alcohol and/or drug use, fighting or horseplay are prohibited and will result in immediate termination
- ☐ 100 % eye protection, hard hats and reflective safety vests are required when on the construction project
- ☐ Review potential hazards on the project and the precautions to be taken to prevent injury
- ☐ Disciplinary Policy:
 - Non-serious violation**
 - First violation - Verbal warning
 - Second violation - Verbal & written warning
 - Third violation - Verbal & written warning and three day suspension without pay
 - Fourth violation - Employee discharge from company
- Serious violation** - (see disciplinary policy)
 - First violation - Verbal & written warning
 - Second violation - Employee discharge from company
- ☐ Hazard Communication Program - location of MSDS's and written program on the project
- ☐ All accidents, injuries and unsafe conditions shall be reported to supervisor immediately
- ☐ Medical treatment protocols for injuries requiring off-site medical treatment with a doctor
- ☐ Safety meetings are held on a weekly basis (attendance is mandatory)
- ☐ All employees shall dress properly while working. Minimum attire is long pants, shirt with at least 4 inch sleeves and sturdy above the ankle work boots
- ☐ Ground fault circuit interrupters (GFCI) are required on all tools. All extension cords and power tools shall be properly grounded. Notify supervision immediately if defective equipment exists.
- ☐ All employees exposed to a fall exposure of six or greater, shall be protected by the means of fall protection. Specific training is required for fall protection.
- ☐ Employee are not allowed to work in excavations 4 feet or more in depth, unless they are properly sloped or protected by shielding or shoring
- ☐ Lockout/tagout is required when working on equipment or tools where unexpected start-up may occur or the release of energy may result in injury
- ☐ Before any employee is allowed to wear a respirator (including paper masks) they must be medically approved by a doctor and fit-tested
- ☐ Scaffolds shall be inspected and tagged prior to use by any personnel. Red tag means DO NOT USE; Yellow Tag means section of scaffold does not meet OSHA standards and Green Tag means SAFE FOR USE.
- ☐ Other hazards discussed related to the construction project:

Equipment Issued

- ☐ Hardhat
- ☐ Safety Glasses
- ☐ Orange vest
- ☐ Fall Protection Harness & Lanyard
- ☐ Respirator
- ☐ Other _____

To be completed by supervisor in the field with the employee

- ☐ Show employee around the project and discuss potential hazards
- ☐ Introduce employee to crew members
- ☐ Assign new employee to experienced work crew
- ☐ Specify work duties
- ☐ Where to eat lunch

This is to acknowledge that I have completed new employee orientation and understand that failure to comply with the Safety Program may be grounds for dismissal.

Employee Print Name: _____ Date: _____

Emergency Contact: _____

Employee Signature: _____

Supervision Signature: _____ Date: _____

Appendix B – Employee Disciplinary Guideline

The discipline policy is intended to encourage compliance with the requirements of the Federal Occupational Safety and Health Act of 1970 (OSHA) and all additions and revisions thereto, as well as other applicable federal, state, and local requirements and this Safety and Health Guideline. Workers performing work in an unsafe manner that would endanger the employee, other workers or the public shall be subject to discipline or termination.

The Project Representative in conjunction with the Project Manager and Project Foreman will determine the course of action best suited to the circumstances. The steps to be taken shall be progressive, except in the most egregious circumstances and shall include:

- a) **Non-Serious** – Initial, isolated, or rare instances of violation, that do not result in danger to the employee, property, or others, should be corrected through non disciplinary discussion and instruction. Safety violations of a less serious nature will be handled as follows:

First Offense	Verbal Warning
Second Offense	Written Warning
Third Offense	Employee given three-day suspension without pay
Fourth Offense	Employee Discharge

- b) **Serious** – One which could result in serious injury or loss of life or serious loss of property, shall be subject to:

First Offense	Employee given three-day suspension without pay
Second Offense	Employee Discharge

- c) **Supervisor Accountability** – If two or more employees working for the same supervisor are found in serious violation as described above, that subcontractor supervisor is also subject to disciplinary action up to and including immediate discharge.

Documentation - Notice of safety violation (written) shall be given to the employee, and a copy sent to the Project Safety Representative.

Appendix C - Critical Lift Checklist

Project: _____ Date: _____

Description of Lift: _____

Name of supervisor in charge of lift: _____

Name of crane operator(s): _____

Name of signal person(s): _____

Crane Data:

Make and Model: _____

Boom Length: _____

Counterweight: _____

Capacity: _____

Load Data:

Gross Load Weight: _____

Rigging Weight: _____

Load block & line Weight: _____

Max. Load Radius: _____

Min. Load Angle: _____

Max. Boom Angle: _____

Min. Boom Angle: _____

Net Load Weight: _____

Pre-Lift Requirements:

- _____ Load is within chart limits.
- _____ Has the Center of Gravity of the Load been established and marked?
- _____ Is rigging adequate and in good condition?
- _____ Load chart utilized is for exact crane model; boom type, length, tip; counterweight.
- _____ Competent person in charge of lift: Name _____
- _____ Competent signal person identified: Name _____
- _____ Pre-pick meeting held with crew
- _____ Written crane inspection completed within 1 day of critical pick
- _____ Swing path not over personnel
- _____ Footing is sound and level (soil conditions/compaction, underground tunnel or utilities).
- _____ Pre-planning for radio or hand signal communications.
- _____ Minimum clearances from power lines can and will be maintained.
- _____ The load radius has been measured with tape measure.
- _____ Weather conditions have been checked, including wind speed.
- _____ Load will not touch boom at any time.
- _____ For dual crane lift – diagrams have been prepared.
- _____ Pad blocking is adequate and substantial.

_____ Outriggers are fully extended.

Signed: _____
Supervisor in Charge

Appendix D – Substance Abuse

Policy Statement

The Owner **Memphis-Shelby County Airport Authority** and the OCIP Team are committed to providing project employees with a drug-free and alcohol-free workplace. It is our goal to protect the health and safety of these employees and visitors to our job site, promote a productive workplace, and protect the reputation of our project.

Consistent with those goals, the use, possession, distribution or sale at project sites of drugs, drug paraphernalia or alcohol is prohibited. A program of drug and alcohol testing will be instituted to monitor compliance with this policy.

Contractors / Subcontractors refusing to comply with this Drug and Alcohol Policy will not be permitted to work on this OCIP project and will be noted as being in violation of their contract with the (Project Name) / or other contractors & subcontractors working on this project.

This Policy does not represent a contract between the Owner **Memphis-Shelby County Airport Authority**, Design and Development, the OCIP Team, Owners of project, Construction Managers, General Contractors, Subcontractors, employees or perspective employees of the project.

Policy Administration

It is our combined goal to protect the health and safety of personnel, craft workers, and visitors to our job site; to promote a productive workplace and protect the reputation of this OCIP.

Prohibited Substances

1. Drugs or Drug is defined as any substance which may impair mental or motor function including but not limited to illegal drugs, controlled substances, designer drugs, synthetic drugs, look alike drugs, and under circumstances described in this policy -prescription drugs.
2. Alcohol is defined as any beverage or substance containing alcohol, ethyl alcohol or ethanol. "Alcohol Testing or Alcohol test means testing by certified breath-alcohol technician using a DOT approved initial screening device or urine alcohol testing conducted by a certified laboratory and confirmed by gas chromatography/mass spectroscopy (GC/MS)". Test levels must not meet or exceed .04 grams per 210 liter of breath.

Pre-Project Testing

Prior to the beginning work on this Project, employers will be required to ensure that all employees have met the requirements of this policy with a negative (passing) test result. Employers and employees not meeting the requirements will not be allowed to work on this OCIP job site.

Additional Testing of Employees

1. **Post-Accident:** It is agreed that drug and alcohol testing of employees shall be required after each and every work related incident. This testing shall take place at the medical facility providing treatment for the injury. A work-related accident is defined as an accident resulting in an injury requiring treatment by a physician to the employee or other employees injured and / or resulting in damage to property or equipment.
2. **Reasonable Suspicion:** Is defined as supervision having a reason to suspect employee drug or alcohol use. The employer will bear the cost of this test.

Points of Understanding Regarding Substance Abuse Testing

1. The employer, the medical facility and the testing laboratory agree that the results of the described tests are to be held in strictest **CONFIDENCE** between the employer, the OCIP Workers Compensation Carrier and the

medical facility (MRO). This is an issue of employee – employer relationship (employment) and falls under the requirements within the employer's program.

2. This statement is noted for the purpose of adjudicating a workers compensation claim. The OCIP Workers Compensation Carrier requires the employer to report all accident-related drug and alcohol test results to them immediately.

Testing Procedures

1. At a minimum pre-project and post-accident testing is required.
2. Testing shall include the following drugs at a minimum:
Marijuana, Cocaine, Opiates, Amphetamines, Phencyclidine, Barbiturates, Benzodiazepines, Methadone, Propoxyphene
3. For reasons of safety, any employee subject to a reasonable suspicion test shall be suspended until test results are available.

Prescription Drugs

The use of current valid prescription Drugs that may impair an employee's ability to safely perform his or her duties must be reported to the safety director, supervisor and management personnel.

Alcoholic Beverages

Under no circumstances are alcoholic beverages allowed on the project site.

Disciplinary Action

1. A positive pre-project or post-accident test will result in worker dismissal from this project site
2. Employees found using, selling, possessing, or manufacturing drugs shall be removed from this project and may be reported to local law enforcement.

Confidentiality

All actions taken under this policy will be in conformance with the Local Drug Testing Act

Subcontractors and Vendors

Subcontractors, sub-tiered contractors, vendors, and their employees shall cooperate with this policy in achieving a drug-free and alcohol-free workplace.

Amendments to Policy

Amendments to this policy may be issued to comply with project owner requirements, state or local laws, or federal contract requirements.

Company Name _____

**DRUG AND ALCOHOL POLICY
ACKNOWLEDGMENT AND ACCEPTANCE STATEMENT**

I certify that I have read and understand the statement and policy. I further understand that prior to employment and during employment, I am subject to drug and alcohol screening tests. I agree to provide the specimen appropriate to such drug or alcohol test(s) as may be required. I further understand that my property and I may be subject to search under the terms of this policy while I am on the Owner's premises. Failure to provide the appropriate specimen, or to permit a search, will subject me to removal from this site.

I also understand that I will not be allowed to go to work prior to the reporting of my pre-employment drug test results.

If I am an employee of a subcontractor company, an employee of an affiliate company assigned to the job site, or a contract staff, I understand that I am subject to pre-employment drug testing and all testing conditions of this Policy. Failure to provide the appropriate specimen or to permit a search or a positive test result will result in my immediate removal from this job site.

Signature

Date

Print Name and Title

Witness

Guidelines for Reasonable Suspicion

Observation Checklist

- | | | | | |
|---|---|---|--------------------------------------|--|
| 1. Walking | <input type="checkbox"/> Stumbling | <input type="checkbox"/> Staggering | <input type="checkbox"/> Falling | <input type="checkbox"/> Unable to Walk |
| | <input type="checkbox"/> Swaying | <input type="checkbox"/> Unsteady | <input type="checkbox"/> Holding On | <input type="checkbox"/> Normal |
| 2. Standing | <input type="checkbox"/> Swaying | <input type="checkbox"/> Rigid | | <input type="checkbox"/> Unable to Stand |
| | <input type="checkbox"/> Staggering | <input type="checkbox"/> Sagging at Knees | | <input type="checkbox"/> Feet Wide Apart |
| 3. Speech | <input type="checkbox"/> Shouting | <input type="checkbox"/> Silent | <input type="checkbox"/> Whispering | <input type="checkbox"/> Slow |
| | <input type="checkbox"/> Rambling | <input type="checkbox"/> Mute | <input type="checkbox"/> Slurred | <input type="checkbox"/> Slobbering |
| | <input type="checkbox"/> Incoherent | <input type="checkbox"/> Confused | <input type="checkbox"/> Normal | |
| 4. Demeanor | <input type="checkbox"/> Cooperative | <input type="checkbox"/> Polite | <input type="checkbox"/> Calm | <input type="checkbox"/> Sleepy |
| | <input type="checkbox"/> Silent | <input type="checkbox"/> Talkative | <input type="checkbox"/> Crying | <input type="checkbox"/> Excited |
| | <input type="checkbox"/> Sarcastic | <input type="checkbox"/> Fighting | | |
| 5. Actions | <input type="checkbox"/> Resisting | <input type="checkbox"/> Fighting | <input type="checkbox"/> Threatening | <input type="checkbox"/> Erratic |
| | <input type="checkbox"/> Communications | | | |
| | <input type="checkbox"/> Drowsy | <input type="checkbox"/> Profanity | <input type="checkbox"/> Hyperactive | <input type="checkbox"/> Hostile |
| | <input type="checkbox"/> Calm | | | |
| 6. Eyes | <input type="checkbox"/> Bloodshot | <input type="checkbox"/> Watery | <input type="checkbox"/> Dilated | <input type="checkbox"/> Glassy |
| | <input type="checkbox"/> Droopy | <input type="checkbox"/> Closed | <input type="checkbox"/> Normal | |
| 7. Face | <input type="checkbox"/> Flushed | <input type="checkbox"/> Pale | <input type="checkbox"/> Sweaty | <input type="checkbox"/> Normal |
| 8. Appearance/
Clothing | <input type="checkbox"/> Unruly | <input type="checkbox"/> Messy | <input type="checkbox"/> Dirty | <input type="checkbox"/> Partially Dressed |
| | <input type="checkbox"/> Body | <input type="checkbox"/> Stains | <input type="checkbox"/> Neat | <input type="checkbox"/> Normal |
| | <input type="checkbox"/> Excrement | | | |
| 9. Breath | <input type="checkbox"/> Alcoholic | <input type="checkbox"/> Faint Alcohol | <input type="checkbox"/> No Odor | |
| | <input type="checkbox"/> Odor | <input type="checkbox"/> Odor | | |
| 10. Movement | <input type="checkbox"/> Fumbling | <input type="checkbox"/> Jerky | <input type="checkbox"/> Slow | <input type="checkbox"/> Hyperactive |
| | <input type="checkbox"/> Nervous | <input type="checkbox"/> Normal | | |
| 11. Eating/
Chewing | <input type="checkbox"/> Gum | <input type="checkbox"/> Candy | <input type="checkbox"/> Mints | <input type="checkbox"/> Other – identify |
| 12. Other observations: (Visible drug use, possession, sale, etc.: attendance; poor work performance or accident; tampering with drug test; credible reports, etc.) | | | | |

Observed by: _____ Observed by: _____

Date: _____ Time: _____ Location: _____

Appendix E - Supervisor's Report of Bodily Injury

Date of Accident _____ Date Returned to Work: _____
Location of Accident _____ Time of Accident _____ am/pm
Contractor/Subcontractor Involved _____
First Aid: _____ Recordable _____ Lost Time _____ Fatality _____
Damage* _____ Fire _____ Property _____
Equipment _____
Injured Person: _____ SSN: _____
Address: _____ Occupation: _____
_____ Home Phone: _____
Male _____ Female _____ Age _____
Nature of Injury: _____
First Aid Administered By: _____
Hospital _____
Physician _____
Witnesses: _____

Equipment and/or Materials Involved: _____
Cause Of Accident: _____

Superintendent's Corrective Action: _____

Employee's Signature: _____
Supt. Signature _____
Date of report: _____

*Attach a list of damaged property and/or equipment excluding motor vehicles. Indicate owner's names and addresses. Complete "Report of Damage to Equipment or Property" (Appendix F).

Appendix F - Report of Damage to Equipment or Property

Date _____

Contractor/Subcontractor _____

Location of Accident _____

Equipment Involved _____

Personal injuries Yes _____ No _____

Damage Estimate \$ _____

Witness to Accident

Statement Obtained

Statement Attached

Yes No

Yes No

Yes No

Yes No

Yes No

Yes No

Yes No

Yes No

Remarks _____

Time of Accident _____ AM _____ PM _____ Date _____

Weather Conditions _____ Temperature _____

Roadway or surface type _____ Wet _____ Dry _____ Other _____ *

*If other, explain _____

If more space is required, use back of this sheet for additional information and sketches.

Signed _____

Title _____

Employee Name _____

Appendix G - Contractor Monthly Report of Safety Statistics

MONTHLY ACCIDENT EXPERIENCE SUMMARY	CONTRACT NO:		
	CONTRACTOR/SUBCONTRACTOR NAME:		
	MONTH	YEAR	
	REPORTING PERIOD: THROUGH:		
	THIS MONTH	YEAR TO DATE	PROJECT TO DATE
HOURS WORKED			
PAYROLL			
A. FIRST-AID CASES B. OSHA RECORDABLE CASES C. LOST TIME CASES (list each under comments) D. TOTAL LOST WORK DAYS E. PROPERTY DAMAGE F. EQUIPMENT G. GENERAL PUBLIC			
OSHA Recordable Incidence Rate* Lost Time Incident Rate*			
COMMENTS:			
Prepared By:	Date	PM/Superintendent	Date

Appendix H – Safety Improvement Team Guidelines

The Owner recognizes that a cooperative effort is required to insure a safe construction project. Therefore, the Contractor shall establish a Safety Improvement Team to facilitate the proper cooperative attitude.

The Safety Improvement Team shall be composed of an equal number of employee and management representatives. The management personnel (4) will consist of one Owner representative, one person from the Contractor, one from the workers' compensation/general liability insurance carrier and a representative of subcontractor supervision. The employee members (4) shall be selected from the various subcontractor trades on a voluntary basis or by nomination to serve a minimum of one year each.

The Contractor's Safety Manager shall serve as the Safety Improvement Team advisor and is responsible for providing meeting agendas and minutes, giving assignments to the committee, and publicizing committee accomplishments. Safety Improvement Team meeting minutes and attendance roster shall be maintained.

The Contractor's Safety Manager is responsible for assuring that Committee members are adequately trained to perform their duties and responsibilities.

The Contractor's Safety Manager is responsible for assuring that subcontractors with 25 or more employees establish their own Safety Improvement Team commensurate with the NRS requirements.

The primary purpose of the Safety Improvement Team is to evaluate safety and health program effectiveness, suggestions, hazard reports, hotline reports, etc., and to provide suggestions and recommendations to improve workplace safety.

Additional duties include advising and educating employees in safe working practices, investigating accidents and their causes, recommending preventative measures, inspecting work areas, and other duties as assigned

Meetings shall be held at least monthly, discussion items shall include:

- Inspection Reports

- Accident Reports

- The safety of construction methods and practices

- Review and make recommendations on employee hazard reports, hotlines, etc.

The Safety Improvement Team members will receive their regular rates of pay while performing Safety Improvement Team duties. Time spent performing Safety Improvement Team duties shall be documented using normal time reporting procedures.

**EXHIBIT E
TO
LUMP SUM CONSTRUCTION CONTRACT
FOR
TERMINAL APRON RECONSTRUCTION (including Concourse C Demo) – CONSTRUCTION**

**BY AND BETWEEN
THE MEMPHIS-SHELBY COUNTY AIRPORT AUTHORITY
AND
(CONTRACTOR NAME)**

FAA REQUIRED CONTRACT PROVISIONS

Federal laws and regulations require that recipients of federal assistance (Sponsors) include contract provisions in certain contracts, requests for proposals, or invitations to bid. The provisions are as follows:

1. Title VI Clauses for Compliance with Nondiscrimination Requirements (FAA Provision A6.4.1). (Reference: 49 USC § 47123)

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the “contractor”) agrees as follows:

Compliance with Regulations: The contractor (hereinafter includes consultants) will comply with the Title VI List of Pertinent Nondiscrimination Acts and Authorities, as they may be amended from time to time, which are herein incorporated by reference and made a part of this contract.

Non-discrimination: The contractor, with regard to the work performed by it during the contract, will not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The contractor will not participate directly or indirectly in the discrimination prohibited by the Nondiscrimination Acts and Authorities, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 CFR part 21.

Solicitations for Subcontracts, Including Procurements of Materials and Equipment: In all solicitations, either by competitive bidding, or negotiation made by the contractor for work to be performed under a subcontract, including procurements of materials, or leases of equipment, each potential subcontractor or supplier will be notified by the contractor of the contractor's obligations under this contract and the Nondiscrimination Acts And Authorities on the grounds of race, color, or national origin.

Information and Reports: The contractor will provide all information and reports required by the Acts, the Regulations, and directives issued pursuant thereto and will permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the sponsor or the Federal Aviation Administration to be pertinent to ascertain compliance with such Nondiscrimination Acts And Authorities and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish the information, the contractor will so certify to the sponsor or the Federal Aviation Administration, as appropriate, and will set forth what efforts it has made to obtain the information.

Sanctions for Noncompliance: In the event of a contractor's noncompliance with the Non-discrimination provisions of this contract, the sponsor will impose such contract sanctions as it or the Federal Aviation Administration may determine to be appropriate, including, but not limited to:

- a. Withholding payments to the contractor under the contract until the contractor complies; and/or
- b. Cancelling, terminating, or suspending a contract, in whole or in part.

Incorporation of Provisions: The contractor will include the provisions of paragraphs one through six in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Acts, the Regulations and directives issued pursuant thereto. The contractor will take action with respect to any subcontract or procurement as the sponsor or the Federal Aviation Administration may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, that if the contractor becomes involved in, or is threatened with litigation by a subcontractor, or supplier because of such direction, the

contractor may request the sponsor to enter into any litigation to protect the interests of the sponsor. In addition, the contractor may request the United States to enter into the litigation to protect the interests of the United States.

2. Title VI List of Pertinent Nondiscrimination Acts and Authorities (FAA Provision A6.4.5).

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the “contractor”) agrees to comply with the following non-discrimination statutes and authorities; including but not limited to:

Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d *et seq.*, 78 stat. 252), (prohibits discrimination on the basis of race, color, national origin);

49 CFR part 21 (Non-discrimination in Federally-Assisted Programs of The Department of Transportation—Effectuation of Title VI of The Civil Rights Act of 1964);

The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 U.S.C. § 4601), (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects);

Section 504 of the Rehabilitation Act of 1973, (29 U.S.C. § 794 *et seq.*), as amended, (prohibits discrimination on the basis of disability); and 49 CFR part 27;

The Age Discrimination Act of 1975, as amended, (42 U.S.C. § 6101 *et seq.*), (prohibits discrimination on the basis of age);

Airport and Airway Improvement Act of 1982, (49 USC § 471, Section 47123), as amended, (prohibits discrimination based on race, creed, color, national origin, or sex);

The Civil Rights Restoration Act of 1987, (PL 100-209), (Broadened the scope, coverage and applicability of Title VI of the Civil Rights Act of 1964, The Age Discrimination Act of 1975 and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms “programs or activities” to include all of the programs or activities of the Federal-aid recipients, sub-recipients and contractors, whether such programs or activities are Federally funded or not);

Titles II and III of the Americans with Disabilities Act of 1990, which prohibit discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities (42 U.S.C. §§ 12131 – 12189) as implemented by Department of Transportation regulations at 49 CFR parts 37 and 38;

The Federal Aviation Administration’s Non-discrimination statute (49 U.S.C. § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex);

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, which ensures non-discrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations;

Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of limited English proficiency (LEP). To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs (70 Fed. Reg. at 74087 to 74100);

Title IX of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs or activities (20 U.S.C. 1681 *et seq.*).

3. Federal Fair Labor Standards Act (FAA Provision A17). (Reference: 29 U.S.C. § 201, *et seq.*)

All contracts and subcontracts that result from this solicitation incorporate by reference the provisions of 29 CFR part 201, the Federal Fair Labor Standards Act (FLSA), with the same force and effect as if given in full text. The FLSA sets minimum wage, overtime pay, recordkeeping, and child labor standards for full and part time workers.

The Contractor has full responsibility to monitor compliance to the referenced statute or regulation. The Contractor must address any claims or disputes that arise from this requirement directly with the U.S. Department of Labor – Wage and Hour Division.

4. Occupational Safety and Health Act of 1970 (FAA Provision A20). (Reference: 29 CFR part 1910)

All contracts and subcontracts that result from this solicitation incorporate by reference the requirements of 29 CFR Part 1910 with the same force and effect as if given in full text. Contractor must provide a work environment that is free from recognized hazards that may cause death or serious physical harm to the employee. The Contractor retains full responsibility to monitor its compliance and their subcontractor's compliance with the applicable requirements of the Occupational Safety and Health Act of 1970 (20 CFR Part 1910). Contractor must address any claims or disputes that pertain to a referenced requirement directly with the U.S. Department of Labor – Occupational Safety and Health Administration.

5. General Civil Rights Provisions (FAA Provision A5). (Reference: 49 U.S.C. § 47123)

The Contractor agrees to comply with pertinent statutes, Executive Orders, and such rules as are promulgated to ensure that no person shall, on the grounds of race, creed, color, national origin, sex, age, or disability be excluded from participating in any activity conducted with or benefiting from Federal assistance.

This provision binds the contractor and subcontractors from the bid solicitation period through the completion of the contract. This provision is in addition to that required of Title VI of the Civil Rights Act of 1964.

EXHIBIT E

FAA REQUIRED CONTRACT PROVISIONS – AIP CONTRACTS

6. Buy American Preference (FAA Provision A4). (Reference: 49 USC § 50101)

The contractor agrees to comply with 49 USC § 50101, which provides that Federal funds may not be obligated unless all steel and manufactured goods used in AIP funded projects are produced in the United States, unless the FAA has issued a waiver for the product; the product is listed as an Excepted Article, Material Or Supply in Federal Acquisition Regulation subpart 25.108; or is included in the FAA Nationwide Buy American Waivers Issued list.

A bidder or offeror must complete and submit the Buy America certification included herein with their bid or offer. The Owner will reject as nonresponsive any bid or offer that does not include a completed Certificate of Buy American Compliance.

CERTIFICATE OF BUY AMERICAN COMPLIANCE FOR TOTAL FACILITY

As a matter of bid responsiveness, the bidder or offeror must complete, sign, date, and submit this certification statement with their proposal. The bidder or offeror must indicate how they intend to comply with 49 USC § 50101 by selecting one of the following certification statements. These statements are mutually exclusive. Bidder must select one or the other (i.e. not both) by inserting a checkmark (✓) or the letter "X".

- ☐ Bidder or offeror hereby certifies that it will comply with 49 USC. 50101 by:
- a) Only installing steel and manufactured products produced in the United States; or
 - b) Installing manufactured products for which the FAA has issued a waiver as indicated by inclusion on the current FAA Nationwide Buy American Waivers Issued listing; or
 - c) Installing products listed as an Excepted Article, Material or Supply in Federal Acquisition Regulation Subpart 25.108.

By selecting this certification statement, the bidder or offeror agrees:

- 1. To provide to the Owner evidence that documents the source and origin of the steel and manufactured product.
- 2. To faithfully comply with providing US domestic products.
- 3. To refrain from seeking a waiver request after establishment of the contract, unless extenuating circumstances emerge that the FAA determines justified.

- ☐ The bidder or offeror hereby certifies it cannot comply with the 100% Buy American Preferences of 49 USC § 50101(a) but may qualify for either a Type 3 or Type 4 waiver under 49 USC § 50101(b). By selecting this certification statement, the apparent bidder or offeror with the apparent low bid agrees:

- 1. To submit to the Owner within 15 calendar days of the bid opening, a formal waiver request and required documentation that support the type of waiver being requested.
- 2. That failure to submit the required documentation within the specified timeframe is cause for a non-responsive determination that may result in rejection of the proposal.
- 3. To faithfully comply with providing US domestic products at or above the approved US domestic content percentage as approved by the FAA.
- 4. To furnish US domestic product for any waiver request that the FAA rejects.
- 5. To refrain from seeking a waiver request after establishment of the contract, unless extenuating circumstances emerge that the FAA determines justified.

Required Documentation

Type 3 Waiver - The cost of components and subcomponents produced in the United States is more than 60% of the cost of all components and subcomponents of the "facility". The required documentation for a type 3 waiver is:

- a) Listing of all manufactured products that are not comprised of 100% US domestic content (Excludes products listed on the FAA Nationwide Buy American Waivers Issued listing and products excluded by Federal Acquisition Regulation Subpart 25.108; products of unknown origin must be considered as non-domestic products in their entirety)
- b) Cost of non-domestic components and subcomponents, excluding labor costs associated with final assembly and installation at project location.
- c) Percentage of non-domestic component and subcomponent cost as compared to total "facility" component and subcomponent costs, excluding labor costs associated with final assembly and installation at project location.

Type 4 Waiver – Total cost of project using US domestic source product exceeds the total project cost using non-domestic product by 25%. The required documentation for a type 4 of waiver is:

- a) Detailed cost information for total project using US domestic product
- b) Detailed cost information for total project using non-domestic product

False Statements: Per 49 USC § 47126, this certification concerns a matter within the jurisdiction of the Federal Aviation Administration and the making of a false, fictitious or fraudulent certification may render the maker subject to prosecution under Title 18, United States Code.

Date

Signature

Company Name

Title

CERTIFICATE OF BUY AMERICAN COMPLIANCE FOR MANUFACTURED PRODUCTS

As a matter of bid responsiveness, the bidder or offeror must complete, sign, date, and submit this certification statement with their proposal. The bidder or offeror must indicate how they intend to comply with 49 USC § 50101 by selecting one on the following certification statements. These statements are mutually exclusive. Bidder must select one or the other (not both) by inserting a checkmark (✓) or the letter "X".

☐ Bidder or offeror hereby certifies that it will comply with 49 USC § 50101 by:

- a) Only installing steel and manufactured products produced in the United States, or;
- b) Installing manufactured products for which the FAA has issued a waiver as indicated by inclusion on the current FAA Nationwide Buy American Waivers Issued listing, or;
- c) Installing products listed as an Excepted Article, Material or Supply in Federal Acquisition Regulation Subpart 25.108.

By selecting this certification statement, the bidder or offeror agrees:

- 1. To provide to the Owner evidence that documents the source and origin of the steel and manufactured product.
- 2. To faithfully comply with providing US domestic product.
- 3. To furnish US domestic product for any waiver request that the FAA rejects.
- 4. To refrain from seeking a waiver request after establishment of the contract, unless extenuating circumstances emerge that the FAA determines justified.

☐ The bidder or offeror hereby certifies it cannot comply with the 100% Buy American Preferences of 49 USC § 50101(a) but may qualify for either a Type 3 or Type 4 waiver under 49 USC § 50101(b). By selecting this certification statement, the apparent bidder or offeror with the apparent low bid agrees:

- 1. To submit to the Owner within 15 calendar days of the bid opening, a formal waiver request and required documentation that support the type of waiver being requested.
- 2. That failure to submit the required documentation within the specified timeframe is cause for a non-responsive determination that may result in rejection of the proposal.
- 3. To faithfully comply with providing US domestic products at or above the approved US domestic content percentage as approved by the FAA.
- 4. To refrain from seeking a waiver request after establishment of the contract, unless extenuating circumstances emerge that the FAA determines justified.

Required Documentation

Type 3 Waiver - The cost of the item components and subcomponents produced in the United States is more than 60% of the cost of all components and subcomponents of the "item". The required documentation for a type 3 waiver is:

- a) Listing of all product components and subcomponents that are not comprised of 100% US domestic content (Excludes products listed on the FAA Nationwide Buy American Waivers Issued listing and products excluded by Federal Acquisition Regulation Subpart 25.108; products of unknown origin must be considered as non-domestic products in their entirety).
- b) Cost of non-domestic components and subcomponents, excluding labor costs associated with final assembly at place of manufacture.
- c) Percentage of non-domestic component and subcomponent cost as compared to total "item" component and subcomponent costs, excluding labor costs associated with final assembly at place of manufacture.

Type 4 Waiver – Total cost of project using US domestic source product exceeds the total project cost using non-domestic product by 25%. The required documentation for a type 4 of waiver is:

- a) Detailed cost information for total project using US domestic product.
- b) Detailed cost information for total project using non-domestic product.

False Statements: Per 49 USC § 47126, this certification concerns a matter within the jurisdiction of the Federal Aviation Administration and the making of a false, fictitious, or fraudulent certification may render the maker subject to prosecution under Title 18, United States Code.

Date

Signature

Company Name

Title

7. Clean Air and Water Pollution Control (FAA Provision A7). (Reference 2 CFR § 200, Appendix II(G))

Contractor agrees to comply with all applicable standards, orders, and regulations issued pursuant to the Clean Air Act (42 U.S.C. § 740-7671q) and the Federal Water Pollution Control Act as amended (33 U.S.C. § 1251-1387). The Contractor agrees to report any violation to the Owner immediately upon discovery. The Owner assumes responsibility for notifying the Environmental Protection Agency (EPA) and the Federal Aviation Administration.

Contractor must include this requirement in all subcontracts that exceeds \$150,000.

8. Contract Workhours and Safety Standards Act Requirements (FAA Provision A8). (Reference: 2 CFR § 200, Appendix II (E))

1. Overtime Requirements.

No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic, including watchmen and guards, in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

2. Violation; Liability for Unpaid Wages; Liquidated Damages.

In the event of any violation of the clause set forth in paragraph (1) of this clause, the contractor, and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1) of this clause, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1) of this clause.

3. Withholding for Unpaid Wages and Liquidated Damages.

The Federal Aviation Administration (FAA) or the Owner shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph 2 of this clause.

4. Subcontractors.

The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraphs (1) through (4) and also a clause requiring the subcontractor to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1) through (4) of this clause.

9. Debarment and Suspension (FAA Provision A11). (Reference: 2 CFR part 180 (Subpart C); 2 CFR part 1200; DOT Order 4200.5)

CERTIFICATION OF OFFERER/BIDDER REGARDING DEBARMENT

By submitting a bid/proposal under this solicitation, the bidder or offeror certifies that neither it nor its principals are presently debarred or suspended by any Federal department or agency from participation in this transaction.

CERTIFICATION OF LOWER TIER CONTRACTORS REGARDING DEBARMENT

The successful bidder, by administering each lower tier subcontract that exceeds \$25,000 as a "covered transaction", must verify each lower tier participant of a "covered transaction" under the project is not presently debarred or otherwise disqualified from participation in this federally assisted project. The successful bidder will accomplish this by:

1. Checking the System for Award Management at website: <http://www.sam.gov>.
2. Collecting a certification statement similar to the Certificate Regarding Debarment and Suspension (Bidder or Offeror), above.
3. Inserting a clause or condition in the covered transaction with the lower tier contract.

If the FAA later determines that a lower tier participant failed to disclose to a higher tier participant that it was excluded or disqualified at the time it entered the covered transaction, the FAA may pursue any available remedies, including suspension and debarment of the non-compliant participant.

10. Prohibition of Segregated Facilities (FAA Provision A19). (Reference: 41 CFR § 60)

- (a) The Contractor agrees that it does not and will not maintain or provide for its employees any segregated facilities at any of its establishments, and that it does not and will not permit its employees to perform their services at any location under its control where segregated facilities are maintained. The Contractor agrees that a breach of this clause is a violation of the Equal Opportunity clause in this contract.
- (b) "Segregated facilities," as used in this clause, means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees, that are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, sex, or national origin because of written or oral policies or employee custom. The term does not include separate or single-user rest rooms or necessary dressing or sleeping areas provided to assure privacy between the sexes.
- (c) The Contractor shall include this clause in every subcontract and purchase order that is subject to the Equal Opportunity clause of this contract.

11. Access to Records and Reports (FAA Provision A1). (Reference: 2 CFR § 200.333, 2 CFR § 200.336)

The Contractor must maintain an acceptable cost accounting system. The Contractor agrees to provide the sponsor, the Federal Aviation Administration, and the Comptroller General of the United States or any of their duly authorized representatives, access to any books, documents, papers, and records of the contractor which are directly pertinent to the specific contract for the purpose of making audit, examination, excerpts, and transcriptions. The Contractor agrees to maintain all books, records and reports required under this contract for a period of not less than three years after final payment is made and all pending matters are closed.

12. Affirmative Action Requirement (FAA Provision A2). (Reference: 41 CFR part 60-4, Executive Order 11246)

NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY

1. The Offeror's or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Opportunity Construction Contract Specifications" set forth herein.
2. The goals and timetables for minority and female participation, expressed in percentage terms for the contractor's aggregate workforce in each trade on all construction work in the covered area, are as follows:

Timetables

Goals for minority participation for each trade: 32.3%

Goals for female participation in each trade: 6.9%

These goals are applicable to all of the contractor's construction work (whether or not it is Federal or federally assisted) performed in the covered area. If the contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for such geographical area where the work is actually performed. With regard to this second area, the contractor also is subject to the goals for both its federally involved and non-federally involved construction.

The Contractor's compliance with the Executive Order and the regulations in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3(a), and its efforts to meet the goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and the contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, the Executive Order, and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

3. The Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs (OFCCP) within 10 working days of award of any construction subcontract in excess of \$10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address, and telephone number of the subcontractor; employer identification number of the subcontractor; estimated dollar amount of the subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the subcontract is to be performed.
4. As used in this notice and in the contract resulting from this solicitation, the "covered area" is Memphis, Shelby County, Tennessee.

13. Copeland "Anti-Kickback" Act (FAA Provision A9). (Reference: 2 CFR § 200, Appendix II (D), 29 CFR Parts 3 & 5)

Contractor must comply with the requirements of the Copeland "Anti-Kickback" Act (18 U.S.C. 874 and 40 U.S.C. 3145), as supplemented by Department of Labor regulation 29 CFR part 3. Contractor and subcontractors are prohibited from inducing, by any means, any person employed on the project to give up any part of the compensation to which the employee is entitled. The Contractor and each Subcontractor must submit to the Owner, a weekly statement on the wages paid to each employee performing on covered work during the prior week. Owner must report any violations of the Act to the Federal Aviation Administration.

14. Davis-Bacon Requirements (FAA Provision A10). (Reference: 2 CFR § 200, Appendix II (D), 29 CFR Part 5)

1. Minimum Wages

- (i) All laborers and mechanics employed or working upon the site of the work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by the Secretary of Labor under the Copeland Act (29 CFR Part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalent thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR Part 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: *Provided*, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under (1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can easily be seen by the workers.

- (ii) (A) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination, and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

- (1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and
- (2) The classification is utilized in the area by the construction industry; and
- (3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, D.C. 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(C) In the event the contractor, the laborers, or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to subparagraphs (1)(ii) (B) or (C) of this paragraph, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

- (iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.
- (iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, *Provided*, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

2. Withholding.

The Federal Aviation Administration or the sponsor shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of work, all or part of the wages required by the contract, the Federal Aviation Administration may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

3. Payrolls and basic records.

- (i) Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records

shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual costs incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

- (ii) (A) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the Federal Aviation Administration if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant, sponsor, or owner, as the case may be, for transmission to the Federal Aviation Administration. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead, the payrolls shall only need to include an individually identifying number for each employee (e.g. the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at <http://www.dol.gov/esa/whd/forms/wh347instr.htm> or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the Federal Aviation Administration if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit them to the applicant, sponsor, or owner, as the case may be, for transmission to the Federal Aviation Administration, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the sponsoring government agency (or the applicant, sponsor, or owner).

(B) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

- (1) That the payroll for the payroll period contains the information required to be provided under 29 CFR § 5.5(a)(3)(ii), the appropriate information is being maintained under 29 CFR § 5.5 (a)(3)(i) and that such information is correct and complete;
- (2) That each laborer and mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations 29 CFR Part 3;
- (4) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (3)(ii)(B) of this section.

(D) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 231 of Title 31 of the United States Code.

- (iii) The contractor or subcontractor shall make the records required under paragraph (3)(i) of this section available for inspection, copying or transcription by authorized representatives of the sponsor, the Federal Aviation Administration or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the Federal agency may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

4. Apprentices and Trainees.

- (i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Bureau of Apprenticeship and Training, or with a State Apprenticeship Agency recognized by the Bureau, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship and Training or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Bureau of Apprenticeship and Training, or a State Apprenticeship Agency recognized by the Bureau, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.
- (ii) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate that is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.
- (iii) Equal Employment Opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

5. Compliance with Copeland Act Requirements.

The contractor shall comply with the requirements of 29 CFR Part 3, which are incorporated by reference in this contract.

6. Subcontracts.

The contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR Part 5.5(a)(1) through (10) and such other clauses as the Federal Aviation Administration may by appropriate instructions require, and also a clause

requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR Part 5.5.

7. Contract Termination: Debarment.

A breach of the contract clauses in paragraph 1 through 10 of this section may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance with Davis-Bacon and Related Act Requirements.

All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1, 3, and 5 are herein incorporated by reference in this contract.

9. Disputes Concerning Labor Standards.

Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR Parts 5, 6 and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

10. Certification of Eligibility.

- (i) By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).
- (ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).
- (iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

15. Disadvantaged Business Enterprises (FAA Provision A12). (Reference: 49 CFR part 26)

- (a) **Contract Assurance (§ 26.13)** - The contractor or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy, as the Owner deems appropriate, which may include, but is not limited to:
 - 1) Withholding monthly progress payments;
 - 2) Assessing sanctions;
 - 3) Liquidated damages; and/or
 - 4) Disqualifying the Contractor from future bidding as non-responsible.
- (b) **Prompt Payment (§26.29)** - The prime contractor agrees to pay each subcontractor under this prime contract for satisfactory performance of its contract no later than ten (10) days from the receipt of each payment the prime contractor receives from Memphis-Shelby County Airport Authority. The prime contractor agrees further to return retainage payments to each subcontractor within ten (10) days after the subcontractor's work is satisfactorily completed. Any delay or postponement of payment from the above referenced time frame may occur only for good cause following written approval of the Memphis-Shelby County Airport Authority. This clause applies to both DBE and non-DBE subcontractors.

16 Energy Conservation Requirements (FAA Provision A14). (Reference: 2 CFR § 200, Appendix II(H))

Contractor and Subcontractor agree to comply with mandatory standards and policies relating to energy efficiency as contained in the state energy conservation plan issued in compliance with the Energy Policy and Conservation Act (42 U.S.C. 6201 *et seq*).

17.1 Equal Employment Opportunity (EEO) (FAA Provision A16). (Reference: 2 CFR 200, Appendix II(C), 41 CFR § 60-1.4, Executive Order 11246)

During the performance of this contract, the contractor agrees as follows:

- (1) The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, sexual orientation, gender identify or national origin. Such action shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.
- (2) The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive considerations for employment without regard to race, color, religion, sex, or national origin.
- (3) The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the contractor's commitments under this section and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
- (4) The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.
- (5) The contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.
- (6) In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.
- (7) The contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (7) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance: Provided, however, That in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency the contractor may request the United States to enter into such litigation to protect the interests of the United States.

17.2 Equal Employment Opportunity Specification (FAA Provision A16). (Reference: 2 CFR 200, Appendix II(C) 41 CFR § 60-1.4, Executive Order 11246)

1. As used in these specifications:

- a. "Covered area" means the geographical area described in the solicitation from which this contract resulted;
- b. "Director" means Director, Office of Federal Contract Compliance Programs (OFCCP), U.S. Department of Labor, or any person to whom the Director delegates authority;
- c. "Employer identification number" means the Federal social security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941;
- d. "Minority" includes:

- (1) Black (all) persons having origins in any of the Black African racial groups not of Hispanic origin);

- (2) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin regardless of race);
 - (3) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and
 - (4) American Indian or Alaskan native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).
2. Whenever the contractor, or any subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of \$10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation, and which is set forth in the solicitations from which this contract resulted.
3. If the contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors shall be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each contractor or subcontractor participating in an approved plan is individually required to comply with its obligations under the EEO clause and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other contractors or subcontractors toward a goal in an approved Plan does not excuse any covered contractor's or subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.
4. The contractor shall implement the specific affirmative action standards provided in paragraphs 7a through 7p of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered construction contractors performing construction work in a geographical area where they do not have a Federal or federally assisted construction contract shall apply the minority and female goals established for the geographical area where the work is being performed. Goals are published periodically in the Federal Register in notice form, and such notices may be obtained from any Office of Federal Contract Compliance Programs office or from Federal procurement contracting officers. The contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.
5. Neither the provisions of any collective bargaining agreement nor the failure by a union with whom the contractor has a collective bargaining agreement to refer either minorities or women shall excuse the contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.
6. In order for the non-working training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees shall be employed by the contractor during the training period and the contractor shall have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees shall be trained pursuant to training programs approved by the U.S. Department of Labor.
7. The contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The contractor shall document these efforts fully and shall implement affirmative action steps at least as extensive as the following:
 - a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the contractor's employees are assigned to work. The contractor, where possible, will assign two or more women to each construction project. The contractor shall specifically ensure that all foremen, superintendents, and other onsite supervisory personnel are aware of and carry out the contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.

- b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.
- c. Maintain a current file of the names, addresses, and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source, or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the contractor by the union or, if referred, not employed by the contractor, this shall be documented in the file with the reason therefore along with whatever additional actions the contractor may have taken.
- d. Provide immediate written notification to the Director when the union or unions with which the contractor has a collective bargaining agreement has not referred to the contractor a minority person or female sent by the contractor, or when the contractor has other information that the union referral process has impeded the contractor's efforts to meet its obligations.
- e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the contractor's employment needs, especially those programs funded or approved by the Department of Labor. The contractor shall provide notice of these programs to the sources compiled under 7b above.
- f. Disseminate the contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.
- g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination, or other employment decisions including specific review of these items with onsite supervisory personnel such as a superintendent, general foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.
- h. Disseminate the contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the contractor's EEO policy with other contractors and subcontractors with whom the contractor does or anticipates doing business.
- i. Direct its recruitment efforts, both oral and written, to minority, female, and community organizations, to schools with minority and female students; and to minority and female recruitment and training organizations serving the contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the contractor shall send written notification to organizations, such as the above, describing the openings, screening procedures, and tests to be used in the selection process.
- j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer, and vacation employment to minority and female youth both on the site and in other areas of a contractor's workforce.
- k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60-3.
- l. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel, for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.

- m. Ensure that seniority practices, job classifications, work assignments, and other personnel practices do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the contractor's obligations under these specifications are being carried out.
 - n. Ensure that all facilities and company activities are non-segregated except that separate or single user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.
 - o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.
 - p. Conduct a review, at least annually, of all supervisor's adherence to and performance under the contractor's EEO policies and affirmative action obligations.
8. Contractors are encouraged to participate in voluntary associations, which assist in fulfilling one or more of their affirmative action obligations (7a through 7p). The efforts of a contractor association, joint contractor union, contractor community, or other similar groups of which the contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under 7a through 7p of these specifications provided that the contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the contractor's minority and female workforce participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the contractor. The obligation to comply, however, is the contractor's and failure of such a group to fulfill an obligation shall not be a defense for the contractor's noncompliance.
 9. A single goal for minorities and a separate single goal for women have been established. The contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, if the particular group is employed in a substantially disparate manner (for example, even though the contractor has achieved its goals for women generally,) the contractor may be in violation of the Executive Order if a specific minority group of women is underutilized.
 10. The contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.
 11. The contractor shall not enter into any subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.
 12. The contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination, and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.
 13. The contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8.
 14. The contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government, and to keep records. Records shall at least include for each employee, the name, address, telephone number, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g.,

mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.

15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

18. Lobbying and Influencing Federal Employees (FAA Provision A18). (Reference: 31 U.S.C. § 1352, 49 CFR part 20, Appendix A)

The bidder or offeror certifies by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

- (1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the Bidder or Offeror, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
- (2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.
- (3) The undersigned shall require that the language of this certification be included in the award documents for all sub-awards at all tiers (including subcontracts, sub-grants, and contracts under grants, loans, and cooperative agreements) and that all sub-recipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

19. Rights to Inventions (FAA Provision A22). (Reference: 2 CFR § 200, Appendix II(F), 37CFR § 401)

Contracts or agreements that include the performance of experimental, developmental, or research work must provide for the rights of the Federal Government and the Owner in any resulting invention as established by 37 CFR part 401, Rights to Inventions Made by Non-profit Organizations and Small Business Firms under Government Grants, Contracts, and Cooperative Agreements. This contract incorporates by reference the patent and inventions rights as specified in 37 CFR §401.14. Contractor must include this requirement in all sub-tier contracts involving experimental, developmental or research work.

20. Trade Restriction Certification (FAA Provision A26). (Reference: 49 USC § 50104, 49 CFR part 30)

By submission of an offer, the Offeror certifies that with respect to this solicitation and any resultant contract, the Offeror –

- a. is not owned or controlled by one or more citizens of a foreign country included in the list of countries that discriminate against U.S. firms as published by the Office of the United States Trade Representative (U.S.T.R.);
- b. has not knowingly entered into any contract or subcontract for this project with a person that is a citizen or national of a foreign country included on the list of countries that discriminate against U.S. firms as published by the U.S.T.R; and
- c. has not entered into any subcontract for any product to be used on the Federal project that is produced in a foreign country included on the list of countries that discriminate against U.S. firms published by the U.S.T.R.

This certification concerns a matter within the jurisdiction of an agency of the United States of America and the making of a false, fictitious, or fraudulent certification may render the maker subject to prosecution under Title 18, United States Code, Section 1001.

The Offeror/Contractor must provide immediate written notice to the Owner if the Offeror/Contractor learns that its certification or that of a subcontractor was erroneous when submitted or has become erroneous by reason of changed circumstances. The Contractor must require subcontractors provide immediate written notice to the Contractor if at any time it learns that its certification was erroneous by reason of changed circumstances.

Unless the restrictions of this clause are waived by the Secretary of Transportation in accordance with 49 CFR 30.17, no contract shall be awarded to an Offeror or subcontractor:

- (1) who is owned or controlled by one or more citizens or nationals of a foreign country included on the list of countries that discriminate against U.S. firms published by the U.S.T.R; or
- (2) whose subcontractors are owned or controlled by one or more citizens or nationals of a foreign country on such U.S.T.R. list; or
- (3) who incorporates in the public works project any product of a foreign country on such U.S.T.R. list.

Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render, in good faith, the certification required by this provision. The knowledge and information of a contractor is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

The Offeror agrees that, if awarded a contract resulting from this solicitation, it will incorporate this provision for certification without modification in all lower tier subcontracts. The contractor may rely on the certification of a prospective subcontractor that it is not a firm from a foreign country included on the list of countries that discriminate against U.S. firms as published by U.S.T.R, unless the Offeror has knowledge that the certification is erroneous.

This certification is a material representation of fact upon which reliance was placed when making an award. If it is later determined that the Contractor or subcontractor knowingly rendered an erroneous certification, the Federal Aviation Administration may direct through the Owner cancellation of the contract or subcontract for default at no cost to the Owner or the FAA.

21. Veteran's Preference (FAA Provision A27). (Reference: 49 USC § 47112(c))

In the employment of labor (excluding executive, administrative, and supervisory positions), the contractor and all sub-tier contractors must give preference to covered veterans as defined within Title 49 United States Code Section 47112. Covered veterans include Vietnam-era veterans, Persian Gulf veterans, Afghanistan-Iraq war veterans, disabled veterans, and small business concerns (as defined by 15 U.S.C. 632) owned and controlled by disabled veterans. This preference only applies when there are covered veterans readily available and qualified to perform the work to which the employment relates.

22. Procurement of Recovered Materials (FAA Provision A21). (Reference: 2 CFR § 200.322, 40 CFR part 247)

Contractor and subcontractor agree to comply with Section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act, and the regulatory provisions of 40 CFR Part 247. In the performance of this contract and to the extent practicable, the Contractor and subcontractors are to use products containing the highest percentage of recovered materials for items designated by the Environmental Protection Agency (EPA) under 40 CFR Part 247 whenever:

- a) The contract requires procurement of \$10,000 or more of a designated item during the fiscal year; or,
- b) The contractor has procured \$10,000 or more of a designated item using Federal funding during the previous fiscal year. The list of EPA-designated items is available at www.epa.gov/smm/comprehensive-procurement-guidelines-construction-products.
Section 6002(c) establishes exceptions to the preference for recovery of EPA-designated products if the contractor can demonstrate the item is:
 - a) Not reasonably available within a timeframe providing for compliance with the contract performance schedule;
 - b) Fails to meet reasonable contract performance requirements; or
 - c) Is only available at an unreasonable price.

23. Seismic Safety (FAA Provision A23). (Reference: 49 CFR part 41)

- (a) In the performance of design services, the Consultant agrees to furnish a building design and associated construction specification that conform to a building code standard which provides a level of seismic safety substantially equivalent to standards as established by the National Earthquake Hazards Reduction Program (NEHRP). Local building codes that model their building code after the current version of the International Building Code (IBC) meet the NEHRP equivalency level for seismic safety. At the conclusion of the design services, the Consultant agrees to furnish the Owner a "certification of compliance" that attests conformance of the building design and the construction specifications with the seismic standards of NEHRP or an equivalent building code.

- (b) The contractor agrees to ensure that all work performed under the contract, including work performed by subcontractors, conforms to a building code standard that provides a level of seismic safety substantially equivalent to standards established by the National Earthquake Hazards Reduction Program (NEHRP). Local building codes that model their code after the current version of the International Building Code (IBC) meet the NEHRP equivalency level for seismic safety.

24. Distracted Driving (FAA Provision A13). (Reference: Executive Order 13513, DOT Order 3902.10)

In accordance with Executive Order 13513, "Federal Leadership on Reducing Text Messaging While Driving" (10/1/2009) and DOT Order 3902.10 "Text Messaging While Driving" (12/30/2009), the FAA encourages recipients of Federal grant funds to adopt and enforce safety policies that decrease crashes by distracted drivers, including policies to ban text messaging while driving when performing work related to a grant or sub-grant.

In support of this initiative, the Owner encourages the Contractor to promote policies and initiatives for its employees and other work personnel that decrease crashes by distracted drivers, including policies that ban text messaging while driving motor vehicles while performing work activities associated with the project. The Contractor must include the substance of this clause in all sub-tier contracts exceeding \$3,500 which involve driving a motor vehicle in performance of work activities associated with the project.

25. Tax Delinquency and Felony Conviction (FAA Provision A24).

CERTIFICATION OF OFFERER/BIDDER REGARDING TAX DELINQUENCY AND FELONY CONVICTIONS

The applicant must complete the following two certification statements. The applicant must indicate its current status as it relates to tax delinquency and felony conviction by inserting a checkmark (✓) in the space following the applicable response. The applicant agrees that, if awarded a contract resulting from this solicitation, it will incorporate this provision for certification in all lower tier subcontracts.

Certifications

- a) The applicant represents that it is (✓) is not (✓) a corporation that has any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability.
- b) The applicant represents that it is (✓) is not (✓) is not a corporation that was convicted of a criminal violation under any Federal law within the preceding 24 months.

Note

If an applicant responds in the affirmative to either of the above representations, the applicant is ineligible to receive an award unless the sponsor has received notification from the agency suspension and debarment official (SDO) that the SDO has considered suspension or debarment and determined that further action is not required to protect the Government's interests. The applicant therefore must provide information to the owner about its tax liability or conviction to the Owner, who will then notify the FAA Airports District Office, which will then notify the agency's SDO to facilitate completion of the required considerations before award decisions are made.

Term Definitions

Felony conviction: Felony conviction means a conviction within the preceding twenty-four (24) months of a felony criminal violation under any Federal law and includes conviction of an offense defined in a section of the U.S. code that specifically classifies the offense as a felony and conviction of an offense that is classified as a felony under 18 U.S.C. § 3559.

Tax Delinquency: A tax delinquency is any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted, or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability.

**EXHIBIT F
TO
UNIT PRICE CONSTRUCTION CONTRACT
FOR
TERMINAL APRON RECONSTRUCTION (including Concourse C Demo) – CONSTRUCTION**

**BY AND BETWEEN
THE MEMPHIS-SHELBY COUNTY AIRPORT AUTHORITY
AND
(CONTRACTOR NAME)**

STATE REQUIRED CONTRACT PROVISIONS

STANDARD TERMS AND CONDITIONS:

Grantees shall not assign an Aeronautics Grant Contract or enter into a subcontract for any of the services performed under an Aeronautics Grant Contract without obtaining the prior written approval of the State. If such subcontracts are approved by the State, each shall contain, at a minimum, sections of the Aeronautics Grant Contract pertaining to "Conflicts of Interest," "Lobbying," "Nondiscrimination," "Public Accountability," "Public Notice," and "Records" (as identified by the section headings). Notwithstanding any use of approved subcontractors, the Grantee shall remain responsible for all work performed.

CONTRACT CLAUSES:

- F.1. Conflicts of Interest. Contractor warrants that no part of the total contract amount shall be paid directly or indirectly to an employee or official of the State of Tennessee as wages, compensation, or gifts in exchange for acting as an officer, agent, employee, subcontractor, or consultant to MSCAA in connection with any work contemplated or performed relative to this Contract.
- F.2. Lobbying. The Contractor certifies, to the best of its knowledge and belief, that:
- a. No federally appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any federal contract, the making of any federal grant, the making of any federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any federal contract, grant, loan, or cooperative agreement.
 - b. If any funds other than federally appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this contract, grant, loan, or cooperative agreement, the Promisor shall complete and submit Standard Form-LLL, "Disclosure of Lobbying Activities," in accordance with its instructions.
 - c. The Contractor shall require that the language of this certification be included in the award documents for all sub-awards at all tiers (including subcontracts, sub-grants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into and is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. § 1352.

- F.3. Nondiscrimination. Contractor hereby agrees, warrants, and assures that no person shall be excluded from participation in, be denied benefits of, or be otherwise subjected to discrimination in the performance of this Grant Contract or in the employment practices of the Contractor on the grounds of handicap or disability, age, race, color, religion, sex, national origin, or any other classification protected by federal, Tennessee state constitutional,

or statutory law. The Contractor shall, upon request, show proof of nondiscrimination and shall post in conspicuous places, available to all employees and applicants, notices of nondiscrimination.

- F.4. Public Accountability. If the Contractor is subject to Tenn. Code Ann. § 8-4-401 *et seq.*, or if this Contract involves the provision of services to citizens by Contractor on behalf of the State, Contractor agrees to establish a system through which recipients of services may present grievances about the operation of the service program. The Contractor shall also display in a prominent place, located near the passageway through which the public enters in order to receive Grant supported services, a sign at least eleven inches (11") in height and seventeen inches (17") in width stating:

NOTICE: THIS AGENCY IS A RECIPIENT OF TAXPAYER FUNDING. IF YOU OBSERVE AN AGENCY DIRECTOR OR EMPLOYEE ENGAGING IN ANY ACTIVITY WHICH YOU CONSIDER TO BE ILLEGAL, IMPROPER, OR WASTEFUL, PLEASE CALL THE STATE COMPTROLLER'S TOLL-FREE HOTLINE: 1-800-232-5454.

The sign shall be on the form prescribed by the Comptroller of the Treasury. MSCAA shall obtain copies of the sign from the Tennessee Department of Transportation, Aeronautics Division, and upon request from the Contractor, provide Contractor with any necessary signs.

- F.5. Public Notice. All notices, informational pamphlets, press releases, research reports, signs, and similar public notices prepared and released by the Contractor in relation to this Contract shall include the statement, "This project is funded under a grant contract with the State of Tennessee." All notices by the Contractor in relation to this Contract shall be approved by the State.
- F.6. Records. The Contractor and any approved subcontractor shall maintain documentation for all charges under this Contract. The books, records, and documents of the Contractor and any approved subcontractor, insofar as they relate to work performed or money received under this Grant Contract, shall be maintained in accordance with applicable Tennessee law. In no case shall the records be maintained for a period of less than five (5) full years from the date of the final payment. The Contractor's records shall be subject to audit at any reasonable time and upon reasonable notice by the Tennessee Department of Transportation, the Comptroller of the Treasury, or their duly appointed representatives.

The records shall be maintained in accordance with Governmental Accounting Standards Board (GASB) Accounting Standards or the Financial Accounting Standards Board (FASB) Accounting Standards Codification, as applicable, and any related AICPA Industry Audit and Accounting guides.

In addition, documentation of grant applications, budgets, reports, awards, and expenditures will be maintained in accordance with U.S. Office of Management and Budget's *Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards*.

Contract expenditures shall be made in accordance with local government purchasing policies and procedures and purchasing procedures for local governments authorized under state law.

The Contractor shall also comply with any recordkeeping and reporting requirements prescribed by the Tennessee Comptroller of the Treasury.

The Contractor shall establish a system of internal controls that utilize the COSO Internal Control - Integrated Framework model as the basic foundation for the internal control system. The Contractor shall incorporate any additional Comptroller of the Treasury directives into its internal control system.

Any other required records or reports which are not contemplated in the above standards shall follow the format designated by the head of the Tennessee Department of Transportation, the Central Procurement Office, or the Commissioner of Finance and Administration of the State of Tennessee.

DIVISION 0 – SECTION 00605
CERTIFICATE OF SECRETARY

AS TO RESOLUTION ADOPTED BY BOARD OF DIRECTORS

On _____

I, _____, hereby certify that I am the duly authorized Secretary of _____, charged with keeping the records and the seal of said Corporation, and that the following is a true and correct copy of a resolution adopted at a meeting of the Board of Directors of the Corporation duly held on _____, which resolution is now in full force and effect.

RESOLVED, that _____, (President, Vice President) of _____ is hereby authorized to execute contracts, performance bonds and labor materials bonds on behalf of the Corporation.

WITNESS my hand as Secretary, and the seal of the Corporation this ____ day of _____, 20____.

 Secretary

BEFORE ME, a notary public of the state and county mentioned, personally appeared

_____, with whom I am personally acquainted, and who, upon oath, acknowledged such person to be _____, and officer authorized to execute the

instrument, of _____, the within named bargainor, a corporation, and that such

officer, as such _____, executed the foregoing instrument for the purposes therein contained, by personally signing their name of the corporation as _____.

WITNESS my hand and seal, at office, this _____ day of _____, 20____.

 Notary Public

(SEAL)

My Commission Expires: _____

END OF SECTION 00605

ISSUED FOR BID

00605
 Page 1

THIS PAGE LEFT BLANK INTENTIONALLY.

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: that

as Principal, hereinafter called Contractor or Principal, and

as Surety, hereinafter called Surety, are held and firmly bound unto

MEMPHIS-SHELBY COUNTY AIRPORT AUTHORITY

hereinafter called Owner, or Oblige, in the amount of _____ Dollars, for the performance whereof Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly, severally, and solidarily, firmly by these presents.

The penal sum of this Performance Bond shall be increased by the amount that the Contract, as herein below defined, is increased during the term of the Performance Bond.

WHEREAS, Principal has entered into a written agreement with the Owner (hereinafter referred to as "Contract") for:

in accordance with Drawings and Specifications prepared and to be prepared by

URBAN ARCH ASSOCIATES

which Contract is by reference incorporated herein and made a part hereof.

WHEREAS, the Surety represents that it possesses an A-VIII rating or higher in the most recent edition of Best Insurance Reports and that Surety is authorized to execute and deliver bonds in the State of Tennessee.

NOW THEREFORE, THE CONDITION OF THIS OBLIGATION is such that, if Principal shall promptly and faithfully perform each and every term, condition, obligation and provision of said Contract, including but not limited to, completion and delivery of the work described in the Contract within the scheduled time as such time may be extended from time to time as permitted in the Contract, then this obligation shall be null and void; otherwise, it shall remain in full force and effect.

The Surety shall within sixty (60) days from notice by Owner to the Surety, either

1. Proceed to complete the performance of the Contract timely in accordance with the terms and conditions of the Contract, including but not limited to:

(a) The responsibilities of the Principal for completion of the Work, correction of defective Work, warranty Work and payment for the Work; and

(b) Payment of liquidated damages specified in the Contract, or

2. Pay to the Owner the amount of its costs and damages, up to the penal sum of this bond, that would be owed by the Principal to the Oblige under the Contract to complete the obligations of the Principal, including any liquidated damages that may be due and any additional legal, design professional or delay costs resulting from the Contractor's default less any remaining contract funds.

The Surety hereby waives notice of any alteration or extension of time made by the Owner. The Surety hereby waives notice of any change in the scope of the Contract.

Any suit under this Performance Bond must be instituted in a court of competent jurisdiction, in Shelby County, Tennessee, and not elsewhere within four (4) years from Substantial Completion as defined in the Contract.

No right of action shall accrue on this bond to or for the use of any person, partnership or corporation other than the Owner or the heirs, executors, administrators, successors or assigns of the Owner.

Notice of claim to the Surety under the bond shall be sent to the following address:

SIGNED AND SEALED this ____ day of _____, 20____.

PRINCIPAL

TITLE: _____

SURETY

TITLE: _____

ADDRESS

CITY

STATE

ZIP CODE

LABOR AND MATERIAL PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: that

as Principal, hereinafter called Contractor or Principal, and

as Surety, hereinafter called Surety, are held and firmly bound unto

MEMPHIS-SHELBY COUNTY AIRPORT AUTHORITY

hereinafter called Owner or Obligee, in the amount of _____ Dollars, for the payment whereof Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly, severally, and solidarily, firmly by these presents.

The penal sum of this Labor and Material Payment Bond shall increase by the amount that the Contract, as herein below defined, is increased during the term of the Labor and Material Payment Bond.

WHEREAS, Principal has entered into a written agreement with the Owner (hereinafter referred to as the "Contract") for:

in accordance with Drawings and Specifications prepared and to be prepared by

URBAN ARCH ASSOCIATES

which Contract is by reference incorporated herein and made a part hereof.

WHEREAS, the Surety represents that it possesses an A--.VIII rating or higher in the most recent edition of Best Insurance Reports and that Surety is authorized to execute and deliver bonds in the State of Tennessee.

NOW THEREFORE, THE CONDITION OF THIS OBLIGATION is such that, if Principal shall promptly and faithfully complete the work as defined in the Contract free and clear of all claims, liens and any other contractual, statutory, or legal rights the Claimants, as hereinbelow defined, may have for the payment of amounts owed in connection with or arising out of the Contract ("Claims"); and the Principal shall make prompt payment to all persons having a Claim or lien pursuant to any statute or law of the State of Tennessee, then this obligation shall be void; otherwise, it shall remain in full force and effect.

1. A Claimant is defined as one having a contract with the Principal or a subcontractor or supplier of any tier for labor, materials, equipment used or reasonably required for use in the performance of the Contract, labor and materials being construed to include water, power, gas, light, heat, oil, gasoline, or telephone services applicable to the Contract.
2. No suit or action shall be commenced by any Claimant:
 - a) After the expiration of two (2) years following the date which Substantial Completion as defined in the Contract is achieved. However, if any limitation embodied in this bond is prohibited by any law controlling the construction hereof, such limitation shall be deemed to be amended so as to be equal to the minimum period of limitation permitted by such law.

- b) Other than in a court of competent jurisdiction in Shelby County, Tennessee, and not elsewhere.
3. Upon written notice to Surety from the Owner, Surety shall, within forty-five (45) days after receipt of said notice, pay or cause to be paid all Claims made or if the Surety contests in good faith the validity of any Claim, the Surety shall, within forty-five (45) days after receipt of said notice, cause bonds to be posted in an amount and form acceptable to Oblige to bond off such Claims. Surety shall indemnify, defend and hold Oblige harmless from any such Claims together with any and all attorney's fees, costs and expenses or liability in any manner arising out of or in connection therewith.
4. The Surety hereby waives notice of any alteration or extension of time made by the Owner. The Surety hereby also waives notice of any changes in the scope of the Contract, including changes to the contract amount.

Notice of claim to the Surety under the bond shall be sent to the following address.

SIGNED AND SEALED this the _____ day of _____, 20____.

PRINCIPAL

TITLE: _____

SURETY

TITLE: _____

ADDRESS

CITY

STATE

ZIP CODE



MEMPHIS INTERNATIONAL AIRPORT

APPLICATION FOR PAYMENT NO. _____

TO: MEMPHIS-SHELBY COUNTY AIRPORT AUTHORITY

REGARDING CONTRACT FOR: **MSCAA PROJECT NO. 13-1368-02**
TERMINAL APRON RECONSTRUCTION
(INCLUDING CONCOURSE C DEMO SOUTH)

CONTRACTOR: **CONTRACTOR**

FOR WORK ACCOMPLISHED FROM __ TO __

STATUS OF CONTRACT:

ORIGINAL CONTRACT PRICE: **\$0.00**

APPROVED CONTRACT AMENDMENTS:

No. 1 Approved	MM/DD/YYYY	Adds <u>0</u> days	\$0.00
No. 2 Approved	MM/DD/YYYY	Adds <u>0</u> days	\$0.00
No. 3 Approved	MM/DD/YYYY	Adds <u>0</u> days	\$0.00
No. 4 Approved	MM/DD/YYYY	Adds <u>0</u> days	\$0.00
No. 5 Approved	MM/DD/YYYY	Adds <u>0</u> days	\$0.00
No. 6 Approved	MM/DD/YYYY	Adds <u>0</u> days	\$0.00
Total time extension:		Adds <u>0</u> days	

TOTAL AMENDED CONTRACT PRICE **\$0.00**

NOTICE TO PROCEED DATE:

ORIGINAL COMPLETION DATE:

AMENDED COMPLETION DATE:

REMARKS:

TOTAL INSTALLED TO DATE		
previously installed to date	\$0.00	
this application installed	\$0.00	\$0.00
plus STORED MATERIALS		
previously stored materials	\$0.00	
this application stored materials	\$0.00	\$0.00
less PREVIOUSLY CERTIFIED FOR PAYMENT		\$0.00
equals AMOUNT DUE THIS APPLICATION		\$0.00

CONTRACTOR'S CERTIFICATION:

The undersigned Contractor certifies that (1) all previous progress payments received from Owner on account of Work done under the Contract referred to above have been applied to discharge in full all obligations of Contractor incurred in connection with Work covered by prior Application for Payment number 0 through __ inclusive; and (2) title to all materials and equipment incorporated in said Work or otherwise listed in or covered by this Application for Payment will pass to Owner at time of payment free and clear of all liens, claims, security interests and encumbrances (except such as covered by Bond acceptable to Owner). Progress status is as described in schedule under monthly construction payment request.

Dated: MM/DD/YYYY

State of: TennesseeCounty of: Shelby

Subscribed and sworn to before me this _____ day of _____, YYYY.

Notary Public:

CONTRACTOR:

Contractor

BY: _____

Signatory

Title

My Commission Expires:

PROGRAM MANAGER'S RECOMMENDATION:

Payment of the above AMOUNT DUE THIS APPLICATION to CONTRACTOR is recommended.

DATED:

BY: _____

Program Manager Signatory

THIS PAGE LEFT BLANK INTENTIONALLY.

DIVISION 0 - SECTION 00640

Business Diversity Monthly Compliance Report

MSCAA Project. Name and Number: Terminal Apron Reconstruction (including Concourse C South Demo) - Construction (13-1368-02) Date: _____

To: Memphis Shelby County Airport Authority From: Name: _____
 Attn: ReGina Armstrong Company: _____
 2491 Winchester Rd., Ste. 113 Address: _____
 Memphis, TN 38116-3856 Ph: _____
 Owner Gender & Ethnicity: _____

For the month ending _____, I certify that the current payment for this contract was satisfied by the means shown below:

Name, Address, & Phone No. of All Subcontractors	Company Code	Current Payment Amt.	Check No.	Total for Calendar Year	Cumulative Total to Date	Gender	Ethnicity

PLEASE PROVIDE PROOF OF YOUR PAYMENT AMOUNT TO YOUR SUB CONTRACTORS.

Signed: _____ Title: _____

Gender Code: M=Male, F=Female

Proof of Payments: Copy of Check, or Copy of E-Payment Confirmation

Company Code: DBE =Disadvantaged Business Enterprise, MOC=Majority Owner Company, INC=Incorporated/Partnership, CM/WBE = M/WBEs the owners of which have been certified as having a personal net worth less than \$1.32mil

Ethnicity Code: B=Black, H=Hispanic, N=Native American, AA=Asian American, APA=Asian Pacific American, SCA=Sub Continent Asian, NM=Non-Minority, C=Caucasian & O=Other

THIS PAGE LEFT BLANK INTENTIONALLY.

DIVISION 0 – SECTION 00661**DAVIS-BACON WAGE DETERMINATION**

General Decision Number: TN20220200 05/06/2022

Superseded General Decision Number: TN20210200

State: Tennessee

Construction Type: Building

BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories)

Counties: Fayette and Shelby Counties in Tennessee.

BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories).

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022: 	. Executive Order 14026 generally applies to the contract. . The contractor must pay all covered workers at least \$15.00 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2022.
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022: 	. Executive Order 13658 generally applies to the contract. . The contractor must pay all covered workers at least \$11.25 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2022.

The applicable Executive Order minimum wage rate will be

ISSUED FOR BID

adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at <https://www.dol.gov/agencies/whd/government-contracts>.

Modification Number	Publication Date
0	03/11/2022
1	04/22/2022
2	05/06/2022

* ASBE0086-002 03/01/2022

	Rates	Fringes
ASBESTOS WORKER/HEAT & FROST INSULATOR.....	\$ 33.25	17.22

CARP0345-001 05/01/2021		

	Rates	Fringes
CARPENTER.....	\$ 26.08	13.90

ELEC0474-002 08/02/2021		

	Rates	Fringes
ELECTRICIAN (Excludes Low Voltage Wiring).....	\$ 30.40	14.29

IRON0492-002 05/01/2021		

	Rates	Fringes
IRONWORKER, ORNAMENTAL.....	\$ 30.35	15.36
IRONWORKER, REINFORCING.....	\$ 30.35	15.36
IRONWORKER, STRUCTURAL.....	\$ 30.35	15.36

SHEE0004-008 01/01/2022		

	Rates	Fringes
SHEET METAL WORKER (HVAC Duct Installation Only).....	\$ 31.80	15.90
SHEET METAL WORKER (HVAC Unit Installation Only).....	\$ 31.80	15.90

SHEE0004-009 01/01/2022		

	Rates	Fringes

SHEET METAL WORKER (Excludes
HVAC Duct Installation).....\$ 31.80 15.90

* SUTN2017-053 04/16/2021

	Rates	Fringes
BRICKLAYER.....	\$ 20.00	0.00
CEMENT MASON/CONCRETE FINISHER...	\$ 20.25	0.00
ELECTRICIAN (Low Voltage Wiring).....	\$ 25.31	9.18
GLAZIER.....	\$ 16.99	3.70
LABORER DEMOLITION.....	\$ 16.74	0.00
LABORER GRADE CHECKER.....	\$ 13.01 **	0.00
LABORER: Common or General.....	\$ 13.97 **	1.30
LABORER: Mason Tender - Brick...	\$ 13.54 **	0.00
LABORER: Mason Tender - Cement/Concrete.....	\$ 15.33	0.00
LABORER: Pipelayer.....	\$ 14.99 **	2.41
OPERATOR: Backhoe/Excavator/Trackhoe.....	\$ 23.06	0.00
OPERATOR: Bobcat/Skid Steer/Skid Loader.....	\$ 16.84	0.00
OPERATOR: Bulldozer.....	\$ 28.19	9.65
OPERATOR: Crane.....	\$ 25.70	7.75
OPERATOR: Drill.....	\$ 26.50	4.09
OPERATOR: Forklift.....	\$ 15.00	0.00
OPERATOR: Paver (Asphalt, Aggregate, and Concrete).....	\$ 14.70 **	0.00
OPERATOR: Roller.....	\$ 14.35 **	0.00
PAINTER (Brush and Roller).....	\$ 17.00	0.00
PIPEFITTER.....	\$ 29.54	12.41
PLUMBER.....	\$ 26.86	10.40
ROOFER.....	\$ 16.29	0.00
TILE FINISHER.....	\$ 14.00 **	0.00

ISSUED FOR BID

TILE SETTER.....	\$ 19.65	0.00
TRUCK DRIVER: Dump Truck.....	\$ 15.28	0.00

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

=====
 ** Workers in this classification may be entitled to a higher minimum wage under Executive Order 14026 (\$15.00) or 13658 (\$11.25). Please see the Note at the top of the wage determination for more information.

Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at <https://www.dol.gov/agencies/whd/government-contracts>.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than "SU" or

""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour National Office because National Office has responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

=====

END OF GENERAL DECISION

General Decision Number: TN20220147 02/25/2022

Superseded General Decision Number: TN20210147

State: Tennessee

Construction Type: Highway

Counties: Tennessee Statewide.

HIGHWAY CONSTRUCTION PROJECTS

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60).

If the contract is entered	. Executive Order 14026	
into on or after January 30,	generally applies to the	
2022, or the contract is	contract.	
renewed or extended (e.g., an	. The contractor must pay	
option is exercised) on or	all covered workers at	
after January 30, 2022:	least \$15.00 per hour (or	
	the applicable wage rate	
	listed on this wage	
	determination, if it is	
	higher) for all hours	
	spent performing on the	
	contract in 2022.	
If the contract was awarded on	. Executive Order 13658	
or between January 1, 2015 and	generally applies to the	
January 29, 2022, and the	contract.	
contract is not renewed or	. The contractor must pay all	
extended on or after January	covered workers at least	
30, 2022:	\$11.25 per hour (or the	
	applicable wage rate listed	
	on this wage determination,	
	if it is higher) for all	
	hours spent performing on	
	that contract in 2022.	

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at

ISSUED FOR BID

[https://www.dol.gov/agencies/whd/government-contracts.](https://www.dol.gov/agencies/whd/government-contracts)

Modification Number	Publication Date
0	01/07/2022
1	02/25/2022

* SUTN2016-001 07/13/2016

	Rates	Fringes
BRICKLAYER.....	\$ 14.26	**
CARPENTER.....	\$ 17.52	
CEMENT MASON/CONCRETE FINISHER...	\$ 15.55	
ELECTRICIAN.....	\$ 24.08	
IRONWORKER		
Reinforcing.....	\$ 16.29	
Structural.....	\$ 16.89	
LABORER		
Common/Unskilled.....	\$ 13.11	**
Skilled		
Air Tool Operator,		
Asphalt Raker, Chain Saw		
Operator, Concrete Mixer		
(less than 1 yd),		
Concrete Rubber, Edger,		
Fence Erector, Form		
Setter (steel), Guard		
Rail Erector, Mechanic's		
Tender (tire changer or		
oiler), Mortar Mixer,		
Nozzleman or Gun Operator		
(gunite), Pipelayer,		
Sign Erector.....	\$ 15.27	
PAINTER (INCLUDES SANDBLASTER)...	\$ 26.36	
POWER EQUIPMENT OPERATOR:		
GROUP 1		
Backhoe/Hydraulic		
Excavator (3/4 yd &		
over), Crane (less than		
20 Tons), End Loader (3		
yd & over), Motor Patrol		
(finish), Piledriver,		
Dragline.....	\$ 19.14	
GROUP 1A		
Drill Operator (Caisson)...	\$ 25.26	
Farm Tractor Operator		
(Power Broom).....	\$ 13.50	**
GROUP 2		
Backhoe/Hydraulic		

Excavator (less than 3/4
yd), Bulldozer or Push
Dozer, End Loader (less
than 3 yd), Motor Patrol
(rough), Tractor
(crawler/ utility), Truck
Driver (Heavy Duty, Off
Road) Scraper, Shovel, or
Trenching Machine.....\$ 17.08

GROUP 3
Asphalt Paver, Concrete
Finishing Machine,
Concrete Paver, Scale,
Spreader (self-
propelled), Concrete
Grinder, Asphalt Milling
Machine, Boring Machine
(horizontal).....\$ 17.75

GROUP 4
Bobcat, Central Mining
Plant, Concrete Pump,
Concrete Saw, Curb
Machine (automatic or
manual), Dozer or Loader
(stockpile), Drill
(piling), Mulcher or
Seeder, Rock Drill (truck
mounted), Roller
(asphalt), Roller
(compaction self-
propelled), Soil
Stabilization Machine,
Tractor (boom and hoist),
Bituminous Distributor
Machine, pump, Track
Drill, Striping Machine....\$ 16.48
Heavy Duty Mechanic.....\$ 20.33
Light Duty Mechanic.....\$ 19.53
Sweeping Machine (Vacuum)
Operator.....\$ 15.56

GROUP 5
Crane (over 20 Tons).....\$ 20.44

TRUCK DRIVER

2 axles.....\$ 15.36
3-4 axles.....\$ 14.86 **
5 or more axles.....\$ 16.27

WELDERS - Receive rate prescribed for craft performing
operation to which welding is incidental.

=====

** Workers in this classification may be entitled to a higher
minimum wage under Executive Order 14026 (\$15.00) or 13658
(\$11.25). Please see the Note at the top of the wage

ISSUED FOR BID

determination for more information.

Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at <https://www.dol.gov/agencies/whd/government-contracts>.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than "SU" or "UAVG" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing

this classification and rate.

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour National Office because National Office has responsibility for

the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

=====

END OF GENERAL DECISION

END OF SECTION 00661

THIS PAGE LEFT BLANK INTENTIONALLY.

DIVISION 0 – SECTION 00663**LABOR STANDARDS INTERVIEW**

In accord with Davis-Bacon Requirements, the Contractor shall permit Owner to conduct interviews with employees during working hours on the job. These interviews will be conducted at least once every three months with one person employed by the Contractor and one person employed by each of the subcontractors (and sub-subcontractors to all tiers of the project, as applicable). Any and all employees subject to payment minimum wages per Davis-Bacon Requirements may be selected for interviews. The frequency and quantity of interviews may be increased or decreased at the Owner's sole discretion. The interview form on the next page will be used to conduct each interview and will be available to the Contractor upon request.

END OF SECTION 00663

Memphis-Shelby County Airport Authority
Labor Standards Interview Form



SECTION 1 – TO BE COMPLETED BY INTERVIEWER UNDER INTERVIEWEE’S OBSERVATION

Project Name: Terminal Apron Reconstruction (including Concourse C South Demo) - Construction Project
Number: 13-1368-02

Interviewee’s Name: _____

Work Classification: _____ Interviewee’s Wage Rate: _____

Interviewee’s Employer: _____

Interviewee’s Supervisor: _____

Do you work over 8 hours per day? Yes ☐ No ☐

Do you work over 40 hours per week? Yes ☐ No ☐

Are you paid at least time and a half for overtime hours? Yes ☐ No ☐

Are you receiving any cash payments for fringe benefits required by the posted
wage determination decision? Yes ☐ No ☐

Are there deductions other than taxes and social security made from your pay? Yes ☐ No ☐

If yes to previous question, describe deductions: _____

What tools do you use? _____

The above information is correct to the best of my knowledge

Interviewee’s Signature: _____ Date: _____

Interviewer’s Signature: _____ Date: _____

SECTION 2 – TO BE COMPLETED BY INTERVIEWER SEPARATE FROM INTERVIEWEE

Work being completed by interviewee at time of interview: _____

Are wage rates and posters displayed? Yes ☐ No ☐

SECTION 3 – TO BE COMPLETED BY PAYROLL CHECKER

Is interviewee properly classified and paid? Yes ☐ No ☐

Is above information in agreement with payroll data? Yes ☐ No ☐

Checker's Signature: _____ Date: _____

DIVISION 0 – SECTION 00765**SUPPLEMENTAL PROVISIONS****00765-01 CONTRACTOR'S FIELD OFFICE**

A Contractor's field office is required for this project. Contractor shall keep on file at the project site copies of contract drawings, shop drawings, specifications, and other records pertaining to the project, in good condition, and readily accessible to the Contractor, Owner, Engineer, and all parties concerned.

00765-02 PROTECTION OF PERSONS AND PROPERTY

00765-02.1 The Contractor shall be responsible for initiating, maintaining and supervising safety and anti-substance abuse precautions and programs in connection with the Work, and shall provide all protection to prevent injury to all persons involved in any way in the Work and all other persons, including, without limitation, the employees, agents, guests, visitors, invitees and licensees of the Owner who may visit or be affected thereby. These precautions shall include, but in no event be limited to: the posting of danger signs and personal notification to all affected persons of the existence of a hazard of whatever nature; the furnishing and maintaining of necessary traffic control barricades and flagman services; the use, or storage, removal and disposal of required explosives or other hazardous materials only under the supervision of qualified personnel and after first obtaining permission of all applicable governmental authorities; and the maintenance of adequate quantities of both hose and operable fire extinguishers at the job site. The Contractor shall set forth in writing its safety and anti-substance abuse precautions and programs in connection with the Work and, if requested by the Owner, submit the same to the Owner for review. The Owner may, but shall not be obligated to, make suggestions and recommendations to the Contractor with respect thereto.

00765-02.2 All Work, whether performed by the Contractor, its Subcontractors or Sub-Subcontractors, or anyone directly or indirectly employed by any of them, and all equipment, appliances, machinery, materials, tools and like items incorporated or used in the Work, shall be in compliance with, and conform to: (a) all applicable laws, ordinances, rules, regulations and orders of any public, quasi-public or other governmental authority relating to the safety of persons and their protection against injury, specifically including, but in no event limited to, the Federal Occupational Safety and Health Act of 1970, as amended, and all rules and regulations now or hereafter in effect pursuant to said Act; and (b) all codes, rules, regulations and requirements of the Owner and its insurance carriers relating thereto. In the event of conflicting requirements, the more stringent shall govern.

00765-02.3 The Contractor shall designate a responsible member of its organization at the Job site as the Project Safety Officer, whose duties it shall be to enforce the Contractor's safety and anti-substance abuse programs, to assure compliance with the Contract Documents and to prevent accidents. This person shall have enforcement authority and be responsible for carrying out the relevant duties and be designated in writing by the Contractor and approved by the Owner. The Contractor shall further cause each of its Subcontractors and Sub-Subcontractors to designate a responsible supervisory representative to assist the Contractor's Project Safety Officer representative in the performance of their duties as aforesaid.

00765-02.4 Should the Contractor fail to provide a safe area for the performance of the Work or any portion thereof, the Owner shall have the right, but not the obligation, to suspend Work in the unsafe area. All costs of any nature (including, without limitation, overtime pay) resulting from the suspension, by whomsoever incurred, shall be borne by the Contractor.

00765-02.5 The Contractor shall provide to each worker on the job site the proper safety equipment for the duties being performed by that worker and will not permit any worker on the job site who fails or refuses to use the same. The Owner shall have the right, but not the obligation, to order the Contractor to send a worker home for the day or to discharge a worker for their failure to comply with safe practices or anti-substance abuse policies, with which order the Contractor shall promptly comply.

00765-02.6 The Contractor shall indemnify the Owner, from and against any and all liability, public or private, penalties, contractual or otherwise, losses, damages, costs, attorney's fees, expenses, causes of action, claims or judgments resulting either in whole or in part from any failure of the Contractor, its Subcontractors or Sub-Subcontractors or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, to comply with the provisions of the Contract. The Contractor shall not be relieved of its responsibilities under the Contract, should the Owner act or fail to act pursuant to its rights hereunder, nor shall the Owner thereby assume, nor be deemed to have assumed, any responsibilities otherwise imposed upon the Contractor by this Construction Contract, in any manner whatsoever.

00765-02.7 The Contractor shall, throughout the performance of the Work, maintain adequate and continuous protection of all Work and temporary facilities against loss or damage from whatever cause, shall protect the property of the Owner and third parties from loss or damage from whatever cause arising out of the performance of the Work and shall comply with the requirements of the Owner, its designated agents, and its insurance carriers and with all applicable laws, codes, rules and regulations with respect to the prevention of loss or damage to property as a result of fire or other hazards. The Owner may, but shall not be required to, make periodic patrols of the job site as a part of its normal security program. In such event, however, the Contractor shall not be relieved of its aforesaid responsibilities.

END OF SECTION 00765

DIVISION 0 – SECTION 00801**AIRPORT CONSTRUCTION SAFETY REQUIREMENTS****PART 1 GENERAL****1.01 SUMMARY**

- A. This section contains the minimum level of safety requirements for construction projects at Memphis International Airport, General DeWitt Spain Airport, and/or Charles W. Baker Airport.
- B. Related work:
 - 1. Other contract documents affecting construction safety include, but are not limited to, the DIVISION 0 AND DIVISION 1 specifications.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION**3.01 CONTRACTOR PERSONNEL SAFETY ORIENTATION**

- A. The Contractor shall be responsible for briefing all construction personnel on the requirements contained in this section prior to their working in the construction area and at periodic intervals throughout the course of the contract. These briefings will be documented in writing.

3.02 SCHEDULING WORK

- A. See Specification section 01100, SEQUENCE OF CONSTRUCTION & LIQUIDATED DAMAGES.
- B. See General Provision Section 80, Paragraph 80-04, Limitation of Operations.

3.03 CONSTRUCTION SECURITY

- A. See Specification section 00802, AIRPORT SECURITY REQUIREMENTS.

3.04 LIMITATION ON CONSTRUCTION

- A. The limits of construction, material storage areas, equipment parking and other areas defined as available for the contractor's exclusive use during construction shall be identified and defined by the contractor prior to starting work on the project. Temporary barricades, flagging and flashing caution lights may be required at access points, taxiway crossings and pavement tie-ins. The type markings, barricades and flashing caution lights are designated on the construction plans and must be inspected and approved by the Airport Authority.
- B. The Contractor shall store all materials and park construction equipment, when not in use only in the areas designated on the plans or during the pre-construction conference.
- C. Stockpiling of dirt and construction materials shall be constrained in a manner preventing movement resulting from jet blast or wind in excess of 10 knots.
- D. Construction debris, waste, wrappings or loose material capable of causing damage to aircraft engines, propellers, or landing gear shall not be allowed on active aircraft movement areas. Material meeting this criteria shall be contained and removed immediately from the AOA.

- E. Open flame, welding, or torch cutting operations are prohibited in the construction area unless written permission has been given by the Airport Authority and adequate fire and safety precautions have been taken.
- F. The use or possession of explosives is prohibited on Airport property.
- G. Extensive stockpiles of construction materials will not be permitted near runway ends, runway edges, taxiways or aircraft parking aprons.
- H. Excavation and open trenches may be permitted within runway safety areas and up to the edge of structural pavement on taxiways and aprons, on a case-by-case basis, i.e. cable trenches, pavement tie-ins, etc.; but only with prior approval of the Owner and, where required, the FAA.
- I. Hazardous areas, into which no part of an aircraft may enter, (i.e., excavations, open trenches, material stockpiles, etc.) must be permanently delineated by use of barricades with alternate orange and white markings. The barricades are to be supplemented with orange flags (20x20 inch minimum) made and installed so that they are always in the extended position and properly oriented. For nighttime use, the barricades are supplemented with flashing red lights. Light intensity and barricade spacing must adequately delineate the hazardous area. Flare pots are prohibited.

Note: The Contractor shall designate an individual by name who is on call 24 hours per day for emergency maintenance of airport hazard lighting and barricades.
- J. FAA approval is required in advance of scheduled operation of any crane or other construction equipment with top elevation exceeding 300 feet mean sea level or that will penetrate any navigable surface as defined under FAR PART 77. Advance notification of intended use will be provided by the Owner well in advance of intended use.

3.06 CONSTRUCTION VEHICLE TRAFFIC

- A. Access to the construction site is as shown on the plans or as directed by the Owner. No other access point is authorized unless designated in writing by the Airport Authority. Construction traffic will operate only on designated haul routes within the construction area limits.
- B. Drivers of construction vehicles will be knowledgeable of construction routes or will be escorted by other Contractor or Owner designated personnel who are knowledgeable.
- C. The Contractor will be responsible for traffic control in the various construction areas of the work site. The Contractor will not permit unauthorized personnel or vehicles on the construction site.
- D. The Contractor shall be responsible for immediate cleanup of any debris deposited along construction routes, as result of his construction traffic.
- E. Directional signing at the construction access gate and along the delivery route to work site temporary storage areas shall be as designated and approved by the Owner.
- F. Construction vehicle identification shall be as prescribed in Specification Section 00802, AIRPORT SECURITY REQUIREMENTS.
- G. No construction vehicle is authorized on any active AOA pavement surface or to enter runway safety areas without specific authorization from the Owner.

3.07 REPORTING PROPERTY DAMAGE OR PERSONNEL INJURY

- A. All persons involved in any accident whether personal injury, aircraft or automotive, occurring on Airport property, shall make a full report to the Airport Police (922-8298) as soon after the accident as possible. The report shall include, but not be limited to, the names, addresses of all principals and witnesses, if known, and a statement of the facts. Construction accidents fall under this category.
- B. In the event of personnel injury requiring ambulance response, the Airport Police Dispatcher, upon notification, telephone 922-8333, will call the ambulance and arrange Airport Police escort to the injury site. A written report will be prepared by the Airport Police after the injury is treated.

END OF SECTION 00801

THIS PAGE LEFT BLANK INTENTIONALLY.

DIVISION 0 – SECTION 00802**AIRPORT SECURITY REQUIREMENTS****PART 1 GENERAL****1.01 CONTRACTORS SECURITY AND VEHICLE PROCEDURES OVERVIEW**

- A. This overview outlines procedures concerning Airport security requirements, vehicle operation, and maintenance requirements for contractors at Memphis International Airport or any airport owned and operated by the Memphis-Shelby County Airport Authority. The sponsor Memphis-Shelby County Airport Authority (Airport Authority), airline, tenant, or concessionaire at the Airport who has hired the contractor is responsible for ensuring the contractor understands and complies with all the rules and regulations. This is a consolidated synopsis of the contractor requirements from the Airport Security Program and the Airport Rules and Regulations.

1.02 DEFINITIONS

- A. **Aircraft** - shall mean any contrivance known or hereinafter invented, used or designed for navigation of or flight in the air.
- B. **Air Operations Area (AOA)** - that part of the Airport used or intended to be used for landing, taking off, surface maneuvering, loading, unloading, or servicing the aircraft.
- C. **Airport** - shall mean the Memphis International Airport and/or the General DeWitt Spain Airport and/or the Charles W. Baker Airport – where applicable.
- D. **Airport Restricted Area** - area of Memphis International Airport that is not intended for public uses or access. These are areas designated by the Airport Authority as restricted areas and clearly identified with signs designating those areas as "RESTRICTED AREA." The restricted area also includes the AOA.
- E. **AOA Driver's Permit** - permit issued by the Airport Authority for operating unescorted motor vehicles on the AOA.
- F. **Construction Restricted Area** - any area, inside or outside of the Airport Restricted Area, which is fenced, or in some like manner defined by the Contractor. The Contractor is responsible for the security of the Construction Restricted Area.
- G. **Director** - shall mean the Director of Operations and Public Safety or his duly authorized representatives.
- H. **Job Site** - a predetermined geographic area with specific boundaries established by the Airport Authority.
- I. **Movement Area** - runways, taxiways, and other areas of the Airport used for taxiing, takeoff, and landing of aircraft, except loading ramps and parking areas.
- J. **Personal Escort** - remaining within sight of the individual under escort at all times while in the Airport restricted areas at a distance not to exceed 20 feet.
- K. **Public Area** - any area within Airport facilities open to the general public.
- L. **SIDA** - Security Identification Display Area.

- M. **Unescorted Identification Badge** - pictured identification badge issued by the Airport Authority, which allows bearer to enter Airport Restricted Areas where there is a job related need.
- N. **Vehicle Escort** - means the following of an authorized escort vehicle into the Airport Restricted Areas.

PART 2 PRODUCTS

(No products are required in this Section.)

PART 3 EXECUTION

3.01 AMENDMENTS AND SPECIAL NOTICES

- A. The Contractor will be bound by any future amendments, additions, deletions, or corrections of the Airport Rules and Regulations promulgated by the Airport Authority, as dictated by changes in Federal Transportation Security Administration (TSA) regulations, as dictated by changes in Federal Aviation Administration (FAA) regulations, or safety requirements at Memphis International Airport or any airport owned and operated by Memphis-Shelby County Airport Authority.
- B. Special regulations, notices, memoranda, or directions of an operations nature of interest to persons engaged in business with the Airport Authority, as generated by the Director, shall be issued under the authority of the Airport Regulations and shall have the same effect as the Airport Rules and Regulations.
- C. The Director is authorized to interpret and construe these regulations wherever necessary, either by directions of general or specific application, and his interpretation and construction should be deemed a part of the regulations and binding upon all persons.

3.02 ENFORCEMENT AND COMPLIANCE WITH AIRPORT REGULATIONS

- A. The uniformed Airport Police Officers of the Airport Authority and other representatives as designated by the Director are empowered to require compliance with Airport Rules and Regulations, ordinances of the City of Memphis, laws of the State of Tennessee, and federal rules and regulations. No authority is either hereby expressed or implied, however, that would permit any individual other than the Director to change, alter, or amend Airport Rules and Regulations.
- B. It shall be unlawful for any person to do or commit any act forbidden herein or fail to perform any act required by Airport Rules and Regulations.

3.03 SCOPE

- A. All users of and persons on Airport property shall be governed by the Airport Rules and Regulations and directions of the Director. Airport Rules and Regulations are subject to change by the Airport Authority Board of Directors at any time.
- B. Airport Rules and Regulations are not intended to amend, modify or supersede federal, state, or local laws or regulations.
- C. If any portion of the Airport Rules and Regulations shall be invalid or unenforceable, all other portions shall remain in effect and be construed to achieve the purposes hereof.

3.04 IDENTIFICATION REQUIREMENTS

- A. Entry into the SIDA is controlled by an automated access control system as mandated under CFR 49 Part 1540 and 1542. All persons in the SIDA must display, on the outermost garment, below the head and above the waist, an Airport-approved identification media unless under Airport approved escort.
- B. The Airport Authority will issue Airport Identification badges to the Contractor's employees who require access to the Airport Secured/Restricted Areas. The extent of the background check necessary for access into any worksite will be determined on a project by project basis. AIRPORT ID BADGES REMAIN AIRPORT AUTHORITY PROPERTY. Other identification procedures must be authorized by the Director in accordance with TSA regulations.
- C. Recent changes to Federal TSA Regulations provide for individual sanctions against employees who violate regulatory requirements. Individual employees may be subject to federal enforcement action by the TSA to include civil penalties. Some examples of punishable actions would include:
 - 1. Loaning a badge to someone else for use in the system.
 - 2. "Tailgating" through restricted area doors (or not using their own badge when entering or exiting).
 - 3. Failing to challenge unauthorized individuals in Airport restricted areas.
 - 4. Failing to notify proper authorities for individuals violating prescribed security regulations.
- D. The Memphis International Airport Identification Badge is the property of the Memphis-Shelby County Airport and must be surrendered upon termination of employment or completion of the project. The bearer will be held personally responsible for its return and is subject to any fines or penalties imposed. The badge is mandated through federal government guidelines and any misuse or tampering of badges is punishable under federal guidelines.
- E. Any employee attempting to bypass security measures will be subject to having their badge confiscated and access privileges terminated. Further, any efforts by an employee to circumvent prescribed security measures could result in arrest and the imposition of penalties from the TSA to the employee and to the related employer.
- F. Identification badges will be issued following the procedures listed below.
 - 1. Identification Badge Application – To be issued at Pre-Construction Meeting.
 - a. Prior to the issuance of an Airport identification badge to a contract employee of the Airport or Airport tenant, a badge application form must be prepared and submitted to the Airport Authority Identification Office.
 - b. Badge applications must be completed before badges will be issued. Employees should be instructed to print all information clearly and legibly. After an employee completes the employee and applicant portions of the application, certification by a designated MSCAA Approved Certifying Official is required.
 - c. Access is limited to only those restricted areas predicated on the Contractor's duties determined by the Development and Operations Divisions.
 - d. The Aviation Transportation Security Act (ATSA), which was passed by Congress on November 19, 2001, changed the requirements for SIDA access by requiring immediate fingerprint based background checks of all persons applying for and currently with unescorted SIDA access.

In addition, the number of disqualifying criminal offenses has increased. (See Attachment) The fingerprint based check must be complete and not reveal any disqualifying crimes in the last 10 years prior to any applicant receiving unescorted access to the SIDA.

- e. For employees unable to produce a legible set of fingerprints, they will submit to a manual criminal history check by the TSA. The process will take 30 days or more.

2. Airport Security Briefing

- a. Each employee requesting an Airport identification badge must attend a security training class. This briefing is conducted Monday through Friday. Contact the Airport Authority Identification Office at 922-8005 for the correct time.

3. Accountability

- a. In accordance with TSA guidelines, no more than 5% of identification badges issued by the Airport Authority can be unaccounted for at any time. A badge is considered unaccounted for if it is lost, stolen or not returned. If 5% of issued identification badges are unaccounted for, all badges must be reissued. Contractors will be assessed a fee for each badge leading to this reissuance. See Section 3.04, Identification Requirements, paragraph H.1.h below for the applicable fee.
- b. Federal regulations require immediate notification of employee terminations and lost badges to the operator in charge of deleting access privileges, which, in our case, would be the Control Center, 922-8298.
- c. When the Contractor has reason to believe that the terminated employee may pose a threat to the Airport or air carrier operations, the Contractor is responsible to immediately notify the Airport Authority Identification Office in person, via telephone, or in writing whichever is most expeditious.
- d. Routine termination of employee access authority will be accomplished by the Airport Authority Identification Office **within 8 hours** of notification. The identification badge must be returned to the Airport Authority Identification Office or the Airport Authority Security Coordinator **within 24 hours** of employee dismissal or resignation. Identification cards recovered from the employee at the time of routine termination are considered to be denied access.
- e. It is the Contractor's responsibility to retrieve the Airport identification badge IMMEDIATELY upon an employee's termination (voluntary or involuntary), transfer, retirement, death, reassignment, or completion of work assignment.
- f. Reportedly lost or stolen identification badges must be thoroughly investigated and closely scrutinized. Replacement Identification badges will be issued only upon written request from the employer. Such request must be on company letterhead stationary, must state the circumstances surrounding the loss, and must be signed by an authorized company representative on file with the Airport Authority. A fee will be charged for a lost badge.
- g. Identification badges shall be valid only during the term of the contract for which it is issued.

- h. If the Airport Authority Identification Office receives notification from an outside source (e.g. Airport Police Department, etc.) that immediate denial should be enacted, then our office will contact the proper company officials to notify them of the change that is being requested.

H. Identification Badge Fees.

1. After the Contractor meets all requirements, the Airport Authority shall issue the Contractor's employees automated photo identification badges for the following fees. Payment must be made according to the arrangement made with the Finance Division as indicated on the badge application. The following fees will be implemented as of September 1, 2018.

a.	Fingerprint Fee (required initially and every two years)	\$27.00
b.	Fingerprint Admin Fee	\$10.00
c.	Initial ID Badge (Includes \$11 lifetime STA fee)	\$25.00
d.	Deposit Per Badge	\$100.00
e.	Badge Renewal Fee	\$10.00
f.	1 st Lost Badge Fee (Refund of \$50 upon return)	\$100.00
g.	2 nd Lost Badge Fee (Refund of \$75 upon return)	\$150.00
h.	3 rd Lost Badge Fee (Refund of \$100 upon return)	\$200.00*
i.	Non-Returned Badge	\$100.00
j.	Badge Replacement	\$10.00
k.	Damaged Badge	No Charge

*Requires meeting with Project Manager and Security Coordinator before identification badge can be replaced.

2. Deposits.
 - a. Badge deposits are due prior to the release of any badges.
 - b. Payments may be made by check, money order or cashier's check. Absolutely no cash will be accepted.
 - c. The fee for expired badges will be deducted from the deposit until the badge is returned. If an update for the expired badge is requested, the Contractor must bring the amount on deposit to \$100 before the badge can be released.
 - d. Deposits will be reimbursed to the Contractor upon receipt of the identification badges once a project has been completed or badging is no longer required.
3. Employees challenged in the Airport Restricted Areas without an Airport Identification Badge PROPERLY DISPLAYED will be transported to the Airport Police Office where a fine of \$25.00 will be assessed and access authority removed for a minimum of 5 days. FINES NOT PAID WITHIN 14 DAYS OF THE VIOLATION WILL RESULT IN THE SUSPENSION OF THE EMPLOYEE'S ACCESS TO AIRPORT RESTRICTED AREAS.

I. Airport Access Gate Control.

1. At the Contract preconstruction conference a specific airfield security gate will be designated in writing for Contractor ingress and egress to and from the construction site. The Contractor's, suppliers, and subcontractors are required to use **only** this gate unless designation is made in writing by the Director of Operations and Public Safety, authorizing use of a different gate.
2. Under normal circumstances the designated access gate will be manned by security personnel under contract with the Airport Authority. These gates are manned only during

specific hours. Contractors scheduling work are required to coordinate with the Construction Security Coordinator, 922-8021, a minimum of 24 hours in advance of required gate use.

3. If a gate other than the regular construction gate is necessary, the Contractor must provide a guardhouse for the Airport security guard. If the Airport Authority does not have a portable guard house available for the Contractor's use, the Contractor will be required to furnish a guard house which meets the requirements as set forth in Exhibit B.
4. The Contractor will submit a projected estimate of the guard services required for the following week. This projection must be submitted by noon each Thursday to the Security Coordinator. (Exhibit C)

J. Clearance Procedures.

1. Gate guards will perform the following procedures for all persons requesting entrance into restricted areas:
 - a. The guard will take possession of the badge of each person entering an access gate.
 - b. The photo is checked against the holder.
 - c. The badge information is checked against the stop list.
 - (1) If a badge is on the stop list the guard will retain the badge and notify the Airport Police.
 - d. Expiration date is checked to ensure that the badge has not expired.
 - e. The vehicle will be checked for an authorizing decal, debris and unauthorized items. A request to enter a restricted area IMPLIES CONSENT TO SEARCH.
 - f. The person or vehicle (if applicable) will be logged in by entering name, employer, destination, license number, time in and badge expiration date.
 - g. Clear persons to be escorted (if required) to destination.
2. Under special circumstances, Contractors may have airfield security gates designated for their contract use, which are not manned by security personnel. In this event the Airport Authority, with the concurrence of the TSA, will furnish the Contractor with written requirements for the control of authorized access gates proper to the beginning of any construction.

K. Escorts Into An Airport Restricted Area.

1. Contractors who do not have a valid Airport identification badge wishing to enter a restricted area must be escorted by a person holding a valid Airport identification badge.
2. All vehicles operated in a restricted area must either be driven by or escorted by a person holding an Airport identification badge and an Airport Driver's Permit.

L. Operating Without Escort.

1. The Airport Authority will take under consideration, on a case-by-case basis, the issuance of an Airport Driver's Permit to one project supervisor on each shift. The Contractor will be required to justify, in writing to the Director of Public Safety, the need for unescorted vehicle movement. This Airport Driver's Permit does not permit the holder to escort other vehicles.
2. If a Contractor is authorized by the Airport Authority to provide their own vehicle escorts, the Airport Police will conduct the necessary training. This training will consist of approximately 16 hours of classroom and practical exercises.

M. Exiting Restricted Areas.

1. Construction workers must exit the same gate they entered.
2. Upon exiting the restricted area, vehicles may be required to stop and all persons in the vehicle may be required to present an Airport photo identification badge to the gate guard.

N. Flag Persons.

1. The Airport Authority will provide flag persons within the Airport Restricted Area.

3.05 VEHICLE PARKING AND OPERATION

A. General.

1. All streets on the Airport shall have the status of dedicated city streets for the purpose of traffic enforcement.
2. Motor vehicles operated on the public roadways and parking lots of the Airport shall be governed by the traffic ordinance of the city and state laws applicable and, in addition thereto, the following regulations shall be applicable.

B. Traffic Rules and Regulations in the Air Operations Area.

1. The driver of any motor vehicle operating within the Airport boundary shall comply with the lawful orders, signals or directives of Airport Police Officers.
2. All drivers operating motor vehicles within the Airport boundary must possess a valid state driver's license.
3. Only drivers possessing a valid Airport Driver's Permit issued by the Airport Authority are authorized to operate any motorized vehicle unescorted on the AOA of Memphis International Airport. (The Security Coordinator may designate certain construction areas as void of this requirement)
4. Riding on trailer hitches, fenders, or on any portion of a vehicle not equipped with proper seats, running boards, or handholds is prohibited. Standing up in a moving motor vehicle, riding outside of a moving motor vehicle, or riding with arms or legs protruding from the body of the vehicle is prohibited.
5. All vehicle lights shall be lighted during the hours of darkness or during the time of reduced visibility when said vehicle is being operated in the restricted area.
6. No person shall operate any motorized vehicle when vision is restricted due to the load being carried, or for any other reason.
7. No person under the influence of alcoholic beverages or narcotic drugs shall operate any motor vehicle or motorized equipment on the Airport.
8. It shall be the responsibility of the operator to ascertain that the vehicle is in good operating condition. Operators are required to check proper operation of the vehicle's brakes before commencing any operation on airport.
9. Vehicles dripping oil, gasoline, water, or debris of any kind, shall be restricted.

10. Pedestrians and aircraft shall at all times have right-of-way over vehicular traffic. All vehicles must pass to the rear of taxiing aircraft.

C. Radio Equipment.

1. All vehicles operating in the aircraft movement area must be equipped with a two-way radio and, when the movement area is being controlled, be in continuous communication with the Control Tower, unless being escorted by authorized escort vehicle.
2. The installation of two-way radios does not permit the operation of vehicles on the Airport without proper authorization of the Director.

D. Contractor Employee Parking.

1. Employee parking is not available on the job site. The Contractor must provide for remote parking for employees and transport them to the job site.

E. Authorized Contractor Vehicles.

1. Unless otherwise authorized, the Contractor and each subcontractor shall be permitted to have no more than one (1) vehicle per trade on the job site. All Contractor vehicles authorized access to Airport restricted areas shall be:
 - a. Owned or hired by the Contractor or subcontractor;
 - b. Insured under company policy;
 - c. On a pre-approved list; and
 - d. Marked in accordance with Airport regulations.
2. Passenger type vehicles, including pickup trucks, must have the company name displayed on each front door of the vehicle. The company name must be readable, but at a minimum (the letter size shall be 4.5"). The vehicle must display the appropriate Airport registration decal. Specialized equipment such as bulldozers, cranes, etc., will be exempted from this requirement.
3. Cranes used during daylight hours shall have a red flag affixed to the top of boom. Cranes shall have a red obstruction light on the top of boom when used at night. Crane booms shall not be left erect when not in use or following end of workday.

F. Emergency Vehicles and Conditions.

1. Any person operating a motor vehicle on the air operations area shall immediately yield the right-of-way to the police, ambulance, fire department, or other emergency vehicle giving an audible or visual signal or as otherwise directed by an Airport law enforcement officer or fire/rescue department personnel.
2. Emergency conditions existing on the air operations area will not mitigate or cancel existing regulations for non-emergency vehicles in areas not affected by the emergency.
3. Under emergency conditions such as an aircraft accident or fire, access to the scene is denied to all vehicles or persons except those whose duties require their presence. Permits and licensing shall be rendered invalid in the area of emergency conditions and the Airport Authority shall determine when normal operations may be resumed.

G. Passing Aircraft.

1. All vehicles shall pass to the rear of taxiing aircraft and shall pass no nearer than 20 feet horizontal distance.

H. Passenger Concourse.

1. No motorized vehicles or carts of any type shall be used in any concourse or terminal lobby unless approved by the Director.
2. No vehicle or motorized equipment shall be driven under concourses except at authorized vehicle pass-throughs designated by the Director.

I. AOA Driving Lanes.

1. Vehicles on the aircraft parking apron at the terminal and air cargo buildings shall be operated within the marked driving lanes and in compliance with marked traffic control signs except for the following:
 - a. Authorized vehicles engaged in parking apron repair and inspection; and
 - b. Vehicles exceeding a width of 12 feet which shall follow marked lanes as closely as possible.
2. Vehicles shall enter and exit designated driving lanes at a point nearest to the origin and destination.
3. No vehicles or equipment shall be parked in a manner as to obstruct any portion of the driving lanes.

J. Taxiing Aircraft.

1. Vehicles shall yield to taxiing aircraft or aircraft under tow.

K. Speed Limits.

1. No person shall operate a motor vehicle or other motorized equipment at a speed greater than the following:
 - a. Five miles per hour in designated drives under the terminal;
 - b. Fifteen miles per hour on paved service roads in the vicinity of the terminal and air cargo buildings; or
 - c. Twenty-five miles per hour on all aprons or ramps unless the area has an otherwise posted speed limit.
 - d. Fifteen miles per hour on all aprons or ramps at General DeWitt Spain Airport and Charles W. Baker Airport unless the area has an otherwise posted speed limit.

L. Inspection of Vehicles.

1. Contractors authorized to operate vehicles on the air operations area shall be responsible for ensuring that each motor vehicle is inspected at least each 12 months by a qualified mechanic, is in good mechanical condition and has all the required safety equipment.
2. The Contractor shall remove from service any vehicle, which, in the opinion of the Director, is defective and in need of repair and said vehicle will not be returned to service until properly repaired.

M. Violations of Restricted Area Traffic Regulations.

ISSUED FOR BID

1. The penalties for a violation of restricted area traffic regulations shall be as follows:
 - a. First offense within any 12-month period: retraining;
 - b. Second offense within any 12 month period: retraining and fine not to exceed \$50.00;
 - c. Third offense within any 12 month period: retraining and fine not to exceed \$100.00; and
 - d. Fourth offense within any 12 month period: revocation of privilege to drive in restricted area (unescorted or escorted).
2. The above set penalties do not negate the right of the Airport Authority to immediately revoke driving privileges, dependent upon the seriousness of the violation.

N. Vehicle Registration.

1. The Contractor shall list all construction vehicles requiring passage through the access gate on the "AOA Access Decal Request Form," which will be provided upon request.
2. Each vehicle approved will be issued a windshield decal, which must be affixed to the driver's side of the windshield. This decal is not transferable. Only those vehicles so marked will be allowed through the access gate with the following exceptions:
 - a. dump trucks;
 - b. concrete trucks;
 - c. vehicles making deliveries; and
 - d. cranes, tractor, etc.

O. Delivery Vehicles.

1. Each day the Contractor shall give the access gate guard a written list of deliveries expected. No delivery will be cleared into the restricted area unless it is on the list or the construction supervisor is contacted for clearance.

3.06 GENERAL INFORMATION

A. Access to Public Facilities.

1. Contractor employees are not authorized to use public facilities, (i.e., rest rooms, eating facilities, boarding gate hold rooms or other public areas of the terminal), except as specifically authorized by the Airport Authority and as necessary for access to job site.
2. Contractors shall provide adequate rest room and break facilities within the job site and staging areas as appropriate.
3. All public areas authorized for use by the Contractor's employees are to be kept in a clean and sanitary manner, free of all construction debris.

B. Accident Reports.

1. All persons involved in any accident whether personal injury, aircraft or automotive, occurring on Airport property, shall make a full report to the Airport Police (922-8298) as soon after the accident as possible. The report shall include, but not be limited to, the names, addresses of all principals and witnesses, if known, and a statement of the facts. Construction accidents fall under this category

2. To request paramedics call 922-8333.
- C. Airport Rules and Regulations.
1. The Contractor shall conform to the "Memphis-Shelby County Airport Authority Rules and Regulations."
 2. The Contractor shall conform to "Memphis-Shelby County Airport Authority's Air Operations Area Rules and Regulations and its Airport Security Program."
- D. Alcoholic Beverages and Narcotic Drugs.
1. No person shall have any alcoholic beverages or narcotic drugs on Airport property.
- E. Damages.
1. Contractors shall be fully responsible for all damages to buildings, equipment, real property and appurtenances in the ownerships or custody of the Airport Authority caused by negligence, abuse or carelessness on the part of their employees, agents, customers, visitors, suppliers or persons with whom they do business.
- F. Disorderly Conduct.
1. No person shall commit any disorderly, obscene or indecent act nor commit any nuisance.
 2. Abusive behavior by Contractor supervisors or their employees will not be tolerated.
- G. Debris and Cleanup.
1. No person shall dispose of any garbage, trash, refuse or any other material on the Airport except in the receptacles provided for that purpose.
 2. No person shall dispose of any fill or building materials or any other materials on Airport property except in such areas as are specifically designated by the Director.
 3. Contractors are responsible for the cleanliness of the job site and access to the job site as appropriate. All Contractors must establish an active ongoing program to eliminate any foreign objects which may cause damage to aircraft or cause personal injury to other persons. Contractors must pay particular attention to haul routes used to and from the job site to clean up any debris which may be tracked onto or dropped on the air operations area. Contractor will immediately remove such debris to eliminate the hazard. **END OF THE WORKDAY CLEANUP WILL NOT SUFFICE.** Cleanup shall be done to the satisfaction of the Airport Authority. All Active taxiway crossings and work areas adjacent to the taxiways shall be kept clean.
 4. If it should become necessary for the Airport Authority to remove debris left by a Contractor, the Contractor shall be billed at 2 1/2 times the actual cost of the cleanup or a minimum of \$250 per trip whichever is greater.
- H. Firearms and Explosives.
1. No person shall have any firearm, explosive or incendiary device on or about their person or accessible property while on Airport property.

I. Fire Equipment.

1. All Contractors shall supply and maintain adequate and readily accessible fire extinguishers for the particular hazard involved as directed by the Airport Authority or the Fire Marshal. All fire apparatus shall be maintained in first class operable condition.
2. The Contractor shall maintain the following items on site:
 - a. Two-pound dry chemical extinguisher, or
 - b. Four-pound carbon dioxide extinguisher.
3. Carbon tetrachloride chlorobromethene or other vaporizing liquid extinguishers are not permitted inside buildings due to their high toxicity unless approved in writing by the Fire Marshal.

J. Gambling.

1. No person shall conduct gambling in any form or operate gambling devices anywhere on Airport property.

K. Hazards.

1. No person shall use flammable volatile liquids having a flash point of less than 100°F in cleaning of parts, appliances, or for any other purpose unless such operations are conducted in the open air not within 50 feet of an aircraft, away from structures and equipment or in properly ventilated, approved paint booths.
2. No person shall keep or store any flammable liquids, gases, oil, oil wastes, flares, paints, or other similar material in any building within the Airport boundary except that such materials may be kept in specially provided rooms or receptacles approved by the Fire Marshal.
3. Contractors shall provide suitable metal receptacles with covers for the storage of wastes, rags, or other rubbish.
4. No person shall start any open fires of any type, including flare posts, torches or fires in containers formerly used for oil, paint, or similar materials on any part of an Airport without permission of the Director.

L. Picketing and Public Demonstrations.

1. Subject to applicable federal, state and local regulations and laws, no persons shall walk in a picket line as a picketer or take part in any labor or other public demonstration on any Airport property or facilities therein except in those places which may be specifically assigned for use of such picket lines or other public demonstration by the Director.

M. Restricted Areas.

1. No persons shall enter any area posted as being restricted or closed to the public except for the following:
 - a. Persons assigned to duty therein;
 - b. Persons authorized by the Director; or
 - c. Persons under contractual agreement with the Airport Authority or tenants of the Airport Authority.

2. All persons in restricted areas of Memphis International Airport must be duly authorized and must have displayed on their person an official identification badge which will clearly establish the individual by name, contractor affiliation, and construction project completion date.
3. The identification badge must be worn on the outermost garment above the waist except in those cases where there exists an overriding safety consideration approved by the FAA.

N. Signs on the Airport.

1. Signs may not be installed in public view on the Airport without prior approval of the Airport Authority. Proposals should be documented and submitted to the Airport Authority with an accompanying sketch depicting the general appearance and location of the desired sign, and the name and telephone number of an individual to contact.

O. Smoking.

1. No person shall smoke or carry lighted cigars, cigarettes, pipes, matches or any naked flame in or on any fuel storage areas, Air Operations Area, public aircraft parking and storage area, in any other place where smoking is specifically prohibited by signs or upon any open space within 50 feet of any fuel carrier which is not in motion. Smoking by tank vehicle drivers, helpers, repairmen, or other personnel is prohibited while they are driving, making deliveries, filling or making repairs to tank vehicles. No person shall smoke or permit any open flame within 100 feet of any aircraft undergoing fuel service or within at least 50 feet of any hangar or building.

P. Storage of Equipment.

1. Contractors shall store or stock material or equipment in a neat and orderly manner and in a manner not to constitute a hazard to personnel or property.

Q. Trash Containers.

1. Areas to be used for trash and garbage containers shall be designated by the Director and no other areas shall be used. Only trash containers approved by the Director shall be used by contractors for the collection of trash and garbage. The placement of trash or garbage outside approved containers is strictly prohibited.

R. Utilities.

1. The following instructions must be adhered to without exception:
 - a. No contractor or employee for any craft shall turn off any utilities without contacting the Airport Authority. This includes water, electrical and HVAC;
 - b. No one shall open any electrical substations, distribution or motor control centers without first notifying the Airport Authority. No branch circuits shall be turned off or on, without obtaining permission from the Airport Authority; and
 - c. No one shall turn off the water or the HVAC or open any drain lines without notifying the Airport Authority.
2. All notifications for utility disruption must be made through the Airport Authority and must be made a minimum of 24 hours prior to scheduled shutoff.

3. The Airport Authority has a responsibility to keep the Airport in operation; it is your responsibility to conform to the above instructions. You may contact the Airport Authority.

FOR ANY QUESTIONS CONCERNING SECURITY REGULATIONS CONTACT THE SECURITY COORDINATOR AT 901/922-8021.

END OF SECTION 00802

EXHIBIT B**GUARD HOUSE SPECIFICATIONS**

1. No less than 5' x 8'
2. Heated, air conditioned and lighted
3. Counter or table (minimum size 16" x 36")
4. House must have two doors to allow guards to check entering and exiting vehicles.
5. Windows on all sides, large enough for guard to observe restricted areas from a seated position.
6. Chair with turning radius of 360 degrees, at a height which allows guards to observe restricted areas through windows.
7. Trash can (dumping daily responsibility of Contractor)

PORTABLE TOILETS

1. Daily cleanliness responsibility of Contractor
2. Restricted to guards only. NO CONSTRUCTION PERSONNEL PERMITTED.

PLACEMENT OF GUARD HOUSES AND PORTABLE TOILETS


1. Area to be designated by Airport Authority
2. Clear Accessibility (paved or gravel)

The Contractor is responsible for supplying and maintaining power source for the guard houses. The contractor is also responsible for maintaining the heating and cooling of same.

END OF EXHIBIT B

EXHIBIT C

CONTRACT SECURITY SERVICE PROJECTION FORM (.PDF VERSION IS AVAILABLE)



CONTRACT SECURITY SERVICE PROJECTION FORM

CONSTRUCTION

A CONTRACT SECURITY SERVICE PROJECTION FORM SHOULD BE SUBMITTED TO THE AIRPORT SECURITY COORDINATOR EACH THURSDAY NO LATER THAN 12:00 PM FOR THE FOLLOWING WEEK. CONTRACT SECURITY SERVICES MAY NOT BE AVAILABLE IF AN ACCURATE PROJECTION FORM IS NOT RECEIVED ON TIME. IF YOU HAVE ANY QUESTIONS CONTACT THE MSCAA SECURITY COORDINATOR AT 901-922-8021 OR EMAIL @CROBINSON@FLYMEMPHIS.COM.

IMPORTANT NOTE: THIS FORM MUST BE FILLED OUT COMPLETELY & SIGNED PRIOR TO SUBMITTAL.

PROJECTED SCHEDULE FOR THE WEEK OF:		SCHEDULE				
		DAY	DATE	OPEN TIME	CLOSE TIME	SIGN IN TIME <small>(FOR OFFICIAL USE ONLY)</small>
COMPANY NAME: PROJECT NAME: PROJECT NUMBER: LOCATION: POINT OF CONTACT: PHONE#:		SUNDAY				
		MONDAY				
		TUESDAY				
		WEDNESDAY				
		THURSDAY				
		FRIDAY				
SATURDAY						

IMPORTANT NOTE: A 24 HOUR NOTICE IS REQUIRED FOR ANY CHANGES TO A SUBMITTED SCHEDULE.

COMPANY AUTHORIZED SIGNATORY AUTHORIZATION/VERIFICATION

(LAST NAME)
(FIRST)
(MI)
(SIGNATURE)
(COMPANY)
(DATE)
(CONTACT TEL #)

ALL REQUESTS FOR SERVICE MUST BE MADE BY AN AIRPORT AUTHORIZED SIGNATORY

CS FM03 - CONTRACT SECURITY SERVICE PROJECTION FORM

END OF EXHIBIT C

Part 1 – General Contract Provisions

Section 10 Definition of Terms

When the following terms are used in these specifications, in the contract, or in any documents or other instruments pertaining to construction where these specifications govern, the intent and meaning shall be defined as follows:

Paragraph Number	Term	Definition
10-01	AASHTO	The American Association of State Highway and Transportation Officials.
10-02	Access Road	The right-of-way, the roadway and all improvements constructed thereon connecting the airport to a public roadway.
10-03	Advertisement	A public announcement, as required by local law, inviting bids for work to be performed and materials to be furnished.
10-04	Airport	Airport means an area of land or water which is used or intended to be used for the landing and takeoff of aircraft; an appurtenant area used or intended to be used for airport buildings or other airport facilities or rights of way; airport buildings and facilities located in any of these areas, and a heliport.
10-05	Airport Improvement Program (AIP)	A grant-in-aid program, administered by the Federal Aviation Administration (FAA).
10-06	Air Operations Area (AOA)	The term air operations area (AOA) shall mean any area of the airport used or intended to be used for the landing, takeoff, or surface maneuvering of aircraft. An air operation area shall include such paved or unpaved areas that are used or intended to be used for the unobstructed movement of aircraft in addition to its associated runway, taxiway, or apron.
10-07	Apron	Area where aircraft are parked, unloaded or loaded, fueled and/or serviced.
10-08	ASTM International (ASTM)	Formerly known as the American Society for Testing and Materials (ASTM).

Paragraph Number	Term	Definition
10-09	Award	The Owner's notice to the successful bidder of the acceptance of the submitted bid.
10-10	Bidder	Any individual, partnership, firm, or corporation, acting directly or through a duly authorized representative, who submits a proposal for the work contemplated.
10-11	Building Area	An area on the airport to be used, considered, or intended to be used for airport buildings or other airport facilities or rights-of-way together with all airport buildings and facilities located thereon.
10-12	Calendar Day	Every day shown on the calendar.
10-13	Certificate of Analysis (COA)	The COA is the manufacturer's Certificate of Compliance (COC) including all applicable test results required by the specifications.
10-14	Certificate of Compliance (COC)	The manufacturer's certification stating that materials or assemblies furnished fully comply with the requirements of the contract. The certificate shall be signed by the manufacturer's authorized representative.
10-15	Change Order	A written order to the Contractor covering changes in the plans, specifications, or proposal quantities and establishing the basis of payment and contract time adjustment, if any, for work within the scope of the contract and necessary to complete the project.
10-16	Contract	<p>A written agreement between the Owner and the Contractor that establishes the obligations of the parties including but not limited to performance of work, furnishing of labor, equipment and materials and the basis of payment.</p> <p>The awarded contract includes but may not be limited to: Advertisement, Contract form, Proposal, Performance bond, payment bond, General provisions, certifications and representations, Technical Specifications, Plans, Supplemental Provisions, standards incorporated by reference and issued addenda.</p>
10-17	Contract Item (Pay Item)	A specific unit of work for which a price is provided in the contract.
10-18	Contract Time	The number of calendar days or working days, stated in the proposal, allowed for completion of the contract, including authorized time extensions. If a calendar date of

Paragraph Number	Term	Definition
		completion is stated in the proposal, in lieu of a number of calendar or working days, the contract shall be completed by that date.
10-19	Contractor	The individual, partnership, firm, or corporation primarily liable for the acceptable performance of the work contracted and for the payment of all legal debts pertaining to the work who acts directly or through lawful agents or employees to complete the contract work.
10-20	Contractors Quality Control (QC) Facilities	The Contractor's QC facilities in accordance with the Contractor Quality Control Program (CQCP).
10-21	Contractor Quality Control Program (CQCP)	Details the methods and procedures that will be taken to assure that all materials and completed construction required by the contract conform to contract plans, technical specifications and other requirements, whether manufactured by the Contractor, or procured from subcontractors or vendors.
10-22	Control Strip	A demonstration by the Contractor that the materials, equipment, and construction processes results in a product meeting the requirements of the specification.
10-23	Construction Safety and Phasing Plan (CSPP)	The overall plan for safety and phasing of a construction project developed by the airport operator, or developed by the airport operator's consultant and approved by the airport operator. It is included in the invitation for bids and becomes part of the project specifications.
10-24	Drainage System	The system of pipes, ditches, and structures by which surface or subsurface waters are collected and conducted from the airport area.
10-25	Engineer	The individual, partnership, firm, or corporation duly authorized by the Owner to be responsible for engineering, inspection, and/or observation of the contract work and acting directly or through an authorized representative.
10-26	Equipment	All machinery, together with the necessary supplies for upkeep and maintenance; and all tools and apparatus necessary for the proper construction and acceptable completion of the work.
10-27	Extra Work	An item of work not provided for in the awarded contract as previously modified by change order or supplemental agreement, but which is found by the Owner's Engineer or

Paragraph Number	Term	Definition
		Resident Project Representative (RPR) to be necessary to complete the work within the intended scope of the contract as previously modified.
10-28	FAA	The Federal Aviation Administration. When used to designate a person, FAA shall mean the Administrator or their duly authorized representative.
10-29	Federal Specifications	The federal specifications and standards, commercial item descriptions, and supplements, amendments, and indices prepared and issued by the General Services Administration.
10-30	Force Account	<p>a. Contract Force Account - A method of payment that addresses extra work performed by the Contractor on a time and material basis.</p> <p>b. Owner Force Account - Work performed for the project by the Owner's employees.</p>
10-31	Intention of Terms	<p>Whenever, in these specifications or on the plans, the words “directed,” “required,” “permitted,” “ordered,” “designated,” “prescribed,” or words of like import are used, it shall be understood that the direction, requirement, permission, order, designation, or prescription of the Engineer and/or Resident Project Representative (RPR) is intended; and similarly, the words “approved,” “acceptable,” “satisfactory,” or words of like import, shall mean approved by, or acceptable to, or satisfactory to the Engineer and/or RPR, subject in each case to the final determination of the Owner.</p> <p>Any reference to a specific requirement of a numbered paragraph of the contract specifications or a cited standard shall be interpreted to include all general requirements of the entire section, specification item, or cited standard that may be pertinent to such specific reference.</p>
10-32	Lighting	A system of fixtures providing or controlling the light sources used on or near the airport or within the airport buildings. The field lighting includes all luminous signals, markers, floodlights, and illuminating devices used on or near the airport or to aid in the operation of aircraft landing at, taking off from, or taxiing on the airport surface.
10-33	Major and Minor Contract Items	A major contract item shall be any item that is listed in the proposal, the total cost of which is equal to or greater than

Paragraph Number	Term	Definition
		20% of the total amount of the award contract. All other items shall be considered minor contract items.
10-34	Materials	Any substance specified for use in the construction of the contract work.
10-35	Modification of Standards (MOS)	Any deviation from standard specifications applicable to material and construction methods in accordance with FAA Order 5300.1.
10-36	Notice to Proceed (NTP)	A written notice to the Contractor to begin the actual contract work on a previously agreed to date. If applicable, the Notice to Proceed shall state the date on which the contract time begins.
10-37	Owner	The term "Owner" shall mean the party of the first part or the contracting agency signatory to the contract. Where the term "Owner" is capitalized in this document, it shall mean airport Sponsor only. The Owner for this project is Memphis-Shelby County Airport Authority .
10-38	Passenger Facility Charge (PFC)	Per 14 Code of Federal Regulations (CFR) Part 158 and 49 United States Code (USC) § 40117, a PFC is a charge imposed by a public agency on passengers enplaned at a commercial service airport it controls.
10-39	Pavement Structure	The combined surface course, base course(s), and subbase course(s), if any, considered as a single unit.
10-40	Payment bond	The approved form of security furnished by the Contractor and their own surety as a guaranty that the Contractor will pay in full all bills and accounts for materials and labor used in the construction of the work.
10-41	Performance bond	The approved form of security furnished by the Contractor and their own surety as a guaranty that the Contractor will complete the work in accordance with the terms of the contract.
10-42	Plans	The official drawings or exact reproductions which show the location, character, dimensions and details of the airport and the work to be done and which are to be considered as a part of the contract, supplementary to the specifications. Plans may also be referred to as 'contract drawings.'

Paragraph Number	Term	Definition
10-43	Project	The agreed scope of work for accomplishing specific airport development with respect to a particular airport.
10-44	Proposal	The written offer of the bidder (when submitted on the approved proposal form) to perform the contemplated work and furnish the necessary materials in accordance with the provisions of the plans and specifications.
10-45	Proposal guaranty	The security furnished with a proposal to guarantee that the bidder will enter into a contract if their own proposal is accepted by the Owner.
10-46	Quality Assurance (QA)	Owner's responsibility to assure that construction work completed complies with specifications for payment.
10-47	Quality Control (QC)	Contractor's responsibility to control material(s) and construction processes to complete construction in accordance with project specifications.
10-48	Quality Assurance (QA) Inspector	An authorized representative of the Engineer and/or Resident Project Representative (RPR) assigned to make all necessary inspections, observations, tests, and/or observation of tests of the work performed or being performed, or of the materials furnished or being furnished by the Contractor.
10-49	Quality Assurance (QA) Laboratory	The official quality assurance testing laboratories of the Owner or such other laboratories as may be designated by the Engineer or RPR. May also be referred to as Engineer's, Owner's, or QA Laboratory.
10-50	Resident Project Representative (RPR) / Program Manager	The individual, partnership, firm, or corporation duly authorized by the Owner to be responsible for all necessary inspections, observations, tests, and/or observations of tests of the contract work performed or being performed, or of the materials furnished or being furnished by the Contractor, and acting directly or through an authorized representative. RPR and Program Manager are used interchangeably.
10-51	Runway	The area on the airport prepared for the landing and takeoff of aircraft.
10-52	Runway Safety Area (RSA)	A defined surface surrounding the runway prepared or suitable for reducing the risk of damage to aircraft. See the

Paragraph Number	Term	Definition
		construction safety and phasing plan (CSPP) for limits of the RSA.
10-53	Safety Plan Compliance Document (SPCD)	Details how the Contractor will comply with the CSPP.
10-54	Specifications	A part of the contract containing the written directions and requirements for completing the contract work. Standards for specifying materials or testing which are cited in the contract specifications by reference shall have the same force and effect as if included in the contract physically.
10-55	Sponsor	A Sponsor is defined in 49 USC § 47102(24) as a public agency that submits to the FAA for an AIP grant; or a private Owner of a public-use airport that submits to the FAA an application for an AIP grant for the airport.
10-56	Structures	Airport facilities such as bridges; culverts; catch basins, inlets, retaining walls, cribbing; storm and sanitary sewer lines; water lines; underdrains; electrical ducts, manholes, handholes, lighting fixtures and bases; transformers; navigational aids; buildings; vaults; and, other manmade features of the airport that may be encountered in the work and not otherwise classified herein.
10-57	Subgrade	The soil that forms the pavement foundation.
10-58	Superintendent	The Contractor's executive representative who is present on the work during progress, authorized to receive and fulfill instructions from the RPR, and who shall supervise and direct the construction.
10-59	Supplemental Agreement	A written agreement between the Contractor and the Owner that establishes the basis of payment and contract time adjustment, if any, for the work affected by the supplemental agreement. A supplemental agreement is required if: (1) in scope work would increase or decrease the total amount of the awarded contract by more than 25%; (2) in scope work would increase or decrease the total of any major contract item by more than 25%; (3) work that is not within the scope of the originally awarded contract; or (4) adding or deleting of a major contract item.
10-60	Surety	The corporation, partnership, or individual, other than the Contractor, executing payment or performance bonds that are furnished to the Owner by the Contractor.

Paragraph Number	Term	Definition
10-61	Taxilane	A taxiway designed for low speed movement of aircraft between aircraft parking areas and terminal areas.
10-62	Taxiway	The portion of the air operations area of an airport that has been designated by competent airport authority for movement of aircraft to and from the airport's runways, aircraft parking areas, and terminal areas.
10-63	Taxiway/Taxilane Safety Area (TSA)	A defined surface alongside the taxiway prepared or suitable for reducing the risk of damage to an aircraft. See the construction safety and phasing plan (CSPP) for limits of the TSA.
10-64	Work	The furnishing of all labor, materials, tools, equipment, and incidentals necessary or convenient to the Contractor's performance of all duties and obligations imposed by the contract, plans, and specifications.
10-65	Working day	A working day shall be any day other than a legal holiday, Saturday, or Sunday on which the normal working forces of the Contractor may proceed with regular work for at least six (6) hours toward completion of the contract. When work is suspended for causes beyond the Contractor's control, it will not be counted as a working day. Saturdays, Sundays and holidays on which the Contractor's forces engage in regular work will be considered as working days.
10-66	Owner Defined terms	See Section 150 General Provisions Addendum for additional terms.

END OF SECTION 10

Section 20 Proposal Requirements and Conditions

20-01 Advertisement (Notice to Bidders). See specification section 00100, Legal Notice to Bidders.

20-02 Qualification of bidders. Each bidder shall submit evidence of competency and evidence of financial responsibility to perform the work to the Owner at the time of bid opening.

Evidence of competency, unless otherwise specified, shall consist of statements covering the bidder's past experience on similar work, and a list of equipment and a list of key personnel that would be available for the work.

Each bidder shall furnish the Owner satisfactory evidence of their financial responsibility. Evidence of financial responsibility, unless otherwise specified, shall consist of a confidential statement or report of the bidder's financial resources and liabilities as of the last calendar year or the bidder's last fiscal year. Such statements or reports shall be certified by a public accountant. At the time of submitting such financial statements or reports, the bidder shall further certify whether their financial responsibility is approximately the same as stated or reported by the public accountant. If the bidder's financial responsibility has changed, the bidder shall qualify the public accountant's statement or report to reflect the bidder's true financial condition at the time such qualified statement or report is submitted to the Owner.

Unless otherwise specified, a bidder may submit evidence that they are prequalified with the State Highway Division and are on the current "bidder's list" of the state in which the proposed work is located. Evidence of State Highway Division prequalification may be submitted as evidence of financial responsibility in lieu of the certified statements or reports specified above.

20-03 Contents of proposal forms. The Owner's proposal forms state the location and description of the proposed construction; the place, date, and time of opening of the proposals; and the estimated quantities of the various items of work to be performed and materials to be furnished for which unit bid prices are asked. The proposal form states the time in which the work must be completed, and the amount of the proposal guaranty that must accompany the proposal. The Owner will accept only those Proposals properly executed on physical forms or electronic forms provided by the Owner. Bidder actions that may cause the Owner to deem a proposal irregular are given in paragraph 20-09 *Irregular proposals*.

See sections C-105, 00405, and 01100 for information on Mobilization.

A virtual Pre-Bid Meeting will be held Monday, June 13, 2022, at 1:00 PM local time via phone/video conferencing (Link: <https://us06web.zoom.us/j/83619806347?pwd=VWdTbkM0WDZVZEgzM3FteG4zVWhjQT09>; Phone: 1 (312) 626-6799 / Passcode: 703397; Meeting ID: 836 1980 6347). Attendance at the Pre-Bid Meeting is strongly recommended. Information for site visit(s) will be posted on the website.

20-04 Issuance of proposal forms. The Owner reserves the right to refuse to issue a proposal form to a prospective bidder if the bidder is in default for any of the following reasons:

a. Failure to comply with any prequalification regulations of the Owner, if such regulations are cited, or otherwise included, in the proposal as a requirement for bidding.

b. Failure to pay, or satisfactorily settle, all bills due for labor and materials on former contracts in force with the Owner at the time the Owner issues the proposal to a prospective bidder.

- c. Documented record of Contractor default under previous contracts with the Owner.
- d. Documented record of unsatisfactory work on previous contracts with the Owner.

20-05 Interpretation of estimated proposal quantities. An estimate of quantities of work to be done and materials to be furnished under these specifications is given in the proposal. It is the result of careful calculations and is believed to be correct. It is given only as a basis for comparison of proposals and the award of the contract. The Owner does not expressly, or by implication, agree that the actual quantities involved will correspond exactly therewith; nor shall the bidder plead misunderstanding or deception because of such estimates of quantities, or of the character, location, or other conditions pertaining to the work. Payment to the Contractor will be made only for the actual quantities of work performed or materials furnished in accordance with the plans and specifications. It is understood that the quantities may be increased or decreased as provided in the Section 40, paragraph 40-02, Alteration of Work and Quantities, without in any way invalidating the unit bid prices.

20-06 Examination of plans, specifications, and site. The bidder is expected to carefully examine the site of the proposed work, the proposal, plans, specifications, and contract forms. Bidders shall satisfy themselves to the character, quality, and quantities of work to be performed, materials to be furnished, and to the requirements of the proposed contract. The submission of a proposal shall be prima facie evidence that the bidder has made such examination and is satisfied to the conditions to be encountered in performing the work and the requirements of the proposed contract, plans, and specifications.

20-07 Preparation of proposal. The bidder shall submit their proposal on the forms furnished by the Owner. All blank spaces in the proposal forms, unless explicitly stated otherwise, must be correctly filled in where indicated for each and every item for which a quantity is given. The bidder shall state the price (written in ink or typed) both in words and numerals which they propose for each pay item furnished in the proposal. In case of conflict between words and numerals, the words, unless obviously incorrect, shall govern.

The bidder shall correctly sign the proposal in ink. If the proposal is made by an individual, their name and post office address must be shown. If made by a partnership, the name and post office address of each member of the partnership must be shown. If made by a corporation, the person signing the proposal shall give the name of the state where the corporation was chartered and the name, titles, and business address of the president, secretary, and the treasurer. Anyone signing a proposal as an agent shall file evidence of their authority to do so and that the signature is binding upon the firm or corporation.

20-08 Responsive and responsible bidder. A responsive bid conforms to all significant terms and conditions contained in the Owner's invitation for bid. It is the Owner's responsibility to decide if the exceptions taken by a bidder to the solicitation are material or not and the extent of deviation it is willing to accept.

A responsible bidder has the ability to perform successfully under the terms and conditions of a proposed procurement, as defined in 2 CFR § 200.318(h). This includes such matters as Contractor integrity, compliance with public policy, record of past performance, and financial and technical resources.

20-09 Irregular proposals. Proposals shall be considered irregular for the following reasons:

- a. If the proposal is on a form other than that furnished by the Owner, or if the Owner's form is altered, or if any part of the proposal form is detached.
- b. If there are unauthorized additions, conditional or alternate pay items, or irregularities of any kind that make the proposal incomplete, indefinite, or otherwise ambiguous.
- c. If the proposal does not contain a unit price for each pay item listed in the proposal, except in the case of authorized alternate pay items, for which the bidder is not required to furnish a unit price.

- d. If the proposal contains unit prices that are obviously unbalanced.
- e. If the proposal is not accompanied by the proposal guaranty specified by the Owner.
- f. If the applicable Disadvantaged Business Enterprise information is incomplete.

The Owner reserves the right to reject any irregular proposal and the right to waive technicalities if such waiver is in the best interest of the Owner and conforms to local laws and ordinances pertaining to the letting of construction contracts.

20-10 Bid guarantee. Each separate proposal shall be accompanied by a bid bond, certified check, or other specified acceptable collateral, in the amount specified in the proposal form. Such bond, check, or collateral, shall be made payable to the Owner.

20-11 Delivery of proposal. Each proposal submitted shall be placed in a sealed envelope plainly marked with the project number, location of airport, and name and business address of the bidder on the outside. When sent by mail, preferably registered, the sealed proposal, marked as indicated above, should be enclosed in an additional envelope. No proposal will be considered unless received at the place specified in the advertisement or as modified by Addendum before the time specified for opening all bids. Proposals received after the bid opening time shall be returned to the bidder unopened.

20-12 Withdrawal or revision of proposals. A bidder may withdraw or revise (by withdrawal of one proposal and submission of another) a proposal provided that the bidder's request for withdrawal is received by the Owner in writing or by fax or email before the time specified for opening bids. Revised proposals must be received at the place specified in the advertisement before the time specified for opening all bids.

20-13 Public opening of proposals. Proposals shall be opened, and read, publicly at the time and place specified in the advertisement. Bidders, their authorized agents, and other interested persons are invited to attend. Proposals that have been withdrawn (by written or telegraphic request) or received after the time specified for opening bids shall be returned to the bidder unopened.

20-14 Disqualification of bidders. A bidder shall be considered disqualified for any of the following reasons:

- a. Submitting more than one proposal from the same partnership, firm, or corporation under the same or different name.
- b. Evidence of collusion among bidders. Bidders participating in such collusion shall be disqualified as bidders for any future work of the Owner until any such participating bidder has been reinstated by the Owner as a qualified bidder.
- c. If the bidder is considered to be in "default" for any reason specified in paragraph 20-04, *Issuance of Proposal Forms*, of this section.

20-15 Discrepancies and Omissions. A Bidder who discovers discrepancies or omissions with the project bid documents shall immediately notify the Owner's Engineer of the matter. A bidder that has doubt as to the true meaning of a project requirement may submit to the Owner's Engineer a written request for interpretation no later than seven (7) days prior to bid opening.

Any interpretation of the project bid documents by the Owner's Engineer will be by written addendum issued by the Owner. The Owner will not consider any instructions, clarifications or interpretations of the bidding documents in any manner other than written addendum.

END OF SECTION 20

Page Intentionally Blank

Section 30 Award and Execution of Contract

30-01 Consideration of proposals. After the proposals are publicly opened and read, they will be compared on the basis of the summation of the products obtained by multiplying the estimated quantities shown in the proposal by the unit bid prices. If a bidder's proposal contains a discrepancy between unit bid prices written in words and unit bid prices written in numbers, the unit bid price written in words shall govern.

Until the award of a contract is made, the Owner reserves the right to reject a bidder's proposal for any of the following reasons:

a. If the proposal is irregular as specified in Section 20, paragraph 20-09, *Irregular Proposals*.

b. If the bidder is disqualified for any of the reasons specified Section 20, paragraph 20-14, *Disqualification of Bidders*.

In addition, until the award of a contract is made, the Owner reserves the right to reject any or all proposals, waive technicalities, if such waiver is in the best interest of the Owner and is in conformance with applicable state and local laws or regulations pertaining to the letting of construction contracts; advertise for new proposals; or proceed with the work otherwise. All such actions shall promote the Owner's best interests.

30-02 Award of contract. The award of a contract, if it is to be awarded, shall be made within ninety (90) calendar days of the date specified for publicly opening proposals, unless otherwise specified herein.

If the Owner elects to proceed with an award of contract, the Owner will make award to the responsible bidder whose bid, conforming with all the material terms and conditions of the bid documents, is the lowest in price.

30-03 Cancellation of award. The Owner reserves the right to cancel the award without liability to the bidder, except return of proposal guaranty, at any time before a contract has been fully executed by all parties and is approved by the Owner in accordance with paragraph 30-07 *Approval of Contract*.

30-04 Return of proposal guaranty. All proposal guaranties, except those of the two lowest bidders, will be returned immediately after the Owner has made a comparison of bids as specified in the paragraph 30-01, *Consideration of Proposals*. Proposal guaranties of the two lowest bidders will be retained by the Owner until such time as an award is made, at which time, the unsuccessful bidder's proposal guaranty will be returned. The successful bidder's proposal guaranty will be returned as soon as the Owner receives the contract bonds as specified in paragraph 30-05, *Requirements of Contract Bonds*.

30-05 Requirements of contract bonds. At the time of the execution of the contract, the successful bidder shall furnish the Owner a surety bond or bonds that have been fully executed by the bidder and the surety guaranteeing the performance of the work and the payment of all legal debts that may be incurred by reason of the Contractor's performance of the work. The surety and the form of the bond or bonds shall be acceptable to the Owner. Unless otherwise specified in this subsection, the surety bond or bonds shall be in a sum equal to the full amount of the contract.

30-06 Execution of contract. The successful bidder shall sign (execute) the necessary agreements for entering into the contract and return the signed contract to the Owner, along with the fully executed surety

bond or bonds specified in paragraph 30-05, *Requirements of Contract Bonds*, of this section, within fifteen (15) calendar days from the date mailed or otherwise delivered to the successful bidder.

30-07 Approval of contract. Upon receipt of the contract and contract bond or bonds that have been executed by the successful bidder, the Owner shall complete the execution of the contract in accordance with local laws or ordinances, and return the fully executed contract to the Contractor. Delivery of the fully executed contract to the Contractor shall constitute the Owner's approval to be bound by the successful bidder's proposal and the terms of the contract.

30-08 Failure to execute contract. Failure of the successful bidder to execute the contract and furnish an acceptable surety bond or bonds within the period specified in paragraph 30-06, *Execution of Contract*, of this section shall be just cause for cancellation of the award and forfeiture of the proposal guaranty, not as a penalty, but as liquidated damages to the Owner.

END OF SECTION 30

Page Intentionally Blank

Section 40 Scope of Work

40-01 Intent of contract. The intent of the contract is to provide for construction and completion, in every detail, of the work described. It is further intended that the Contractor shall furnish all labor, materials, equipment, tools, transportation, and supplies required to complete the work in accordance with the plans, specifications, and terms of the contract.

40-02 Alteration of work and quantities. The Owner reserves the right to make such changes in quantities and work as may be necessary or desirable to complete, in a satisfactory manner, the original intended work. Unless otherwise specified in the Contract, the Owner's Engineer or RPR shall be and is hereby authorized to make, in writing, such in-scope alterations in the work and variation of quantities as may be necessary to complete the work, provided such action does not represent a significant change in the character of the work.

For purpose of this section, a significant change in character of work means: any change that is outside the current contract scope of work; any change (increase or decrease) in the total contract cost by more than 25%; or any change in the total cost of a major contract item by more than 25%.

Work alterations and quantity variances that do not meet the definition of significant change in character of work shall not invalidate the contract nor release the surety. Contractor agrees to accept payment for such work alterations and quantity variances in accordance with Section 90, paragraph 90-03, *Compensation for Altered Quantities*.

Should the value of altered work or quantity variance meet the criteria for significant change in character of work, such altered work and quantity variance shall be covered by a supplemental agreement. Supplemental agreements shall also require consent of the Contractor's surety and separate performance and payment bonds. If the Owner and the Contractor are unable to agree on a unit adjustment for any contract item that requires a supplemental agreement, the Owner reserves the right to terminate the contract with respect to the item and make other arrangements for its completion.

40-03 Omitted items. The Owner, the Owner's Engineer or the RPR may provide written notice to the Contractor to omit from the work any contract item that does not meet the definition of major contract item. Major contract items may be omitted by a supplemental agreement. Such omission of contract items shall not invalidate any other contract provision or requirement.

Should a contract item be omitted or otherwise ordered to be non-performed, the Contractor shall be paid for all work performed toward completion of such item prior to the date of the order to omit such item. Payment for work performed shall be in accordance with Section 90, paragraph 90-04, *Payment for Omitted Items*.

40-04 Extra work. Should acceptable completion of the contract require the Contractor to perform an item of work not provided for in the awarded contract as previously modified by change order or supplemental agreement, Owner may issue a Change Order to cover the necessary extra work. Change orders for extra work shall contain agreed unit prices for performing the change order work in accordance with the requirements specified in the order, and shall contain any adjustment to the contract time that, in the RPR's opinion, is necessary for completion of the extra work.

When determined by the RPR to be in the Owner's best interest, the RPR may order the Contractor to proceed with extra work as provided in Section 90, paragraph 90-05, *Payment for Extra Work*. Extra work

that is necessary for acceptable completion of the project, but is not within the general scope of the work covered by the original contract shall be covered by a supplemental agreement as defined in Section 10, paragraph 10-59, *Supplemental Agreement*.

If extra work is essential to maintaining the project critical path, RPR may order the Contractor to commence the extra work under a Time and Material contract method. Once sufficient detail is available to establish the level of effort necessary for the extra work, the Owner shall initiate a change order or supplemental agreement to cover the extra work.

Any claim for payment of extra work that is not covered by written agreement (change order or supplemental agreement) shall be rejected by the Owner.

40-05 Maintenance of traffic. It is the explicit intention of the contract that the safety of aircraft, as well as the Contractor's equipment and personnel, is the most important consideration. The Contractor shall maintain traffic in the manner detailed in the Construction Safety and Phasing Plan (CSPP).

a. It is understood and agreed that the Contractor shall provide for the free and unobstructed movement of aircraft in the air operations areas (AOAs) of the airport with respect to their own operations and the operations of all subcontractors as specified in Section 80, paragraph 80-04, *Limitation of Operations*. It is further understood and agreed that the Contractor shall provide for the uninterrupted operation of visual and electronic signals (including power supplies thereto) used in the guidance of aircraft while operating to, from, and upon the airport as specified in Section 70, paragraph 70-15, *Contractor's Responsibility for Utility Service and Facilities of Others*.

b. With respect to their own operations and the operations of all subcontractors, the Contractor shall provide marking, lighting, and other acceptable means of identifying personnel, equipment, vehicles, storage areas, and any work area or condition that may be hazardous to the operation of aircraft, fire-rescue equipment, or maintenance vehicles at the airport in accordance with the construction safety and phasing plan (CSPP) and the safety plan compliance document (SPCD).

c. When the contract requires the maintenance of an existing road, street, or highway during the Contractor's performance of work that is otherwise provided for in the contract, plans, and specifications, the Contractor shall keep the road, street, or highway open to all traffic and shall provide maintenance as may be required to accommodate traffic. The Contractor, at their expense, shall be responsible for the repair to equal or better than preconstruction conditions of any damage caused by the Contractor's equipment and personnel. The Contractor shall furnish, erect, and maintain barricades, warning signs, flag person, and other traffic control devices in reasonable conformity with the Manual on Uniform Traffic Control Devices (MUTCD) (<http://mutcd.fhwa.dot.gov/>), unless otherwise specified. The Contractor shall also construct and maintain in a safe condition any temporary connections necessary for ingress to and egress from abutting property or intersecting roads, streets or highways. Unless otherwise specified herein, the Contractor will not be required to furnish snow removal for such existing road, street, or highway.

40-06 Removal of existing structures. All existing structures encountered within the established lines, grades, or grading sections shall be removed by the Contractor, unless such existing structures are otherwise specified to be relocated, adjusted up or down, salvaged, abandoned in place, reused in the work or to remain in place. The cost of removing such existing structures shall not be measured or paid for directly, but shall be included in the various contract items.

Should the Contractor encounter an existing structure (above or below ground) in the work for which the disposition is not indicated on the plans, the Resident Project Representative (RPR) shall be notified prior to disturbing such structure. The disposition of existing structures so encountered shall be immediately determined by the RPR in accordance with the provisions of the contract.

Except as provided in Section 40, paragraph 40-07, *Rights in and Use of Materials Found in the Work*, it is intended that all existing materials or structures that may be encountered (within the lines, grades, or grading sections established for completion of the work) shall be used in the work as otherwise provided for in the contract and shall remain the property of the Owner when so used in the work.

40-07 Rights in and use of materials found in the work. Should the Contractor encounter any material such as (but not restricted to) sand, stone, gravel, slag, or concrete slabs within the established lines, grades, or grading sections, the use of which is intended by the terms of the contract to be embankment, the Contractor may at their own option either:

- a. Use such material in another contract item, providing such use is approved by the RPR and is in conformance with the contract specifications applicable to such use; or,
- b. Remove such material from the site, upon written approval of the RPR; or
- c. Use such material for the Contractor's own temporary construction on site; or,
- d. Use such material as intended by the terms of the contract.

Should the Contractor wish to exercise option a., b., or c., the Contractor shall request the RPR's approval in advance of such use.

Should the RPR approve the Contractor's request to exercise option a., b., or c., the Contractor shall be paid for the excavation or removal of such material at the applicable contract price. The Contractor shall replace, at their expense, such removed or excavated material with an agreed equal volume of material that is acceptable for use in constructing embankment, backfills, or otherwise to the extent that such replacement material is needed to complete the contract work. The Contractor shall not be charged for use of such material used in the work or removed from the site.

Should the RPR approve the Contractor's exercise of option a., the Contractor shall be paid, at the applicable contract price, for furnishing and installing such material in accordance with requirements of the contract item in which the material is used.

It is understood and agreed that the Contractor shall make no claim for delays by reason of their own exercise of option a., b., or c.

The Contractor shall not excavate, remove, or otherwise disturb any material, structure, or part of a structure which is located outside the lines, grades, or grading sections established for the work, except where such excavation or removal is provided for in the contract, plans, or specifications.

40-08 Final cleanup. Upon completion of the work and before acceptance and final payment will be made, the Contractor shall remove from the site all machinery, equipment, surplus and discarded materials, rubbish, temporary structures, and stumps or portions of trees. The Contractor shall cut all brush and woods within the limits indicated and shall leave the site in a neat and presentable condition. Material cleared from the site and deposited on adjacent property will not be considered as having been disposed of satisfactorily, unless the Contractor has obtained the written permission of the property Owner.

END OF SECTION 40

Section 50 Control of Work

50-01 Authority of the Resident Project Representative (RPR). The RPR has final authority regarding the interpretation of project specification requirements. The RPR shall determine acceptability of the quality of materials furnished, method of performance of work performed, and the manner and rate of performance of the work. The RPR does not have the authority to accept work that does not conform to specification requirements.

50-02 Conformity with plans and specifications. All work and all materials furnished shall be in reasonably close conformity with the lines, grades, grading sections, cross-sections, dimensions, material requirements, and testing requirements that are specified (including specified tolerances) in the contract, plans, or specifications.

If the RPR finds the materials furnished, work performed, or the finished product not within reasonably close conformity with the plans and specifications, but that the portion of the work affected will, in their opinion, result in a finished product having a level of safety, economy, durability, and workmanship acceptable to the Owner, the RPR will advise the Owner of their determination that the affected work be accepted and remain in place. The RPR will document the determination and recommend to the Owner a basis of acceptance that will provide for an adjustment in the contract price for the affected portion of the work. Changes in the contract price must be covered by contract change order or supplemental agreement as applicable.

If the RPR finds the materials furnished, work performed, or the finished product are not in reasonably close conformity with the plans and specifications and have resulted in an unacceptable finished product, the affected work or materials shall be removed and replaced or otherwise corrected by and at the expense of the Contractor in accordance with the RPR's written orders.

The term "reasonably close conformity" shall not be construed as waiving the Contractor's responsibility to complete the work in accordance with the contract, plans, and specifications. The term shall not be construed as waiving the RPR's responsibility to insist on strict compliance with the requirements of the contract, plans, and specifications during the Contractor's execution of the work, when, in the RPR's opinion, such compliance is essential to provide an acceptable finished portion of the work.

The term "reasonably close conformity" is also intended to provide the RPR with the authority, after consultation with the Sponsor and FAA, to use sound engineering judgment in their determinations to accept work that is not in strict conformity, but will provide a finished product equal to or better than that required by the requirements of the contract, plans and specifications.

The RPR will not be responsible for the Contractor's means, methods, techniques, sequences, or procedures of construction or the safety precautions incident thereto.

50-03 Coordination of contract, plans, and specifications. The contract, plans, specifications, and all referenced standards cited are essential parts of the contract requirements. If electronic files are provided and used on the project and there is a conflict between the electronic files and hard copy plans, the hard copy plans shall govern. A requirement occurring in one is as binding as though occurring in all. They are intended to be complementary and to describe and provide for a complete work. In case of discrepancy, calculated dimensions will govern over scaled dimensions; contract technical specifications shall govern over contract general provisions, plans, cited standards for materials or testing, and cited advisory circulars (ACs); contract general provisions shall govern over plans, cited standards for materials

or testing, and cited ACs; plans shall govern over cited standards for materials or testing and cited ACs. If any paragraphs contained in the Special Provisions conflict with General Provisions or Technical Specifications, the Special Provisions shall govern.

From time to time, discrepancies within cited testing standards occur due to the timing of the change, edits, and/or replacement of the standards. If the Contractor discovers any apparent discrepancy within standard test methods, the Contractor shall immediately ask the RPR for an interpretation and decision, and such decision shall be final.

The Contractor shall not take advantage of any apparent error or omission on the plans or specifications. In the event the Contractor discovers any apparent error or discrepancy, Contractor shall immediately notify the Owner or the designated representative in writing requesting their written interpretation and decision.

50-04 List of Special Provisions. NOT APPLICABLE

50-05 Cooperation of Contractor. The Contractor shall be supplied with one (1) hard copy or an electronic PDF of the plans and specifications. The Contractor shall have available on the construction site at all times one hardcopy each of the plans and specifications. Additional hard copies of plans and specifications may be obtained by the Contractor for the cost of reproduction.

The Contractor shall give constant attention to the work to facilitate the progress thereof, and shall cooperate with the RPR and their inspectors and with other Contractors in every way possible. The Contractor shall have a competent superintendent on the work at all times who is fully authorized as their agent on the work. The superintendent shall be capable of reading and thoroughly understanding the plans and specifications and shall receive and fulfill instructions from the RPR or their authorized representative.

50-06 Cooperation between Contractors. The Owner reserves the right to contract for and perform other or additional work on or near the work covered by this contract.

When separate contracts are let within the limits of any one project, each Contractor shall conduct the work not to interfere with or hinder the progress of completion of the work being performed by other Contractors. Contractors working on the same project shall cooperate with each other as directed.

Each Contractor involved shall assume all liability, financial or otherwise, in connection with their own contract and shall protect and hold harmless the Owner from any and all damages or claims that may arise because of inconvenience, delays, or loss experienced because of the presence and operations of other Contractors working within the limits of the same project.

The Contractor shall arrange their work and shall place and dispose of the materials being used to not interfere with the operations of the other Contractors within the limits of the same project. The Contractor shall join their work with that of the others in an acceptable manner and shall perform it in proper sequence to that of the others.

50-07 Construction layout and stakes. The Engineer/RPR shall establish necessary horizontal and vertical control. The establishment of Survey Control and/or reestablishment of survey control shall be by a State Licensed Land Surveyor. Contractor is responsible for preserving integrity of horizontal and vertical controls established by Engineer/RPR. In case of negligence on the part of the Contractor or their employees, resulting in the destruction of any horizontal and vertical control, the resulting costs will be deducted as a liquidated damage against the Contractor.

Prior to the start of construction, the Contractor will check all control points for horizontal and vertical accuracy and certify in writing to the RPR that the Contractor concurs with survey control established for the project. All lines, grades and measurements from control points necessary for the proper execution

and control of the work on this project will be provided to the RPR. The Contractor is responsible to establish all layout required for the construction of the project.

Copies of survey notes will be provided to the RPR for each area of construction and for each placement of material as specified to allow the RPR to make periodic checks for conformance with plan grades, alignments and grade tolerances required by the applicable material specifications. Surveys will be provided to the RPR prior to commencing work items that cover or disturb the survey staking. Survey(s) and notes shall be provided.

Laser, GPS, String line, or other automatic control shall be checked with temporary control as necessary. In the case of error, on the part of the Contractor, their surveyor, employees or subcontractors, resulting in established grades, alignment or grade tolerances that do not concur with those specified or shown on the plans, the Contractor is solely responsible for correction, removal, replacement and all associated costs at no additional cost to the Owner.

See Section 01321 for additional surveying requirements.

No direct payment will be made, unless otherwise specified in contract documents, for this labor, materials, or other expenses. The cost shall be included in the price of the bid for the various items of the Contract.

50-08 Authority and duties of Quality Assurance (QA) inspectors. QA inspectors shall be authorized to inspect all work done and all material furnished. Such QA inspection may extend to all or any part of the work and to the preparation, fabrication, or manufacture of the materials to be used. QA inspectors are not authorized to revoke, alter, or waive any provision of the contract. QA inspectors are not authorized to issue instructions contrary to the plans and specifications or to act as foreman for the Contractor.

QA Inspectors are authorized to notify the Contractor or their representatives of any failure of the work or materials to conform to the requirements of the contract, plans, or specifications and to reject such nonconforming materials in question until such issues can be referred to the RPR for a decision.

50-09 Inspection of the work. All materials and each part or detail of the work shall be subject to inspection. The RPR shall be allowed access to all parts of the work and shall be furnished with such information and assistance by the Contractor as is required to make a complete and detailed inspection.

If the RPR requests it, the Contractor, at any time before acceptance of the work, shall remove or uncover such portions of the finished work as may be directed. After examination, the Contractor shall restore said portions of the work to the standard required by the specifications. Should the work thus exposed or examined prove acceptable, the uncovering, or removing, and the replacing of the covering or making good of the parts removed will be paid for as extra work; but should the work so exposed or examined prove unacceptable, the uncovering, or removing, and the replacing of the covering or making good of the parts removed will be at the Contractor's expense.

Provide advance written notice to the RPR of work the Contractor plans to perform each week and each day. Any work done or materials used without written notice and allowing opportunity for inspection by the RPR may be ordered removed and replaced at the Contractor's expense.

Should the contract work include relocation, adjustment, or any other modification to existing facilities, not the property of the (contract) Owner, authorized representatives of the Owners of such facilities shall have the right to inspect such work. Such inspection shall in no sense make any facility owner a party to the contract, and shall in no way interfere with the rights of the parties to this contract.

50-10 Removal of unacceptable and unauthorized work. All work that does not conform to the requirements of the contract, plans, and specifications will be considered unacceptable, unless otherwise

determined acceptable by the RPR as provided in paragraph 50-02, *Conformity with Plans and Specifications*.

Unacceptable work, whether the result of poor workmanship, use of defective materials, damage through carelessness, or any other cause found to exist prior to the final acceptance of the work, shall be removed immediately and replaced in an acceptable manner in accordance with the provisions of Section 70, paragraph 70-14, *Contractor's Responsibility for Work*.

No removal work made under provision of this paragraph shall be done without lines and grades having been established by the RPR. Work done contrary to the instructions of the RPR, work done beyond the lines shown on the plans or as established by the RPR, except as herein specified, or any extra work done without authority, will be considered as unauthorized and will not be paid for under the provisions of the contract. Work so done may be ordered removed or replaced at the Contractor's expense.

Upon failure on the part of the Contractor to comply with any order of the RPR made under the provisions of this subsection, the RPR will have authority to cause unacceptable work to be remedied or removed and replaced; and unauthorized work to be removed and recover the resulting costs as a liquidated damage against the Contractor.

50-11 Load restrictions. The Contractor shall comply with all legal load restrictions in the hauling of materials on public roads beyond the limits of the work. A special permit will not relieve the Contractor of liability for damage that may result from the moving of material or equipment.

The operation of equipment of such weight or so loaded as to cause damage to structures or to any other type of construction will not be permitted. Hauling of materials over the base course or surface course under construction shall be limited as directed. No loads will be permitted on a concrete pavement, base, or structure before the expiration of the curing period. The Contractor, at their own expense, shall be responsible for the repair to equal or better than preconstruction conditions of any damage caused by the Contractor's equipment and personnel.

50-12 Maintenance during construction. The Contractor shall maintain the work during construction and until the work is accepted. Maintenance shall constitute continuous and effective work prosecuted day by day, with adequate equipment and forces so that the work is maintained in satisfactory condition at all times.

In the case of a contract for the placing of a course upon a course or subgrade previously constructed, the Contractor shall maintain the previous course or subgrade during all construction operations.

All costs of maintenance work during construction and before the project is accepted shall be included in the unit prices bid on the various contract items, and the Contractor will not be paid an additional amount for such work.

50-13 Failure to maintain the work. Should the Contractor at any time fail to maintain the work as provided in paragraph 50-12, *Maintenance during Construction*, the RPR shall immediately notify the Contractor of such noncompliance. Such notification shall specify a reasonable time within which the Contractor shall be required to remedy such unsatisfactory maintenance condition. The time specified will give due consideration to the exigency that exists.

Should the Contractor fail to respond to the RPR's notification, the Owner may suspend any work necessary for the Owner to correct such unsatisfactory maintenance condition, depending on the exigency that exists. Any maintenance cost incurred by the Owner, shall be recovered as a liquidated damage against the Contractor.

50-14 Partial acceptance. If at any time during the execution of the project the Contractor substantially completes a usable unit or portion of the work, the occupancy of which will benefit the Owner, the

Contractor may request the RPR to make final inspection of that unit. If the RPR finds upon inspection that the unit has been satisfactorily completed in compliance with the contract, the RPR may accept it as being complete, and the Contractor may be relieved of further responsibility for that unit. Such partial acceptance and beneficial occupancy by the Owner shall not void or alter any provision of the contract.

50-15 Final acceptance. Upon due notice from the Contractor of presumptive completion of the entire project, the RPR and Owner will make an inspection. If all construction provided for and contemplated by the contract is found to be complete in accordance with the contract, plans, and specifications, such inspection shall constitute the final inspection. The RPR shall notify the Contractor in writing of final acceptance as of the date of the final inspection.

If, however, the inspection discloses any work, in whole or in part, as being unsatisfactory, the RPR will notify the Contractor and the Contractor shall correct the unsatisfactory work. Upon correction of the work, another inspection will be made which shall constitute the final inspection, provided the work has been satisfactorily completed. In such event, the RPR will make the final acceptance and notify the Contractor in writing of this acceptance as of the date of final inspection.

50-16 Claims for adjustment and disputes. If for any reason the Contractor deems that additional compensation is due for work or materials not clearly provided for in the contract, plans, or specifications or previously authorized as extra work, the Contractor shall notify the RPR in writing of their intention to claim such additional compensation before the Contractor begins the work on which the Contractor bases the claim. If such notification is not given or the RPR is not afforded proper opportunity by the Contractor for keeping strict account of actual cost as required, then the Contractor hereby agrees to waive any claim for such additional compensation. Such notice by the Contractor and the fact that the RPR has kept account of the cost of the work shall not in any way be construed as proving or substantiating the validity of the claim. When the work on which the claim for additional compensation is based has been completed, the Contractor shall, within 10 calendar days, submit a written claim to the RPR who will present it to the Owner for consideration in accordance with local laws or ordinances.

Nothing in this subsection shall be construed as a waiver of the Contractor's right to dispute final payment based on differences in measurements or computations.

END OF SECTION 50

Section 60 Control of Materials

60-01 Source of supply and quality requirements. The materials used in the work shall conform to the requirements of the contract, plans, and specifications. Unless otherwise specified, such materials that are manufactured or processed shall be new (as compared to used or reprocessed).

In order to expedite the inspection and testing of materials, the Contractor shall furnish documentation to the RPR as to the origin, composition, and manufacture of all materials to be used in the work.

Documentation shall be furnished promptly after execution of the contract but, in all cases, prior to delivery of such materials.

At the RPR's option, materials may be approved at the source of supply before delivery. If it is found after trial that sources of supply for previously approved materials do not produce specified products, the Contractor shall furnish materials from other sources.

The Contractor shall furnish airport lighting equipment that meets the requirements of the specifications; and is listed in AC 150/5345-53, *Airport Lighting Equipment Certification Program* and *Addendum*, that is in effect on the date of advertisement.

60-02 Samples, tests, and cited specifications. All materials used in the work shall be inspected, tested, and approved by the RPR before incorporation in the work unless otherwise designated. Any work in which untested materials are used without approval or written permission of the RPR shall be performed at the Contractor's risk. Materials found to be unacceptable and unauthorized will not be paid for and, if directed by the RPR, shall be removed at the Contractor's expense.

Unless otherwise designated, quality assurance tests will be made by and at the expense of the Owner in accordance with the cited standard methods of ASTM, American Association of State Highway and Transportation Officials (AASHTO), federal specifications, Commercial Item Descriptions, and all other cited methods, which are current on the date of advertisement for bids.

The testing organizations performing on-site quality assurance field tests shall have copies of all referenced standards on the construction site for use by all technicians and other personnel. Unless otherwise designated, samples for quality assurance will be taken by a qualified representative of the RPR. All materials being used are subject to inspection, test, or rejection at any time prior to or during incorporation into the work. Copies of all tests will be furnished to the Contractor's representative at their request after review and approval of the RPR.

A copy of all Contractor QC test data shall be provided to the RPR daily, along with printed reports, in an approved format, on a weekly basis. After completion of the project, and prior to final payment, the Contractor shall submit a final report to the RPR showing all test data reports, plus an analysis of all results showing ranges, averages, and corrective action taken on all failing tests.

The Contractor shall employ a Quality Control (QC) testing organization to perform all Contractor required QC tests in accordance with Item C-100 Contractor Quality Control Program (CQCP).

60-03 Certification of compliance/analysis (COC/COA). The RPR may permit the use, prior to sampling and testing, of certain materials or assemblies when accompanied by manufacturer's COC stating that such materials or assemblies fully comply with the requirements of the contract. The certificate shall be signed by the manufacturer. Each lot of such materials or assemblies delivered to the

work must be accompanied by a certificate of compliance in which the lot is clearly identified. The COA is the manufacturer's COC and includes all applicable test results.

Materials or assemblies used on the basis of certificates of compliance may be sampled and tested at any time and if found not to be in conformity with contract requirements will be subject to rejection whether in place or not.

The form and distribution of certificates of compliance shall be as approved by the RPR.

When a material or assembly is specified by "brand name or equal" and the Contractor elects to furnish the specified "or equal," the Contractor shall be required to furnish the manufacturer's certificate of compliance for each lot of such material or assembly delivered to the work. Such certificate of compliance shall clearly identify each lot delivered and shall certify as to:

- a. Conformance to the specified performance, testing, quality or dimensional requirements; and,
- b. Suitability of the material or assembly for the use intended in the contract work.

The RPR shall be the sole judge as to whether the proposed "or equal" is suitable for use in the work.

The RPR reserves the right to refuse permission for use of materials or assemblies on the basis of certificates of compliance.

60-04 Plant inspection. The RPR or their authorized representative may inspect, at its source, any specified material or assembly to be used in the work. Manufacturing plants may be inspected from time to time for the purpose of determining compliance with specified manufacturing methods or materials to be used in the work and to obtain samples required for acceptance of the material or assembly.

Should the RPR conduct plant inspections, the following conditions shall exist:

- a. The RPR shall have the cooperation and assistance of the Contractor and the producer with whom the Contractor has contracted for materials.
- b. The RPR shall have full entry at all reasonable times to such parts of the plant that concern the manufacture or production of the materials being furnished.
- c. If required by the RPR, the Contractor shall arrange for adequate office or working space that may be reasonably needed for conducting plant inspections. Place office or working space in a convenient location with respect to the plant.

It is understood and agreed that the Owner shall have the right to retest any material that has been tested and approved at the source of supply after it has been delivered to the site. The RPR shall have the right to reject only material which, when retested, does not meet the requirements of the contract, plans, or specifications.

60-05 Engineer/ Resident Project Representative (RPR) field office. NOT REQUIRED

60-06 Storage of materials. Materials shall be stored to assure the preservation of their quality and fitness for the work. Stored materials, even though approved before storage, may again be inspected prior to their use in the work. Stored materials shall be located to facilitate their prompt inspection. The Contractor shall coordinate the storage of all materials with the RPR. Materials to be stored on airport property shall not create an obstruction to air navigation nor shall they interfere with the free and unobstructed movement of aircraft. Unless otherwise shown on the plans and/or CSPP, the storage of materials and the location of the Contractor's plant and parked equipment or vehicles shall be as directed by the RPR. Private property shall not be used for storage purposes without written permission of the Owner or lessee of such property. The Contractor shall make all arrangements and bear all expenses for

the storage of materials on private property. Upon request, the Contractor shall furnish the RPR a copy of the property Owner's permission.

All storage sites on private or airport property shall be restored to their original condition by the Contractor at their expense, except as otherwise agreed to (in writing) by the Owner or lessee of the property.

60-07 Unacceptable materials. Any material or assembly that does not conform to the requirements of the contract, plans, or specifications shall be considered unacceptable and shall be rejected. The Contractor shall remove any rejected material or assembly from the site of the work, unless otherwise instructed by the RPR.

Rejected material or assembly, the defects of which have been corrected by the Contractor, shall not be returned to the site of the work until such time as the RPR has approved its use in the work.

60-08 Owner furnished materials. The Contractor shall furnish all materials required to complete the work, except those specified, if any, to be furnished by the Owner. Owner-furnished materials shall be made available to the Contractor at the location specified.

All costs of handling, transportation from the specified location to the site of work, storage, and installing Owner-furnished materials shall be included in the unit price bid for the contract item in which such Owner-furnished material is used.

After any Owner-furnished material has been delivered to the location specified, the Contractor shall be responsible for any demurrage, damage, loss, or other deficiencies that may occur during the Contractor's handling, storage, or use of such Owner-furnished material. The Owner will deduct from any monies due or to become due the Contractor any cost incurred by the Owner in making good such loss due to the Contractor's handling, storage, or use of Owner-furnished materials.

END OF SECTION 60

Section 70 Legal Regulations and Responsibility to Public

70-01 Laws to be observed. The Contractor shall keep fully informed of all federal and state laws, all local laws, ordinances, and regulations and all orders and decrees of bodies or tribunals having any jurisdiction or authority, which in any manner affect those engaged or employed on the work, or which in any way affect the conduct of the work. The Contractor shall at all times observe and comply with all such laws, ordinances, regulations, orders, and decrees; and shall protect and indemnify the Owner and all their officers, agents, or servants against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order, or decree, whether by the Contractor or the Contractor's employees.

70-02 Permits, licenses, and taxes. The Contractor shall procure all permits and licenses, pay all charges, fees, and taxes, and give all notices necessary and incidental to the due and lawful execution of the work.

70-03 Patented devices, materials, and processes. If the Contractor is required or desires to use any design, device, material, or process covered by letters of patent or copyright, the Contractor shall provide for such use by suitable legal agreement with the Patentee or Owner. The Contractor and the surety shall indemnify and hold harmless the Owner, any third party, or political subdivision from any and all claims for infringement by reason of the use of any such patented design, device, material or process, or any trademark or copyright, and shall indemnify the Owner for any costs, expenses, and damages which it may be obliged to pay by reason of an infringement, at any time during the execution or after the completion of the work.

70-04 Restoration of surfaces disturbed by others. The Owner reserves the right to authorize the construction, reconstruction, or maintenance of any public or private utility service, FAA or National Oceanic and Atmospheric Administration (NOAA) facility, or a utility service of another government agency at any time during the progress of the work. To the extent that such construction, reconstruction, or maintenance has been coordinated with the Owner, such authorized work (by others) must be shown on the plans and is indicated as follows: NONE

Except as listed above, the Contractor shall not permit any individual, firm, or corporation to excavate or otherwise disturb such utility services or facilities located within the limits of the work without the written permission of the RPR.

Should the Owner of public or private utility service, FAA, or NOAA facility, or a utility service of another government agency be authorized to construct, reconstruct, or maintain such utility service or facility during the progress of the work, the Contractor shall cooperate with such Owners by arranging and performing the work in this contract to facilitate such construction, reconstruction or maintenance by others whether or not such work by others is listed above. When ordered as extra work by the RPR, the Contractor shall make all necessary repairs to the work which are due to such authorized work by others, unless otherwise provided for in the contract, plans, or specifications. It is understood and agreed that the Contractor shall not be entitled to make any claim for damages due to such authorized work by others or for any delay to the work resulting from such authorized work.

70-05 Federal Participation. The United States Government has agreed to reimburse the Owner for some portion of the contract costs. The contract work is subject to the inspection and approval of duly authorized representatives of the FAA Administrator. No requirement of this contract shall be construed

as making the United States a party to the contract nor will any such requirement interfere, in any way, with the rights of either party to the contract.

70-06 Sanitary, health, and safety provisions. The Contractor's worksite and facilities shall comply with applicable federal, state, and local requirements for health, safety and sanitary provisions.

70-07 Public convenience and safety. The Contractor shall control their operations and those of their subcontractors and all suppliers, to assure the least inconvenience to the traveling public. Under all circumstances, safety shall be the most important consideration.

The Contractor shall maintain the free and unobstructed movement of aircraft and vehicular traffic with respect to their own operations and those of their own subcontractors and all suppliers in accordance with Section 40, paragraph 40-05, *Maintenance of Traffic*, and shall limit such operations for the convenience and safety of the traveling public as specified in Section 80, paragraph 80-04, *Limitation of Operations*.

The Contractor shall remove or control debris and rubbish resulting from its work operations at frequent intervals, and upon the order of the RPR. If the RPR determines the existence of Contractor debris in the work site represents a hazard to airport operations and the Contractor is unable to respond in a prompt and reasonable manner, the RPR reserves the right to assign the task of debris removal to a third party and recover the resulting costs as a liquidated damage against the Contractor.

70-08 Construction Safety and Phasing Plan (CSPP). The Contractor shall complete the work in accordance with the approved Construction Safety and Phasing Plan (CSPP) developed in accordance with AC 150/5370-2, Operational Safety on Airports During Construction. The CSPP is on sheets G-PH-01 to G-PH-05 of the project plans.

70-09 Use of explosives. The use of explosives is not permitted on this project.

70-10 Protection and restoration of property and landscape. The Contractor shall be responsible for the preservation of all public and private property, and shall protect carefully from disturbance or damage all land monuments and property markers until the Engineer/RPR has witnessed or otherwise referenced their location and shall not move them until directed.

The Contractor shall be responsible for all damage or injury to property of any character, during the execution of the work, resulting from any act, omission, neglect, or misconduct in manner or method of executing the work, or at any time due to defective work or materials, and said responsibility shall not be released until the project has been completed and accepted.

When or where any direct or indirect damage or injury is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work, or in consequence of the non-execution thereof by the Contractor, the Contractor shall restore, at their expense, such property to a condition similar or equal to that existing before such damage or injury was done, by repairing, or otherwise restoring as may be directed, or the Contractor shall make good such damage or injury in an acceptable manner.

70-11 Responsibility for damage claims. The Contractor shall indemnify and hold harmless the Engineer/RPR and the Owner and their officers, agents, and employees from all suits, actions, or claims, of any character, brought because of any injuries or damage received or sustained by any person, persons, or property on account of the operations of the Contractor; or on account of or in consequence of any neglect in safeguarding the work; or through use of unacceptable materials in constructing the work; or because of any act or omission, neglect, or misconduct of said Contractor; or because of any claims or amounts recovered from any infringements of patent, trademark, or copyright; or from any claims or amounts arising or recovered under the "Workmen's Compensation Act," or any other law, ordinance, order, or decree. Money due the Contractor under and by virtue of their own contract considered necessary by the Owner for such purpose may be retained for the use of the Owner or, in case no money

is due, their own surety may be held until such suits, actions, or claims for injuries or damages shall have been settled and suitable evidence to that effect furnished to the Owner, except that money due the Contractor will not be withheld when the Contractor produces satisfactory evidence that he or she is adequately protected by public liability and property damage insurance.

70-12 Third party beneficiary clause. It is specifically agreed between the parties executing the contract that it is not intended by any of the provisions of any part of the contract to create for the public or any member thereof, a third-party beneficiary or to authorize anyone not a party to the contract to maintain a suit for personal injuries or property damage pursuant to the terms or provisions of the contract.

70-13 Opening sections of the work to traffic. If it is necessary for the Contractor to complete portions of the contract work for the beneficial occupancy of the Owner prior to completion of the entire contract, such “phasing” of the work must be specified below and indicated on the approved Construction Safety and Phasing Plan (CSPP) and the project plans. When so specified, the Contractor shall complete such portions of the work on or before the date specified or as otherwise specified.

Upon completion of any portion of work listed above, such portion shall be accepted by the Owner in accordance with Section 50, paragraph 50-14, *Partial Acceptance*.

No portion of the work may be opened by the Contractor until directed by the Owner in writing. Should it become necessary to open a portion of the work to traffic on a temporary or intermittent basis, such openings shall be made when, in the opinion of the RPR, such portion of the work is in an acceptable condition to support the intended traffic. Temporary or intermittent openings are considered to be inherent in the work and shall not constitute either acceptance of the portion of the work so opened or a waiver of any provision of the contract. Any damage to the portion of the work so opened that is not attributable to traffic which is permitted by the Owner shall be repaired by the Contractor at their expense.

The Contractor shall make their own estimate of the inherent difficulties involved in completing the work under the conditions herein described and shall not claim any added compensation by reason of delay or increased cost due to opening a portion of the contract work.

The Contractor must conform to safety standards contained AC 150/5370-2 and the approved CSPP.

Contractor shall refer to the plans, specifications, and the approved CSPP to identify barricade requirements, temporary and/or permanent markings, airfield lighting, guidance signs and other safety requirements prior to opening up sections of work to traffic.

70-14 Contractor’s responsibility for work. Until the RPR’s final written acceptance of the entire completed work, excepting only those portions of the work accepted in accordance with Section 50, paragraph 50-14, *Partial Acceptance*, the Contractor shall have the charge and care thereof and shall take every precaution against injury or damage to any part due to the action of the elements or from any other cause, whether arising from the execution or from the non-execution of the work. The Contractor shall rebuild, repair, restore, and make good all injuries or damages to any portion of the work occasioned by any of the above causes before final acceptance and shall bear the expense thereof except damage to the work due to unforeseeable causes beyond the control of and without the fault or negligence of the Contractor, including but not restricted to acts of God such as earthquake, tidal wave, tornado, hurricane or other cataclysmic phenomenon of nature, or acts of the public enemy or of government authorities.

If the work is suspended for any cause whatever, the Contractor shall be responsible for the work and shall take such precautions necessary to prevent damage to the work. The Contractor shall provide for normal drainage and shall erect necessary temporary structures, signs, or other facilities at their own expense. During such period of suspension of work, the Contractor shall properly and continuously maintain in an acceptable growing condition all living material in newly established planting, seeding,

and sodding furnished under the contract, and shall take adequate precautions to protect new tree growth and other important vegetative growth against injury.

70-15 Contractor's responsibility for utility service and facilities of others. As provided in paragraph 70-04, *Restoration of Surfaces Disturbed by Others*, the Contractor shall cooperate with the owner of any public or private utility service, FAA or NOAA, or a utility service of another government agency that may be authorized by the Owner to construct, reconstruct or maintain such utility services or facilities during the progress of the work. In addition, the Contractor shall control their operations to prevent the unscheduled interruption of such utility services and facilities.

To the extent that such public or private utility services, FAA, or NOAA facilities, or utility services of another governmental agency are known to exist within the limits of the contract work, the approximate locations have been indicated on the plans and/or in the contract documents.

It is understood and agreed that the Owner does not guarantee the accuracy or the completeness of the location information relating to existing utility services, facilities, or structures that may be shown on the plans or encountered in the work. Any inaccuracy or omission in such information shall not relieve the Contractor of the responsibility to protect such existing features from damage or unscheduled interruption of service.

It is further understood and agreed that the Contractor shall, upon execution of the contract, notify the Owners of all utility services or other facilities of their plan of operations. Such notification shall be in writing addressed to "The Person to Contact" as provided in this paragraph and paragraph 70-04, *Restoration of Surfaces Disturbed By Others*. A copy of each notification shall be given to the RPR.

In addition to the general written notification provided, it shall be the responsibility of the Contractor to keep such individual Owners advised of changes in their plan of operations that would affect such Owners.

Prior to beginning the work in the general vicinity of an existing utility service or facility, the Contractor shall again notify each such Owner of their plan of operation. If, in the Contractor's opinion, the Owner's assistance is needed to locate the utility service or facility or the presence of a representative of the Owner is desirable to observe the work, such advice should be included in the notification. Such notification shall be given by the most expeditious means to reach the utility owner's "Person to Contact" no later than two normal business days prior to the Contractor's commencement of operations in such general vicinity. The Contractor shall furnish a written summary of the notification to the RPR.

The Contractor's failure to give the two days' notice shall be cause for the Owner to suspend the Contractor's operations in the general vicinity of a utility service or facility.

Where the outside limits of an underground utility service have been located and staked on the ground, the Contractor shall be required to use hand excavation methods within 3 feet (1 m) of such outside limits at such points as may be required to ensure protection from damage due to the Contractor's operations.

Should the Contractor damage or interrupt the operation of a utility service or facility by accident or otherwise, the Contractor shall immediately notify the proper authority and the RPR and shall take all reasonable measures to prevent further damage or interruption of service. The Contractor, in such events, shall cooperate with the utility service or facility owner and the RPR continuously until such damage has been repaired and service restored to the satisfaction of the utility or facility owner.

The Contractor shall bear all costs of damage and restoration of service to any utility service or facility due to their operations whether due to negligence or accident. The Owner reserves the right to deduct such costs from any monies due or which may become due the Contractor, or their own surety.

70-15.1 FAA facilities and cable runs. The Contractor is hereby advised that the construction limits of the project include existing facilities and buried cable runs that are owned, operated and maintained by the FAA. The Contractor, during the execution of the project work, shall comply with the following:

a. The Contractor shall permit FAA maintenance personnel the right of access to the project work site for purposes of inspecting and maintaining all existing FAA owned facilities.

b. The Contractor shall provide notice to the FAA Air Traffic Organization (ATO)/Technical Operations/System Support Center (SSC) Point-of-Contact through the airport Owner a minimum of seven (7) calendar days prior to commencement of construction activities in order to permit sufficient time to locate and mark existing buried cables and to schedule any required facility outages.

c. If execution of the project work requires a facility outage, the Contractor shall contact the FAA Point-of-Contact a minimum of 72 hours prior to the time of the required outage.

d. Any damage to FAA cables, access roads, or FAA facilities during construction caused by the Contractor's equipment or personnel whether by negligence or accident will require the Contractor to repair or replace the damaged cables, access road, or FAA facilities to FAA requirements. The Contractor shall not bear the cost to repair damage to underground facilities or utilities improperly located by the FAA.

e. If the project work requires the cutting or splicing of FAA owned cables, the FAA Point-of-Contact shall be contacted a minimum of 72 hours prior to the time the cable work commences. The FAA reserves the right to have a FAA representative on site to observe the splicing of the cables as a condition of acceptance. All cable splices are to be accomplished in accordance with FAA specifications and require approval by the FAA Point-of-Contact as a condition of acceptance by the Owner. The Contractor is hereby advised that FAA restricts the location of where splices may be installed. If a cable splice is required in a location that is not permitted by FAA, the Contractor shall furnish and install a sufficient length of new cable that eliminates the need for any splice.

70-16 Furnishing rights-of-way. The Owner will be responsible for furnishing all rights-of-way upon which the work is to be constructed in advance of the Contractor's operations.

70-17 Personal liability of public officials. In carrying out any of the contract provisions or in exercising any power or authority granted by this contract, there shall be no liability upon the Engineer, RPR, their authorized representatives, or any officials of the Owner either personally or as an official of the Owner. It is understood that in such matters they act solely as agents and representatives of the Owner.

70-18 No waiver of legal rights. Upon completion of the work, the Owner will expeditiously make final inspection and notify the Contractor of final acceptance. Such final acceptance, however, shall not preclude or stop the Owner from correcting any measurement, estimate, or certificate made before or after completion of the work, nor shall the Owner be precluded or stopped from recovering from the Contractor or their surety, or both, such overpayment as may be sustained, or by failure on the part of the Contractor to fulfill their obligations under the contract. A waiver on the part of the Owner of any breach of any part of the contract shall not be held to be a waiver of any other or subsequent breach.

The Contractor, without prejudice to the terms of the contract, shall be liable to the Owner for latent defects, fraud, or such gross mistakes as may amount to fraud, or as regards the Owner's rights under any warranty or guaranty.

70-19 Environmental protection. The Contractor shall comply with all federal, state, and local laws and regulations controlling pollution of the environment. The Contractor shall take necessary precautions to prevent pollution of streams, lakes, ponds, and reservoirs with fuels, oils, asphalts, chemicals, or other harmful materials and to prevent pollution of the atmosphere from particulate and gaseous matter.

70-20 Archaeological and historical findings. Unless otherwise specified in this subsection, the Contractor is advised that the site of the work is not within any property, district, or site, and does not contain any building, structure, or object listed in the current National Register of Historic Places published by the United States Department of Interior.

Should the Contractor encounter, during their operations, any building, part of a building, structure, or object that is incongruous with its surroundings, the Contractor shall immediately cease operations in that location and notify the RPR. The RPR will immediately investigate the Contractor's finding and the Owner will direct the Contractor to either resume operations or to suspend operations as directed.

Should the Owner order suspension of the Contractor's operations in order to protect an archaeological or historical finding, or order the Contractor to perform extra work, such shall be covered by an appropriate contract change order or supplemental agreement as provided in Section 40, paragraph 40-04, *Extra Work*, and Section 90, paragraph 90-05, *Payment for Extra Work*. If appropriate, the contract change order or supplemental agreement shall include an extension of contract time in accordance with Section 80, paragraph 80-07, *Determination and Extension of Contract Time*.

70-21 Insurance Requirements. See Article 19 of Section 00500 Construction Contract.

END OF SECTION 70

Page Intentionally Blank

Section 80 Execution and Progress

80-01 Subletting of contract. The Owner will not recognize any subcontractor on the work. The Contractor shall at all times when work is in progress be represented either in person, by a qualified superintendent, or by other designated, qualified representative who is duly authorized to receive and execute orders of the Resident Project Representative (RPR).

The Contractor shall perform, with his organization, an amount of work equal to at least twenty-five (25) percent of the total contract cost.

Should the Contractor elect to assign their contract, said assignment shall be concurred in by the surety, shall be presented for the consideration and approval of the Owner, and shall be consummated only on the written approval of the Owner.

The Contractor shall provide copies of all subcontracts to the RPR 14 days prior to being utilized on the project. As a minimum, the information shall include the following:

- Subcontractor's legal company name.
- Subcontractor's legal company address, including County name.
- Principal contact person's name, telephone and fax number.
- Complete narrative description, and dollar value of the work to be performed by the subcontractor.
- Copies of required insurance certificates in accordance with the specifications.
- Minority/ non-minority status.

80-02 Notice to proceed (NTP). The Owners notice to proceed will state the date on which contract time commences. The Contractor is expected to commence project operations within ten (10) days of the NTP date. The Contractor shall notify the RPR at least 24 hours (24) in advance of the time contract operations begins. The Contractor shall not commence any actual operations prior to the date on which the notice to proceed is issued by the Owner.

80-03 Execution and progress. Unless otherwise specified, the Contractor shall submit their coordinated construction schedule showing all work activities for the RPR's review and acceptance at least 10 days prior to the start of work. The Contractor's progress schedule, once accepted by the RPR, will represent the Contractor's baseline plan to accomplish the project in accordance with the terms and conditions of the Contract. The RPR will compare actual Contractor progress against the baseline schedule to determine that status of the Contractor's performance. The Contractor shall provide sufficient materials, equipment, and labor to guarantee the completion of the project in accordance with the plans and specifications within the time set forth in the proposal.

If the Contractor falls significantly behind the submitted schedule, the Contractor shall, upon the RPR's request, submit a revised schedule for completion of the work within the contract time and modify their operations to provide such additional materials, equipment, and labor necessary to meet the revised schedule. Should the execution of the work be discontinued for any reason, the Contractor shall notify the RPR at least 24 hours in advance of resuming operations.

The Contractor shall not commence any actual construction prior to the date on which the NTP is issued by the Owner.

The project schedule shall be prepared as a network diagram in Critical Path Method (CPM), Program Evaluation and Review Technique (PERT), or other format, or as otherwise specified. It shall include information on the sequence of work activities, milestone dates, and activity duration. The schedule shall show all work items identified in the project proposal for each work area and shall include the project start date and end date.

The Contractor shall maintain the work schedule and provide an update and analysis of the progress schedule on a twice monthly basis, or as otherwise specified in the contract. Submission of the work schedule shall not relieve the Contractor of overall responsibility for scheduling, sequencing, and coordinating all work to comply with the requirements of the contract.

80-04 Limitation of operations. The Contractor shall control their operations and the operations of their subcontractors and all suppliers to provide for the free and unobstructed movement of aircraft in the air operations areas (AOA) of the airport.

When the work requires the Contractor to conduct their operations within an AOA of the airport, the work shall be coordinated with airport operations (through the RPR) at least 48 hours prior to commencement of such work. The Contractor shall not close an AOA until so authorized by the RPR and until the necessary temporary marking, signage and associated lighting is in place as provided in Section 70, paragraph 70-08, *Construction Safety and Phasing Plan (CSPP)*.

When the contract work requires the Contractor to work within an AOA of the airport on an intermittent basis (intermittent opening and closing of the AOA), the Contractor shall maintain constant communications as specified; immediately obey all instructions to vacate the AOA; and immediately obey all instructions to resume work in such AOA. Failure to maintain the specified communications or to obey instructions shall be cause for suspension of the Contractor's operations in the AOA until satisfactory conditions are provided. The areas of the AOA identified in the Construction Safety Phasing Plan (CSPP) and as listed below, cannot be closed to operating aircraft to permit the Contractor's operations on a continuous basis and will therefore be closed to aircraft operations intermittently as follows: N/A

The Contractor shall be required to conform to safety standards contained in AC 150/5370-2, Operational Safety on Airports During Construction and the approved CSPP.

80-04.1 Operational safety on airport during construction. All Contractors' operations shall be conducted in accordance with the approved project Construction Safety and Phasing Plan (CSPP) and the Safety Plan Compliance Document (SPCD) and the provisions set forth within the current version of AC 150/5370-2, Operational Safety on Airports During Construction. The CSPP included within the contract documents conveys minimum requirements for operational safety on the airport during construction activities. The Contractor shall prepare and submit a SPCD that details how it proposes to comply with the requirements presented within the CSPP.

The Contractor shall implement all necessary safety plan measures prior to commencement of any work activity. The Contractor shall conduct routine checks to assure compliance with the safety plan measures.

The Contractor is responsible to the Owner for the conduct of all subcontractors it employs on the project. The Contractor shall assure that all subcontractors are made aware of the requirements of the CSPP and SPCD and that they implement and maintain all necessary measures.

No deviation or modifications may be made to the approved CSPP and SPCD unless approved in writing by the Owner. The necessary coordination actions to review Contractor proposed modifications to an approved CSPP or approved SPCD can require a significant amount of time.

80-05 Character of workers, methods, and equipment. The Contractor shall, at all times, employ sufficient labor and equipment for prosecuting the work to full completion in the manner and time required by the contract, plans, and specifications.

All workers shall have sufficient skill and experience to perform properly the work assigned to them. Workers engaged in special work or skilled work shall have sufficient experience in such work and in the operation of the equipment required to perform the work satisfactorily.

Any person employed by the Contractor or by any subcontractor who violates any operational regulations or operational safety requirements and, in the opinion of the RPR, does not perform his work in a proper and skillful manner or is intemperate or disorderly shall, at the written request of the RPR, be removed immediately by the Contractor or subcontractor employing such person, and shall not be employed again in any portion of the work without approval of the RPR.

Should the Contractor fail to remove such person or persons, or fail to furnish suitable and sufficient personnel for the proper execution of the work, the RPR may suspend the work by written notice until compliance with such orders.

All equipment that is proposed to be used on the work shall be of sufficient size and in such mechanical condition as to meet requirements of the work and to produce a satisfactory quality of work. Equipment used on any portion of the work shall not cause injury to previously completed work, adjacent property, or existing airport facilities due to its use.

When the methods and equipment to be used by the Contractor in accomplishing the work are not prescribed in the contract, the Contractor is free to use any methods or equipment that will accomplish the work in conformity with the requirements of the contract, plans, and specifications.

When the contract specifies the use of certain methods and equipment, such methods and equipment shall be used unless otherwise authorized by the RPR. If the Contractor desires to use a method or type of equipment other than specified in the contract, the Contractor may request authority from the RPR to do so. The request shall be in writing and shall include a full description of the methods and equipment proposed and of the reasons for desiring to make the change. If approval is given, it will be on the condition that the Contractor will be fully responsible for producing work in conformity with contract requirements. If, after trial use of the substituted methods or equipment, the RPR determines that the work produced does not meet contract requirements, the Contractor shall discontinue the use of the substitute method or equipment and shall complete the remaining work with the specified methods and equipment. The Contractor shall remove any deficient work and replace it with work of specified quality, or take such other corrective action as the RPR may direct. No change will be made in basis of payment for the contract items involved nor in contract time as a result of authorizing a change in methods or equipment under this paragraph.

80-06 Temporary suspension of the work. The Owner shall have the authority to suspend the work wholly, or in part, for such period or periods the Owner may deem necessary, due to unsuitable weather, or other conditions considered unfavorable for the execution of the work, or for such time necessary due to the failure on the part of the Contractor to carry out orders given or perform any or all provisions of the contract.

In the event that the Contractor is ordered by the Owner, in writing, to suspend work for some unforeseen cause not otherwise provided for in the contract and over which the Contractor has no control, the Contractor may be reimbursed for actual money expended on the work during the period of shutdown. No allowance will be made for anticipated profits. The period of shutdown shall be computed from the effective date of the written order to suspend work to the effective date of the written order to resume the work. Claims for such compensation shall be filed with the RPR within the time period stated in the RPR's order to resume work. The Contractor shall submit with their own claim information substantiating

the amount shown on the claim. The RPR will forward the Contractor's claim to the Owner for consideration in accordance with local laws or ordinances. No provision of this article shall be construed as entitling the Contractor to compensation for delays due to inclement weather or for any other delay provided for in the contract, plans, or specifications.

If it becomes necessary to suspend work for an indefinite period, the Contractor shall store all materials in such manner that they will not become an obstruction nor become damaged in any way. The Contractor shall take every precaution to prevent damage or deterioration of the work performed and provide for normal drainage of the work. The Contractor shall erect temporary structures where necessary to provide for traffic on, to, or from the airport.

80-07 Determination and extension of contract time. The number of calendar days shall be stated in the proposal and contract and shall be known as the Contract Time.

If the contract time requires extension for reasons beyond the Contractor's control, it shall be adjusted as follows:

Contract time based on calendar days. Contract Time based on calendar days shall consist of the number of calendar days stated in the contract counting from the effective date of the Notice to Proceed and including all Saturdays, Sundays, holidays, and non-work days. All calendar days elapsing between the effective dates of the Owner's orders to suspend and resume all work, due to causes not the fault of the Contractor, shall be excluded.

At the time of final payment, the contract time shall be increased in the same proportion as the cost of the actually completed quantities bears to the cost of the originally estimated quantities in the proposal. Such increase in the contract time shall not consider either cost of work or the extension of contract time that has been covered by a change order or supplemental agreement. Charges against the contract time will cease as of the date of final acceptance.

80-08 Failure to complete on time. For each calendar day or working day, as specified in the contract, that any work remains uncompleted after the contract time (including all extensions and adjustments as provided in paragraph 80-07, *Determination and Extension of Contract Time*) the sum specified in the contract and proposal as liquidated damages (LD) will be deducted from any money due or to become due the Contractor or their own surety. Such deducted sums shall not be deducted as a penalty but shall be considered as liquidation of a reasonable portion of damages including but not limited to additional engineering services that will be incurred by the Owner should the Contractor fail to complete the work in the time provided in their contract.

Schedule	Liquidated Damages Cost	Allowed Construction Time
Substantial Completion	\$2,500 per calendar day	180 calendar days
Final Completion & Demobilization Phase	\$500 per calendar day	45 calendar days

Permitting the Contractor to continue and finish the work or any part of it after the time fixed for its completion, or after the date to which the time for completion may have been extended, will in no way operate as a waiver on the part of the Owner of any of its rights under the contract.

80-09 Default and termination of contract. The Contractor shall be considered in default of their contract and such default will be considered as cause for the Owner to terminate the contract for any of the following reasons, if the Contractor:

- a. Fails to begin the work under the contract within the time specified in the Notice to Proceed, or
- b. Fails to perform the work or fails to provide sufficient workers, equipment and/or materials to assure completion of work in accordance with the terms of the contract, or
- c. Performs the work unsuitably or neglects or refuses to remove materials or to perform anew such work as may be rejected as unacceptable and unsuitable, or
- d. Discontinues the execution of the work, or
- e. Fails to resume work which has been discontinued within a reasonable time after notice to do so, or
- f. Becomes insolvent or is declared bankrupt, or commits any act of bankruptcy or insolvency, or
- g. Allows any final judgment to stand against the Contractor unsatisfied for a period of 10 days, or
- h. Makes an assignment for the benefit of creditors, or
- i. For any other cause whatsoever, fails to carry on the work in an acceptable manner.

Should the Owner consider the Contractor in default of the contract for any reason above, the Owner shall immediately give written notice to the Contractor and the Contractor's surety as to the reasons for considering the Contractor in default and the Owner's intentions to terminate the contract.

If the Contractor or surety, within a period of 10 days after such notice, does not proceed in accordance therewith, then the Owner will, upon written notification from the RPR of the facts of such delay, neglect, or default and the Contractor's failure to comply with such notice, have full power and authority without violating the contract, to take the execution of the work out of the hands of the Contractor. The Owner may appropriate or use any or all materials and equipment that have been mobilized for use in the work and are acceptable and may enter into an agreement for the completion of said contract according to the terms and provisions thereof, or use such other methods as in the opinion of the RPR will be required for the completion of said contract in an acceptable manner.

All costs and charges incurred by the Owner, together with the cost of completing the work under contract, will be deducted from any monies due or which may become due the Contractor. If such expense exceeds the sum which would have been payable under the contract, then the Contractor and the surety shall be liable and shall pay to the Owner the amount of such excess.

80-10 Termination for national emergencies. The Owner shall terminate the contract or portion thereof by written notice when the Contractor is prevented from proceeding with the construction contract as a direct result of an Executive Order of the President with respect to the execution of war or in the interest of national defense.

When the contract, or any portion thereof, is terminated before completion of all items of work in the contract, payment will be made for the actual number of units or items of work completed at the contract price or as mutually agreed for items of work partially completed or not started. No claims or loss of anticipated profits shall be considered.

Reimbursement for organization of the work, and other overhead expenses, (when not otherwise included in the contract) and moving equipment and materials to and from the job will be considered, the intent being that an equitable settlement will be made with the Contractor.

Acceptable materials, obtained or ordered by the Contractor for the work and that are not incorporated in the work shall, at the option of the Contractor, be purchased from the Contractor at actual cost as shown by receipted bills and actual cost records at such points of delivery as may be designated by the RPR.

Termination of the contract or a portion thereof shall neither relieve the Contractor of their responsibilities for the completed work nor shall it relieve their surety of its obligation for and concerning any just claim arising out of the work performed.

80-11 Work area, storage area and sequence of operations. The Contractor shall obtain approval from the RPR prior to beginning any work in all areas of the airport. No operating runway, taxiway, or air operations area (AOA) shall be crossed, entered, or obstructed while it is operational. The Contractor shall plan and coordinate work in accordance with the approved CSPP and SPCD.

END OF SECTION 80

Section 90 Measurement and Payment

90-01 Measurement of quantities. All work completed under the contract will be measured by the RPR, or their authorized representatives, using United States Customary Units of Measurement.

The method of measurement and computations to be used in determination of quantities of material furnished and of work performed under the contract will be those methods generally recognized as conforming to good engineering practice.

Unless otherwise specified, longitudinal measurements for area computations will be made horizontally, and no deductions will be made for individual fixtures (or leave-outs) having an area of 9 square feet (0.8 square meters) or less. Unless otherwise specified, transverse measurements for area computations will be the neat dimensions shown on the plans or ordered in writing by the RPR.

Unless otherwise specified, all contract items which are measured by the linear foot such as electrical ducts, conduits, pipe culverts, underdrains, and similar items shall be measured parallel to the base or foundation upon which such items are placed.

The term “lump sum” when used as an item of payment will mean complete payment for the work described in the contract. When a complete structure or structural unit (in effect, “lump sum” work) is specified as the unit of measurement, the unit will be construed to include all necessary fittings and accessories.

When requested by the Contractor and approved by the RPR in writing, material specified to be measured by the cubic yard (cubic meter) may be weighed, and such weights will be converted to cubic yards (cubic meters) for payment purposes. Factors for conversion from weight measurement to volume measurement will be determined by the RPR and shall be agreed to by the Contractor before such method of measurement of pay quantities is used.

Measurement and Payment Terms

Term	Description
Excavation and Embankment Volume	In computing volumes of excavation, the average end area method will be used unless otherwise specified.
Measurement and Proportion by Weight	The term “ton” will mean the short ton consisting of 2,000 pounds (907 kg) avoirdupois. All materials that are measured or proportioned by weights shall be weighed on accurate, independently certified scales by competent, qualified personnel at locations designated by the RPR. If material is shipped by rail, the car weight may be accepted provided that only the actual weight of material is paid for. However, car weights will not be acceptable for material to be passed through mixing plants. Trucks used to haul material being paid for by weight shall be weighed empty daily at such times as the RPR directs, and each truck shall bear a plainly legible identification mark.

Term	Description
Measurement by Volume	Materials to be measured by volume in the hauling vehicle shall be hauled in approved vehicles and measured therein at the point of delivery. Vehicles for this purpose may be of any size or type acceptable for the materials hauled, provided that the body is of such shape that the actual contents may be readily and accurately determined. All vehicles shall be loaded to at least their water level capacity, and all loads shall be leveled when the vehicles arrive at the point of delivery.
Asphalt Material	Asphalt materials will be measured by the gallon (liter) or ton (kg). When measured by volume, such volumes will be measured at 60°F (16°C) or will be corrected to the volume at 60°F (16°C) using ASTM D1250 for asphalts. Net certified scale weights or weights based on certified volumes in the case of rail shipments will be used as a basis of measurement, subject to correction when asphalt material has been lost from the car or the distributor, wasted, or otherwise not incorporated in the work. When asphalt materials are shipped by truck or transport, net certified weights by volume, subject to correction for loss or foaming, will be used for computing quantities.
Cement	Cement will be measured by the ton (kg) or hundredweight (km).
Structure	Structures will be measured according to neat lines shown on the plans or as altered to fit field conditions.
Timber	Timber will be measured by the thousand feet board measure (MFBM) actually incorporated in the structure. Measurement will be based on nominal widths and thicknesses and the extreme length of each piece.
Plates and Sheets	The thickness of plates and galvanized sheet used in the manufacture of corrugated metal pipe, metal plate pipe culverts and arches, and metal cribbing will be specified and measured in decimal fraction of inch.
Miscellaneous Items	When standard manufactured items are specified such as fence, wire, plates, rolled shapes, pipe conduit, etc., and these items are identified by gauge, unit weight, section dimensions, etc., such identification will be considered to be nominal weights or dimensions. Unless more stringently controlled by tolerances in cited specifications, manufacturing tolerances established by the industries involved will be accepted.
Scales	<p>Scales must be tested for accuracy and serviced before use. Scales for weighing materials which are required to be proportioned or measured and paid for by weight shall be furnished, erected, and maintained by the Contractor, or be certified permanently installed commercial scales. Platform scales shall be installed and maintained with the platform level and rigid bulkheads at each end.</p> <p>Scales shall be accurate within 0.5% of the correct weight throughout the range of use. The Contractor shall have the scales checked under the observation of the RPR before beginning work and at such other times as requested. The intervals shall be uniform in spacing throughout the graduated or marked length of the beam or dial and shall not exceed 0.1% of the nominal rated capacity of the</p>

Term	Description
	<p>scale, but not less than one pound (454 grams). The use of spring balances will not be permitted.</p> <p>In the event inspection reveals the scales have been “overweighing” (indicating more than correct weight) they will be immediately adjusted. All materials received subsequent to the last previous correct weighting-accuracy test will be reduced by the percentage of error in excess of 0.5%.</p> <p>In the event inspection reveals the scales have been under-weighing (indicating less than correct weight), they shall be immediately adjusted. No additional payment to the Contractor will be allowed for materials previously weighed and recorded.</p> <p>Beams, dials, platforms, and other scale equipment shall be so arranged that the operator and the RPR can safely and conveniently view them.</p> <p>Scale installations shall have available ten standard 50-pound (2.3 km) weights for testing the weighing equipment or suitable weights and devices for other approved equipment.</p> <p>All costs in connection with furnishing, installing, certifying, testing, and maintaining scales; for furnishing check weights and scale house; and for all other items specified in this subsection, for the weighing of materials for proportioning or payment, shall be included in the unit contract prices for the various items of the project.</p>
Rental Equipment	<p>Rental of equipment will be measured by time in hours of actual working time and necessary traveling time of the equipment within the limits of the work. Special equipment ordered in connection with extra work will be measured as agreed in the change order or supplemental agreement authorizing such work as provided in paragraph 90-05 <i>Payment for Extra Work</i>.</p>
Pay Quantities	<p>When the estimated quantities for a specific portion of the work are designated as the pay quantities in the contract, they shall be the final quantities for which payment for such specific portion of the work will be made, unless the dimensions of said portions of the work shown on the plans are revised by the RPR. If revised dimensions result in an increase or decrease in the quantities of such work, the final quantities for payment will be revised in the amount represented by the authorized changes in the dimensions.</p>

90-02 Scope of payment. The Contractor shall receive and accept compensation provided for in the contract as full payment for furnishing all materials, for performing all work under the contract in a complete and acceptable manner, and for all risk, loss, damage, or expense of whatever character arising out of the nature of the work or the execution thereof, subject to the provisions of Section 70, paragraph 70-18, *No Waiver of Legal Rights*.

When the “basis of payment” subsection of a technical specification requires that the contract price (price bid) include compensation for certain work or material essential to the item, this same work or material will not also be measured for payment under any other contract item which may appear elsewhere in the contract, plans, or specifications.

90-03 Compensation for altered quantities. When the accepted quantities of work vary from the quantities in the proposal, the Contractor shall accept as payment in full, so far as contract items are concerned, payment at the original contract price for the accepted quantities of work actually completed and accepted. No allowance, except as provided for in Section 40, paragraph 40-02, *Alteration of Work and Quantities*, will be made for any increased expense, loss of expected reimbursement, or loss of anticipated profits suffered or claimed by the Contractor which results directly from such alterations or indirectly from their own unbalanced allocation of overhead and profit among the contract items, or from any other cause.

90-04 Payment for omitted items. As specified in Section 40, paragraph 40-03, *Omitted Items*, the RPR shall have the right to omit from the work (order nonperformance) any contract item, except major contract items, in the best interest of the Owner.

Should the RPR omit or order nonperformance of a contract item or portion of such item from the work, the Contractor shall accept payment in full at the contract prices for any work actually completed and acceptable prior to the RPR's order to omit or non-perform such contract item.

Acceptable materials ordered by the Contractor or delivered on the work prior to the date of the RPR's order will be paid for at the actual cost to the Contractor and shall thereupon become the property of the Owner.

In addition to the reimbursement hereinbefore provided, the Contractor shall be reimbursed for all actual costs incurred for the purpose of performing the omitted contract item prior to the date of the RPR's order. Such additional costs incurred by the Contractor must be directly related to the deleted contract item and shall be supported by certified statements by the Contractor as to the nature the amount of such costs.

90-05 Payment for extra work. Extra work, performed in accordance with Section 40, paragraph 40-04, *Extra Work*, will be paid for at the contract prices or agreed prices specified in the change order or supplemental agreement authorizing the extra work.

90-06 Partial payments. Partial payments will be made to the Contractor at least once each month as the work progresses. Said payments will be based upon estimates, prepared by the RPR, of the value of the work performed and materials complete and in place, in accordance with the contract, plans, and specifications. Such partial payments may also include the delivered actual cost of those materials stockpiled and stored in accordance with paragraph 90-07, *Payment for Materials on Hand*. No partial payment will be made when the amount due to the Contractor since the last estimate amounts to less than five hundred dollars.

a. Retainage will not be withheld on this project. No retainage will be withheld by the Owner from progress payments due the prime Contractor. Retainage by the prime or subcontractors is prohibited, and no retainage will be held by the prime from progress due subcontractors.

b. The Contractor is required to pay all subcontractors for satisfactory performance of their contracts no later than 30 days after the Contractor has received a partial payment. A subcontractor's work is satisfactorily completed when all the tasks called for in the subcontract have been accomplished and documented as required by the Owner. When the Owner has made an incremental acceptance of a portion of a prime contract, the work of a subcontractor covered by that acceptance is deemed to be satisfactorily completed.

c. When at least 95% of the project work has been completed to the satisfaction of the RPR, the RPR shall, at the Owner's discretion and with the consent of the surety, prepare estimates of both the contract value and the cost of the remaining work to be done.

It is understood and agreed that the Contractor shall not be entitled to demand or receive partial payment based on quantities of work in excess of those provided in the proposal or covered by approved change orders or supplemental agreements, except when such excess quantities have been determined by the RPR to be a part of the final quantity for the item of work in question.

No partial payment shall bind the Owner to the acceptance of any materials or work in place as to quality or quantity. All partial payments are subject to correction at the time of final payment as provided in paragraph 90-09, *Acceptance and Final Payment*.

The Contractor shall deliver to the Owner a complete release of all claims for labor and material arising out of this contract before the final payment is made. If any subcontractor or supplier fails to furnish such a release in full, the Contractor may furnish a bond or other collateral satisfactory to the Owner to indemnify the Owner against any potential lien or other such claim. The bond or collateral shall include all costs, expenses, and attorney fees the Owner may be compelled to pay in discharging any such lien or claim.

90-07 Payment for materials on hand. Partial payments may be made to the extent of the delivered cost of materials to be incorporated in the work, provided that such materials meet the requirements of the contract, plans, and specifications and are delivered to acceptable sites on the airport property or at other sites in the vicinity that are acceptable to the Owner. Such delivered costs of stored or stockpiled materials may be included in the next partial payment after the following conditions are met:

- a. The material has been stored or stockpiled in a manner acceptable to the RPR at or on an approved site.
- b. The Contractor has furnished the RPR with acceptable evidence of the quantity and quality of such stored or stockpiled materials.
- c. The Contractor has furnished the RPR with satisfactory evidence that the material and transportation costs have been paid.
- d. The Contractor has furnished the Owner legal title (free of liens or encumbrances of any kind) to the material stored or stockpiled.
- e. The Contractor has furnished the Owner evidence that the material stored or stockpiled is insured against loss by damage to or disappearance of such materials at any time prior to use in the work.

It is understood and agreed that the transfer of title and the Owner's payment for such stored or stockpiled materials shall in no way relieve the Contractor of their responsibility for furnishing and placing such materials in accordance with the requirements of the contract, plans, and specifications.

In no case will the amount of partial payments for materials on hand exceed the contract price for such materials or the contract price for the contract item in which the material is intended to be used.

No partial payment will be made for stored or stockpiled living or perishable plant materials.

The Contractor shall bear all costs associated with the partial payment of stored or stockpiled materials in accordance with the provisions of this paragraph.

90-08 Payment of withheld funds. At the Contractor's option, if an Owner withholds retainage in accordance with the methods described in paragraph 90-06 *Partial Payments*, the Contractor may request that the Owner deposit the retainage into an escrow account. The Owner's deposit of retainage into an escrow account is subject to the following conditions:

- a. The Contractor shall bear all expenses of establishing and maintaining an escrow account and escrow agreement acceptable to the Owner.

b. The Contractor shall deposit to and maintain in such escrow only those securities or bank certificates of deposit as are acceptable to the Owner and having a value not less than the retainage that would otherwise be withheld from partial payment.

c. The Contractor shall enter into an escrow agreement satisfactory to the Owner.

d. The Contractor shall obtain the written consent of the surety to such agreement.

90-09 Acceptance and final payment. When the contract work has been accepted in accordance with the requirements of Section 50, paragraph 50-15, *Final Acceptance*, the RPR will prepare the final estimate of the items of work actually performed. The Contractor shall approve the RPR's final estimate or advise the RPR of the Contractor's objections to the final estimate which are based on disputes in measurements or computations of the final quantities to be paid under the contract as amended by change order or supplemental agreement. The Contractor and the RPR shall resolve all disputes (if any) in the measurement and computation of final quantities to be paid within 30 calendar days of the Contractor's receipt of the RPR's final estimate. If, after such 30-day period, a dispute still exists, the Contractor may approve the RPR's estimate under protest of the quantities in dispute, and such disputed quantities shall be considered by the Owner as a claim in accordance with Section 50, paragraph 50-16, *Claims for Adjustment and Disputes*.

After the Contractor has approved, or approved under protest, the RPR's final estimate, and after the RPR's receipt of the project closeout documentation required in paragraph 90-11, *Contractor Final Project Documentation*, final payment will be processed based on the entire sum, or the undisputed sum in case of approval under protest, determined to be due the Contractor less all previous payments and all amounts to be deducted under the provisions of the contract. All prior partial estimates and payments shall be subject to correction in the final estimate and payment.

If the Contractor has filed a claim for additional compensation under the provisions of Section 50, paragraph 50-16, *Claims for Adjustments and Disputes*, or under the provisions of this paragraph, such claims will be considered by the Owner in accordance with local laws or ordinances. Upon final adjudication of such claims, any additional payment determined to be due the Contractor will be paid pursuant to a supplemental final estimate.

90-10 Construction warranty.

a. In addition to any other warranties in this contract, the Contractor warrants that work performed under this contract conforms to the contract requirements and is free of any defect in equipment, material, workmanship, or design furnished, or performed by the Contractor or any subcontractor or supplier at any tier.

b. This warranty shall continue for a period of one year from the date of final acceptance of the work, except as noted. If the Owner takes possession of any part of the work before final acceptance, this warranty shall continue for a period of one year from the date the Owner takes possession. However, this will not relieve the Contractor from corrective items required by the final acceptance of the project work. Light Emitting Diode emitting diode (LED) light fixtures with the exception of obstruction lighting, must be warranted by the manufacturer for a minimum of four (4) years after date of installation inclusive of all electronics.

See technical specifications for additional equipment with extended warranties.

c. The Contractor shall remedy at the Contractor's expense any failure to conform, or any defect. In addition, the Contractor shall remedy at the Contractor's expense any damage to Owner real or personal property, when that damage is the result of the Contractor's failure to conform to contract requirements; or any defect of equipment, material, workmanship, or design furnished by the Contractor.

d. The Contractor shall restore any work damaged in fulfilling the terms and conditions of this clause. The Contractor's warranty with respect to work repaired or replaced will run for one year from the date of repair or replacement.

e. The Owner will notify the Contractor, in writing, within seven (7) days after the discovery of any failure, defect, or damage.

f. If the Contractor fails to remedy any failure, defect, or damage within fourteen 14 days after receipt of notice, the Owner shall have the right to replace, repair, or otherwise remedy the failure, defect, or damage at the Contractor's expense.

g. With respect to all warranties, express or implied, from subcontractors, manufacturers, or suppliers for work performed and materials furnished under this contract, the Contractor shall: (1) Obtain all warranties that would be given in normal commercial practice; (2) Require all warranties to be executed, in writing, for the benefit of the Owner, as directed by the Owner, and (3) Enforce all warranties for the benefit of the Owner.

h. This warranty shall not limit the Owner's rights with respect to latent defects, gross mistakes, or fraud.

90-11 Contractor Final Project Documentation. Approval of final payment to the Contractor is contingent upon completion and submittal of the items listed below. The final payment will not be approved until the RPR approves the Contractor's final submittal. The Contractor shall:

a. Provide two (2) copies of all manufacturers warranties specified for materials, equipment, and installations.

b. Provide weekly payroll records (not previously received) from the general Contractor and all subcontractors.

c. Complete final cleanup in accordance with Section 40, paragraph 40-08, *Final Cleanup*.

d. Complete all punch list items identified during the Final Inspection.

e. Provide complete release of all claims for labor and material arising out of the Contract.

f. Provide a certified statement signed by the subcontractors, indicating actual amounts paid to the Disadvantaged Business Enterprise (DBE) subcontractors and/or suppliers associated with the project.

g. When applicable per state requirements, return copies of sales tax completion forms.

h. Manufacturer's certifications for all items incorporated in the work.

i. All required record drawings, as-built drawings or as-constructed drawings.

j. Project Operation and Maintenance (O&M) Manual(s).

k. Security for Construction Warranty.

l. Equipment commissioning documentation submitted, if required.

See Section 01770 for additional closeout procedures.

END OF SECTION 90

Section 150 General Provisions Addendum

150-10 GENERAL PROVISIONS ADDENDUM - Section 10 Definition of Terms

Whenever the following terms are used in these specifications, in the contract, in any documents or other instruments pertaining to construction of the project where these specifications govern, the intent and meaning shall be interpreted as follows; and whenever one of the following capitalized words, terms or phrases is used herein, it shall be interpreted or construed first as defined in Specification Section GP-10, second as defined below, third according to its generally accepted meaning in the construction industry, and fourth according to its common and customary usage.

150-10-101 ACCESS ROAD

As defined in GP-10 and shall further be defined to include “or an internal roadway for construction or maintenance.”

150-10-102 ADDENDA

Written or graphic instructions issued prior to the opening of Proposals, which clarify, correct or change the bidding documents or the Contract Documents.

150-10-103 AIRPORT OPERATIONS or OPERATIONS

Depending on use, airport operations may refer to a department of the Airport Authority or the movement of aircraft on, or approaching the airfield.

150-10-104 BID ITEMS

The proposal provides for quotation of a price, for one or more bid items, which may be lump sum bid prices, alternate bid prices, unit bid prices, or a combination thereof. No payment will be made for items not set up in the proposal, unless otherwise provided by contract amendment. Bidders are cautioned that they should include in the prices quoted for various bid items all necessary allowances for the performance of all work required for the satisfactory completion of the project.

150-10-105 BUILDER

A term to be used interchangeably with “Contractor.”

150-10-106 CONTRACT AMENDMENT

A term to be used interchangeably with “Change order.”

150-10-107 CONTRACT FOR PROFESSIONAL SERVICES

A written agreement between the Owner and a Professional for provision of services and related items required to design, engineer or program manage all or part of a Project.

150-10-108 DEFECTIVE

An adjective which when modifying the word Work refers to Work that is unsatisfactory, faulty or deficient, or does not conform to the Contract Documents, or does not meet the requirements of any Inspection, reference standard, test or approval referred to in the Contract Documents, or has been damaged prior to the Program Manager's recommendation of final payment.

150-10-109 DRAWINGS

A term to be used interchangeably with “Plans.”

150-10-110 ENGINEER or PROFESSIONAL

As defined in GP-10 and shall further be defined to include “Engineer will not supervise, direct, control, or have authority over or be responsible for Contractors means, methods, techniques, sequences or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with laws and regulations applicable to performance of the Work. UrbanArch is the Architect for this Project.”

150-10-111 FINAL COMPLETION

The stage of construction when the Work has been 100% completed including all punch list items, record drawings, O&M manuals, lien waivers, maintenance training, warranties, consent of surety to final payment, and all other required closeout documentation.

150-10-112 GP

Abbreviation for General Provision.

150-10-113 HAZARDOUS SUBSTANCES

The term "Hazardous Substance" shall have the same meaning and definition as set forth in the Comprehensive Environmental Response Compensation and Liability Act as amended, 42 U.S.C. § 6901 *et seq.*, and regulations promulgated thereunder (collectively "CERCLA") and any corresponding state or local law or regulation, and shall also include: (a) any Pollutant or Contaminant as those terms are defined in CERCLA; (b) any Solid Waste or Hazardous Constituent as those terms are defined by, or are otherwise identified by, the Resource Conservation and Recovery Act as amended, 42 U.S.C. § 6901 *et seq.*, and regulations promulgated thereunder (collectively "RCRA") and any corresponding state or local law or regulation; (c) crude oil, petroleum and fractions of distillates thereof; (d) any other material, substance or chemical defined, characterized or regulated as toxic or hazardous under any applicable law, regulation, ordinance, directive or ruling; and (e) any infectious or medical waste as defined by any applicable federal or state laws or regulations.

150-10-114 INTENTION OF TERMS

As defined in GP-10 and shall further be defined to include “The use of any such term shall not be effective to assign to Program Manager any duty or authority to supervise or direct the furnishing or performance of the work. Wherever in the specifications or on the drawings the words "install," "furnish," "provide," or words of like import are used, they mean the Contractor shall install, furnish, or provide, as the case may be complete and ready for Owner's use.”

150-10-115 LUMP SUM PRICE

The dollar amount for which a Contractor agrees to perform the Work or a specific component of the Work as set forth in a Contract for construction.

150-10-116 MAJOR SUBCONTRACTOR

A major subcontractor shall be any subcontractor who is responsible for 15 percent or more of the full amount of the contract.

150-10-117 OWNER or SPONSOR

As defined in GP-10 and shall further be defined to include “The Owner shall mean the Memphis-Shelby County Airport Authority.”

150-10-118 PARTIAL COMPLETION

The stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents when the Owner can satisfactorily occupy or beneficially use a finite portion of completed Work for its intended purpose. Partial completion and acceptance of a finite portion of the work will in no way imply the overall project is substantially complete or start of the project warranty.

150-10-119 PROGRAM MANAGER

The individual, partnership, firm, or corporation duly authorized by the Owner (sponsor) to be responsible for engineering supervision during construction and acting directly or through an authorized representative. The term Program Manager means the person, person or organization named by the Owner to act as their representative. Program Manager will not supervise, direct, control, or have authority over or be responsible for Contractors means, methods, techniques, sequences or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with laws and regulations applicable to performance of the Work. All authority granted to the Engineer by these construction documents shall also be available to the Program Manager, at the discretion of the Owner. Parsons is the Program Manager for this Project.

150-10-120 PUNCHLIST ITEM

Any item of work, in whole or in part, which the Program Manager has identified as being unsatisfactory after an inspection of the project. A punch-list item may be further classified as being either "major" or "minor". A "major" punch-list item is defined as any punch-list item the correction of which is, in the Program Manager's determination, necessary for the Owner to use the completed project for its intended purpose. A "minor" punch-list item is defined as any punch-list item not classified as "major" by the Program Manager.

150-10-121 SHOP DRAWINGS

All drawings, diagrams, illustrations, schedules and other data which are specifically prepared by or for the Contractor to illustrate some portion of the Work and all illustrations, brochures, standard schedules, performance charts, instructions, diagrams and other information prepared by a supplier, manufacturer, subcontractor or fabricator and submitted by the Contractor to illustrate material or equipment for some portion of the Work.

150-10-122 SITE

The geographical location of a Project, usually defined by legal boundary lines, and the location characteristics including, but not limited to, grades and lines of streets, alleys, pavements and adjoining structures, rights-of-way, restrictions, easements, encroachments, zoning, deed restrictions, existing buildings and improvements, and service and utility lines.

150-10-123 SUBSTANTIAL COMPLETION

The stage in the progress of the Work when the Work is substantially complete in accordance with the Contract Documents and the Owner can occupy or beneficially use satisfactorily completed Work for its intended purpose.

150-20 GENERAL PROVISIONS ADDENDUM - PROPOSAL REQUIREMENTS AND CONDITIONS

150-20-01 ADVERTISEMENT (NOTICE TO BIDDERS)

General Provisions 20-01 shall include: “See Section LEGAL NOTICE TO BIDDERS for the ADVERTISEMENT notifying prospective Bidders of this project.”

150-20-05 INTERPRETATION OF ESTIMATED PROPOSAL QUANTITIES

General Provisions 20-05 shall include: “The proposal provides for quotation of a price, for one or more bid items, which may be lump sum bid prices, alternate bid prices, unit bid prices, or a combination thereof. No payment will be made for items not set up in the proposal, unless otherwise provided by contract amendment. Bidders are cautioned that they should include in the prices quoted for various bid items all necessary allowances for the performance of all work required for the satisfactory completion of the project.”

150-20-07 PREPARATION OF PROPOSAL.

General Provisions 20-07 shall include “The bidder shall state the unit price and extension, written in ink or typed, for which he proposes to do each pay item furnished in the proposal. In case of conflict between the unit price and extension, the unit price, unless obviously incorrect, shall govern.”

150-20-09 IRREGULAR PROPOSALS

General Provisions 20-09 item f) shall include:

- f.** If the proposal does not meet the DBE participation requirement specified in Section DBE REQ.

150-20-10 BID GUARANTEE.

General Provisions 20-10 shall include

“Each proposal shall be accompanied by either a cashier's check or a certified check drawn on a solvent bank, or a Bidder's bond executed by the Bidder and a surety company acceptable to the Memphis-Shelby County Airport Authority, in the amount of not less than five (5) percent of the total bid price, made payable without conditions to the Memphis-Shelby County Airport Authority, as a guarantee that if the proposal is accepted, the Bidder will enter into a contract and execute a Performance and Payment Bond with legally responsible surety within ten (10) days after contract award is made by the Memphis-Shelby County Airport Authority. Bidder's Bond (if used) shall be executed on the form prescribed within these documents.

“In the event that the Bidder's proposal is accepted and the contract is awarded by the Memphis-Shelby County Airport Authority, and the Bidder fails or refuses to execute the contract and furnish the required Performance and Payment Bond within ten (10) days after such award is made by the Memphis-Shelby County Airport Authority, unless given a written extension of time by the Memphis-Shelby County Airport Authority, then the Bidder will be considered as having abandoned his proposal, and his proposal guarantee will be retained by the Memphis-Shelby County Airport Authority as liquidated damages and not as a penalty, IT NOW BEING AGREED that the amount of the proposal guarantee is a fair estimate of the amount of damages that the Memphis-Shelby County Airport Authority will sustain in case the Bidder fails to enter into the contract and furnish the required Performance and Payment Bond within ten (10) days after receiving notice of such award.”

150-20-14 DISQUALIFICATION OF BIDDERS.

General Provisions 20-14 item d) shall include:

- d.** Failure to show evidence of possessing a valid state of Tennessee Contractor's License, as required by law.

150-20-15 EXPLANATIONS AND INTERPRETATIONS OF CONTRACT DOCUMENTS

All explanations desired by Bidders regarding the meaning or interpretation of the drawings and specifications must be requested with sufficient time allowed for a written reply to reach them before the submission of their bids. Oral explanation or instructions will not be given. All necessary explanations or interpretations will be made in the form of written addenda to the specifications or drawings, and will be furnished to all Bidders, and the receipt thereof shall be acknowledged by each Bidder on his proposal.

150-20-16 DBE REQUIREMENTS

All Bidders shall submit with his/her proposal the DBE's Assurance Statement/Letter of Intent for each DBE subcontractor (subcontractors' signatures not required) Subcontractors' bids to the Prime Contractor with items included in the bid either circled and/or highlighted, DBE's Current Certification for each DBE Subcontractor, Respondent DBE Goals Accomplishment Statement, and Information on All Firms that Provide Bids or Quotes, which have been provided in the bid envelope. There must be one DBE's Assurance Statement/Letter of Intent for each proposed DBE subcontractor properly completed and signed by the Bidder.

Within 24 hours of the proposal submittal deadline, all Bidders shall submit the DBE's Assurance Statement/Letter of Intent for each DBE subcontractor (subcontractors' signatures required). There must be one DBE's Assurance Statement/Letter of Intent for each proposed DBE subcontractor properly completed and signed by the DBE subcontractor, and if applicable the 2nd/3rd Tier Subcontractor's, and the Bidder.

See specification section DISADVANTAGED BUSINESS ENTERPRISE (DBE) REQUIREMENTS for additional proposal requirements and conditions.

150-40 GENERAL PROVISIONS ADDENDUM - SCOPE OF WORK

150-40-04 EXTRA WORK.

General Provisions 40-04 shall include “When determined by the Program Manager to be in the Owner's best interest, the Owner may order the Contractor to proceed with extra work by time and materials as provided in Section GP-150-90.”

150-50 GENERAL PROVISIONS ADDENDUM - CONTROL OF WORK

150-50-04 COOPERATION OF CONTRACTOR.

General Provisions 50-04 shall include “The Owner shall allocate the work and designate the sequence of construction in case of controversy between contractors.”

150-70 GENERAL PROVISIONS ADDENDUM - LEGAL REGULATIONS AND RESPONSIBILITY TO PUBLIC

150-70-01 LAWS TO BE OBSERVED.

General Provisions 70-01 shall include “Applicable laws, ordinances, regulations, orders, and decrees shall be considered as MINIMUM requirements, and everything shown or specified in excess of these minimum requirements shall be installed in excess thereof, as shown or specified. No instructions given in the contract documents shall be construed as an authorization to violate any law, ordinance, regulation, order, or decree.

“If the Contractor observes that the drawings or specifications are at variance with any applicable law, ordinance, regulation, order, or decree, he shall immediately notify the Program Manager in writing, and obtain the Program Manager's decision before proceeding with the portion of the work involved.

“The Contract shall be governed by the law of the State of Tennessee. Any action brought which involves the Contract, the Work or the Project shall be brought and determined in accordance with the Laws of the State of Tennessee.”

150-70-14 CONTRACTOR'S RESPONSIBILITY FOR WORK

General Provisions 70-14 shall include “The Program Manager shall not be responsible for the methods and means employed by the Contractor in the performance of the Contractor's work. The Program Manager shall have no responsibility for the safety of workmen and others who may be injured during the course of the Contractor's work.”

150-70-21 CONTINUANCE OF WORK NOTWITHSTANDING DISPUTES, ETC.

Unless otherwise agreed in writing, the Contractor shall, notwithstanding any dispute, proceeding, or litigation, proceed forthwith in accordance with the Program Manager's written decision and/or direction and shall continue the Work and maintain its progress. The Owner shall continue to make payments to the Contractor to the extent that the sums due and owing the Contractor are not in dispute, in accordance with the Contract Documents.

150-70-22 SCOPE OF PROGRAM MANAGER’S RESPONSIBILITIES TO CONTRACTOR AND OWNER

The Program Manager is to act as Owner’s representative, and shall have the duties and responsibilities and the rights and authority assigned to Program Manager in the Contract in connection with completion of the Work in accordance with the Contract. Neither the Program Manager’s authority to act under the Contract, nor any decision made by him in good faith either to exercise or not to exercise authority under the Contract, shall give rise to any duty or responsibility of the Program Manager to the Contractor, any Subcontractor, any of their agents or employees. However, nothing contained herein shall exculpate in any manner nor relieve the Program Manager of his duties and responsibilities to the Owner in accordance with the Contract and in accordance with any other agreements between the Program Manager and Owner establishing the Program Manager’s duties and responsibilities to properly administer the Contract and to correctly apply the requirements of the Contract to the Work.

150-80 GENERAL PROVISIONS ADDENDUM - PROSECUTION AND PROGRESS

150-80-01 SUBLETTING OF CONTRACT

General Provisions 80-01 shall include “The Contractor shall obtain prior approval from the Owner before subcontracting any portion of this contract. Only those subcontractors who are known for doing quality, first class airport work of the type required of the subcontract will be approved by the Owner. For each proposed subcontract, the Contractor shall supply the Program Manager with the subcontractor's name, the amount of the subcontract, their previous, related experience, their available appropriate equipment both owned and leased, and their available personnel. The Contractor shall also submit to the Program Manager those items of the contract to be performed directly by his own organization. The amounts of these items and the amounts of all items awarded to all subcontractors shall correspond to the contract price for the entire project. The Owner reserves the right to withhold approval of any subcontractor who, in the Owner's opinion, is not qualified to perform the work. If the Owner withholds approval of a subcontractor the Contractor shall be required to find an alternate subcontractor that meets the approval of the Owner or he shall perform the work himself. In either event, contract pay items shall not be adjusted. The contract will not be signed until all major subcontractors have been approved by the Owner. In case of approval, the Contractor shall file copies of all subcontracts with the Program Manager.”

150-80-07 DETERMINATION AND EXTENSION OF CONTRACT TIME

General Provisions 80-07 shall include “Time extension for delays caused by the effects of inclement weather are justified only when rains or other excessive inclement weather conditions or related adverse soil conditions prevent the Contractor from productively performing critical activities of work resulting in:

1. The Contractor being unable to work at least 50% of the normal work day on pre-determined critical path items due to adverse weather conditions or;
2. The Contractor being required to make major repairs to the work damaged by excessive weather, provided that the damage was not attributable to the Contractor's negligence or failure to perform, and provided that the Contractor was unable to work an available day as defined under GP-10.

“The Contractor will be granted a time extension based on weather days in excess of the anticipated days during the original contract completion. After the new contract completion date has been established by the Program Manager, additional anticipated days as identified by SC-120 Section 3.05 paragraph E for the months covered within the contract extension period will be granted. Once the Contractor reaches the revised completion date and has not completed the project due to additional weather delays, the Contractor will be granted, only the verified lost weather days leading to the revised contract completion. No other weather days will be granted beyond the established final completion date.

“If the Contractor finds it impossible for reasons beyond his/her control to complete the work within the contract time as specified or as extended he may, within ten (10) days after commencement of the cause of delay make a written request to the Program Manager for an extension of time setting forth the reasons which he believes will justify the granting of his/her request; otherwise, such claim will be waived. The Contractor's plea that insufficient time was specified is not a valid reason for extension of time. If the Program Manager finds that the work was delayed because of conditions beyond the control and without the fault of the Contractor, he may recommend the Owner extend the time for completion in such amount as the conditions justify. The extended time for completion shall then be in full force and effect, the same as though it were the original time for completion. Should the contract time require extension it shall be by change order or supplemental agreement”

150-80-09 DEFAULT AND TERMINATION OF CONTRACT

General Provisions 80-09 shall include “The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause. Upon receipt of written notice from the Owner of such termination for the Owner's convenience, the Contractor shall:

- a. Cease operations as directed by the Owner in the notice;

- b. Take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
- c. Except for the Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing Subcontractors and purchase orders and enter into no further Subcontracts and purchase orders.

“In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment from the Owner for Work executed and for proven loss with respect to materials, equipment, tools and construction equipment and machinery, including reasonable overhead, profit and damages.”

150-90 GENERAL PROVISIONS ADDENDUM - MEASUREMENT AND PAYMENT

150-90-05 PAYMENT FOR EXTRA WORK OR TIME AND MATERIALS WORK

General Provisions 90-05 shall include:

“EXTRA Work and TIME and MATERIALS Work will be paid in accordance with the paragraphs below and will include documented costs for labor, labor burden, insurance and taxes, materials, equipment, plus a set allowance for combined overhead and profit to be included in the total cost to the Owner. The Contractor is responsible for preparing detailed daily reports documenting all labor, material, and equipment charges incurred and signed by both Contractor and Program Manager for all TIME and MATERIALS work.

When the change order or supplemental agreement authorizing extra work or time and materials work is prepared, compensation will be based on actual expended labor, equipment, and materials costs as follows:

a. Labor. For all labor (skilled and unskilled) and foremen in direct charge of a specific time and materials item, the Contractor shall receive the rate of wage (or scale) for every hour that such labor or foreman is actually engaged in the specified time and materials work. Such wage (or scale) shall be the same U.S. Secretary of Labor wage determination as is included in the originally awarded contract.

The Contractor shall receive the actual costs paid to, or on behalf of workers by reason of subsistence and travel allowances, health and welfare benefits, pension fund benefits or other benefits, when such amounts are required by collective bargaining agreement or other employment contract generally applicable to the classes of labor employed on the work.

The Contractor shall submit an audited labor burden percentage for review and approval which, after approval, will also be paid to the Contractor based upon actual labor costs expended. The Contractor's audited labor burden rate will include any and all insurance costs not paid by OCIP, unemployment insurance contributions, and social security taxes paid on the employees behalf. The Contractor shall furnish satisfactory evidence of the rate or rates paid for such insurance and taxes.

c. Materials. For materials accepted by the Program Manager and used exclusively for the Extra or Time and Materials Work, the Contractor shall receive the actual cost of such materials delivered on the work, including transportation charges paid by him (exclusive of machinery rentals as hereinafter set forth) and applicable sales or use tax.

d. Equipment. For any machinery or special equipment (other than small tools) including fuel, lubricants, and transportation costs, the use of which has been authorized by the Program Manager, the Contractor shall receive the current published "Blue Book" rental rates for the actual time that such equipment is committed to the work.

e. Miscellaneous. No additional allowance will be made for general superintendence, the use of small tools, or other costs for which no specific allowance is herein provided.

The Contractor and the Program Manager shall compare records of the cost of TIME AND MATERIALS WORK at the end of each day. Agreement shall be indicated by signature of the Contractor and the Program Manager or their duly authorized representatives. Failure to obtain the Program Manager's signature shall constitute a waiver on the part of the Contractor of any right to collect reimbursement for such costs.

No payment will be made for work performed on an EXTRA WORK or TIME AND MATERIALS basis until the Contractor has furnished the Program Manager with itemized statements and all required backup documentation of the cost of such extra or time and materials work.

The fixed percentage allowance for combined overhead and profit to be added to the total of the labor, materials, and equipment costs above will be based on the following schedule:

- a. For the Contractor, for Work performed by the Contractor's own forces, ten percent (10%) of the cost.
- b. For the Contractor, for Work performed by the Contractor's Subcontractor, five percent (5%) of the amount due the Subcontractor.
- c. For each Subcontractor or Sub-subcontractor involved, for Work performed by that Subcontractor's or Sub-subcontractor's own forces, fifteen percent (15%) of the cost.
- d. For each Subcontractor, the Work performed by the Subcontractor's Subcontractor, five percent (5%) of the amount due the Subcontractor's Subcontractor.

The total payment will be based on the total documented labor, material, and equipment cost plus the fixed percentages for combined overhead and profit specified above. This total payment shall constitute full compensation for all items of expense not specifically provided for the extra work or time and materials work.

150-90-07 PAYMENT FOR MATERIALS ON HAND

General Provisions 90-07 shall include "Request for partial payments must be accompanied by a completed, accurate stored material work sheet. The stored material work sheet will be supplied by the Program Manager upon request by the Contractor."

END OF SECTION GP-150

ITEM C-100 CONTRACTOR QUALITY CONTROL PROGRAM (CQCP)

100-1 General. Quality is more than test results. Quality is the combination of proper materials, testing, workmanship, equipment, inspection, and documentation of the project. Establishing and maintaining a culture of quality is key to achieving a quality project. The Contractor shall establish, provide, and maintain an effective Contractor Quality Control Program (CQCP) that details the methods and procedures that will be taken to assure that all materials and completed construction required by this contract conform to contract plans, technical specifications and other requirements, whether manufactured by the Contractor, or procured from subcontractors or vendors. Although guidelines are established and certain minimum requirements are specified here and elsewhere in the contract technical specifications, the Contractor shall assume full responsibility for accomplishing the stated purpose.

The Contractor shall establish a CQCP that will:

- a. Provide qualified personnel to develop and implement the CQCP.
- b. Provide for the production of acceptable quality materials.
- c. Provide sufficient information to assure that the specification requirements can be met.
- d. Document the CQCP process.

The Contractor shall not begin any construction or production of materials to be incorporated into the completed work until the CQCP has been reviewed and approved by the Program Manager. No partial payment will be made for materials subject to specific quality control (QC) requirements until the CQCP has been reviewed and approved.

The QC requirements contained in this section and elsewhere in the contract technical specifications are in addition to and separate from the quality assurance (QA) testing requirements. QA testing requirements are the responsibility of the Program Manager or Contractor as specified in the specifications.

A Quality Control (QC)/Quality Assurance (QA) workshop with the Engineer, Program Manager, Contractor, subcontractors, testing laboratories, and Owner must be held prior to start of construction. The QC/QA workshop will be facilitated by the Contractor. The Contractor shall coordinate with the Airport and the Program Manager on time and location of the QC/QA workshop. Items to be addressed, at a minimum, will include:

- a. Review of the CQCP including submittals, QC Testing, Action & Suspension Limits for Production, Corrective Action Plans, Distribution of QC reports, and Control Charts.
- b. Discussion of the QA program.
- c. Discussion of the QC and QA Organization and authority including coordination and information exchange between QC and QA.
- d. Establish regular meetings to discuss control of materials, methods and testing.
- e. Establishment of the overall QC culture.

100-2 Description of program.

- a. **General description.** The Contractor shall establish a CQCP to perform QC inspection and testing of all items of work required by the technical specifications, including those performed by

subcontractors. The CQCP shall ensure conformance to applicable specifications and plans with respect to materials, off-site fabrication, workmanship, construction, finish, and functional performance. The CQCP shall be effective for control of all construction work performed under this Contract and shall specifically include surveillance and tests required by the technical specifications, in addition to other requirements of this section and any other activities deemed necessary by the Contractor to establish an effective level of QC.

- b. Contractor Quality Control Program (CQCP).** The Contractor shall describe the CQCP in a written document that shall be reviewed and approved by the Program Manager prior to the start of any production, construction, or off-site fabrication. The written CQCP shall be submitted to the Program Manager for review and approval at least 10 calendar days before the CQCP Workshop. The Contractor's CQCP and QC testing laboratory must be approved in writing by the Program Manager prior to the Notice to Proceed (NTP).

The CQCP shall be organized to address, as a minimum, the following:

1. QC organization and resumes of key staff
2. Project progress schedule
3. Submittals schedule
4. Inspection requirements
5. QC testing plan
6. Documentation of QC activities and distribution of QC reports
7. Requirements for corrective action when QC and/or QA acceptance criteria are not met
8. Material quality and construction means and methods. Address all elements applicable to the project that affect the quality of the pavement structure including subgrade, subbase, base, and surface course. Some elements that must be addressed include, but is not limited to mix design, aggregate grading, stockpile management, mixing and transporting, placing and finishing, quality control testing and inspection, smoothness, laydown plan, equipment, and temperature management plan.

The Contractor must add any additional elements to the CQCP that is necessary to adequately control all production and/or construction processes required by this contract.

100-3 CQCP organization. The CQCP shall be implemented by the establishment of a QC organization. An organizational chart shall be developed to show all QC personnel, their authority, and how these personnel integrate with other management/production and construction functions and personnel.

The organizational chart shall identify all QC staff by name and function, and shall indicate the total staff required to implement all elements of the CQCP, including inspection and testing for each item of work. If necessary, different technicians can be used for specific inspection and testing functions for different items of work. If an outside organization or independent testing laboratory is used for implementation of all or part of the CQCP, the personnel assigned shall be subject to the qualification requirements of paragraphs 100-03a and 100-03b. The organizational chart shall indicate which personnel are Contractor employees and which are provided by an outside organization.

The QC organization shall, as a minimum, consist of the following personnel:

- a. Program Administrator.** The Contractor Quality Control Program Administrator (CQCPA) must be a **full-time on-site** employee of the Contractor, or a consultant engaged by the Contractor. The CQCPA

ISSUED FOR BID

must have a minimum of five (5) years of experience in QC pavement construction with prior QC experience on a project of comparable size and scope as the contract.

Included in the five (5) years of paving/QC experience, the CQCPA must meet at least one of the following requirements:

- (1) Professional Engineer with one (1) year of airport paving experience.
- (2) Engineer-in-training with two (2) years of airport paving experience.
- (3) National Institute for Certification in Engineering Technologies (NICET) Civil Engineering Technology Level IV with three (3) years of airport paving experience.
- (4) An individual with four (4) years of airport paving experience, with a Bachelor of Science Degree in Civil Engineering, Civil Engineering Technology or Construction.

The CQCPA must have full authority to institute any and all actions necessary for the successful implementation of the CQCP to ensure compliance with the contract plans and technical specifications. The CQCPA authority must include the ability to immediately stop production until materials and/or processes are in compliance with contract specifications. The CQCPA must report directly to a principal officer of the construction firm. The CQCPA may supervise the Quality Control Program on more than one project provided that person can be at the job site within two (2) hours after being notified of a problem.

b. QC technicians. A sufficient number of QC technicians necessary to adequately implement the CQCP must be provided. These personnel must be either Engineers, engineering technicians, or experienced craftsman with qualifications in the appropriate field equivalent to NICET Level II in Civil Engineering Technology or higher, and shall have a minimum of two (2) years of experience in their area of expertise.

The QC technicians must report directly to the CQCPA and shall perform the following functions:

- (1) Inspection of all materials, construction, plant, and equipment for conformance to the technical specifications, and as required by paragraph 100-6.
- (2) Performance of all QC tests as required by the technical specifications and paragraph 100-8.
- (3) Performance of tests for the Program Manager when required by the technical specifications.

Certification at an equivalent level of qualification and experience by a state or nationally recognized organization will be acceptable in lieu of NICET certification.

c. Staffing levels. The Contractor shall provide sufficient qualified QC personnel to monitor each work activity at all times. Where material is being produced in a plant for incorporation into the work, separate plant and field technicians shall be provided at each plant and field placement location. The scheduling and coordinating of all inspection and testing must match the type and pace of work activity. The CQCP shall state where different technicians will be required for different work elements.

100-4 Project progress schedule. Critical QC activities must be shown on the project schedule as required by General Contract Provision Section 80, paragraph 80-03, *Execution and Progress*.

100-5 Submittals schedule. The Contractor shall submit a detailed listing of all submittals (for example, mix designs, material certifications) and shop drawings required by the technical specifications. The listing can be developed in a spreadsheet format and shall include as a minimum:

- a. Specification item number
- b. Item description
- c. Description of submittal

- d. Specification paragraph requiring submittal
- e. Scheduled date of submittal

100-6 Inspection requirements. QC inspection functions shall be organized to provide inspections for all definable features of work, as detailed below. All inspections shall be documented by the Contractor as specified by paragraph 100-9.

Inspections shall be performed as needed to ensure continuing compliance with contract requirements until completion of the particular feature of work. Inspections shall include the following minimum requirements:

- a. During plant operation for material production, QC test results and periodic inspections shall be used to ensure the quality of aggregates and other mix components, and to adjust and control mix proportioning to meet the approved mix design and other requirements of the technical specifications. All equipment used in proportioning and mixing shall be inspected to ensure its proper operating condition. The CQCP shall detail how these and other QC functions will be accomplished and used.

- b. During field operations, QC test results and periodic inspections shall be used to ensure the quality of all materials and workmanship. All equipment used in placing, finishing, and compacting shall be inspected to ensure its proper operating condition and to ensure that all such operations are in conformance to the technical specifications and are within the plan dimensions, lines, grades, and tolerances specified. The CQCP shall document how these and other QC functions will be accomplished and used.

100-7 Contractor QC testing facility.

- a. For projects that include Item P-401, Item P-403, Item P-404, Item S-401, and Item S-402 the Contractor shall ensure facilities, including all necessary equipment, materials, and current reference standards, are provided that meet requirements in the following paragraphs of ASTM D3666, *Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials*:

- Equipment Calibration and Checks;
- 8.1.9 Equipment Calibration, Standardization, and Check Records;
- 8.1.12 Test Methods and Procedures

- b. For projects that include P-501, the Contractor shall ensure facilities, including all necessary equipment, materials, and current reference standards, are provided that meet requirements in the following paragraphs of ASTM C1077, *Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation*:

- 7 Test Methods and Procedures
- 8 Facilities, Equipment, and Supplemental Procedures

100-8 QC testing plan. As a part of the overall CQCP, the Contractor shall implement a QC testing plan, as required by the technical specifications. The testing plan shall include the minimum tests and test frequencies required by each technical specification Item, as well as any additional QC tests that the Contractor deems necessary to adequately control production and/or construction processes.

The QC testing plan can be developed in a spreadsheet fashion and shall, as a minimum, include the following:

- a. Specification item number (e.g., P-401)
- b. Item description (e.g., Hot Mix Asphalt Pavements)
- c. Test type (e.g., gradation, grade, asphalt content)

ISSUED FOR BID

- d. Test standard (e.g., ASTM or American Association of State Highway and Transportation Officials (AASHTO) test number, as applicable)
- e. Test frequency (e.g., as required by technical specifications or minimum frequency when requirements are not stated)
- f. Responsibility (e.g., plant technician)
- g. Control requirements (e.g., target, permissible deviations)

The QC testing plan shall contain a statistically-based procedure of random sampling for acquiring test samples in accordance with ASTM D3665. The Program Manager shall be provided the opportunity to witness QC sampling and testing.

All QC test results shall be documented by the Contractor as required by paragraph 100-9.

100-9 Documentation. The Contractor shall maintain current QC records of all inspections and tests performed. These records shall include factual evidence that the required QC inspections or tests have been performed, including type and number of inspections or tests involved; results of inspections or tests; nature of defects, deviations, causes for rejection, etc.; proposed remedial action; and corrective actions taken.

These records must cover both conforming and defective or deficient features and must include a statement that all supplies and materials incorporated in the work are in full compliance with the terms of the contract. Legible copies of these records shall be furnished to the Program Manager daily. The records shall cover all work placed subsequent to the previously furnished records and shall be verified and signed by the CQCPA.

Contractor QC records required for the contract shall include, but are not necessarily limited to, the following records:

a. Daily inspection reports. Each Contractor QC technician shall maintain a daily log of all inspections performed for both Contractor and subcontractor operations. These technician's daily reports shall provide factual evidence that continuous QC inspections have been performed and shall, as a minimum, include the following:

- (1) Technical specification item number and description
- (2) Compliance with approved submittals
- (3) Proper storage of materials and equipment
- (4) Proper operation of all equipment
- (5) Adherence to plans and technical specifications
- (6) Summary of any necessary corrective actions
- (7) Safety inspection.
- (8) Photographs and/or video (as needed or required)

The daily inspection reports shall identify all QC inspections and QC tests conducted, results of inspections, location and nature of defects found, causes for rejection, and remedial or corrective actions taken or proposed.

The daily inspection reports shall be signed by the responsible QC technician and the CQCPA. The Program Manager shall be provided at least one copy of each daily inspection report on the work day following the day of record. When QC inspection and test results are recorded and transmitted electronically, the results must be archived.

b. Daily test reports. The Contractor shall be responsible for establishing a system that will record all QC test results. Daily test reports shall document the following information:

ISSUED FOR BID

- (1) Technical specification item number and description
- (2) Test designation
- (3) Location
- (4) Date of test
- (5) Control requirements
- (6) Test results
- (7) Causes for rejection
- (8) Recommended remedial actions
- (9) Retests

Test results from each day's work period shall be submitted to the Program Manager prior to the start of the next day's work period. When required by the technical specifications, the Contractor shall maintain statistical QC charts. When QC daily test results are recorded and transmitted electronically, the results must be archived.

100-10 Corrective action requirements. The CQCP shall indicate the appropriate action to be taken when a process is deemed, or believed, to be out of control (out of tolerance) and detail what action will be taken to bring the process into control. The requirements for corrective action shall include both general requirements for operation of the CQCP as a whole, and for individual items of work contained in the technical specifications.

The CQCP shall detail how the results of QC inspections and tests will be used for determining the need for corrective action and shall contain clear rules to gauge when a process is out of control and the type of correction to be taken to regain process control.

When applicable or required by the technical specifications, the Contractor shall establish and use statistical QC charts for individual QC tests. The requirements for corrective action shall be linked to the control charts.

100-11 Inspection and/or observations by the Program Manager. All items of material and equipment are subject to inspection and/or observation by the Program Manager at the point of production, manufacture or shipment to determine if the Contractor, producer, manufacturer or shipper maintains an adequate QC system in conformance with the requirements detailed here and the applicable technical specifications and plans. In addition, all items of materials, equipment and work in place shall be subject to inspection and/or observation by the Program Manager at the site for the same purpose.

Inspection and/or observations by the Program Manager does not relieve the Contractor of performing QC inspections of either on-site or off-site Contractor's or subcontractor's work.

100-12 Noncompliance.

a. The Program Manager will provide written notice to the Contractor of any noncompliance with their CQCP. After receipt of such notice, the Contractor must take corrective action.

b. When QC activities do not comply with either the CQCP or the contract provisions or when the Contractor fails to properly operate and maintain an effective CQCP, and no effective corrective actions have been taken after notification of non-compliance, the Program Manager will recommend the Owner take the following actions:

- (1) Order the Contractor to replace ineffective or unqualified QC personnel or subcontractors and/or
- (2) Order the Contractor to stop operations until appropriate corrective actions are taken.

ISSUED FOR BID

METHOD OF MEASUREMENT

100-13 Basis of measurement and payment. Contractor Quality Control Program (CQCP) is for the personnel, tests, facilities and documentation required to implement the CQCP. The CQCP will be paid as a lump sum with the following schedule of partial payments:

- a. With first pay request, 25% with approval of CQCP and completion of the Quality Control (QC)/Quality Assurance (QA) workshop.
- b. When 25% or more of the original contract is earned, an additional 25%.
- c. When 50% or more of the original contract is earned, an additional 20%.
- d. When 75% or more of the original contract is earned, an additional 20%.
- e. After final inspection and acceptance of project, the final 10%

BASIS OF PAYMENT

100-14 Payment will be made under:

Item C-100-14.1 Contractor Quality Control Program (CQCP) – per lump sum

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

National Institute for Certification in Engineering Technologies (NICET)

ASTM International (ASTM)

ASTM C1077	Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
ASTM D3665	Standard Practice for Random Sampling of Construction Materials
ASTM D3666	Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials

END OF ITEM C-100

ISSUED FOR BID

ITEM C-102 TEMPORARY AIR AND WATER POLLUTION, SOIL EROSION, AND SILTATION CONTROL

DESCRIPTION

102-1. This item shall consist of temporary control measures as shown on the plans or as ordered by the Program Manager during the life of a contract to control pollution of air and water, soil erosion, and siltation through the use of silt fences, sediment basins, gravel, and other erosion control devices or methods.

Temporary erosion control shall be in accordance with the approved erosion control plan; the approved Construction Safety and Phasing Plan (CSPP) and AC 150/5370-2, *Operational Safety on Airports During Construction*. The temporary erosion control measures contained herein shall be coordinated with the permanent erosion control measures specified as part of this contract to the extent practical to assure economical, effective, and continuous erosion control throughout the construction period.

Temporary control may include work outside the construction limits such as borrow pit operations, equipment and material storage sites, waste areas, and temporary plant sites.

Temporary control measures shall be designed, installed and maintained to minimize the creation of wildlife attractants that have the potential to attract hazardous wildlife on or near public-use airports.

102-2 Tennessee Department of Environment and Conservation. The Contractor must perform and certify that an inspection, as described in section 3.5.8.2 of the General Permit for Stormwater Discharges from Construction Activities (“Permit”) has been performed at least twice every calendar week and documented on form CN-1173 (Rev. 6-16), provided in the Contractor Storm Water Pollution Prevention Plan (SWPPP). The Contractor must certify the inspection of erosion and sediment controls and of outfall points was performed; and whether or not all planned and designed erosion and sediment controls are installed and in working order. The certification must be executed by a person who meets the signatory requirements described in Section(s) 3.5.8.2(g) and 7.7.2 of the General NPDES Permit for Discharges of Stormwater Associated with Construction Activities also referred to as the construction general permit (CGP). Inspections must be performed at least 72 hours apart. Inspection documentation will be maintained on-site and made available upon request. Inspection reports must be submitted to the Tennessee Department of Environment and Conservation (TDEC) – Division of Water Resources within 10 days of a request.

The record of inspections must be submitted to the following address:

Tennessee Department of Environmental and Conservation
Division of Water Resources – Memphis Environmental Field Office
8383 Wolf Lake Drive
Bartlett, TN 38133

MATERIALS

102-2.1 Grass. Not used.

102-2.2 Mulches. Not used.

102-2.3 Fertilizer. Not used.

102-2.4 Slope drains. Not used.

102-2.5 Silt fence. Silt fence shall consist of polymeric filaments which are formed into a stable network such that filaments retain their relative positions. Synthetic filter fabric shall contain ultraviolet ray

ISSUED FOR BID

inhibitors and stabilizers to provide a minimum of six months of expected usable construction life. Silt fence shall meet the requirements of ASTM D6461.

102-2.6 Other. All other materials as shown on the plans shall meet commercial grade standards and shall be approved by the Program Manager before being incorporated into the project.

CONSTRUCTION REQUIREMENTS

102-3.1 General. In the event of conflict between these requirements and pollution control laws, rules, or regulations of other federal, state, or local agencies, the more restrictive laws, rules, or regulations shall apply.

The Program Manager shall be responsible for assuring compliance to the extent that construction practices, construction operations, and construction work are involved.

102-3.2 Schedule. Prior to the start of construction, the Contractor shall submit schedules in accordance with the approved Construction Safety and Phasing Plan (CSPP) and the plans for accomplishment of temporary and permanent erosion control work for clearing and grubbing; grading; construction; paving; and structures at watercourses. The Contractor shall also submit a proposed method of erosion and dust control on haul roads and borrow pits and a plan for disposal of waste materials. Work shall not be started until the erosion control schedules and methods of operation for the applicable construction have been accepted by the Program Manager.

102-3.3 Construction details. The Contractor will be required to incorporate all permanent erosion control features into the project at the earliest practicable time as outlined in the plans and approved CSPP. Temporary erosion and pollution control measures will be used to correct conditions that develop during construction that were not foreseen during the design stage; that are needed prior to installation of permanent control features; or that are needed temporarily to control erosion that develops during normal construction practices but are not associated with permanent control features on the project.

Where erosion may be a problem, schedule and perform clearing and grubbing operations so that grading operations and permanent erosion control features can follow immediately if project conditions permit. Temporary erosion control measures are required if permanent measures cannot immediately follow grading operations. The Program Manager shall limit the area of clearing and grubbing, excavation, borrow, and embankment operations in progress, commensurate with the Contractor's capability and progress in keeping the finish grading and other such permanent control measures current with the accepted schedule. If seasonal limitations make such coordination unrealistic, temporary erosion control measures shall be taken immediately to the extent feasible and justified as directed by the Program Manager.

The Contractor shall provide immediate permanent or temporary pollution control measures to minimize contamination of adjacent streams or other watercourses, lakes, ponds, or other areas of water impoundment as directed by the Program Manager. If temporary erosion and pollution control measures are required due to the Contractor's negligence, carelessness, or failure to install permanent controls as a part of the work as scheduled or directed by the Program Manager, the work shall be performed by the Contractor and the cost shall be incidental to this item.

The Program Manager may increase or decrease the area of erodible earth material that can be exposed at any time based on an analysis of project conditions.

The erosion control features installed by the Contractor shall be maintained by the Contractor during the construction period.

Provide temporary structures whenever construction equipment must cross watercourses at frequent intervals. Pollutants such as fuels, lubricants, bitumen, raw sewage, wash water from concrete mixing

operations, and other harmful materials shall not be discharged into any waterways, impoundments or into natural or manmade channels.

The Contractor shall provide equipment wash out areas and these areas will be so constructed and protected so as to not allow any discharge of silt, fuels, lubricants and other harmful materials into any waterways, impoundments or into natural or manmade channels.

The Contractor shall periodically inspect the pollution control features at the intervals stated in the approved SWPPP, and immediately after each rainfall and at least daily during prolonged rainfall and immediately correct any deficiencies. The Contractor shall review the location of pollution control features for effectiveness. If deficiencies exist, the Contractor shall correct as directed by the Program Manager.

The Contractor shall remove sediment deposits when the deposit reaches approximately 1/2 of the volume capacity of the sediment control feature, or as otherwise directed by the Program Manager. The Contractor shall also remove all sediment deposits when the sediment control feature is removed on completion of the project or applicable construction phase. The Contractor shall grade and dress the area and restore it to its pre-construction condition or the proposed finish grade, as called for on the plans. Sediment removal operations shall be considered normal maintenance operations for BMP's, incidental to the item requiring its use, and shall not be measured separately for pay.

In compliance with the General Provisions Section 50, Control of Work, Subsection 20-12, Maintenance During Construction, the Contractor shall continuously maintain permanent and temporary pollution control features. There shall be no additional or separate compensation paid to the Contractor for such work.

If construction is suspended, the Contractor shall inspect, maintain and operate temporary and permanent pollution control features during such suspension. If suspension is part of the project phasing and sequencing plan, or if the suspension is requested by the Contractor, the Contractor shall not be paid additional or separate compensation for, nor relieved of the responsibility to inspect, maintain and operate the pollution control facilities.

The Contractor is responsible for the removal of all temporary erosion and pollution control facilities as well as the restoration of those sites. This work shall include the repair of any trenching for silt fence, removal of all silt build-up, the removal of fencing, barriers and silt bales and the associated stakes and appurtenances. All inlets, catch basins and manholes constructed for this project shall be cleaned and the new drainage pipes flushed. All materials taken from the facilities or flushed from the new piping system shall be collected by the Contractor and disposed of off-site.

102-3.4 Installation, maintenance and removal of silt fence. Silt fences shall extend a minimum of 26 inches and a maximum of 34 inches above the ground surface. Posts shall be set no more than 10 feet on center. Filter fabric shall be cut from a continuous roll to the length required minimizing joints where possible. When joints are necessary, the fabric shall be spliced at a support post with a minimum 12-inch overlap and securely sealed. A trench shall be excavated approximately 6 inches deep by 4 inches wide on the upslope side of the silt fence. The trench shall be backfilled and the soil compacted over the silt fence fabric. The Contractor shall remove and dispose of silt that accumulates during construction and prior to establishment of permanent erosion control. The fence shall be maintained in good working condition until permanent erosion control is established. Silt fence shall be removed upon approval of the Program Manager.

102-3.5 Fugitive Dust Control. The Contractor shall be responsible for providing temporary measures as needed to adequately control fugitive dust during construction. Dust, as discussed herein, may be from blowing soil, Portland cement, lime, dry grass, or other such materials.

Several methods of controlling dust and other air pollutants include:

- a. Exposing the minimum area of erodible earth.
- b. Not used.

ISSUED FOR BID

- c. Using water sprinkler trucks.
- d. Using covered haul trucks
- e. Using dust palliatives or penetration asphalt on haul roads.
- f. Using Plastic sheet coverings.

Dust control at an operational airfield is of the utmost importance because excessive dust can restrict sight distance and damage aircraft engines. The Program Manager reserves the right to shut down or restrict construction operations when excessive dust, as determined by the Program Manager, could impact air navigation or airfield operations. Such a restriction or shut-down may not be the basis for additional costs or contract time.

The cost of temporary measures to control dust shall be incidental to the contract and no separate payment will be made for these measures.

102-3.6 Suspended Solid Control. The Contractor shall address and remove, to the Program Managers satisfaction, suspended solids in collected stormwater runoff which will be detained for sediment removal in the proposed temporary sediment basins for the project prior to release to stormwater systems. The Contractor shall be responsible for obtaining the services of a professional or a laboratory to analyze the soil and/or construction storm water and to recommend an effective blend of polymer flocculant and the application rate to be used for this site to promote effective sediment removal.

102-3.7 Temporary Seeding. Not used.

METHOD OF MEASUREMENT

102-4.1 Temporary erosion and pollution control work required will be performed as scheduled or directed by the Program Manager. Completed and accepted work will be measured as follows:

- a. Installation and removal of Sediment Tubes will be measured by the linear foot. Such measurement shall include removal upon completion of the project or phase requiring its use.
- b. Installation and removal of Erosion Control Barrier will be measured by the linear foot. Such measurement shall include removal upon completion of the project or phase requiring its use.
- c. Installation and removal of Silt Fence (with and without backing) will be measured by the linear foot. Such measurement shall include removal upon completion of the project or phase requiring its use.
- d. Manhole Sediment Trap will be measured by each. This item includes excavation, the surrounding granular berm, geotextile fabric, and application of flocculant. Such measurement shall also include its removal upon completion of the project or phase requiring its use.
- e. Sediment Basin will be measured by each. This item includes excavation, the surrounding granular berm, geotextile fabric, and application of flocculant. Such measurement shall also include its removal upon completion of the project or phase requiring its use.

102-4.2 Control work performed for protection of construction areas outside the construction limits, such as borrow and waste areas, haul roads, equipment and material storage sites, and temporary plant sites, will not be measured and paid for directly but shall be considered as a subsidiary obligation of the Contractor.

ISSUED FOR BID

BASIS OF PAYMENT

102-5.1 Accepted quantities of temporary water pollution, soil erosion, and siltation control work ordered by the Program Manager and measured as provided in paragraph 102-4.1 will be paid for under:

Item C-102-5.1	Sediment Tubes— per Linear Foot
Item C-102-5.2	Erosion Control Barrier – per Linear Foot
Item C-102-5.3	Silt Fence – per Linear Foot
Item C-102-5.4	Manhole Sediment Trap – per Each
Item C-102-5.5	Sediment Basin – per Each
Item C-102-5.6	Temporary Construction Exit – per Each

Where other directed work falls within the specifications for a work item that has a contract price, the units of work shall be measured and paid for at the contract unit price bid for the various items.

Temporary control features not covered by contract items that are ordered by the Program Manager will be paid for in accordance with Section 90, paragraph 90-05 *Payment for Extra Work*.

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

Advisory Circulars (AC)

AC 150/5200-33 *Hazardous Wildlife Attractants on or Near Airports*

AC 150/5370-2 *Operational Safety on Airports During Construction*

ASTM International (ASTM)

ASTM D6461 *Standard Specification for Silt Fence Materials*

United States Department of Agriculture (USDA)

FAA/USDA Wildlife Hazard Management at Airports, A Manual for Airport Personnel

END OF ITEM C-102

ITEM C-105 MOBILIZATION

105-1 Description. This item of work shall consist of, but is not limited to, work and operations necessary for the movement of personnel, equipment, material and supplies to and from the project site for work on the project except as provided in the contract as separate pay items.

105-2 Mobilization limit. See sections 00405 and 01100 for additional information.

105-3 Posted notices. Prior to commencement of construction activities, the Contractor must post the following documents in a prominent and accessible place where they may be easily viewed by all employees of the prime Contractor and by all employees of subcontractors engaged by the prime Contractor: Equal Employment Opportunity (EEO) Poster “Equal Employment Opportunity is the Law” in accordance with the Office of Federal Contract Compliance Programs Executive Order 11246, as amended; Davis Bacon Wage Poster (WH 1321) - DOL “Notice to All Employees” Poster; and Applicable Davis-Bacon Wage Rate Determination. These notices must remain posted until final acceptance of the work by the Owner.

METHOD OF MEASUREMENT

105-5 Basis of measurement and payment. Based upon the contract lump sum price for “Mobilization” partial payments will be allowed as follows:

- a. With first pay request, 34%.
- b. With second pay request, and additional 33%.
- c. With third pay request, the final 33%.

BASIS OF PAYMENT

105-6 Payment will be made under:

Item C-105-6.1 Mobilization – per lump sum

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

Office of Federal Contract Compliance Programs (OFCCP)

Executive Order 11246, as amended

EEOC-P/E-1 – Equal Employment Opportunity is the Law Poster

ISSUED FOR BID

United States Department of Labor, Wage and Hour Division (WHD)
WH 1321 – Employee Rights under the Davis-Bacon Act Poster

END OF ITEM C-105

ISSUED FOR BID

Item C-110 Method of Estimating Percentage of Material Within Specification Limits (PWL)

110-1 General. When the specifications provide for acceptance of material based on the method of estimating percentage of material within specification limits (PWL), the PWL will be determined in accordance with this section. All test results for a lot will be analyzed statistically to determine the total estimated percent of the lot that is within specification limits. The PWL is computed using the sample average (\bar{X}) and sample standard deviation (S_n) of the specified number (n) of sublots for the lot and the specification tolerance limits, L for lower and U for upper, for the particular acceptance parameter. From these values, the respective Quality index, Q_L for Lower Quality Index and/or Q_U for Upper Quality Index, is computed and the PWL for the lot for the specified n is determined from Table 1. All specification limits specified in the technical sections shall be absolute values. Test results used in the calculations shall be to the significant figure given in the test procedure.

There is some degree of uncertainty (risk) in the measurement for acceptance because only a small fraction of production material (the population) is sampled and tested. This uncertainty exists because all portions of the production material have the same probability to be randomly sampled. The Contractor's risk is the probability that material produced at the acceptable quality level is rejected or subjected to a pay adjustment. The Owner's risk is the probability that material produced at the rejectable quality level is accepted.

It is the intent of this section to inform the Contractor that, in order to consistently offset the Contractor's risk for material evaluated, production quality (using population average and population standard deviation) must be maintained at the acceptable quality specified or higher. In all cases, it is the responsibility of the Contractor to produce at quality levels that will meet the specified acceptance criteria when sampled and tested at the frequencies specified.

110-2 Method for computing PWL. The computational sequence for computing PWL is as follows:

- a. Divide the lot into n sublots in accordance with the acceptance requirements of the specification.
- b. Locate the random sampling position within the subplot in accordance with the requirements of the specification.
- c. Make a measurement at each location, or take a test portion and make the measurement on the test portion in accordance with the testing requirements of the specification.
- d. Find the sample average (\bar{X}) for all subplot test values within the lot by using the following formula:

$$\bar{X} = (x_1 + x_2 + x_3 + \dots + x_n) / n$$

Where: \bar{X} = Sample average of all subplot test values within a lot

x_1, x_2, \dots, x_n = Individual subplot test values

n = Number of subplot test values

- e. Find the sample standard deviation (S_n) by use of the following formula:

$$S_n = [(d_1^2 + d_2^2 + d_3^2 + \dots + d_n^2)/(n-1)]^{1/2}$$

Where: S_n = Sample standard deviation of the number of subplot test values in the set

d_1, d_2, \dots, d_n = Deviations of the individual subplot test values x_1, x_2, \dots from the average value X

that is: $d_1 = (x_1 - X), d_2 = (x_2 - X) \dots d_n = (x_n - X)$

n = Number of subplot test values

f. For single sided specification limits (i.e., L only), compute the Lower Quality Index Q_L by use of the following formula:

$$Q_L = (X - L) / S_n$$

Where: L = specification lower tolerance limit

Estimate the percentage of material within limits (PWL) by entering Table 1 with Q_L , using the column appropriate to the total number (n) of measurements. If the value of Q_L falls between values shown on the table, use the next higher value of PWL.

g. For double-sided specification limits (i.e., L and U), compute the Quality Indexes Q_L and Q_U by use of the following formulas:

$$Q_L = (X - L) / S_n$$

and

$$Q_U = (U - X) / S_n$$

Where: L and U = specification lower and upper tolerance limits

Estimate the percentage of material between the lower (L) and upper (U) tolerance limits (PWL) by entering Table 1 separately with Q_L and Q_U , using the column appropriate to the total number (n) of measurements, and determining the percent of material above P_L and percent of material below P_U for each tolerance limit. If the values of Q_L fall between values shown on the table, use the next higher value of P_L or P_U . Determine the PWL by use of the following formula:

$$PWL = (P_U + P_L) - 100$$

Where: P_L = percent within lower specification limit

P_U = percent within upper specification limit

EXAMPLE OF PWL CALCULATION

Project: Example Project

Test Item: Item P-401, Lot A.

A. PWL Determination for Mat Density.

1. Density of four random cores taken from Lot A.

A-1 = 96.60

A-2 = 97.55

ISSUED FOR BID

$$A-3 = 99.30$$

$$A-4 = 98.35$$

$$n = 4$$

2. Calculate average density for the lot.

$$X = (x_1 + x_2 + x_3 + \dots + x_n) / n$$

$$X = (96.60 + 97.55 + 99.30 + 98.35) / 4$$

$$X = 97.95\% \text{ density}$$

3. Calculate the standard deviation for the lot.

$$S_n = [((96.60 - 97.95)^2 + (97.55 - 97.95)^2 + (99.30 - 97.95)^2 + (98.35 - 97.95)^2) / (4 - 1)]^{1/2}$$

$$S_n = [(1.82 + 0.16 + 1.82 + 0.16) / 3]^{1/2}$$

$$S_n = 1.15$$

4. Calculate the Lower Quality Index Q_L for the lot. ($L=96.3$)

$$Q_L = (X - L) / S_n$$

$$Q_L = (97.95 - 96.30) / 1.15$$

$$Q_L = 1.4348$$

5. Determine PWL by entering Table 1 with $Q_L=1.44$ and $n=4$.

$$PWL = 98$$

B. PWL Determination for Air Voids.

1. Air Voids of four random samples taken from Lot A.

$$A-1 = 5.00$$

$$A-2 = 3.74$$

$$A-3 = 2.30$$

$$A-4 = 3.25$$

2. Calculate the average air voids for the lot.

$$X = (x_1 + x_2 + x_3 + \dots + x_n) / n$$

$$X = (5.00 + 3.74 + 2.30 + 3.25) / 4$$

$$X = 3.57\%$$

3. Calculate the standard deviation S_n for the lot.

$$S_n = [((3.57 - 5.00)^2 + (3.57 - 3.74)^2 + (3.57 - 2.30)^2 + (3.57 - 3.25)^2) / (4 - 1)]^{1/2}$$

$$S_n = [(2.04 + 0.03 + 1.62 + 0.10) / 3]^{1/2}$$

$$S_n = 1.12$$

4. Calculate the Lower Quality Index Q_L for the lot. ($L=2.0$)

$$Q_L = (X - L) / S_n$$

$$Q_L = (3.57 - 2.00) / 1.12$$

$$Q_L = 1.3992$$

5. Determine P_L by entering Table 1 with $Q_L = 1.41$ and $n = 4$.

$$P_L = 97$$

ISSUED FOR BID

6. Calculate the Upper Quality Index Q_U for the lot. ($U = 5.0$)

$$Q_U = (U - \bar{X}) / S_n$$

$$Q_U = (5.00 - 3.57) / 1.12$$

$$Q_U = 1.2702$$

7. Determine P_U by entering Table 1 with $Q_U = 1.29$ and $n = 4$.

$$P_U = 93$$

8. Calculate Air Voids PWL

$$PWL = (P_L + P_U) - 100$$

$$PWL = (97 + 93) - 100 = 90$$

EXAMPLE OF OUTLIER CALCULATION (REFERENCE ASTM E178)

Project: Example Project

Test Item: Item P-401, Lot A.

A. Outlier Determination for Mat Density.

1. Density of four random cores taken from Lot A arranged in descending order.

$$A-3 = 99.30$$

$$A-4 = 98.35$$

$$A-2 = 97.55$$

$$A-1 = 96.60$$

2. From ASTM E178, Table 1, for $n=4$ an upper 5% significance level, the critical value for test criterion = 1.463.

3. Use average density, standard deviation, and test criterion value to evaluate density measurements.

- a. For measurements greater than the average:

If (measurement - average)/(standard deviation) is less than test criterion, then the measurement is not considered an outlier.

For A-3, check if $(99.30 - 97.95) / 1.15$ is greater than 1.463.

Since 1.174 is less than 1.463, the value is not an outlier.

- b. For measurements less than the average:

If (average - measurement)/(standard deviation) is less than test criterion, then the measurement is not considered an outlier.

For A-1, check if $(97.95 - 96.60) / 1.15$ is greater than 1.463.

Since 1.174 is less than 1.463, the value is not an outlier.

Note: In this example, a measurement would be considered an outlier if the density were:

$$\text{Greater than } (97.95 + 1.463 \times 1.15) = 99.63\%$$

OR

$$\text{less than } (97.95 - 1.463 \times 1.15) = 96.27\%.$$

ISSUED FOR BID

Table 1. Table for Estimating Percent of Lot Within Limits (PWL)

Percent Within Limits (P _L and P _U)	Positive Values of Q (Q _L and Q _U)							
	n=3	n=4	n=5	n=6	n=7	n=8	n=9	n=10
99	1.1541	1.4700	1.6714	1.8008	1.8888	1.9520	1.9994	2.0362
98	1.1524	1.4400	1.6016	1.6982	1.7612	1.8053	1.8379	1.8630
97	1.1496	1.4100	1.5427	1.6181	1.6661	1.6993	1.7235	1.7420
96	1.1456	1.3800	1.4897	1.5497	1.5871	1.6127	1.6313	1.6454
95	1.1405	1.3500	1.4407	1.4887	1.5181	1.5381	1.5525	1.5635
94	1.1342	1.3200	1.3946	1.4329	1.4561	1.4717	1.4829	1.4914
93	1.1269	1.2900	1.3508	1.3810	1.3991	1.4112	1.4199	1.4265
92	1.1184	1.2600	1.3088	1.3323	1.3461	1.3554	1.3620	1.3670
91	1.1089	1.2300	1.2683	1.2860	1.2964	1.3032	1.3081	1.3118
90	1.0982	1.2000	1.2290	1.2419	1.2492	1.2541	1.2576	1.2602
89	1.0864	1.1700	1.1909	1.1995	1.2043	1.2075	1.2098	1.2115
88	1.0736	1.1400	1.1537	1.1587	1.1613	1.1630	1.1643	1.1653
87	1.0597	1.1100	1.1173	1.1192	1.1199	1.1204	1.1208	1.1212
86	1.0448	1.0800	1.0817	1.0808	1.0800	1.0794	1.0791	1.0789
85	1.0288	1.0500	1.0467	1.0435	1.0413	1.0399	1.0389	1.0382
84	1.0119	1.0200	1.0124	1.0071	1.0037	1.0015	1.0000	0.9990
83	0.9939	0.9900	0.9785	0.9715	0.9671	0.9643	0.9624	0.9610
82	0.9749	0.9600	0.9452	0.9367	0.9315	0.9281	0.9258	0.9241
81	0.9550	0.9300	0.9123	0.9025	0.8966	0.8928	0.8901	0.8882
80	0.9342	0.9000	0.8799	0.8690	0.8625	0.8583	0.8554	0.8533
79	0.9124	0.8700	0.8478	0.8360	0.8291	0.8245	0.8214	0.8192
78	0.8897	0.8400	0.8160	0.8036	0.7962	0.7915	0.7882	0.7858
77	0.8662	0.8100	0.7846	0.7716	0.7640	0.7590	0.7556	0.7531
76	0.8417	0.7800	0.7535	0.7401	0.7322	0.7271	0.7236	0.7211
75	0.8165	0.7500	0.7226	0.7089	0.7009	0.6958	0.6922	0.6896
74	0.7904	0.7200	0.6921	0.6781	0.6701	0.6649	0.6613	0.6587
73	0.7636	0.6900	0.6617	0.6477	0.6396	0.6344	0.6308	0.6282
72	0.7360	0.6600	0.6316	0.6176	0.6095	0.6044	0.6008	0.5982
71	0.7077	0.6300	0.6016	0.5878	0.5798	0.5747	0.5712	0.5686
70	0.6787	0.6000	0.5719	0.5582	0.5504	0.5454	0.5419	0.5394
69	0.6490	0.5700	0.5423	0.5290	0.5213	0.5164	0.5130	0.5105
68	0.6187	0.5400	0.5129	0.4999	0.4924	0.4877	0.4844	0.4820
67	0.5878	0.5100	0.4836	0.4710	0.4638	0.4592	0.4560	0.4537
66	0.5563	0.4800	0.4545	0.4424	0.4355	0.4310	0.4280	0.4257
65	0.5242	0.4500	0.4255	0.4139	0.4073	0.4030	0.4001	0.3980
64	0.4916	0.4200	0.3967	0.3856	0.3793	0.3753	0.3725	0.3705
63	0.4586	0.3900	0.3679	0.3575	0.3515	0.3477	0.3451	0.3432
62	0.4251	0.3600	0.3392	0.3295	0.3239	0.3203	0.3179	0.3161
61	0.3911	0.3300	0.3107	0.3016	0.2964	0.2931	0.2908	0.2892
60	0.3568	0.3000	0.2822	0.2738	0.2691	0.2660	0.2639	0.2624
59	0.3222	0.2700	0.2537	0.2461	0.2418	0.2391	0.2372	0.2358
58	0.2872	0.2400	0.2254	0.2186	0.2147	0.2122	0.2105	0.2093
57	0.2519	0.2100	0.1971	0.1911	0.1877	0.1855	0.1840	0.1829
56	0.2164	0.1800	0.1688	0.1636	0.1607	0.1588	0.1575	0.1566
55	0.1806	0.1500	0.1406	0.1363	0.1338	0.1322	0.1312	0.1304
54	0.1447	0.1200	0.1125	0.1090	0.1070	0.1057	0.1049	0.1042
53	0.1087	0.0900	0.0843	0.0817	0.0802	0.0793	0.0786	0.0781
52	0.0725	0.0600	0.0562	0.0544	0.0534	0.0528	0.0524	0.0521
51	0.0363	0.0300	0.0281	0.0272	0.0267	0.0264	0.0262	0.0260
50	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

ISSUED FOR BID

Percent Within Limits (P _L and P _U)	Negative Values of Q (Q _L and Q _U)							
	n=3	n=4	n=5	n=6	n=7	n=8	n=9	n=10
49	-0.0363	-0.0300	-0.0281	-0.0272	-0.0267	-0.0264	-0.0262	-0.0260
48	-0.0725	-0.0600	-0.0562	-0.0544	-0.0534	-0.0528	-0.0524	-0.0521
47	-0.1087	-0.0900	-0.0843	-0.0817	-0.0802	-0.0793	-0.0786	-0.0781
46	-0.1447	-0.1200	-0.1125	-0.1090	-0.1070	-0.1057	-0.1049	-0.1042
45	-0.1806	-0.1500	-0.1406	-0.1363	-0.1338	-0.1322	-0.1312	-0.1304
44	-0.2164	-0.1800	-0.1688	-0.1636	-0.1607	-0.1588	-0.1575	-0.1566
43	-0.2519	-0.2100	-0.1971	-0.1911	-0.1877	-0.1855	-0.1840	-0.1829
42	-0.2872	-0.2400	-0.2254	-0.2186	-0.2147	-0.2122	-0.2105	-0.2093
41	-0.3222	-0.2700	-0.2537	-0.2461	-0.2418	-0.2391	-0.2372	-0.2358
40	-0.3568	-0.3000	-0.2822	-0.2738	-0.2691	-0.2660	-0.2639	-0.2624
39	-0.3911	-0.3300	-0.3107	-0.3016	-0.2964	-0.2931	-0.2908	-0.2892
38	-0.4251	-0.3600	-0.3392	-0.3295	-0.3239	-0.3203	-0.3179	-0.3161
37	-0.4586	-0.3900	-0.3679	-0.3575	-0.3515	-0.3477	-0.3451	-0.3432
36	-0.4916	-0.4200	-0.3967	-0.3856	-0.3793	-0.3753	-0.3725	-0.3705
35	-0.5242	-0.4500	-0.4255	-0.4139	-0.4073	-0.4030	-0.4001	-0.3980
34	-0.5563	-0.4800	-0.4545	-0.4424	-0.4355	-0.4310	-0.4280	-0.4257
33	-0.5878	-0.5100	-0.4836	-0.4710	-0.4638	-0.4592	-0.4560	-0.4537
32	-0.6187	-0.5400	-0.5129	-0.4999	-0.4924	-0.4877	-0.4844	-0.4820
31	-0.6490	-0.5700	-0.5423	-0.5290	-0.5213	-0.5164	-0.5130	-0.5105
30	-0.6787	-0.6000	-0.5719	-0.5582	-0.5504	-0.5454	-0.5419	-0.5394
29	-0.7077	-0.6300	-0.6016	-0.5878	-0.5798	-0.5747	-0.5712	-0.5686
28	-0.7360	-0.6600	-0.6316	-0.6176	-0.6095	-0.6044	-0.6008	-0.5982
27	-0.7636	-0.6900	-0.6617	-0.6477	-0.6396	-0.6344	-0.6308	-0.6282
26	-0.7904	-0.7200	-0.6921	-0.6781	-0.6701	-0.6649	-0.6613	-0.6587
25	-0.8165	-0.7500	-0.7226	-0.7089	-0.7009	-0.6958	-0.6922	-0.6896
24	-0.8417	-0.7800	-0.7535	-0.7401	-0.7322	-0.7271	-0.7236	-0.7211
23	-0.8662	-0.8100	-0.7846	-0.7716	-0.7640	-0.7590	-0.7556	-0.7531
22	-0.8897	-0.8400	-0.8160	-0.8036	-0.7962	-0.7915	-0.7882	-0.7858
21	-0.9124	-0.8700	-0.8478	-0.8360	-0.8291	-0.8245	-0.8214	-0.8192
20	-0.9342	-0.9000	-0.8799	-0.8690	-0.8625	-0.8583	-0.8554	-0.8533
19	-0.9550	-0.9300	-0.9123	-0.9025	-0.8966	-0.8928	-0.8901	-0.8882
18	-0.9749	-0.9600	-0.9452	-0.9367	-0.9315	-0.9281	-0.9258	-0.9241
17	-0.9939	-0.9900	-0.9785	-0.9715	-0.9671	-0.9643	-0.9624	-0.9610
16	-1.0119	-1.0200	-1.0124	-1.0071	-1.0037	-1.0015	-1.0000	-0.9990
15	-1.0288	-1.0500	-1.0467	-1.0435	-1.0413	-1.0399	-1.0389	-1.0382
14	-1.0448	-1.0800	-1.0817	-1.0808	-1.0800	-1.0794	-1.0791	-1.0789
13	-1.0597	-1.1100	-1.1173	-1.1192	-1.1199	-1.1204	-1.1208	-1.1212
12	-1.0736	-1.1400	-1.1537	-1.1587	-1.1613	-1.1630	-1.1643	-1.1653
11	-1.0864	-1.1700	-1.1909	-1.1995	-1.2043	-1.2075	-1.2098	-1.2115
10	-1.0982	-1.2000	-1.2290	-1.2419	-1.2492	-1.2541	-1.2576	-1.2602
9	-1.1089	-1.2300	-1.2683	-1.2860	-1.2964	-1.3032	-1.3081	-1.3118
8	-1.1184	-1.2600	-1.3088	-1.3323	-1.3461	-1.3554	-1.3620	-1.3670
7	-1.1269	-1.2900	-1.3508	-1.3810	-1.3991	-1.4112	-1.4199	-1.4265
6	-1.1342	-1.3200	-1.3946	-1.4329	-1.4561	-1.4717	-1.4829	-1.4914
5	-1.1405	-1.3500	-1.4407	-1.4887	-1.5181	-1.5381	-1.5525	-1.5635
4	-1.1456	-1.3800	-1.4897	-1.5497	-1.5871	-1.6127	-1.6313	-1.6454
3	-1.1496	-1.4100	-1.5427	-1.6181	-1.6661	-1.6993	-1.7235	-1.7420
2	-1.1524	-1.4400	-1.6016	-1.6982	-1.7612	-1.8053	-1.8379	-1.8630
1	-1.1541	-1.4700	-1.6714	-1.8008	-1.8888	-1.9520	-1.9994	-2.0362

ISSUED FOR BID

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM E178 Standard Practice for Dealing with Outlying Observations

END OF ITEM C-110

ISSUED FOR BID

DIVISION 1 – SECTION 01100**SUMMARY OF THE WORK, SEQUENCE OF CONSTRUCTION & LIQUIDATED DAMAGES****PART 1 GENERAL**

Related Work:

1. Documents affecting work of this Section include, but are not necessarily limited to Division 0 and Division 1 and other Sections of these Specifications.

1.01 SUMMARY**SUMMARY OF WORK**

- A. The "Project," of which the "Work" of this Contract is a part, is titled Terminal Apron Reconstruction (including Concourse C South Demo) - Construction, MSCAA Project 13-1368-02.
- B. The "Work" of this Contract is defined in the Contract Documents to include, but not be limited to, reconstruction of approximately 8,500 SY of existing apron pavement, and the demolition of the south end of Concourse C.

The scope of work for the apron reconstruction includes removal of existing pavement, subgrade preparation, installation of underdrain piping, utility demolition and installation, abandonment of existing fuel line and fuel pits, and new airfield pavement.

The scope of work for the Concourse C demolition project includes mechanical demo/termination of duct work, plumbing demo/termination of sanitary sewer lines, electrical demo/termination of existing circuits and low voltage data cabling. Reconnection of chilled water, hot water, and domestic water lines. Hauling of demolished material/rubble and backfilling of existing tunnel. Masonry and Glass/Glazing work to close off new end of Concourse C.

- C. Airport Improvement Program Project: The work in this contract is included in an Airport Improvement Program Project (which project is subject to receipt of confirmation of federal funds) which is being undertaken and accomplished by the Owner in accordance with the terms and conditions of an agreement between the Memphis-Shelby County Airport Authority and the United States, under the provision of Title 49, United States Code, herein called Title 49, USC, pursuant to which the United States Government has agreed to pay a certain percentage of the costs of the project that are determined to be allowable project costs under that Act. The United States Government is not a party to this contract and no reference in this contract to the FAA or any representative thereof, or to any rights granted to the FAA or any representative thereof, or the United States Government, by the contract, makes the United States Government a party to this contract.
- D. FAA Inspection and Review: The Contractor shall allow any authorized representative of the FAA to inspect and review any work or materials used in the performance of this contract.
- E. Subcontracts: The Contractor shall insert in each of his subcontracts the provisions contained in paragraphs C. and D., of this section and also a clause requiring the subcontractors to include these provisions in any lower tier subcontracts which they may enter into, together with a clause requiring this insertion in any further subcontracts that may in turn be made.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION**3.01 PROJECT PHASING AND COMPLETION**

- A. This is a fixed-duration Contract required to be substantially completed within one hundred and eighty (180) calendar days from the Notice to Proceed (“NTP”) date. The project scope of work is as stated in Paragraphs 1.01 (A) and (B) above. Final Completion of the project shall be within forty-five (45) days of the Substantial Completion Date.

“Substantial Completion” of the project shall be defined as the stage of construction when work is substantially completed and excludes all punch list items, record drawings, O&M manuals, lien waivers, maintenance training, warranties, consent of surety to final payment, and all other required closeout documentation.

“Final Completion” of the project shall be defined as work that is 100% complete including all punch list items, record drawings, O&M manuals, lien waivers, maintenance training, warranties, consent of surety to final payment, and all other required closeout documentation. Final Completion shall include Demobilization.

“Demobilization” shall consist of all activities by the Contractor and subcontractors necessary for 100% completion of the work and final contract closeout as listed above and all cleanup work and operations, including but not limited to, removal of personnel, equipment, contractor-owned stockpiles, supplies, and incidentals from the project site; return of any and all airport-issued security identification badges; cleanup of all offices, buildings, batch plant, staging/lay-down areas, and other facilities; and restoration of all areas to preconstruction condition or better or to other condition as stipulated in the project plans and specifications; completion and delivery to the Owner of all contract closeout documentation and any other documentation request by Owner, including but not limited to, Operations and Maintenance Manuals, Warranties, Final Lien-waivers, Owner Controlled Insurance Program closeout paperwork, DBE paperwork, Final Project Record Documents and finalization of any and all punch list items. The Demobilization lump sum amount becomes fixed and will not change for the duration of contract.

- B. The actual NTP date will be negotiated and mutually agreed by both parties (Owner and Contractor) prior to issuance of the NTP. If mutual agreement cannot be reached between the parties, the Owner reserves the right to establish the actual Notice to Proceed date. The NTP letter will state the date on which the Contractor will begin construction and from which date contract time will be charged. Contractor shall be mobilized and on site ready for work on the date stated in the Notice to Proceed.
- C. “Mobilization” shall consist of all preparatory work and operations needed to begin construction activities on the date mutually agreed including but not limited to, badging, movement of personnel, equipment, stockpiles, supplies and incidentals to the project site; the establishment of all offices, buildings, batch plant, staging/lay-down areas and other facilities necessary for work on the project; all other work and operations which must be performed or costs incurred prior to beginning work on the various items on the project site, and utility services for all offices, buildings, batch plant, staging/ lay-down areas, and other facilities. The Mobilization lump sum amount becomes fixed and will not change for the duration of contract.
- D. All days are calendar days.
- E. The work site will be available as described on the plans and applicable sections of these specifications. Work is permitted 24 hours per day, 7 days per week except that only non-noise producing activities shall be permitted between 11:00 PM and 6:00 AM, except with prior written approval of the Owner.

- F. The Contractor shall proceed with the work at such rate of progress to ensure full completion within the specified duration. It is expressly understood and agreed, by and between the Contractor and the Owner, that the contract time for the completion of the work described herein is a reasonable time, taking into consideration the average climatic and economic conditions and other factors prevailing in the locality of the work.
- G. If the Contractor experiences weather related delays, he shall submit a report documenting the weather conditions and delays, if any, experienced during any calendar month.
- H. If the Contractor is prevented from working due to any other legitimate reason he shall notify the Owner in writing as per the Lump Sum Construction Contract of the delay and request a corresponding increase in the number of contract days.
- I. The Owner shall be the sole judge as to whether or not a request for a contract time extension is legitimate.
- J. The Owner reserves the right to adjust limits of construction to accommodate the Owner's requirements for maintenance of Airport Operations and Public Traffic with minimum interruption during the construction of this project. Any required adjustment of limits of construction will be at no additional cost to the Owner.

3.02 LIQUIDATED DAMAGES

- A. The OWNER and the CONTRACTOR recognize that time is an essential element of this contract and that delay in completing this project will result in damages due to public inconvenience, obstruction to aviation and vehicular traffic, interference with businesses both on and off the airport, increased operational costs to airport users, and increased costs to the OWNER associated with engineering services, inspections, testing, and project administration. It is therefore agreed that in view of the difficulty of making a precise determination of such damages, the CONTRACTOR will pay the OWNER, sums of money in the amounts herein stipulated, not as a penalty, but as Liquidated Damages for not meeting the schedule for specific critical Project Milestones.
- B. If the CONTRACTOR fails to deliver equipment or materials, or perform any services within the times and dates specified in this Contract to achieve the established Milestones, or any extensions granted in writing, the CONTRACTOR shall pay to the OWNER as Liquidated Damages, the sums specified in Table 1, below:

Table 1		
<i>Milestone</i>	<i>Completion Date</i>	<i>Liquidated Damages</i>
Substantial Completion	180 days	\$2,500 per Day or any portion thereof
Final Completion and Demobilization Phase	45 days	\$500 per Day or any portion thereof

- D. Application of Liquidated Damages is not a Change to the Contract. The application of any Liquidated Damages to one Milestone shall not effect a change in the subsequent Contract Milestone dates or relieve CONTRACTOR of his responsibility to meet all construction schedules. If multiple Milestone dates are missed, Liquidated Damages for more than one Milestone will be imposed concurrently.
- E. If Liquidated Damages are imposed, the OWNER shall deduct the same from any amounts due the CONTRACTOR at the time Liquidated Damages are imposed. If sufficient amounts are not due to the CONTRACTOR to cover such Liquidated Damages, then the OWNER shall invoice the

CONTRACTOR for the amounts due to the OWNER. Such invoices shall become due and payable immediately upon receipt by the CONTRACTOR.

- F. Liquidated Damages are in addition to any other damages or penalties which may be assessed and withheld under other provisions of this contract.

3.03 COMPLETION BONUS

NO completion bonus has been budgeted for this project.

END OF SECTION 01100

DIVISION 1 – SECTION 01125**RENOVATION****PART 1: GENERAL****1.01 RELATED DOCUMENTS**

General provisions of the Contract, and General and Supplementary Conditions and MSCAA “Design Guide – Construction Standards” apply to this section.

1.02 EXISTING CONDITIONS

The General Contractor is cautioned to visit the buildings and examine existing conditions as they relate to the new work. No extras will be considered for conditions visible or accessible at the time of bidding. The General Contractor has the responsibility to continually keep his own workmen, as well as his subcontractors and their workmen, advised as to the importance of existing conditions and their relationship to the finished project. The Architect is to be advised immediately of conflicts between existing conditions and work shown in the contract documents. The Contractor is to cease work in a conflicting area, if continued work jeopardizes the finished work, until a decision can be rendered by the Architect to resolve the conflict. Sample areas of repair and replacement surfaces to be reviewed by the Architect prior to proceeding.

1.03 OBSTRUCTIONS, CUTTING AND REPAIRING

Any obstruction encountered during the construction or installation of the Contract work shall be overcome by the Contractor, by removal or alteration of work in place, or making adjustments in the new work, without additional cost to the Owner. All cutting of work in place shall be performed in a neat workmanlike manner and held to a minimum. All cutting of work in place shall be patched and restored to condition equal to adjacent work. Structural members of existing work shall not be cut under any circumstances, except where expressly and particularly authorized by the Architect in writing. Cutting of existing work necessary for installation of mechanical and electrical work is specified in Divisions 15 and 16, but patching of finished work required because of such cutting shall be included in the general construction work.

1.04 CONNECTION TO EXISTING WORK

Existing work shall be cut, altered, removed, or temporarily removed and replaced as necessary for the performance of the Contract. New work in extension of existing work shall match that to which it connects. Work to remain in place, which is damaged or defaced by reason of work performed under the Contract, shall be restored equal to its condition at time of commencement of the work under the Contract. Where the removal of existing work exposed discolored or unfinished surfaces, or work out of alignment, such surfaces shall be refinished or the materials shall be replaced as necessary to make contiguous work uniform or harmonious. However, this paragraph shall not be construed to require the refinishing or reconstruction of dissimilar finishes previously exposed, nor of finished surfaces in good condition but in different planes or on different levels when brought together by the removal of intervening work, unless such refinishing or reconstruction is specifically shown or specified. All work required in the existing building shall be performed carefully so as not to damage the Owner's furniture, equipment, and similar items. Such items that cannot be temporarily removed from the areas of construction shall be covered with drop cloths, tarpaulins, or otherwise adequately protected from damage.

1.05 UNKNOWN UTILITY LINES

In performing the work under the Contract, it is possible that unknown utility lines may be encountered. Such lines may be lines which have been or will be abandoned, inactive lines which it may be desired to preserve for future use, or active lines which must be preserved and either relocated or replaced. Should such unknown lines be encountered, immediately notify the Architect, who will examine the lines to determine whether they

have been or will be abandoned, or shall be preserved. The Contractor shall assist the Architect by making tests or otherwise as the Architect deems necessary to determine how best to dispose of them. If the lines have been or may be abandoned, remove them to the extent necessary, without additional cost to the Owner. If it is found desirable or necessary to preserve the lines, they shall be capped off, relocated, or replaced, as directed by the Architect. In general, this shall be done by the trades having jurisdiction, but all trades shall fully cooperate in such work. Should changes in connection with unknown utility lines which are to remain active involve a change in the quantity of work called for by the drawings and specifications, the Contract amount shall be equitably adjusted by a Change Order in accordance with the provisions of the General Conditions for changes in the work.

1.06 FIRE PREVENTION

Develop plan for fire prevention and protection during the construction period, with particular emphasis on protecting the existing building and occupants therein during construction. Include provisions for exits where necessary due to construction processes on existing exits, access for the fire department to the site and areas of the building, early awarding of contracts for fire protection equipment, proper supervision of open flames and welding or cutting equipment, use of flame-proofed tarpaulins, hydrant protection availability, emergency protection in the forms of extinguishers, water pails, sand and small hose streams, and watchman service. Combustibles shall be kept outside of new construction. Establish an emergency procedure for fire alarm. Obtain Hot Work Permits from MSCAA Building Maintenance.

PART 2: MATERIALS

Provide all materials, tools, equipment, methods, and incidentals necessary and required to complete the work. Materials used to repair or replace exposed, existing surfaces must match those surfaces in texture and color. Where new work is installed adjacent to existing materials, utilize new materials of the quality specified therein to match the adjacent existing materials. If the original material type is not specified, provide related new material of the best quality. It should be understood that, where the original materials are still available and meet these specifications and unless specifically indicated otherwise on the drawings, the new materials shall be of the same manufacturer as the original. It should also be understood that it may be necessary to supply materials of the same type from more than one manufacturer. Where existing materials are indicated to be reused, use extreme care in their removal and storage. If, in the Architect's opinion the Contractor has used reasonable care in attempting to salvage material required by the drawings to be reused and in the Architect's opinion the material is not suitable for reuse he will recommend that a Change Order be issued to cover the cost of new material only.

PART 3: INSTALLATION

Wherever possible utilize craftsmen familiar with the process and techniques used in the original construction. This is especially true of the trades whose finish work is exposed and dependent upon the skill and technique of the craftsman, such as stucco or wood trim. All demolition including cutting of holes for new services must be accomplished with the minimal disruption of adjacent and surrounding materials which may remain in the project. Accurate starting and stopping locations must be laid out and discussed with the workmen actually doing the demolition. Any questions regarding the starting and stopping points, suitability of power equipment use, reuse of materials removed, or unusual conditions encountered during demolition must be brought to the attention of the Architect for this review prior to proceeding.

END OF SECTION 01125

DIVISION 1 – SECTION 01210**ALLOWANCES****PART 1 GENERAL****1.01 SUMMARY**

- A. To provide adequate budget and bonding to cover items not precisely determined by the Owner prior to bidding, allow within the proposed Contract Sum the amounts described in this Section.
- B. Unless stated otherwise herein, all allowances are to be paid as Time and Materials Work per GP-150.
- C. Related Work:
 - 1. Documents affecting Work of this Section include, but are not necessarily limited to, Division 0, Division 1 and other Sections of these Specifications.
 - 2. Other provisions concerning Allowances may be stated in other Sections of these Specifications.

1.02 SPECIFIC ALLOWANCES – The following cash allowances are included within this Contract:

- A. **Asbestos Abatement** - The Contractor will be required to properly manage all asbestos containing materials per the Shelby County Health Code. Allowance shall be used for abatement activities; it shall not be used for any hazardous material hauling or landfill fees. This fee shall be used at the sole discretion of the Program Manager.
- B. **Low Voltage Repairs** - The contractor shall be required to repair any communication wiring that is inadvertently damaged during demolition activities. This fee shall be used at the sole discretion of the Program Manager.
- C. **MLGW Waterline Fees** - The Contractor shall pay all utility design and connection fees as required by the project. This fee shall be used at the sole discretion of the Program Manager.

END OF 01210

THIS PAGE LEFT BLANK INTENTIONALLY.

DIVISION 1 – SECTION 01230**ALTERNATES****PART 1 GENERAL****1.01 SUMMARY**

- A. This selection includes identification of each Alternate by number, and describes the basic changes to be incorporated into the Work if a particular Alternate is made a part of the Work by specific provisions in the Agreement between the Owner and the Contractor.
- B. Related Work:
 - 1. Documents affecting Work of this Section include, but are not necessarily limited to, Division 0, Division 1 and other Sections of these Specifications.
 - 2. Materials and methods to be used in the Base Bid and in the Alternates also may be described on the Drawings and/or in pertinent other Sections of these Specifications.
 - 3. Method for stating the proposed Contract Sum is shown on the Bid Form.

1.02 SUBMITTALS

- A. All Alternates described in this Section are required to be reflected on the Bid Form as submitted by the Bidder.
- B. Do not submit Alternates other than as described in this Section.

1.03 SELECTION OF ALTERNATES

- A. Immediately after award of the Contract, or as soon thereafter as the Owner has made a decision on which, if any, of the Alternates will be selected, thoroughly and clearly advise necessary personnel and suppliers as to the nature of Alternates selected by the Owner.
- B. If the Owner elects to proceed on the basis of one or more of the described Alternates, make modifications to the Work required in providing the selected Alternate or Alternates to the approval of the Owner and at no additional cost to the Owner except as proposed in the Bid.

1.04 ADVANCE COORDINATION

- A. Immediately after award of the Contract, or as soon thereafter as the Owner has made a decision on which, if any, of the Alternates will be selected, thoroughly and clearly advise necessary personnel and suppliers as to the nature of Alternates selected by the Owner.

PART 2 ALTERNATES – The following alternates are included within this Contract:

- A. Deductive Alternate No. 1 – Architectural
This alternate is shown on the plans and consists of providing exterior insulated finish system (EIFS) in lieu of new glazed brick at the exterior infill repair locations. See sheets A_C-400 and A_C-401 for additional details.

END OF SECTION 01230

DIVISION 1 – SECTION 01250**AMENDMENT PROCEDURE****PART 1 GENERAL****1.01 SUMMARY**

- A. Make such changes in the Work, in the Contract Price, in the Contract Time, or any combination thereof, as are described in written Amendments signed by the Owner and the Contractor and issued after execution of the Construction Contract, in accordance with the provisions of this Section.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, Division 0, Division 1, and other Sections of these Specifications.
 - 2. Any proposal for a change in the Work shall include DBE participation consistent with the required DBE percentage for this Contract. If the Contractor is unable to meet said DBE percentage, a written justification of the good faith efforts made shall be submitted along with the response to the Engineer's or Owner's proposal request.
 - 3. Engineer or Owner supplemental instructions:
 - a. From time to time during progress of the Work the Engineer or Owner may issue supplemental instructions, which interpret the Contract Documents or order minor changes in the Work without change in Contract Sum or Contract Time.
 - b. Should the Contractor consider that a change in Contract Sum or Contract Time is required, he shall submit an itemized proposal to the Engineer or Owner immediately and before proceeding with the Work. If the proposal is found to be satisfactory and in proper order, the supplemental instructions in that event will be superseded by an Amendment.
 - 4. Proposal requests:
 - a. From time to time during progress of the Work the Engineer or Owner may issue a Request for Proposal (RFP) proposal request for an itemized quotation for changes in the Contract Price and/or Contract Time incidental to proposed modifications to the Contract Documents.
 - b. This will not be an Amendment, and will not be a direction to proceed with the changes described therein.

1.02 QUALITY ASSURANCE

- A. Include within the Contractor's quality assurance program such measures as are needed to assure familiarity of the Contractor's staff and employees with these procedures for processing Amendment data.

1.03 PROCESSING PROPOSAL REQUESTS

- A. Make timely written reply to the Engineer or Owner in response to each proposal request. Proposal requests will be numbered in sequence and dated.
1. State proposed change in the Contract Sum, if any.
 2. State proposed change in the Contract Time of Completion, if any.
 3. Clearly describe other changes in the Work, if any, required by the proposed change or desirable therewith.
 4. State amount of DBE participation applicable to the proposed changes.
 5. Include full backup data such as subcontractor's letter of proposal or similar information.
 6. Submit this response in single copy.
- B. When cost or credit for the change has been agreed upon by the Owner and the Contractor, or the Owner has directed that cost or credit be determined in accordance with provisions of Division 0 and Division 1 Specifications, the Engineer or Owner will prepare an Amendment for execution by the Owner and Contractor.

1.04 PROCESSING AMENDMENTS

- A. Amendments will be numbered in sequence, and dated.
1. The Amendment will describe the change or changes, will refer to the proposal requests or supplemental instructions involved, and will be signed by the Contractor and Owner, in sequence.
 2. The Engineer or Owner will issue two copies of each Amendment to the Contractor.
 - a. The Contractor shall promptly sign all copies and return all copies to the Engineer or Owner for further processing by the Owner.
 - b. The Engineer or Owner will forward all copies to the Owner with a request for complete processing.
 - c. The Owner will sign and return a copy to the Contractor for distribution.

END OF SECTION 01250

DIVISION 1 – SECTION 01310**PROJECT MANAGEMENT AND COORDINATION****PART 1 PROJECT MANAGEMENT****1.01 DESCRIPTION**

- A. The Contractor will be required to utilize an integrated construction project management software platform for coordination, meeting organization, submittals, payment applications, project records, drawings, specifications, reports, punch-lists, and schedules throughout the duration of the project.
 - 1. Project Management software platform utilized for this project will be Procore.
- B. The project management software will be provided by the Owner. The Contractor will be allowed seat licenses with access to the project management software as needed for the duration of the project.
- C. Any training required in order for the Contractor to become proficient in the utilization of the construction project management software, shall be the responsibility of the Contractor at no additional cost to the Owner.

PART 2 PRECONSTRUCTION CONFERENCE**2.01 SUMMARY**

- A. To help clarify construction contract administration procedures, the Engineer or Owner will schedule a Preconstruction Conference prior to start of the Work, as described in this Section.
- B. Related Work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, Division 0 and Division 1 Specification Sections.

2.02 AGENDA AND MEETING SUMMARIES

- A. To the maximum extent practicable, advise the Engineer or Owner at least 24 hours in advance of the Conference as to items to be added to the agenda.
- B. The Engineer or Owner will compile summaries of the Conference, and will furnish copies of the summaries to the Contractor. The Contractor may make and distribute such other copies as he wishes.

2.03 QUALITY ASSURANCE

- A. For those persons designated by the Contractor, his subcontractors, and suppliers to attend the Pre-Construction Conference, provide required authority to commit the entities they represent to schedules and solutions agreed upon in the Conference.

2.04 PRECONSTRUCTION CONFERENCE

- A. The Conference will be held at a time and date established by the Engineer or Owner. If requested by the Engineer or Owner, additional conferences will be held.
- B. Attendance:

1. Insure attendance by authorized representatives of the Contractor and major Subcontractors.
 2. The Engineer or Owner will advise other interested parties, including the Owner, and request their attendance.
- C. Minimum agenda:
1. Organizational arrangement of Contractor's forces and personnel and those of subcontractors, material suppliers, and the Engineer or Owner;
 2. Channels and procedures for communications;
 3. Construction schedule, including sequence of critical work;
 4. Contract Documents, including distribution of required copies of Drawings and revisions;
 5. Processing of Shop Drawings and other data submitted to the Engineer or Owner for review;
 6. Processing of field decisions and Change Orders;
 7. Rules and regulations governing performance of the Work;
 8. Procedures for safety and first aid, security, quality control, housekeeping, and related matters; and
 9. Reports required and schedule for submittal.
 10. Items requiring long lead time and special requirements.

PART 3 PROGRESS MEETINGS

3.01 DESCRIPTION

- A. Work included: To enable orderly review during progress of the Work, and to provide for systematic discussion of problems, the Engineer or Owner will conduct project meetings throughout the construction period.
- B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Provisions, and other Sections of these Specifications.
 2. The Contractor's relations with his subcontractors and materials suppliers, and discussions relative thereto, are the Contractor's responsibility and normally are not part of project meetings content.

3.02 SUBMITTALS

- A. Agenda items: To the maximum extent practicable, advise the Engineer or Owner at least 24 hours in advance of project meetings regarding items to be added to the agenda.
- B. Summaries:

1. The Engineer or Owner will compile summaries of each project meeting, and will furnish copies to the Contractor and the Owner.
2. Recipients of copies may make and distribute such other copies as they wish.

3.03 QUALITY ASSURANCE

- A. For those persons designated by the Contractor to attend and participate in project meetings, provide required authority to commit the Contractor to solutions agreed upon in the project meetings.

PART 4 EXECUTION

4.01 MEETING SCHEDULE

- A. Project meetings will be held at times as determined by the Engineer or Owner.
- B. Coordinate as necessary to establish a mutually acceptable schedule for meetings.

4.02 MEETING LOCATION

- A. The Engineer or Owner will establish the meeting location.

4.03 PROJECT MEETINGS

- A. Attendance:
 1. To the maximum extent practicable, assign the same person or persons to represent the Contractor at project meetings throughout progress of the Work.
 2. Subcontractors, materials suppliers, and others may be invited to attend those project meetings in which their aspect of the Work is involved.
- B. Minimum agenda:
 1. Review, revise as necessary, and approve summaries of previous meetings.
 2. Review progress of the Work since last meeting, including status of outstanding submittals.
 3. Identify problems which may impede planned progress.
 4. Develop corrective measures and procedures to reestablish planned schedule.
 5. Discuss other current business.
- C. Revisions to summaries:
 1. Unless published summaries are challenged in writing prior to the next regularly scheduled progress meeting, they will be accepted as properly stating the activities and decisions of the meeting.
 2. Persons challenging published summaries shall reproduce and distribute copies of the challenge to all indicated recipients of the particular set of summaries.
 3. Challenge to summaries shall be settled as priority portion of "old business" at the next

regularly scheduled meeting.

END OF SECTION 01310

DIVISION 1- SECTION 01320**SCHEDULES AND REPORTS****PART 1 GENERAL****1.01 SUMMARY**

- A. The work under this Contract shall be planned, scheduled and reported using computerized precedence diagram format of the Critical Path Method in calendar days, unless otherwise specifically provided in the Contract Documents. The Detailed Construction Schedule shall be developed by using the latest revision of Microsoft Project, or approved equal computer software.
- B. Related Work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, other Sections of these Specifications.
 - 2. Other provisions concerning Schedules and Reports are stated to Specification Sections:
 - 01100 – Summary of Work, Sequence of Construction & Liquidated Damages
 - General Provision Section 60 - Control of Materials
 - General Provision Section 90 - Measurement and Payment

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION**3.01 GENERAL REQUIREMENTS**

- A. The Detailed Construction Schedule shall be developed by using the latest revision of Microsoft Project, or approved equal computer software that is compatible with Owner's scheduling software.
- B. The primary objectives of the requirements of this section are:
 - 1. to insure adequate planning and execution of the Work by Contractor;
 - 2. to assist Owner and Engineer in evaluating the progress of the Work;
 - 3. to provide a mechanism or tool for use by the Owner, Engineer and Contractor in determining and monitoring any actions of the Contractor which may be required in order to comply with the requirements of the Contract relating to the timely completion of the various portions of the Work
- C. The Detailed Construction Schedule, defined in Paragraph 3.04, shall represent the Contractor's commitment and intended plan for completion of the Work in compliance with the Contract. The Contractor will not:
 - 1. Misrepresent to the Owner its planning, scheduling, and coordination of the work;
 - 2. Utilize schedules different from those provided to the Owner and Engineer for the direction, execution and coordination of the work;
 - 3. Utilize schedules which are not feasible or realistic; or

4. Prepare schedules, updates, revisions or reports which do not accurately reflect the Contractor's actual intent or the Contractor's reasonable and actual expectations as to: the sequences of activities, labor availability, productivity, or efficiency; expected or reasonably foreseeable inclement weather conditions; the percentage complete of any activity or path of activities; completion of any item of work or activity; projected dates of completion; delays, slippage, or problems encountered or expected and Subcontractor requests for time extensions,
- D. Once approved by the Engineer or Owner, the Detailed Construction Schedule will become the Schedule of Record for coordinating the work, scheduling the work, monitoring the work, issuing progress payments, evaluating time extension requests, and all other objectives listed in Paragraph 3.01.B. The Contractor is required to employ whatever means he deems necessary to implement the Detailed Construction Schedule and to comply with the requirements of this Section. Updates shall be provided to the Engineer or Owner at each construction progress meeting or as requested by the Engineer or Owner. Updates shall be both electronic media and hard copy.
- E. Contractor is responsible for determining the sequence of activities, the time estimates of the detailed construction activities and the means, methods, techniques and procedures to be employed. Each construction schedule shall represent the Contractor's best judgment of how he will prosecute the Work in compliance with the Contract.
- F. Contractor shall consult with his Subcontractors and Suppliers (if any) relating to the preparation of each construction schedule. Subcontractors shall receive copies of each construction schedule and shall be continually advised of any updates or revisions to each construction schedule as the Work progresses.
- G. When there are separate contractors working concurrently on Airport whose work must interface or be coordinated with the Work of Contractor, Contractor shall coordinate his activities with the activities of the separate contractors and shall, prior to the submission of any construction schedule to the Engineer or Owner, obtain written approval of his construction schedule by the separate contractors.
- H. To carry out the intent of this Section, the Contractor agrees that the reasonable exercise of any rights under this Section by the Engineer or Owner shall not be grounds for any claim by Contractor or any of his Suppliers, Subcontractors or Sub-subcontractors of alleged interference, lack of cooperation, delay, disruption, negligence or hindrance by Owner or Engineer, and Contractor covenants not to sue therefor.
- I. It is understood and agreed that the Detailed Construction Schedule, defined in Paragraph 3.04, is to represent Contractor's best plan and commitment for the Work; however, Contractor acknowledges that the Detailed Construction Schedule may have to be revised from time-to-time as progress proceeds. Contractor further acknowledges and agrees that the Owner and Engineer do not guarantee that:
 1. Any changes, modifications or adjustments to any schedule by Contractor can only be made by the written approval of the Engineer or Owner.
- J. It is understood and agreed that should the Engineer or Owner provide the Contractor, at Contractor's request, with any advice relating to the scheduling or coordination of the Work or any other matter that:
 1. Owner and Engineer shall not be liable to Contractor for any errors, omissions, negligence or deficiencies which may in any way occur because of same;
 2. Such advice is provided solely as aids in the development by Contractor of a

representation of Contractor's actual construction plan and schedule in accordance with the requirements of the Contract Documents, and Owner and Engineer shall not be liable to Contractor should Contractor rely on such advice or counsel to his detriment;

3. Such advice shall not relieve Contractor of any responsibility under Paragraph 3.01.E hereof for all construction means, methods techniques, sequences and procedures and for planning, scheduling and coordinating all portions of the Work; and
 4. Any advice provided by the Engineer or Owner or the lack or alleged untimeliness thereof will not in any way take the place of or relieve the Contractor of full responsibility for compliance with all requirements of the Contract, including, but not limited to the obligations to complete the Work within the Contract.
- K. Approval or acceptance by the Owner or Engineer of any Contractor's construction schedule, or any revisions or updates thereto, shall not relieve the Contractor of the responsibility for accomplishing the Work by the Project Substantial Completion date.
- L. Contractor shall be solely responsible for expediting the delivery of all materials and equipment to be furnished by him so that the progress of construction shall be maintained according to the currently approved construction schedule for the Work. Contractor shall notify the Owner or Engineer in writing, and in a timely and reasonable manner, whenever Contractor determines or anticipates that the delivery date of any material or equipment to be furnished by Contractor will be later than the delivery date indicated by the currently approved construction schedule, or the current update thereof as herein provided.

3.02 NOT USED

3.03 DETAILED CONSTRUCTION SCHEDULE DRAFT

- A. No later than two (2) weeks after the Notice to Proceed, the Contractor shall complete a draft of the Detailed Construction Schedule in accordance with the requirements of this Paragraph 3.03.

3.04 DETAILED CONSTRUCTION SCHEDULE

- A. Prior to any monthly Application for Payment, the Contractor shall complete the Detailed Construction Schedule to the satisfaction of the Owner or Engineer.
- B. The Detailed Construction Schedule shall represent the Contractor's commitment and intended plan for completion of the Work in compliance with the Contract.
- C. The Owner/Engineer reserves the right to require the Contractor to furnish such manpower, materials facilities and equipment and shall work such hours, including additional shifts and overtime operations as may be necessary, to insure completion of the Work or specified portions thereof within the specific dates as set forth in the Contract Documents. If it becomes apparent to the Owner or Engineer that the work, or any required portion thereof, will not be completed by any such dates, the Contractor shall undertake the following actions, at no additional cost to the Owner, and comply with the requirements as set forth in Section 01320, 3.07 and 3.08, in order to ensure that it complies with all completion requirements:
1. Increase the quantity of manpower, materials, trades, crafts, and equipment and facilities on the site;
 2. Increase the number of working hours per shift, shifts per working day, or any combination of the foregoing; and
 3. Reschedule activities to achieve maximum activity accomplishment.

3.05 DETAILED CONSTRUCTION SCHEDULE CONTENT

- A. The Detailed Construction Schedule shall consist of a time-scaled graphic representation of all activities, which are part of the Contractor's construction plan and an accompanying listing of each activity's dependencies and interrelationships.
- B. The Contractor shall anticipate and account for, as a minimum, the potential loss of the number of **calendar** days listed below for each calendar month due to weather and shall schedule the work accordingly.

January	12	July	6
February	10	August	6
March	9	September	4
April	6	October	5
May	8	November	6
June	5	December	10

The preceding days were derived from historical data provided by the National Climatic Data Center regarding rainfall at Memphis International Airport. They represent a number less than the actual number of days of measurable rainfall that can be expected to occur during a twenty-four (24) hour period for the months indicated. **The Contractor shall make his own determination as to the likely impact of weather on his operation and shall include as part of the Detailed Construction Schedule submission an accounting of how the impact of anticipated weather was determined and accounted for in the schedule.** These values listed above are the minimum number of weather related days the Contractor shall consider in developing his Detailed Construction Schedule. It is further understood that said calendar day period shall be derived through assuming that work will take place on a calendar day basis.

The Owner or Engineer will continually monitor the effects of weather and when found justified, grant time extensions, if required, at the end of the Contract. In the event less weather days are actually encountered than provided for in this section, those days will accrue to subsequent months of the phase or contract and be balanced against actual weather. In accordance with the Contract Documents weather days occurring during the extension beyond the original completion date will be compensated day for day, if justified. No weather days will be granted beyond the final Contract completion date as computed herein.

- C. All activity durations shall be given in calendar days.
- D. Contractor shall plan his operations and schedule the work to ensure that the critical path runs through on-site construction activities and that off-site procurement activities do not control the critical path of the Detailed Construction Schedule, unless approved in writing by the Owner or Engineer.

3.06 UPDATING OF CONSTRUCTION SCHEDULE/PROGRESS REPORTS

- A. The Detailed Construction Schedule will be reviewed and updated as needed during each project progress meeting.

3.07 RECOVERY SCHEDULE

- A. Should the updated Detailed Construction Schedule, at any time during Contractor's performance, show, in the sole opinion of the Owner or Engineer, that the Contractor is seven (7) or more days behind schedule for any location or category of work, or should Contractor be required to undertake actions under Paragraph 3.04.D hereof, the Contractor shall immediately prepare a Recovery Schedule explaining and displaying how Contractor intends to reschedule his Work in

order to regain compliance with the Approved Detailed Construction Schedule during the immediate subsequent pay period.

3.08 SCHEDULE REVISIONS

- A. Should Contractor desire to or be otherwise required under the Contract to make modifications or changes in his method of operation, his sequence of Work or the durations of the activities in his Construction Schedule, he shall do so in accordance with Paragraph 3.04 of this specification. The approved Detailed Construction Schedule may only be revised by the written approval of the Owner or Engineer as provided herein.

END OF SECTION 01320

THIS PAGE LEFT BLANK INTENTIONALLY.

DIVISION 1 – SECTION 01321**CONSTRUCTION SURVEYING****PART 1 GENERAL****1.01 SUMMARY**

- A. This section describes the Owner's airport survey grid and surveying requirements.
- B. Related Work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to the General Provisions and other Sections of these Specifications.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTIONS**3.01 EXISTING SURVEY CONTROL MONUMENTS**

- A. The Owner has established an airport-wide survey grid consisting of both first order and second order survey monuments. The monuments are distributed both inside and outside the Air Operations Area fence.
- B. The monuments are tied to the Tennessee State Plane Coordinate System in U.S. Survey feet with the North American Datum, 1983.
- C. Survey control monuments typically, but not always, consist of aluminum disks stamped with identifying codes, set in concrete, and marked by orange witness posts.
- D. The Contractor may obtain the current Survey Control Monument Manual from the Program Manager.

3.02 REQUIREMENTS

- A. Contractor is responsible for all construction surveying.
- B. Any deviations from the existing grades shall be immediately reported to the Program Manager.
- C. Contractor shall tie the project to the survey grid as established by the monuments described in section 3.01.
- D. Contractor shall protect all survey monuments within the vicinity of the project and all survey monuments used for survey while they are occupied.
- E. The Contractor shall, at his expense, have a Tennessee Professional Land Surveyor replace any monument disturbed or destroyed by Contractor's construction activities (using first order techniques); replaced monuments shall be located at least ten feet, but not more than fifty feet, from the location of the disturbed monument. New monuments shall consist of aluminum disks stamped with an identifying code, set in concrete using a procedure approved by Program Manager, and marked by an orange witness post. Replaced-monument survey information shall be provided to Owner in exact format as contained within Owner's Survey Control Monument Manual.

END OF SECTION 01321

ISSUED FOR BID

THIS PAGE LEFT BLANK INTENTIONALLY.

DIVISION 1- SECTION 01322**AERIAL PHOTOGRAPHS****PART 1 GENERAL****1.01 SUMMARY**

- A. Provide photographs taken at specified stages during construction, and in accordance with provisions of this Section.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Provisions and other Sections of these Specifications.

1.02 SUBMITTALS

- A. Except as otherwise directed and paid for, submit one electronic file of each photograph.

1.03 QUALITY ASSURANCE

- A. Secure the services of a professional photographer who is skilled and experienced in construction photography and whose work samples are acceptable to the Engineer.
- B. Do not replace the photographer without the Engineer's written approval.

PART 2 PRODUCTS**2.01 AERIAL PHOTOGRAPHS**

- A. Provide electronic files, at a quality and resolution capable of printing the photographs at a size up to 36" x 24".
- B. Record each electronic file's filename in a manner to show:
 - 1. Job number;
 - 2. Location from which photographed;
 - 3. Date of photograph;
- C. Do not permit photographs to be issued for any other purpose without specific written approval from the Engineer.

PART 3 EXECUTION**3.01 AERIAL PHOTOGRAPHY**

- A. Except as otherwise specifically approved by the Engineer, make the photographs within three calendar days of the date of each Application for Payment.
 - 1. To the maximum extent practicable, make photographs at approximately the same time of day throughout progress of the Work.

2. When inclement weather is anticipated, consult with the Engineer and determine acceptable alternative arrangements.
- B. Except as otherwise specifically approved by the Engineer, take the photographs from four (4) directions. The photographs required shall be oblique aerial photographs. One shall be taken from the north, one from the south, one from the east and one from the west looking at the entire project, or as directed by the Engineer.
1. Select the locations to provide diversified overall views of the Work, from positions, which are expected to remain accessible throughout progress of the Work.
 2. Identify each location by word description, by marked drawing, or by such other means as acceptable to the Engineer, to enable future photographs to be taken from the same position.
 3. When so directed by the Engineer because of the stage of construction, change one or more of the locations as the Engineer directs.
- C. Make each photograph clear, in focus, with high resolution and sharpness, and with minimum distortion.

END OF SECTION 01322

DIVISION 1 – SECTION 01325**DELAYS AND EXTENSIONS OF TIME****1.01 DESCRIPTION**

- A. Work included:
 - 1. Delays and extensions of time.
- B. Related Work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to the General Provisions, and other Sections of these Specifications.

1.02 OBLIGATION OF OWNER AND PROGRAM MANAGER

- A. Neither the Owner nor the Program Manager shall be obligated or liable to the Contractor for any damages, cost or expenses of any type which the Contractor, its subcontractors, sub-subcontractors, or any other person may incur as a result of any disruption or delay from any cause, regardless of the actual source of delay, whether avoidable or unavoidable, it being understood and agreed that the Contractor's sole and exclusive remedy in such event shall be an extension of the Contract Time, but in accordance with provisions of the Contract Documents.
- B. Except for weather delays, any claim for extension of time shall be made in writing to the Program Manager not more than ten (10) days after commencement of such delay, otherwise, such claim will be waived. The Contractor shall provide an estimate of the probable effect of such delay on the progress of the Work.
- C. The time during which the Contractor is delayed in performance of the work caused by the acts or omissions of the Owner, Program Manager or their employees or agents, or by acts of God, fires, floods, epidemics, quarantine restrictions, riots, civil commotions or freight embargoes, or other conditions beyond the Contractor's control which the Contractor could not have reasonably foreseen and provided against shall be added to the Contract Time; however, the Contractor must submit his claim for such delays in accordance with the requirements of this Section and any other applicable provisions of these Contract Documents in order to be considered for an extension of time.
- D. The Contract Time shall be adjusted only for changes in the work pursuant to GP-40, suspensions of the work, excusable delays or emergencies. Whenever the Contractor requests an extension of the Contract Time, the Contractor shall furnish such justification and supporting evidence as required by this section and such other and additional information as the Owner may deem necessary to determine whether the Contractor is entitled to an extension of the Contract Time. All such requests shall conform to all of the requirements of the Contract Documents, shall include evidence that the reasons for the requested Contract Time extension were beyond the control of the Contractor, and the Contractor shall bear the burden of substantiating and proving the necessity of an extension to the Contract Time. The Owner, with the assistance of the Program Manager, shall review all requests for Contract Time extensions and shall advise the Contractor of its decision and finding of fact in writing. If the Owner determines that the Contractor is entitled to an extension of the Contract Time, the length of the extension shall be based upon the currently approved detailed construction schedule and on all other relevant data, which data shall be incorporated into and from the basis for revision to the construction schedule.

The Contractor acknowledges and agrees that the actual delays due to said changes, suspension of the work, or excusable delays in activities which, according to the detailed construction schedule, do not affect the Contract Time, shall not affect the Contract Time, and therefore, cannot form the basis for an extension in the Contract Time or a change in the construction schedule.

- E. The Contractor shall be entitled to an extension of the Contract Time but no increase in the Contract sum, for delays arising from unforeseeable causes beyond the control and without the fault of negligence of the Contractor or its Subcontractors as follows:
 - 1. Acts of God, tornadoes, fires, blizzards, earthquakes, or floods that severely damages completed work or stored materials.
 - 2. Acts of the public enemy; acts of the state, federal or local governments in their sovereign capacities; and acts of a separate contractor in the performance of a separate contract with the Owner relating to this or another project.
- F. The Contractor shall not be entitled to any extension of Contract Time resulting from any condition or cause unless the Contractor strictly complies with the requirements of this Section and the Contractor must submit to the Program Manager within ten (10) days of the first instance of the delay a written request for an extension in the Contract Time which shall include the following information: (a) the nature of the delay; (b) the date of anticipated date of commencement of the delay; (c) activities on the schedule affected by the delay, and/or new activities created by the delay and their relationship with existing activities; (d) identification of persons or organizations or events responsible for the delay; and (e) recommended action to avoid or minimize the delay.
- G. No claim for delay shall be allowed and the Contractor waives any such claim if the Contractor fails to furnish the written request, required by this or other sections, within the period of time specified therein.

END OF SECTION 01325

DIVISION 1 – SECTION 01330**SUBMITTALS****PART 1 GENERAL****1.01 SUMMARY**

- A. This section describes the process for handling Contractor submittals.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, Division 0, Division 1, and other Sections of these Specifications

1.02 SUBMITTALS

- A. Except as otherwise specified below, as soon as practicable after contract award and without causing delay in the work, submit at least 7 bound copies of submittals of all items for which submittals are specified in other sections, and for all major submittal equipment whether specified in other sections or not. Alternatively, all Submittals may be submitted electronically in lieu of hard copies, if possible. Each submittal shall be clearly marked with the project name, dated, and accompanied by a letter of transmittal listing all items included in the submittal and referencing the project specification page and article numbers applicable to each item.
 - 1. Submittals shall include all test results and/or certificate necessary to show that the item conforms to the standards specified. Such standards shall include ASTM, AASHTO, FAA, PCA, Federal Specifications or any other standard listed in these specifications.

1.03 QUALITY ASSURANCE

- A. Before submission to the Engineer or Owner, the Contractor shall check the submittals of all items furnished directly by him, and the applicable Subcontractor shall check the submittals of all items furnished by the Subcontractor involved, as follows: check the submittal drawings for completeness and compliance with the contract documents; check and verify all dimensions, field conditions certifications relating to the submittals and certify in writing that these checks have been made.
 - 1. The Engineer or Owner will return for resubmission, all submittals without the above specified approval and certification, and all submittals which in the Engineer's or Owner's opinion contain numerous discrepancies and/or have not been checked by the Contractor or Subcontractor.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION**3.01 SUBMITTAL REVIEW**

- A. After the Owner or Engineer has reviewed the submittals, except as otherwise specified below, submittals will be dated, and three sets will be returned to the Contractor. If submittals are rejected, four sets will be returned to the Contractor, with indications of the required corrections and changes made on one of the sets. Make such corrections and changes as indicated. Resubmit

submittals as specified above, as often as required by the Engineer or Owner to complete the review. No correction or change indicated on submittals shall be considered as an order for extra work.

- B. Submittals reviewed by the Owner or Engineer will be a general review only, and acceptance will not relieve Contractor or Subcontractor of responsibility for accuracy of submittals, proper fitting, coordination, construction or work, and furnishing materials and work required by Contract but not indicated on submittals. Review of submittals shall not be construed as accepting departures from Contract requirements.
- C. Any material ordered, or work performed prior to obtaining an approved submittal shall be at the Contractor's risk and subject to rejection.

END OF SECTION 01330

DIVISION 1 – SECTION 01351
STORAGE AND PROTECTION

PART 1 GENERAL

1.01 SUMMARY

- A. Protect products scheduled for use in the Work by all means including, but not necessarily limited to, those described in this Section.
- B. Related Work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, Division 0, and Division 1 of these Specifications.
 - 2. Additional procedures may also be prescribed in other Sections of these Specifications.

1.02 QUALITY ASSURANCE

- A. Include within the Contractor's quality assurance program such procedures as are required to assure full protection of work and materials.

1.03 MANUFACTURERS' RECOMMENDATIONS

- A. Except as otherwise approved by the Owner or Engineer, determine and comply with manufacturers' recommendations on product handling, storage, and protection.

1.04 PACKAGING

- A. Deliver products to the job site in their manufacturer's original container, with labels intact and legible.
 - 1. Maintain packaged materials with seals unbroken and labels intact until time of use.
 - 2. Promptly remove damaged material and unsuitable items from the job site, and promptly replace same with material meeting the specified requirements, at no additional cost to the Owner.
- B. The Owner or Engineer may reject as non-complying such material and products as do not bear identification satisfactory to the Owner or Engineer such as manufacturer, grade, quality, and other pertinent information.

1.05 PROTECTION

- A. Protect finished surfaces, materials, trenches, earthwork, etc. from weather, construction operations, etc.
- B. Maintain finished surfaces clean, unmarred, and suitably protected until accepted by the Owner.

1.06 REPAIRS AND REPLACEMENTS

- A. In event of damage, promptly make replacements and repairs to the approval of the Owner or Engineer and at no additional cost to the Owner.
- B. Additional time required to secure replacements and to make repairs will not be considered by the Owner or Engineer to justify an extension in the Substantial Completion Date.

END OF SECTION 01351

DIVISION 1 – SECTION 01353**RADIO COMMUNICATIONS****1.01 DESCRIPTION****A. Work Included**

1. Provide radio communication with Airport Control Tower.

B. Documents affecting work of this Section include, but are not necessarily limited to General Provisions, and other Sections of these Specifications.**1.02 RADIO COMMUNICATIONS**

- A.** When required by the Contract Documents, and when work under this Contract is in progress within the Air Operations Area (AOA), the Contractor's job superintendent or other authorized representative of the Contractor on the job site shall coordinate such work with the Program Manager and the Program Manager shall maintain approved 2-way radio communication with the Airport Control Tower, for coordination of work with airport operations in progress.

END OF SECTION 01353

THIS PAGE LEFT BLANK INTENTIONALLY.

DIVISION 1 – SECTION 01455**QUALITY CONTROL AND QUALITY ASSURANCE TESTING PROGRAMS****PART 1 GENERAL****1.01 SUMMARY**

- A. This Section describes quality control and quality assurance testing and inspections required to be provided by the Contractor and the Owner.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, Division 0, Division 1 and other Sections of these Specifications.
 - 2. Requirements for testing are described in various Sections of these Specifications.

1.02 QUALITY CONTROL and QUALITY ASSURANCE TESTING PROGRAMS

- A. Contractor Quality Control Testing: At his own expense, the Contractor shall make separate arrangements for and be fully responsible for all quality control testing as required by the technical specifications and General Construction Items C-100.
- B. Owner Quality Assurance Testing: At no cost to the Contractor, the Owner will make arrangements for the services of an independent testing laboratory for quality assurance testing of work and materials. This testing is for the Owner's use only and will only be performed after the Contractor's quality control testing program has tested and approved materials and workmanship to be in full compliance with the quality standards of the Specifications. The Owner Quality Assurance testing services shall in no way relieve the Contractor of the responsibility for providing the quality materials, workmanship and testing required for compliance with these specifications.
- C. Determination of Specification Compliance: In all cases of conflicting test results, the Owner's quality assurance test results shall govern. All retesting shall be conducted by Owner's testing laboratory at the Contractor's expense. The amount and location of any retesting shall be as directed by the Owner or Engineer. Unsatisfactory work or materials shall be retested as often as necessary until retests indicate that the failed work or materials have achieved conformity with the Plans and Specifications. The Owner or Engineer shall make the final determination as to whether any work or materials, which do not conform to the Plans and Specifications upon initial testing, are to be removed from the site or reworked. The Owner or Engineer shall also make the final determination as to whether the retesting indicates that work or materials initially rejected have been corrected to meet the requirements of the Plans and Specifications. All removal, replacement, rolling, watering, aeration, reworking, etc. required to bring rejected work or materials into conformance with the Plans and Specifications shall be at the Contractor's expense.
- D. Retesting Expense: The Owner will bear the expense of the initial quality assurance testing of certain items of work or materials as required by the technical specifications. Any retesting of these items of work or materials which upon initial testing fail to meet the standards specified or indicated on the plans shall be at the Contractor's expense.
- E. Laboratory Inspection and Testing: If this contract requires laboratory inspection, testing, and stamping of concrete pipe, concrete fittings, or any other material, the cost of that laboratory inspection, testing, and stamping shall be borne by the Contractor and included in the cost of the work.

- F. Prior to starting concrete operations the Contractor shall name his source of supply for concrete materials and submit representative samples and reports of quality tests for approval.
- G. The Owner shall engage and pay for the services of an independent testing laboratory to perform the following services:
1. Slump test, ASTM C143, shall be taken with every set of cylinders and as often as required to provide the specified consistency of concrete.
 2. Determine air content with every set of cylinders, ASTM C231, or as required.
 3. Cast and test a set of at least 6 cylinders for each day's pour or for each 100 cubic yards or fraction thereof for each class of concrete. Cylinders shall be made and cured, ASTM C31, and tested, ASTM C39, in accordance with ASTM specifications for control tests. Cylinders shall be tested at 7 and 28 days. The Contractor shall provide insulated storage room with heat when necessary to store control cylinders and a protected space for storage of "field" cylinders which approximates the condition of curing of the concrete being sampled. Cylinders designated as "field" cylinders shall be used to determine safe stripping and loading of members. On all pours in excess of 25 cubic yards, continuous laboratory inspection shall be provided at the job site for checking materials, deliveries and concrete consistencies.
- H. The testing laboratory shall observe the materials and the manufacturer of concrete as specified and shall report to the Contractor and Designer the progress thereof. Also, when it appears that the material furnished and the work performed by the Contractor fails to fulfill the specified requirements and Contract, the testing laboratory shall direct the attention of the Contractor and Designer to such failure or infringement. Such observation shall not relieve the Contractor of any obligation to furnish acceptable materials or to provide the concrete quality in the structure that is in strict accordance with plans and specifications. The testing laboratory is not authorized to revoke, alter, relax, enlarge or release the requirements of the specifications, nor to issue instructions contrary to the plans and specifications; nor to approve or accept any portion of the work but in case of any dispute arising between the testing laboratory and the Contractor as to materials furnished or in the manner of performing the work, the testing laboratory shall have the authority to reject materials or suspend the work until the question at issue can be referred to the Designer. The testing laboratory shall not act as foreman or perform other duties for the Contractor. In no case shall any advice or oversight on the part of the testing laboratory relieve the Contractor of responsibility for completing the work in accordance with plans and specifications and the fulfillment of the Contract. The work will be observed as it progresses, but failure to report to the Designer any defective work or materials shall not in any way prevent later rejection when such a defect is discovered or obligate the Owner for final acceptance. Any expense incident to the investigation and determination of actual quality of any questionable material shall be borne by the Contractor.
- I. In the event that concrete tests fail to meet strength requirements of these specifications the designer may require, at no additional cost to the Owner, tests in accordance with the "Standard Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete", ASTM C42, or order load tests in accordance with Chapter 20 of the ACI Building Code 318, to be made on the portions of the structure containing questionable concrete. Suitable appliances and methods of loading the measuring shall be provided by the Contractor under the direction of the testing laboratory. The portions of the structure which are found by the Designer to contain defective concrete shall be removed and reconstructed in a satisfactory manner at the Contractor's expense. Concrete strength tests are to conform to Chapter 5 of the ACI Building Code 318.
- J. The laboratory shall have free access to material stockpiles, batching and mixing plants, and job site. The Contractor shall provide adequate assistance to the laboratory in securing specified samples for tests.

- K. Contractor shall give the Designer and laboratory reasonable notice before beginning any pours (at least 24 hours).
- L. The laboratory shall supply a daily report of concrete and materials testing and inspection to the designer (two copies) and Contractor (one copy).
- M. Concrete batched away from the job and delivered in mixer or agitator trucks shall conform to requirements of ASTM C94.
- N. Sampling and Testing:
1. All materials shall be sampled, tested in accordance with appropriate ASTM Standards, and approved before inclusion in any work on this project.
 2. Samples for testing shall be furnished by the Contractor.
 3. Rejected material shall be immediately removed from the site.
- O. Standards: Comply with the following applicable standards:
1. ACI 211.1R: "Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete."
 2. ACI 211.2 "Standard Practice for Selecting Proportions for Structural Lightweight Concrete."
 3. ACI 301R: "Standard Specifications for Structural Concrete for Buildings".
 4. ACI 304R: "Guide for Measuring, Mixing, Transporting, and Placing Concrete."
 5. ACI 305R: "Hot Weather Concreting."
 6. ACI 306R: "Cold Weather Concreting."
 7. ACI 308R: "Standard Practice for Curing Concrete."
 8. ACI 318: "Building Code Requirements for Structural Concrete and Commentary."
- P. Examine the substrate, formwork, and the conditions under which concrete reinforcement is to be placed, and correct conditions which would prevent proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected.
- Q. Inspection: Before placement of concrete, the Owner's Representative shall observe the placement of all reinforcing and give his approval.

END OF SECTION 01455

THIS PAGE LEFT BLANK INTENTIONALLY.

DIVISION 1 – SECTION 01500**CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS****PART 1 GENERAL****1.01 SUMMARY**

- A. This Section describes construction facilities and temporary controls required for the Work.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, Division 0 and Division 1 Specifications,

1.02 REQUIREMENTS

- A. Provide construction facilities and temporary controls needed for the Work including, but not necessarily limited to:
 - 1. Sanitary facilities;
 - 2. Temporary fencing of the construction site, if required.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Maintain temporary facilities and controls in proper and safe condition throughout progress of the Work.

PART 2 PRODUCTS**2.01 UTILITIES**

- A. Water:
 - 1. Provide necessary temporary piping and water supply and, upon completion of the Work, remove such temporary facilities.
 - 2. Provide and pay for water used in construction.
- B. Electricity:
 - 1. Provide necessary temporary wiring and, upon completion of the Work, remove such temporary facility.
 - 2. Provide area distribution boxes located so that the individual trades may furnish and use 100 ft maximum length extension cords to obtain power and lighting at points where needed for work, inspection, and safety.
 - 3. Provide and pay for electricity used in construction.
- C. Heating: Provide, maintain and pay for heat necessary for proper conduct of operations needed in the Work.
- D. Telephone:

1. Make necessary arrangements and pay costs for installation and operation of telephone service to the Contractor's office at the site.
2. Make the telephone available to the Program Manager for use in connection with the Work.

2.02 FIELD OFFICES AND SHEDS

A. Sanitary facilities:

1. Provide temporary sanitary facilities in the quantity required for use by all personnel.
2. Maintain in a sanitary condition at all times.

2.03 ENCLOSURES

- A. Provide and maintain for the duration of construction all scaffolds, tarpaulins, canopies, warning signs, steps, platforms, bridges, and other temporary construction necessary for proper completion of the Work in compliance with pertinent safety and other regulations.

2.04 TEMPORARY FENCING

- A. If indicated provide and maintain for the duration of construction a temporary fence of design and type needed to prevent entry onto the Work by the public.

2.05 REMOVING AND REPLACING FENCES, SOD, ETC.

- A. Where required to install the Work, carefully remove and store all interfering fences, mailboxes, culverts, etc. After installation of work and backfilling, reinstall these items and restore them to at least the conditions, which existed prior to the commencement of work, using materials and workmanship to match those of the original construction and installation.
- B. Carefully remove and store all interfering shrubbery, trees, sod, flowers, and other planting, sufficiently in advance of construction. After installation of work and backfilling, reset and restore these items to at least the conditions that existed prior to the commencement of work.

PART 3 EXECUTION

3.01 MAINTENANCE AND REMOVAL

- A. Maintain temporary facilities and controls as long as needed for safe and proper completion of the Work.
- B. Remove such temporary facilities and controls as rapidly as progress of the Work will permit, or as directed by the Owner or Engineer.

3.02 DUST CONTROL

- A. During construction, haul roads and other disturbed construction areas shall be watered as required to prevent dust from damaging and/or becoming a nuisance to the terminal and other buildings, automobiles, aircraft, and residential and other built-up areas surrounding the project site.

END OF SECTION 01500

DIVISION 1 - SECTION 01600**PRODUCT REQUIREMENTS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings, Contract, Division 0 and Division 1 Specification Sections apply to this Section.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements governing Contractor's selection of products for use in Project.
- B. Related Sections: Following Sections contain requirements that relate to this Section:
1. Division 1 Section "Reference Standards and Definitions" specifies the applicability of industry standards to products specified.
 2. Division 1 Section 01320 specifies requirements for submittal of the Contractor's Construction Schedule and the Submittal Schedule.
 3. Division 1 Section "Product Substitution Procedures" specifies administrative procedures for handling requests for substitutions made after award of the Contract.

1.3 DEFINITIONS

- A. Definitions used in this Article are not intended to change meaning of other terms used in Contract Documents, such as "specialties," "systems," "structure," "finishes," "accessories," and similar terms. Such terms such are self-explanatory and have well recognized meanings in construction industry.
1. **"Products"** are items purchased for incorporation in Work, whether purchased for Project or taken from previously purchased stock. Term "product" includes terms "material," "equipment," "system," and terms of similar intent.
 - a. "Named Products" are items identified by manufacturer's product name, including make or model designation, indicated in manufacturer's published product literature, that is current as of date of Contract Documents.
 - b. "Foreign Products," as distinguished from "domestic products," are items substantially manufactured (50% or more of value) outside of United States and its possessions; or produced or supplied by entities substantially owned (more than 50%) by persons who are not citizens of nor living within United States and its possessions.
 2. **"Materials"** are products that are substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form part of Work.
 3. **"Equipment"** is a product with operational parts, whether motorized or manually operated, that requires service connections such as wiring or piping.

1.4 SUBMITTALS

- A. **Product List:** Prepare list showing products specified in tabular form acceptable to Program Manager. Include generic names of products required. Include manufacturer's name and proprietary product names for each item listed.
1. Coordinate product list with Contractor's Construction Schedule and Schedule of Submittals.
 2. **Form:** Prepare product list with information on each item tabulated under following column headings:
 - a. Related Specification Section number.
 - b. Generic name used in Contract Documents.
 - c. Proprietary name, model number and similar designations.
 - d. Manufacturer's name and address.
 - e. Supplier's name and address.
 - f. Installer's name and address.
 - g. Projected delivery date, or time span of delivery period.
 3. **Initial Submittal:** Within 30 days after date of commencement of Work, submit 3 copies of an initial product list. Provide written explanation for omissions of data and for known variations from Contract requirements.
 - a. At Contractor's option, initial submittal may be limited to product selections and designations that must be established early in Contract period.
 4. **Completed List:** Within 60 days after date of commencement of Work, submit 3 copies of completed product list. Provide written explanation for omissions of data and for known variations from Contract requirements.
 5. **Engineer's Action:** Engineer will review and the Program Manager will respond in writing to Contractor within 2 wks of receipt of completed product list. No response within this period constitutes no objection to listed manufacturers or products but does not constitute a waiver of the requirement that products comply with Contract Documents. Engineer's review will include a list of unacceptable product selections, containing a brief explanation of reasons for this action.
- B. **Source Limitations:** To fullest extent possible, provide products of same kind, from single source.
1. When specified products are available only from sources that do not or cannot produce quantity adequate to complete project requirements in timely manner, consult with Program Manager for determination by the Engineer of most important product qualities before proceeding. Qualities may include attributes relating to visual appearance, strength, durability, or compatibility. When determination has been made, select products from sources that produce products that possess these qualities, to fullest extent possible.
- C. **Compatibility of Options:** When Contractor is given option of selecting between 2 or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.
1. Each Contractor is responsible for providing products and construction methods that are compatible with products and construction methods of other separate Contractors.
 2. If dispute arises between Contractors over concurrently selectable, but incompatible products, Engineer will determine which products shall be retained and which are incompatible and must be replaced.
- D. **Foreign Product Limitations:** Except under 1 or more of following conditions, provide domestic products, not foreign products, for inclusion in the Work:

1. No available domestic product complies with Contract Documents.
 2. Domestic products that comply with Contract Document are only available at prices or terms that are substantially higher than foreign products that also comply with Contract Documents.
- E. Nameplates: Except for required labels and operating data, do not attach or imprint manufacturer's or producer's nameplates or trademarks on exposed surfaces of products which will be exposed to view in occupied spaces or on exterior.
- F. Labels: Locate required product labels and stamps on a concealed surface or, where required for observation after installation, on an accessible surface that is not conspicuous.
- G. Equipment Nameplates: Provide permanent nameplate on each item of service-connected or power-operated equipment. Locate on an easily accessible surface which is inconspicuous in occupied spaces. Nameplate shall contain following information and other essential operating data:
1. Name of product and manufacturer.
 2. Model and serial number.
 3. Capacity.
 4. Speed.
 5. Ratings.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store and handle products according to manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft.
1. Schedule delivery to minimize long-term storage at site and to prevent overcrowding of construction spaces.
 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft and other losses.
 3. Deliver products to site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting and installing.
 4. Inspect products upon delivery to ensure compliance with Contract Documents, and to ensure that products are undamaged and properly protected.
 5. Store products at site in manner that will facilitate inspection and measurement of quantity or counting of units.
 6. Store heavy materials away from Project structure in manner that will not endanger supporting construction.
- Store products subject to damage by elements above ground, under cover in weathertight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION

- A. General Product Requirements: Provide products that comply with Contract Documents, that are undamaged and, unless otherwise indicated, new at time of installation.
1. Provide products complete with all accessories, trim, finish, safety guards and other devices and details needed for complete installation and for intended use and effect.
 2. Standard Products: Where available, provide standard products of types that have been produced and used successfully in similar situations on other projects.

- B. Product Selection Procedures: Product selection is governed by Contract Documents and governing regulations, not by previous Project experience. Procedures governing product selection include following:
1. Proprietary Specification Requirements: Where only a single product or manufacturer is named, provide product indicated. No substitutions will be permitted.
 2. Semiproprietary Specification Requirements: Where 2 or more products or manufacturers are named, provide 1 of products indicated. No substitutions will be permitted.
 - a. Where products or manufacturers are specified by name, accompanied by term "or equal," or "or approved equal" comply with Contract Document provisions concerning "substitutions" to obtain approval for use of an unnamed product.
 3. Compliance with Standards, Codes and Regulations: Where Specifications only require compliance with an imposed code, standard or regulation, select product that complies with standards, codes or regulations specified.
 4. Visual Matching: Where Specifications require matching an established Sample, Engineer's decision will be final on whether proposed product matches satisfactorily.
 - a. Where no product available within specified category matches satisfactorily and complies with other specified requirements, comply with provisions of Contract Documents concerning "substitutions" for selection of matching product in another product category.
 5. Visual Selection: Where specified product requirements include phrase "...as selected from manufacturer's standard colors, patterns, textures..." or similar phrase, select product and manufacturer that complies with other specified requirements. Engineer will select color, pattern and texture from product line selected.
 6. Allowances: Refer to individual Specification Sections and "Allowance" provisions in Division 1 for allowances that control product selection, and for procedures required for processing such selections.

2.2 ASBESTOS-FREE REQUIREMENTS

- A. The Contractor shall not use any asbestos containing material (ACM) at any time during the Project. The Contractor shall verify that all materials used on the Project are asbestos-free materials.
- B. During the course of the Project, the Contractor shall routinely check products utilized on-site to ensure only asbestos-free products are utilized.
- C. If the Owner suspects the presence of asbestos, the Owner will sample the suspect material to verify that no ACM was utilized. This testing shall be performed at the expense of the Owner. If ACM is subsequently found during the sampling, the Contractor shall remove and replace the product or material at his/her sole expense. No adjustment of the Contract Schedule will be provided to account for delays associated with removal and/or replacement of ACM. The Contractor shall reimburse Owner for any and all costs associated with the original testing and/or any re-testing that may be necessary.
- D. Upon completion, a notarized certification statement shall be provided by the Contractor to the Owner certifying that all materials associated with this Project are asbestos free. See Specification 01771 Closeout Documents for certification document. If the Contractor does not submit the required asbestos-free certification, the Authority shall have a complete building survey performed by a qualified testing firm within the Project's location. The cost of the survey and any subsequent removal/replacement of any ACM shall be deducted from the Contractor's final payment at the sole discretion of the Owner.

PART 3 - EXECUTION

3.1 INSTALLATION OF PRODUCTS:

- A. Comply with manufacturer's instructions and recommendations for installation of products in applications indicated. Anchor each product securely in place, accurately located and aligned with other Work.
- 1. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration until time of Substantial Completion.

END OF SECTION 01600

THIS PAGE LEFT BLANK INTENTIONALLY.

DIVISION 1 - SECTION 01630
PRODUCT SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, Contract, Division 0 and Division 1 Specification Sections apply to this Section.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for handling requests for substitutions made after award of Contract.
- B. Contractor's Construction Schedule and Schedule of Submittals are included under Section 01320.
- C. Standards: Refer to Section "Reference Standards and Definitions" for applicability of industry standards to products specified.
- D. Procedural requirements governing Contractor's selection of products and product options are included under Section "Product Requirements."
- E. Program Manager's policy is to reject requests for substitution unless paragraph "Substitutions" under Article "Definitions" applies.

1.3 DEFINITIONS

- A. Definitions used in this Article are not intended to change or modify meaning of other terms used in Contract Documents.
- B. Substitutions: Requests for changes in products, materials, equipment, and methods of construction required by Contract Documents proposed by Contractor after award of Contract are considered requests for "substitutions." Following are not considered substitutions:
 - 1. Revisions to Contract Documents requested by Owner or Program Manager.
 - 2. Specified options of products and construction methods included in Contract Documents.
 - 3. Contractor's determination of and compliance with governing regulations and orders issued by governing authorities.

1.4 SUBMITTALS

- A. Substitution Request Submittal: Requests for substitution will be considered if received within 30 days after commencement of Work. Requests received more than 30 days after commencement of Work may be considered or rejected at discretion of Program Manager.
 - 1. Submit 3 copies of each request for substitution for consideration. Submit requests on forms included at end of this Section.

2. Identify product, or fabrication or installation method to be replaced in each request. Include related Specification Section and Drawing numbers. Provide complete documentation showing compliance with requirements for substitutions, and the following information, as appropriate:
 - a. Product Data, including Drawings and descriptions of products, fabrication and installation procedures.
 - b. Samples, where applicable or requested.
 - c. Detailed comparison of significant qualities of proposed substitution with those of Work specified. Significant qualities may include elements such as size, weight, durability, performance and visual effect.
 - d. Coordination information, including list of changes or modifications needed to other parts of Work and to construction performed by Owner and separate Contractors, that will become necessary to accommodate proposed substitution.
 - e. Statement indicating substitution's effect on Contractor's Construction Schedule compared to schedule without approval of substitution. Indicate effect of proposed substitution on the overall Substantial Completion of the project.
 - f. Cost information, including proposal of net change, if any in Contract Sum.
 - g. Certification by Contractor that substitution proposed is equal-to or better in every significant respect to that required by Contract Documents, and that it will perform adequately in application indicated. Include Contractor's waiver of rights to additional payment or additional Contract time, that may subsequently become necessary because of failure of substitution to perform adequately.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

- A. Conditions: Contractor's substitution request will be received and considered by Program Manager when one or more of following conditions are satisfied, as determined by Program Manager; otherwise requests will be returned without action except to record noncompliance with these requirements.
 1. Extensive revisions to Contract Documents are not required.
 2. Proposed changes are in keeping with general intent of Contract Documents.
 3. Request is timely, fully documented and properly submitted.
 4. Request is directly related to an "or equal" clause or similar language in Contract Documents.
 5. Specified product or method of construction cannot be provided within Contract Time. Request will not be considered if product or method cannot be provided as result of failure to pursue Work promptly or coordinate activities properly.
 6. Specified product or method of construction cannot receive necessary approval by governing authority, and requested substitution can be approved.
 7. Substantial advantage is offered the Owner, in terms of cost, time, energy conservation or other considerations of merit, after deducting offsetting responsibilities Owner may be required to bear. Additional responsibilities for Owner may include additional compensation to Program Manager and Engineer for redesign and evaluation services, increased cost of other construction by Owner or separate Contractors, and similar considerations.
 8. Specified product or method of construction cannot be provided in manner that is compatible with other materials, and where Contractor certifies that substitution will overcome incompatibility.
 9. Specified product or method of construction cannot be coordinated with other materials, and where Contractor certifies that proposed substitution can be coordinated.
 10. Specified product or method of construction cannot provide warranty required by Contract Documents and where Contractor certifies that proposed substitution provide required warranty.

- B. Contractor's submittal to the Program Manager and Engineer's acceptance of Shop Drawings, Product Data or Samples that relate to construction activities not complying with Contract Documents does not constitute an acceptable or valid request for substitution, nor does it constitute approval.
- C. See next page for "Request for Substitution" form.

REQUEST FOR SUBSTITUTION

To:

Attention:

From:

Name of Company_____
Address_____
City, State, Zip Code_____
Phone

Fully answer all information requested below. Failure to answer any item may cause rejection of request for substitution. If requested by Program Manager, submit information about manufacturer and vendor history, financial stability, distribution and support systems. Use one form for each product requested. Only first product listed will be considered on forms with more than one product listed.

Specification Section Number: _____ Drawing Number: _____

Para Number: _____ Detail Number: _____

Specified Product: _____

Proposed Substitution: _____

Answer the following questions. Attach an explanation sheet on your company's letterhead when required.

Does the proposed substitution affect dimensions indicated on Drawings?

No _____ Yes _____ (If yes, explain below).

Does the proposed substitution require changes in Drawings and/or design or installation changes?

No _____ Yes _____

If yes, is the cost of these changes included in the proposed amount? No ____ Yes ____

Does the proposed substitution affect other trades? No _____ Yes _____

(If yes, explain who and how)

01630

Page 4

ISSUED FOR BID

If the proposed product does affect the work of other trades, has the cost impact on their work been included in the price of the proposed substitution?

No _____ Yes _____

Does the proposed product's guarantee differ from that of the specified product's?

No _____ Yes _____ (If yes, explain below).

Why is this proposal for substitution being submitted? List reasons below.

Attach a listing of 3 projects using proposed substitution completed within the past 5 yrs in geographic and climatic region of Project. One of applications shall have been in service for at least 3 yrs.

Attach product data/brochures and Vendor Qualification Form for the specified and substitute product.

Undersigned has examined Construction Documents, is familiar with specified product, understands indicated application of product, and understands design intent of Engineer. Undersigned states that proposed substitution complies with Construction Documents and will perform at least equally to specified product within limitations stated above. Undersigned accepts responsibility for coordinating application and installation of proposed substitution and waives all claims for additional costs resulting from incorporation of proposed substitution into Project or its subsequent failure to perform according to specified requirements.

Submitted By: _____

Typed

Signature

Date: _____

END OF SECTION 01630

THIS PAGE LEFT BLANK INTENTIONALLY.

DIVISION 1 – SECTION 01700**FIELD ENGINEERING****PART 1 GENERAL****1.01 SUMMARY**

- A. Provide such field engineering services as are required for proper completion of the Work including, but not necessarily limited to:

1. Establishing and maintaining lines and levels;
2. Structural design of shores, forms, and similar items provided by the Contractor as part of his means and methods of construction.

All field engineering is incidental to the Item for which it applies. No direct pay will be made for field engineering.

- B. Related work:

1. Documents affecting work of this Section include, but are not necessarily limited to, Division 0, Division 1 and other Sections of these Specifications.
2. Additional requirements for field engineering may be described in other Sections of these Specifications.

1.02 SUBMITTALS

- A. Upon request of the Owner or Engineer, submit:

1. Data demonstrating qualifications of persons proposed to be engaged for field engineering services.
2. Documentation verifying accuracy of field engineering work.
3. Certification, signed by the Contractor's retained field engineer, certifying that elevations and locations of improvements are in conformance or nonconformance with requirements of the Contract Documents.

1.03 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.04 PROCEDURES

- A. In addition to other procedures directed by the Contractor for proper performance of the Contractor's responsibilities:

1. Locate and protect control points before starting work on the site.
2. Preserve permanent reference points during progress of the Work.
3. Prior to commencing any work requiring location or grades, the Contractor shall establish

temporary bench marks (TBMs) at an interval not to exceed 1000 feet. TBMs are to be located in areas not anticipated to be disturbed by construction. Provide the Owner or Engineer copies of field notes, including peg test of level, and a listing of the adjusted coordinates and elevations of all TBMs.

4. Do not change or relocate reference points or items of the Work without specific approval from the Owner or Engineer.
5. Promptly advise the Owner or Engineer when a reference point is lost or destroyed, or requires relocation because of other changes in the Work.
 - a. Upon direction of the Owner or Engineer, require the field engineer to replace reference stakes or markers.
 - b. Locate such replacements according to the original survey control.

END OF SECTION 01700

DIVISION 1 – SECTION 01720
PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.01 SUMMARY

- A. Throughout progress of the Work, maintain an accurate record of changes in the Contract Documents, as described in paragraph 3.01 below and, upon completion of the Work, transfer the recorded changes to a set of Record Documents, as described in paragraph 3.02 below. This shall include Record Drawings.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Provisions and the Technical Sections of these Specifications.
 - 2. Other requirements affecting Project Record Documents may appear in pertinent other Sections of these Specifications.

1.02 SUBMITTALS

- A. The Program Manager's review of the current status of Project Record Documents is a prerequisite to the Program Manager's approval of requests for progress payments and request for final payment under the Contract.
- B. Prior to submitting each Application for Payment, secure the Program Manager's review of the current status of the Project Record Documents.
- C. The final project Record Documents must be submitted to the Program Manager and secure approval before final payment for demobilization can occur.

1.03 QUALITY ASSURANCE

- A. Delegate the responsibility for maintenance of Record Documents to one person on the Contractor's staff as approved by the Program Manager.
- B. Accuracy of records:
 - 1. Thoroughly coordinate changes within the Record Documents, making adequate and proper entries on each page of Specifications and each sheet of Drawings and other Documents where such entry is required to show the change properly.
 - 2. Accuracy of records shall be such that future searches for items shown in the Contract Documents may rely reasonably on information obtained from the approved Project Record Documents.
- C. Make entries within 24 hours after receipt of information that the change has occurred.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Maintain the job set of Record Documents completely protected from deterioration and from loss and damage until completion of the Work and transfer of all recorded data to the final Project Record Documents.

- B. In the event of loss of recorded data, use any means necessary to again secure the data needed to comply with this section.
 - 1. Such means shall include, if necessary in the opinion of the Program Manager, removal and replacement of concealing work or materials by Contractor at Contractor's expense.

PART 2 PRODUCTS

2.01 RECORD DOCUMENTS

- A. Job set: Promptly following the Notice to Proceed, secure from the Program Manager at no charge to the Contractor one complete set of all Documents comprising the Contract.

PART 3 EXECUTION

3.01 MAINTENANCE OF JOB SET

- A. Immediately upon receipt of the job set described in Paragraph 2.01-A above, identify each of the Documents with the title, "RECORD DOCUMENTS - JOB SET."
- B. Preservation:
 - 1. Considering the Contract completion time, the probable number of occasions upon which the job set must be taken out for new entries and for examination, and the conditions under which these activities will be performed, devise a suitable method for protecting the job set to the approval of the Program Manager.
 - 2. Do not use the job set for any purpose except entry of new data and for review by the Program Manager, until start of transfer of data to final Project Record Documents.
 - 3. Maintain the job set at the site of Work or at another site as designated by the Program Manager.
- C. Making entries on Drawings:
 - 1. Using an erasable colored pencil (not ink or indelible pencil), clearly describe the change by graphic line and note as required.
 - 2. Date all entries.
 - 3. Call attention to the entry by a "cloud" drawn around the area or areas affected.
 - 4. In the event of overlapping changes, use different colors for the overlapping changes.
- D. Make entries in the pertinent other Documents as approved by the Program Manager.
- E. Drawings shall clearly show actual installed locations, depth, and sizes of:
 - 1. Pipe work of all descriptions below ground outside of building and structures, including locations of culverts, storm & sewer lines, water lines, cleanouts, manholes, inlets, hydrants, and underground valves.
 - 2. Underground electrical conduits, electrical ducts, and directly buried conductors light cables, FAA cables including locations of pull and junction boxes, electric manholes and handholes, pad mounted electrical equipment, utility poles, electrical outlets, and lighting fixtures.

3. All existing underground facilities unearthed by Contractors operations not accurately shown on the drawing.
- F. Conversion of schematic layouts:
1. In some cases on the Drawings, arrangements of conduits, circuits, piping, ducts, and similar items, is shown schematically and is not intended to portray precise physical layout.
 - a. Final physical arrangement is determined by the Contractor, subject to the Program Manager's review.
 - b. However, design of future modifications of the facility may require accurate information as to the final physical layout of items, which are shown only schematically, on the Drawings. This information will be provided by the Contractor.
 2. Show on the job set of Record Drawings, by dimension accurate to within one half foot, the centerline of each run of items such as are described in subparagraph 3.01-E above.
 - a. Clearly identify the item by accurate note such as "24 inch R.C. pipe drain", "4" conduit" and the like.
 - b. Show, by symbol or note, the vertical location of the item ("36 inches deep"), "exposed," and the like.
 - c. Make all descriptive identification so that it may be related reliably to the Specifications.
 3. The Program Manager may waive the requirements for conversion of schematic layouts where, in the Program Manager's judgment, conversion serves no useful purpose. However, do not rely upon waivers being issued except as specifically issued in writing by the Program Manager.

3.02 FINAL PROJECT RECORD DOCUMENTS

- A. The purpose of the final Project Record Documents is to provide factual information regarding all aspects of the Work, both concealed and visible, to enable future modification of the Work to proceed without lengthy and expensive site measurement, investigation, and examination.
- B. Approval of recorded data prior to transfer to Program Manager:
 1. Secure the Program Manager's review of all recorded data.
 2. Make required revisions.
- C. Transfer of data to other Documents:
 1. If the Documents other than Drawings have been kept clean during progress of the Work, and if entries thereon have been orderly to the approval of the Program Manager, the job set of those Documents other than Drawings will be accepted as final Record Documents.
 2. If any such Document is not so approved by the Program Manager, secure a new copy of that Document from the Program Manager at the Program Manager's usual charge for reproduction and handling, and carefully transfer the change data to the new copy to the

approval of the Program Manager.

D. Review and submittal:

1. Submit the completed set of Project Record Documents to the Program Manager as described in Paragraph 1.02-C above.
2. Participate in review meetings as required.
3. Make required changes and promptly deliver the final Project Record Documents to the Program Manager.

3.03 CHANGES SUBSEQUENT TO ACCEPTANCE

- A. The Contractor has no responsibility for recording changes in the Work subsequent to Final Completion, except for changes resulting from work performed under Warranty.

END OF SECTION 01720

DIVISION 1 – SECTION 01730**CUTTING AND PATCHING****PART 1 GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for cutting and patching.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 1 Section "Coordination" for procedures for coordinating cutting and patching with other construction activities.
 - 2. Division 2 Section "Selective Demolition" for demolition of selected portions of the building for alterations.
 - 3. Refer to other Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
 - a. Requirements of this Section apply to mechanical and electrical installations. Refer to Division 15 Sections for other requirements and limitations applicable to cutting and patching mechanical and electrical installations.

1.3 QUALITY ASSURANCE

- A. Requirements for Structural Work: Do not cut and patch structural elements in a manner that would change their load-carrying capacity or load-deflection ratio.
 - 1. Obtain approval of the cutting and patching proposal before cutting and patching the following structural elements:
 - a. Foundation construction.
 - b. Bearing and retaining walls.
 - c. Structural concrete.
 - d. Structural steel.
 - e. Lintels.
 - f. Timber and primary wood framing.
 - g. Structural decking.
 - h. Stair systems.
 - i. Miscellaneous structural metals.
 - j. Exterior curtain-wall construction.
 - k. Equipment supports.
 - l. Piping, ductwork, vessels, and equipment.
 - m. Structural systems of special construction in Division 13 Sections.
- B. Operational Limitations: Do not cut and patch operating elements or related components in a manner that would result in reducing their capacity to perform as intended. Do not cut and patch

operating elements or related components in a manner that would result in increased maintenance or decreased operational life or safety.

1. Obtain approval of the cutting and patching proposal before cutting and patching the following operating elements or safety related systems:
 - a. Primary operational systems and equipment.
 - b. Air or smoke barriers.
 - c. Water, moisture, or vapor barriers.
 - d. Membranes and flashings.
 - e. Fire protection systems.
 - f. Noise and vibration control elements and systems.
 - g. Control systems.
 - h. Communication systems.
 - i. Conveying systems.
 - j. Electrical wiring systems.
 - k. Operating systems of special construction in Division 13 Sections.
- C. Visual Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in the Architect's opinion, reduce the building's aesthetic qualities. Do not cut and patch construction in a manner that would result in visual evidence of cutting and patching. Remove and replace construction cut and patched in a visually unsatisfactory manner.
 1. If possible retain the original Installer or fabricator to cut and patch the exposed Work listed below. If it is impossible to engage the original Installer or fabricator, engage another recognized experienced and specialized firm.
 - a. Processed concrete finishes.
 - b. Stonework and stone masonry.
 - c. Ornamental metal.
 - d. Matched-veneer woodwork.
 - e. Preformed metal panels.
 - f. Firestopping.
 - g. Window wall system.
 - h. Stucco and ornamental plaster.
 - i. Acoustical ceilings.
 - j. Terrazzo.
 - k. Finished wood flooring.
 - l. Fluid-applied flooring.
 - m. Carpeting.
 - n. Aggregate wall coating.
 - o. Wall covering.
 - p. Swimming pool finishes.
 - q. HVAC enclosures, cabinets, or covers.

1.4 WARRANTY

- A. Existing Warranties: Replace, patch, and repair material and surfaces cut or damaged by methods and with materials in such a manner as not to void any warranties required or existing.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible if identical materials are unavailable or cannot be used. Use materials whose installed performance will equal or surpass that of existing materials.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed before cutting. If unsafe or unsatisfactory conditions are encountered, take corrective action before proceeding.
 - 1. Before proceeding, meet at the Project Site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

3.2 PREPARATION

- A. Temporary Support: Provide temporary support of work to be cut.
- B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the project that might be exposed during cutting and patching operations.
- C. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Avoid cutting existing pipe, conduit, or ductwork serving the building but scheduled to be removed or relocated until provisions have been made to bypass them.

3.3 PERFORMANCE

- A. General: Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.
 - 1. Cut existing construction to provide for installation of other components or performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.
- B. Cutting: Cut existing construction using methods least likely to damage elements retained or adjoining construction. Where possible, review proposed procedures with the original Installer; comply with the original Installer's recommendations.
 - 1. In general, where cutting, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size

required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.

2. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.
3. Cut through concrete and masonry using a cutting machine, such as a Carborundum saw or a diamond-core drill.
4. Comply with requirements of applicable Division 2 Sections where cutting and patching requires excavating and backfilling.
5. Where services are required to be removed, relocated, or abandoned, by-pass utility services, such as pipe or conduit, before cutting. Cut-off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.

C. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.

1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.
2. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
3. Where removing walls or partitions extends one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform color and appearance. Remove existing floor and wall coverings and re-place with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a smooth painted surface, extend final paint coat over entire unbroken surface containing the patch after the area has received primer and second coat.
4. Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.

3.4 CLEANING

- A. Clean areas and spaces where cutting and patching are performed. Completely re-move paint, mortar, oils, putty, and similar items. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials. Restore dam-aged pipe covering to its original condition.

END OF SECTION 01730

DIVISION 1 – SECTION 01741**CLEANING****PART 1 GENERAL****1.01 SUMMARY**

- A. Throughout the construction period, maintain the site in a standard of cleanliness including mowing of grass as described in this Section. All demolition or construction debris (FOD) shall be confined within the work site at all times.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, Division 0, Division 1 and other Sections of these Specifications.
 - 2. In addition to the standards described in this Section, comply with requirements for cleaning as described in pertinent other Sections of these Specifications.
 - 3. In addition to the standards described in this Section, comply with pertinent requirements of governmental agencies having jurisdiction.

1.02 QUALITY ASSURANCE

- A. Conduct a daily inspection, and more often if necessary, to verify that cleanliness requirements are being met.
- B. In addition to the standards described in this Section, comply with pertinent requirements of governmental agencies having jurisdiction.

PART 2 PRODUCTS**2.01 CLEANING MATERIALS AND EQUIPMENT**

- A. Provide required personnel, equipment, and materials needed to maintain the specified standard of cleanliness.
- B. In addition to the standards described in this Section, comply with pertinent requirements of governmental agencies having jurisdiction.

2.02 COMPATIBILITY

- A. Use only cleaning materials and equipment compatible with the surface being cleaned and as recommended by the manufacturer of the material.

PART 3 EXECUTION**3.01 PROGRESS CLEANING**

- A. General:
 - 1. Retain stored items in an orderly arrangement allowing maximum access, not impeding traffic or drainage, and providing required protection of materials.

2. Do not allow accumulation of scrap, debris, waste material, and other items not required for construction of this Work.
 3. Inspect all haul vehicles leaving the site to make sure no debris can fall from the vehicle during transportation.
 4. Provide adequate storage for all items awaiting removal from the job site, observing requirements for fire protection and protection of the ecology.
- B. Site:
1. Daily, and more often if necessary, inspect the site and pick up all scrap, debris, and waste material. Remove such items to the place designated for their storage. Contractor shall document all daily inspections.
 2. Weekly, and more often if necessary, remove, completely, all accumulated scrap, debris, and waste material from the site.
 3. Maintain the site in a neat and orderly condition at all times.
 4. Mowing of grass within the construction limits is required at a minimum of every two (2) weeks during the active growing season, or as directed by the Engineer or Owner.

3.02 FINAL CLEANING

- A. "Clean," for the purpose of this section, and except as may be specifically provided otherwise, shall be interpreted as meaning the level of cleanliness generally provided by material sweepers and vacuums.
- B. Prior to completion of the Work, remove from the job site all tools, surplus materials, equipment, scrap, debris, and waste. Conduct final progress cleaning as described in Article 3.01 above.
- C. Site:
1. Unless otherwise specifically directed by the Owner or Engineer, broom clean paved areas on the site and public paved areas adjacent to the site.
 2. Completely remove resultant debris.
- D. Schedule final cleaning as approved by the Owner or Engineer to enable the Owner to accept a completely clean Work.

3.03 CLEANING DURING OWNER'S OCCUPANCY

- A. Should the Owner occupy the Work or any portion thereof, prior to its completion by the Contractor, and acceptance by the Owner, responsibilities for interim and final cleaning shall be as determined by the Engineer or Owner in accordance with the Division 0 and Division 1 Specifications.

3.04 INTERVENTION OF OWNER

- A. If the Contractor fails to clean up any debris which is deposited as a result of construction/demolition operations, or fails to mow grass as stipulated, the Airport Authority will, after attempting one notification, immediately do so and the cost thereof will be charged to the Contractor at the rate of two hundred and fifty dollars (\$250.00) per hour, per machine and per person additively. The Contractor shall assume full responsibility for failure to perform clean up operations required.

END OF SECTION 01741

THIS PAGE LEFT BLANK INTENTIONALLY

DIVISION 1 - SECTION 01770**CONTRACT CLOSEOUT****PART 1 - GENERAL****1.01 SECTION INCLUDES**

- A. Procedures and requirements for closing out the Work.
 - 1. Closeout submittals.
 - 2. Final cleaning.
 - 3. Record Documents.
 - 4. Substantial completion.
 - 5. Final inspection.
 - 6. Final payment.
 - 7. Warranties.

1.02 RELATED REQUIREMENTS AND SECTIONS

- A. Section 01100 - Summary of Work, Sequence of Construction & Liquidated Damages.

1.03 CLOSEOUT SUBMITTALS

- A. Record documents of the constructed work.
- B. Certificate of Occupancy.
- C. Warranties: This Section and applicable Sections of these Specifications.
- D. Contractors Affidavit of Payment of Debts and Claims and Contractors Affidavit of Release of Liens.
- E. Consent of Surety to Final Payment.
- F. As-built drawings.

1.05 FINAL CLEANING

- A. Clean work and storage areas free of trash. Broom clean and hose wash walks and pavements.

1.06 RECORD DOCUMENTS

- A. Definition:
 - 1. Dimensioned drawings showing in-place components and systems measured as accurately as practicable.
 - 2. Product data and other documents clearly identifying proprietary product and equipment incorporated into the Work.
- B. Maintain at job site one record copy of:
 - 1. Contract Drawings and As-built Drawings.
 - 2. Project Manual.

3. Addenda.
 4. Approved shop drawings.
 5. Contract Modifications.
 6. Field test records.
 7. Meeting minutes (notes).
- C. Make documents available at all times for inspection by Engineer and Owner.
- D. Marking Devices:
1. Use colored felt marking pens for marking prints and product data.
- E. Label each document "PROJECT RECORD" in 1" high printed letters.
- F. Record information concurrent with construction progress. Do not conceal any work until required information has been recorded.
- G. Submittal of Record Documents:
1. At completion of the Work, deliver Record Documents to Owner or Engineer with request for Final Payment.
 2. Accompany submittal with transmittal letter indicating:
 - a. Date
 - b. Project title
 - c. Contractor's name and address
 - d. Title and number of each record document
 3. Submit one reproducible copy and one electronic copy of Record Documents, and provide one copy of other Record Documents.
 4. Provide one AutoCAD Diskette

1.07 SUBSTANTIAL COMPLETION

- A. When Contractor considers the Work to be substantially complete as defined in Conditions of the Contract, Contractor shall prepare and submit a list (punch list) of items to be completed or corrected. Upon receipt of Contractor's list, Owner or Engineer will decide if the Work is substantially complete and, if necessary, will prepare a supplemental list (punch list) of items to be completed or corrected.
- B. Failure to include items on the punch list does not alter responsibility of Contractor to complete work according to Contract Documents.
- C. Before Owner or Engineer issues a Certificate of Substantial Completion, Contractor shall provide certificate of Use and Occupancy and evidence of approval from applicable governing authorities.

1.08 FINAL INSPECTION

- A. When Owner or Engineer receives written notice that the Work is ready for final inspection, and when final application for payment is received, Owner or Engineer shall promptly inspect to determine if the Work complies with the Contract Documents.
- B. Provide Owner or Engineer with written status report of each punch list item before final inspection.

1.09 FINAL PAYMENT

- A. Final payment will be made to contractor by Owner within 45 days after:

1. Completion of the Work.
2. Acceptance by Owner and Engineer of all work performed under the Contract.
3. Receipt of Project Record Documents.
4. Receipt of O & M data, manufacturer's instructions, service manual, parts manual, warranties, and other closeout submittals specified. O & M data must include a list of recommended vendors for any non-standard replacement parts and must include a detailed Preventative Maintenance guide with a schedule of suggested efforts.
5. Preparation by Contractor and approval of Owner of final statement of cost of the completed Work. Final statement shall indicate:
 - a. Original Contract Sum.
 - b. Previous Change Orders.
 - c. Deductions for liquidated damages.
 - d. Other applicable adjustments to Contract Sum.
 - e. Total Contract Sum as adjusted.
 - f. Previous Payments.
 - g. Final payment remaining due.
6. Upon completion by Contractor of work covered by Contract Documents, and before final payment to Contractor for work performed, Contractor shall deliver to Owner an affidavit, indicating that all labor and material used on or for execution of the Work has been paid.

1.10 WARRANTIES

- A. Provide duplicate notarized copies of warranties required by Contract Documents. Accumulate executed documents by subcontractors, suppliers, and manufacturers; provide table of contents and assemble in binder with durable plastic cover properly titled.
- B. Warranties are in addition to and not a limitation of other rights Owner may have against Contractor under the Contract Documents.
- C. Contractor shall bear costs of correcting work not complying with warranty requirements.
- D. Duration of warranties required by individual Sections shall indicate minimum times and shall not relieve Contractor of obligations required under applicable statutes or other Conditions of the Contract.
 1. Warranty period begins on date of Substantial Completion, except where modified by Conditions of the Contract.
 2. Warranties are non-prorated unless stated otherwise in these Specifications.
- E. Manufacturer's warranties shall be backed by assets of manufacturer and not a third party.
- F. Warranties shall be transferable.
- G. Submit warranties to Owner or Engineer for verification and submittal to Owner with Contractor's final Application for Payment.
- H. Re-submit warranties that do not comply with Contract Documents.

PART 2 - PRODUCTS (not applicable)

PART 3 - EXECUTION (not applicable)

END OF SECTION 01770

DIVISION 1 – SECTION 01771
AFFIDAVIT OF CONTRACTOR

STATE OF _____

COUNTY OF _____

_____, being duly sworn according to Law,
 (Name of Affiant)

deposes and says that he is the _____ of
 (Title)

_____, the Contractor, in a
 (Name of Contractor)
 Construction contract entered into between the Contractor and Memphis-Shelby County Airport Authority, the Owner,
 for the construction of Terminal Apron Reconstruction (including Concourse C South Demo) - Construction, MSCAA
 Project No. 13-1368-02, and that he is authorized to and does make this Affidavit on behalf of said Contractor in order
 to induce the Owner to make payment to the Contractor, in accordance with the provisions of the said Construction
 Contract.

Affiant further says that all persons who have furnished materials, labor, and equipment in connection with the
 construction of the facilities have been paid in full, and that the names of all manufacturers, materialmen,
 subcontractors and DBE subcontractors that furnished any material and/or services in connection with such
 construction and the kind of kinds of material and/or services so furnished are as listed hereinafter.

Affiant further certifies that he/she is familiar with the materials used in the construction of and incorporated into, the
 Project referenced above and attests that no asbestos-containing materials, either friable or otherwise, were used in
 the process of constructing or incorporated into the construction of the Project.

 (Signature of Affiant)

Sworn to and subscribed before me this _____ day of _____ 20____.

 (Notary Public)

My commission expires: _____

Kind of Material and/or Service

[illegible]Page 2
01771

END OF SECTION 01771

DIVISION 1 – SECTION 01772**FINAL LIEN WAIVER AND RELEASE
PRIME CONTRACTOR****STATE OF TENNESSEE
COUNTY OF SHELBY**

The undersigned _____ (hereinafter “Contractor”) has entered into a Contract with the Memphis-Shelby County Airport Authority (“Owner”) for the construction of improvements known as the:

Terminal Apron Reconstruction (including Concourse C South Demo) - Construction
Memphis International Airport
MSCAA Project No. 13-1368-02 (hereinafter “the Project”).

Upon the receipt of the sum of \$_____, the undersigned forever waives and releases any and all liens or claims of liens it has upon the foregoing described real property on account of labor, materials, equipment or services furnished for said Project. The undersigned certifies that all payments have been made for all work/materials performed to date for all subcontractors and suppliers with the exception of the amount due as a result of the payment amount shown above; and, that all subcontractors and suppliers will be paid all balances due upon receipt of the payment amount shown above. Further, the undersigned does hereby waive, release and relinquish any and all claims or demands against the Owner and Engineer of the above-described Project, the right to assert a mechanic’s and materialmen’s lien and/or any claim for quantum meruit or unjust enrichment, additional work, verbal agreements, increased cost, scheduling damages, including, but not limited to damages for delay, disruption, acceleration and/or interference, whether existing now or arising in the future.

The undersigned certifies and warrants that it has complied with all federal, state and local tax laws, including Social Security laws and Unemployment Compensation laws and workers’ compensation laws insofar as applicable to the performance of the Project. Further, the undersigned certifies and warrants that it has paid all of its subcontractors, vendors, and materialmen for services rendered in connection with the construction and improvement of the Project and that all labor, materials and equipment are free and clear of claims, security interests, indebtedness or encumbrances. The undersigned agrees to indemnify and hold harmless the Owner and the Engineer from and against any and all claims, damages, losses and expenses, including but not limited to, attorney’s fees, arising out of or resulting from any non-payment by the undersigned to any subcontractor, laborer, vendor or materialman for the Project.

As of this date, no mechanics’ or materialmen’s liens have been filed of record arising out of or related to the work performed by the undersigned.

Given under hand and seal this ____ day of _____, 20_____.

CONTRACTOR

By: _____

Title: _____

**STATE OF TENNESSEE
COUNTY OF SHELBY**

Before me, a notary public of the state and county mentioned, personally appeared _____, with whom I am personally acquainted, and who, upon oath, acknowledged such person to be _____, an officer authorized to execute the instrument, of _____, the within named bargainor, a corporation, and that such officer, as such _____, executed the foregoing instrument for the purposes therein contained, by personally signing the name of the corporation as _____.

Witness my hand and seal, at office, this ____ day of _____, 20____.

Notary Public

My Commission Expires:

END OF SECTION 01772

DIVISION 1 – SECTION 01774
CONTRACTOR WARRANTY FORM

PROJECT: MSCAA Project No. 13-1368-02, Terminal Apron Reconstruction (including Concourse C South Demo) - Construction

LOCATION: Memphis International Airport, Shelby County, Tennessee

OWNER: Memphis-Shelby County Airport Authority

We _____, Contractor
(Company Name)

for the above-reference project, do hereby warrant all labor and materials furnished and work performed are in accordance with the Contract Documents and authorized modifications thereto, and will be free from defects due to defective materials or workmanship for a period of one year.

This warranty commences on _____ and expires on _____.

This warranty covers that portion of the project described below:

ALL MATERIALS, LABOR, AND EQUIPMENT IN CONNECTION WITH THE CONSTRUCTION OF THE FACILITIES OF THE ABOVE REFERENCED CONTRACT.

The Contractor shall promptly correct all defective Work to comply with the Contract Documents whether observed before or after the substantial completion date and whether or not fabricated, installed or completed. The Contractor shall bear all costs of correcting defective Work.

If, within one (1) year after the substantial completion date, or within such longer period of time as may be prescribed by law or by the terms of any applicable special guarantee or warranty required by the Contract Documents, any of the Work is found to be defective and not in accordance with the Contract Documents, the Contractor shall correct it promptly after receipt of a written notice from the Owner, or the Engineer to do so.

All defective or non-conforming Work shall be removed from the site of the Work if necessary, and the Work shall be corrected to comply with the Contract Documents without cost to the Owner. The Contractor also shall bear the cost of making good all work of other contractors destroyed or damaged by removal or correction of the defective Work of Contractor.

If the Contractor fails to timely and properly correct defective Work, the Owner may correct it and hold the Contractor liable for all costs, expenses and damages, including attorney's fees and litigation costs incurred by Owner in correcting it.

In addition to the foregoing warranty, a warranty period of one (1) year shall apply under the same terms and conditions as the original warranty, to any work, supplied in correction of defective work under warranty pursuant to the provisions of this Section 17.04 and the Contractor shall assign to the Owner any warranties, including extended warranties, which are available in connection with the performance of such correction of defective Work. The warranty period shall commence on the date the Owner accepts the corrective Work of the Contractor.

DATE: _____ FOR: _____
(Company Name)

BY: _____
TITLE: _____

END OF SECTION 01774

ISSUED FOR BID

01774
Page 1

THIS PAGE LEFT BLANK INTENTIONALLY.

DIVISION 1 – SECTION 01775**CONSENT OF SURETY COMPANY TO FINAL PAYMENT**

To: Memphis-Shelby County Airport Authority
 2491 Winchester Road, Suite 113
 Memphis, TN. 38116-3856

Regarding Contract for: Terminal Apron Reconstruction (including Concourse C South Demo) - Construction

Project: 13-1368-02 _____

Dated: _____

CONTRACTOR: _____

In accordance with the provisions of the Contract between the Owner and the Contractor as indicated above, the

 (here insert name and address of Surety Company)

_____, SURETY COMPANY,

on bond of _____
 (here insert name and address of Contractor)

_____, CONTRACTOR,

hereby approves of the final payment to the Contractor, and agrees that final payment to the Contractor shall not relieve the Surety Company of any of its obligations to Memphis-Shelby County Airport Authority, OWNER.

IN WITNESS WHEREOF,
 the Surety Company has hereunto set its hand this _____ day of _____, 20_____

 Surety Company

 Signature of Authorized Representative

Attest:
 (Seal):

 Title

END OF SECTION 01775

THIS PAGE LEFT BLANK INTENTIONALLY.

DIVION 1 – SECTION 01783**ELECTRICAL CHARACTERISTICS, CAPACITIES AND WIRING DIAGRAMS****PART 1 GENERAL****1.01 SUMMARY**

- A. This section describes the electrical characteristics, sizes, capacities, ratings and wiring diagrams required of electrically operated equipment.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to Division 0, Division 1 and other Sections of these Specifications.

1.02 SUBMITTALS

- A. Furnish with each item of electrically operated equipment a wiring diagram showing all necessary electrical connections required to operate the equipment properly, in accordance with drawing and specification requirements.
- B. Furnish a composite wiring diagram showing all necessary interlock and related wiring between the various items of electrically operated equipment and their controls, as required to operate interlocked equipment as specified in other sections of these specifications and as indicated.

1.03 CAPACITIES, RATINGS, SIZES, AND OTHER REQUIREMENTS NOT SPECIFIED:

- A. For all items of material and/or equipment, the capacities, ratings, sizes, and other requirements thereof not specified shall be as indicated on the Contract drawings.
- B. Where capacities, ratings, sizes, and other requirements for materials and/or equipment is neither specified nor indicated on the Contract drawings, refer each case to the Owner or Engineer before ordering the materials and/or equipment involved, or proceeding with the work involved. The Owner's or Engineer's decision shall govern.

1.04 ELECTRICAL CHARACTERISTICS AND SIZES OF ELECTRICALLY OPERATED EQUIPMENT

- A. Each electrically operated item furnished under this contract shall operate proper on the electrical supply to which it is to be connected, as indicated on the electrical drawings.
- B. All electrically operated equipment shall operate on a 60 hz alternating current supply, unless otherwise indicated. Prior to delivery to the job site, it shall be the joint responsibility of the Contractor under the applicable section and the equipment supplier to determine from the electrical drawings the characteristics of the electrical supply indicated to each individual electrically operated item, and to furnish each electrically operated item accordingly.
 - 1. Where electrical characteristics are specified hereinafter, verify them from the electrical drawings. In the case of discrepancy between the specifications and the electrical drawings, the Electrical drawings shall govern.
 - 2. Where electrical characteristics cannot be determined from the electrical drawings, refer each case to the Owner or Engineer, and the Owner's or Engineer's decision shall govern.

END OF SECTION 01783**ISSUED FOR BID**01783
Page 1

THIS PAGE LEFT BLANK INTENTIONALLY.

DIVISION 1 – SECTION 01784
MANUFACTURER'S SUPERVISION

1.01 DESCRIPTION

A. Work included:

1. Furnishing Manufacturer's Supervision

B. Related Work:

1. Documents affecting work of this Section include, but are not necessarily limited to Division 0, Division 1, and other Sections of these Specifications.

1.02 SERVICES

- A. Furnish the services of authorized qualified manufacturer's representatives as required to supervise the installation, testing, initial starting, adjusting, and initial operation of each equipment item or any other item designated by the Contract Documents and included in this Contract.

END OF SECTION 01784

THIS PAGE LEFT BLANK INTENTIONALLY.

ITEM S-100 SPECIAL TECHNICAL PROVISIONS – SAFETY & SECURITY**DESCRIPTION**

100-1.1 Description. This shall consist of furnishing all labor, materials, equipment, and miscellaneous items, the performance of any work, project operations, or document preparation to comply with the safety and security requirements of the project and airport. The Contractor shall familiarize themselves, all employees and all subcontractors accessing the project work site with the safety and security requirements contained herein and throughout the project documents in order to ensure safety and security throughout the process of construction. The Construction Safety and Phasing Plan (CSPP) is specifically made a part of this Contract. Any deviation from the requirements established within this specification or the CSPP will be sufficient cause for Contract termination. Reference the project Construction Safety and Phasing Plan (CSPP) for details.

100-1.2 Safety Plan Compliance Document. At the time of the project award, prior to the issuance of the Notice to Proceed (NTP), the Contractor shall develop and submit a Safety Plan Compliance Document (SPCD).

This document shall outline the Contractor's work processes and methods utilized to meet the safety and security requirements outlined in the CSPP. The SPCD shall detail, but not be limited to, how the Contractor plans to maintain safety and security of both the Contractor's operations and the integrity of airport landside and airside operations during the prosecution of the contract work. The SPCD shall also detail the procedures to be followed in the event of an emergency or accident.

The SPCD must include a certified statement by the Contractor indicating its understanding of operations, safety, and security requirements outlined in the project plan set and CSPP. The statement shall assert that the Contractor understands these requirements and will not deviate from the approved CSPP and SPCD without prior written approval from the Airport.

The submitted SPCD shall be subject to the approval of the Owner and Project Manager and shall reflect any change as may be deemed necessary prior to approval and acceptance. The development of the required SPCD shall be considered incidental to S-100-6.6 *Safety & Security*

100-1.3 Contractor Representation. The Contractor shall appoint an on-site representative to serve as the Safety and Security Manager to ensure required safety and security protocols are followed and enforced for the duration of the contract. The Safety and Security Manager shall ensure that all personnel accessing the project site are familiar with the safety and security procedures as well as the regulations for operating at the airport.

The appointed individual(s) shall have the authority to represent the Contractor on safety and security compliance issues and authorized to make field decisions on the Contractor's behalf. The appointed individuals shall be especially knowledgeable regarding the requirements for operating in an active airfield environment at the airport and with the CSPP and SPCD. The appointed individual(s) shall be available 24-hours a day in the event of a project related construction safety or security emergency and for maintaining construction hazard lighting and barricades. The individual(s) shall be able and capable of responding within a reasonable amount of time from initial contact. These representatives shall be listed and position formalized in the SPCD.

CONTRACTOR ACCESS

100-2.1 Special Access Requirements. For any construction activity inside the security fence shown on

ISSUED FOR BID

the plans, special access requirements and procedures apply as detailed in the Special Conditions, SC-240 Airport Security Requirements. When a portion of the security fence must be removed to gain access or to perform the work, the Contractor must be able to continuously control the movement of personnel into the Restricted Area, maintain Airfield Operations Area (AOA) fence line integrity at all times, and shall restore the security fence to a condition approved by the Owner before leaving the site.

The Contractor's access to the project site shall be as shown in the project plan set. No other points of access shall be allowed without prior approval from the Owner and Project Manager. Vehicle and pedestrian access routes and entry points onto the airfield must be controlled at all times to prevent inadvertent or unauthorized entry of persons, vehicles, or animals onto the AOA or deviation from the approved haul routes. The Airport will coordinate requirements for vehicle operations with the affected airport tenants, Contractor and the FAA air traffic manager. The Contractor shall maintain a list of Contractor and Subcontractor employees and vehicles authorized to access and operate on the project site.

All construction vehicles and personnel shall be restricted to the immediate work areas specified by the contract for this project. These areas include the haul routes into the work areas, the designated contractor staging and equipment storage areas, the soil disposal areas, and any pavement areas under construction. Use of alternate haul routes or staging areas by the contractor shall not be permitted without prior notification and approval by the Owner and the Program Manager.

100-2.2 Vehicle Operation. No privately-owned vehicles shall be allowed onto the AOA. Contractors shall park privately owned vehicles in the designated Contractor staging or parking areas.

The Contractor is required to sign and mark all equipment in conformance with FAA Advisory Circular 150/5210-5D, *Painting, Marking, and Lighting of Vehicles Used on an Airport*. At a minimum, the company logo or name as well as beacons or orange and white checkerboard flags are required on all contractor vehicles accessing the Airport AOA. Beacons are mandatory for each vehicle operating on the airfield during night-time hours. Checkerboard flags will not be permitted as a substitute for beacons on vehicles operating at night.

Beacons and flags must be maintained to standards and in good working and operational condition. Beacons must be located on the uppermost part of the vehicle structure, visible from any direction, and flash 75 +/- 15 flashes per minute. Flags shall be 3' by 3' with alternating 1' by 1' international orange and white squares, and shall be replaced by the contractor if they become faded, discolored, or ragged as determined by Airport Operations or the Program Manager.

100-2.3 Vehicle & Pedestrian Access. The Contractor's access to the site shall be as indicated in the project plan set. No other points of access to the site or AOA shall be allowed without prior approval from the Program Manager. Vehicle and Pedestrian access routes and entry points onto the airfield must be controlled at all time to prevent inadvertent or unauthorized entry of people, vehicles, or animals onto the AOA or deviation from approved haul routes by the Contractor, their subconsultants, or material delivery drivers. The Program Manager and Airport shall coordinate vehicle operations with affected airport tenants, contractors, the FAA air traffic manager, and airport staff. The Contractor shall maintain a list of personnel accessing the secure areas of the airfield through their controlled access points and all personnel operating on the project site.

100-2.4 Material Deliveries. All material suppliers, subcontractors and visitors to the work site are obligated to follow the same safety and security operating procedures as the Contractor. All material suppliers shall make their deliveries using the same access points and routes as the Contractor and shall be advised of the appropriate delivery procedures at the time the materials order is placed. The Contractor shall not use the Airport address for any delivery but shall use the street address appropriate to the location of the entrance of the work site.

100-2.5 Plastic Safety Fence. A plastic fence, as detailed in the drawings, shall be furnished at the locations

ISSUED FOR BID

as indicated in the drawings and/or as directed by the Program Manager. Fence shall be fabricated of high density polyethylene (HDPE) in a diamond link pattern, 4 feet tall, and OSHA orange in color. Fence shall have metal T-post except when within the glide slope and localizer critical areas where it shall have wood posts. All plastic fence, including posts, shall be removed from the project site at the project completion.

100-2.6 Guard House. The Contractor will be required to submit on, obtain approval on, provide and move or locate the guardhouse to those locations shown on the plans or as directed by the Program Manager for each temporary AOA fence line penetration. The Contractor will be responsible for bringing the guard house up to the standards specified in Specification SC-240, if needed and directed by the Program Manager. The Contractor shall maintain the guard house for the duration of the Contract, including repair of air conditioning, heating, lighting, removal of garbage, and cutting of grass around the guard house. The Contractor shall provide a portable toilet facility for the exclusive use of the gate guard. See SC-240 for additional requirements. Upon completion of work thus eliminating the need of Guard House(s), the Contractor shall remove Guard Houses from the site.

100-2.7 Crossing Gate Arm. Crossing gate arms shall be furnished by the Contractor and approved by the Program Manager prior to use. The gate arms will be used at the guard houses that will be stationed at each active taxiway crossing. Two arms per one taxiway crossing are required. (One arm on each side of the taxiway crossing). Gate arms shall be Delta Scientific Corporation MG139, or approved equal. All gate crossing arms (contractor furnished) shall be removed from the project site at the project completion.

CONSTRUCTION SEQUENCING AND COORDINATION

100-3.1 Construction Coordination. Pre-Construction conferences and Pre-work meetings shall be used to introduce airport operational safety and security elements specific to the project and individual work items throughout the duration of construction operations. In addition, construction progress meetings, scope and/or schedule changes, and meetings with the FAA Air Traffic Organization (ATO) will be coordinated as required through the performance of the contract.

Contact information for key construction, Airport, Project Manager and Engineer personnel will be distributed prior to the start of construction. Daily notifications/communication of construction issues and progress will be held as necessary between the Airport staff, the Program Manager, the Engineer, and Contractor. The Airport will brief the FAA and tenants as needed. Communication between the airport staff and tenants and the construction personnel shall be primarily through the Program Manager. If the airport staff and tenants are not able to contact the Program Manager, they may contact the designated Contractor Safety & Security Representative that will be on call 24-hours a day.

100-3.2 Construction Sequencing. The Contractor shall prepare a construction schedule and submit to the Program Manager, no later than 15 days after the date of execution of the Contract, a full detailed critical path method (CPM) schedule. Reference the project Special Conditions.

102-4.3 Closing Surfaces. The Contractor shall acquaint his supervisors and employees with the sequence of construction and its relationship to airport activity and aircraft operations that are inherent to the Airport and project work area(s). No runway, taxiway, apron or airport roadway shall be closed without approval of the Owner and/or Program Manager, to enable necessary NOTAMS and/or advisories to airport fixed based operators (FBOs), tenants and users. The Contractor shall contact the Program Manager a minimum of ten (10) days prior to any requested closure.

Any construction activity within 250-feet of the centerline of an active runway or within 93-feet of the centerline of an active taxiway or apron requires the closure of the affected area. These safety areas are shown on the phasing plan.

The Program Manager will arrange for an inspection prior to the return to service of any facility that has

been closed for work, on or adjacent thereto, or that has been used for a crossing point or haul route by the Contractor.

The Contractor will be required to coordinate stockpile locations and heights with the Program Manager for the project site and all staging/storage areas. FAA restrictions affects the allowable height for equipment or stockpiles.

100-4.4 Low Profile Barricades (Type I). Low Profile Barricade Type I - 10" x 10" x 96" low profile type I barricades as detailed in the drawings shall be furnished by the Contractor. The Contractor shall furnish red flashing and red steady burn lights meeting FAA standards for installation on Contractor Furnished low profile barricades. The lights as installed in the field will longitudinally alternate between steady burn and flashing and shall be maintained for the project duration. The lights will become the property of the Contractor upon completion of the project and shall be removed off of airport property. Multiple installations and removals will be required of the Contractor; however, the Contractor will be paid for only the initial installation. All low-profile barricades will become the property of the Contractor upon completion of the project and shall be removed off of airport property.

100-4.5 Reflective Cone. Reflective cones with red flashing lights that meet FAA standards, as detailed in the drawings, shall be furnished to the jobsite and maintained for project duration. Multiple installations and removals will be required of the Contractor; however, the Contractor will be paid for only the initial installation. The cones with lights will become the property of the Contractor upon completion of the project and shall be removed off of airport property.

100-4.6 Portable Concrete Barrier Rail (Type III). Concrete jersey barricade Type III shall be as detailed in the drawings and shall be furnished by the Contractor. The Contractor shall furnish red flashing and red steady burn lights meeting FAA standards. The lights as installed in the field will longitudinally alternate between steady burn and flashing and shall be maintained for the project duration. Lights shall be placed a maximum of 25' apart and at all corners. Concrete barriers shall be spaced a maximum of 3 feet apart unless otherwise directed by the Program Manager. Multiple installations and removals will be required of the Contractor; however, the Contractor will be paid for only the initial installation. All concrete barricades and lights will become the property of the Contractor upon completion of the project and shall be removed off of airport property.

FACILITIES

100-4.7 Field Office Trailer. A double wide office trailer, having a minimum size of 28'x60', heated and air-conditioned, shall be provided by the Contractor. The trailer shall be for the exclusive use of the Program Manager and Designer, and shall be installed and operational within 45 days of NTP and shall remain in place for up to 45 days after project closeout. Each trailer shall have an enclosed restroom with sink and exhaust fan. The trailer shall have two offices on each end and a central conference room in the center with a minimum of three 110-volt outlets in each office and six in the conference room. Two offices shall have an exterior, solid core door with a dead bolt. In addition, the trailer shall be equipped with 3 telephone lines and 1 DSL internet connection. A compacted 6-inch gravel (P-209) parking area, 30' x 60' and driveway with corrugated metal pipe culvert shall be placed at the direction of the Program Manager. One water spigot and one exterior 110-volt outlet shall be provided near the entrance. Two halogen lamps shall be provided on each end of the trailer facing the parking area. The Program Manager shall approve the floor plan prior to procurement. The Program Manager shall approve the location of the trailer and layout of the parking lot. Any required office furniture will be included and reimbursed under the Office Equipment Allowance included under SC-30-6.

Set up of the trailer, including permits and fees, tie-downs, steps, sanitary sewer, water, telephone, DSL and power, shall meet all applicable building and Fire Department codes and is incidental to the item.

ISSUED FOR BID

Maintenance of the trailer including; cleaning three times a week, utility bills, repair of the trailer, furniture and HVAC, and pumping of the septic tank if not connected to the city system, shall be incidental to the item. Insurance shall be maintained on the trailer covering full replacement value, including contents, for damage or loss resulting from negligence, fire, acts of god or vandalism.

100-4.8 Curing Facilities. The Contractor shall provide initial curing facilities for P-501 beams in accordance with paragraph 501-5.1a.(3) and ASTM C 31. In addition, the initial curing facilities shall be a climate controlled ground level (roll-off) trailer with sufficient space to hold a minimum of 8 storage tanks. The Contractor shall supply storage tanks deep enough to submerge beams in a vertical orientation. The specific construction of the curing tanks shall follow specifications given in ASTM C 511. The facility shall have tables that run the length of the trailer approximately 36 to 44 inches high to support the beams off the floor. The initial curing facility and tables shall be constructed so that they can carry the live load from the concrete test beams. (Each beam will weigh approximately 70 pounds) The initial curing facilities shall also have a minimum of 2-110 volt outlets and sufficient lighting to do the necessary paper work.

The facilities shall be in place and operational at least 60 days prior to placement of P-501 pavement. The maintenance of the facilities will be the responsibility of the Contractor, which will include but will not be limited to climate control, electricity, water, lighting and water leaks. The Contractor shall be responsible for supplying necessary water and electricity to the facilities. The Contractor shall maintain ownership of the equipment and facilities upon completion of the project. The facilities shall remain in place and operational at least 28 days after the last P-501 pavement has been placed. The specified facilities will be for the sole use of the MSCAA Quality Assurance (QA) testing firm and the Project Manager.

METHOD OF MEASUREMENT

100-5.1 Plastic Safety Fence. Plastic safety fence, including plastic tension wire, as detailed in the drawings, with metal T-posts or with wood posts, shall be furnished and installed at the locations indicated in the plans and/or as directed by the Program Manager, moved as necessary, and removed by Contractor, shall not be measured for payment but shall be considered incidental to Project Safety & Security.

100-5.2 Guard House. Guard houses, furnished by, relocated, installed, and maintained by the Contractor, shall be measured per each and accepted by the Program Manager.

100-5.3 Low Profile Barricade (Type I). Safety barricades furnished by, installed, and maintained by Contractor shall not be measured separately but shall be considered incidental to Project Safety & Security. The Contractor furnished lights shall be considered incidental to the low profile barricades.

100-5.4 Portable Concrete Barrier Rail (Type III). Concrete jersey barricade with lights furnished by the Contractor and installed and maintained by the Contractor shall not be measured separately but shall be considered incidental to Project Safety & Security.

100-5.5 Reflective Cone. Reflective cones, including steady burn and flashing strobe lights and either solar-panels or batteries, replacement as required, relocation as required, and maintenance shall not be measured separately but shall be considered incidental to Project Safety & Security.

100-5.6 Field Office Trailer and Curing Facilities. This item shall be measured as lump sum for providing the field office trailer and curing facilities in accordance with this specification.

100-5.7 Crossing Gate Arm. Crossing gate arms furnished by, installed, and maintained by Contractor shall be measured per each as detailed in the drawings.

100-5.8 Project Safety & Security. Safety and Security shall be measured as a lump sum item for all required equipment, installation or use of that equipment, and all operations, maintenance or incidentals required to properly maintain phased site safety and airfield security, unless otherwise indicated as a separate pay item under this specification. Safety and Security shall be furnished for the life of the Contract.

BASIS OF PAYMENT

100-6.1 Plastic Safety Fence. Plastic safety fence shall be furnished at the locations indicated in the drawings and/or as directed by the Program Manager and paid for under Project Safety & Security. Maintenance shall be incidental and may include replacement of posts, replacement of fabric and/or reattachment of fabric to posts. All costs for safety fence, including installation, final demolition, and relocation, if required, is to be included under Project Safety & Security and will not be measured and paid for separately. The prices shall be full compensation for transporting, furnishing materials, and maintenance, for all preparation, assembly, and installation, and for all labor, equipment, tools, and incidentals necessary to complete this item to the provisions and intent of the plans and specifications.

100-6.2 Guard House. Contractor furnished guard houses shall be installed on the project site and maintained for the duration of the project. The unit price includes relocating to the site, installation, relocation throughout the duration (up to but not including the completion) of the project, final removal from the project site, portable toilet, maintenance, cleaning, lights, air conditioning and heat, chair, trash collection, utility hookups and all necessary appurtenances resulting in a useable guard house in accordance with section SC-240 of the project specifications, all utility connection fees, and monthly billings.

Payment will be made only once for each guard house used on the project, regardless if the guard house is moved. Guard house personnel shall be furnished by MSCAA. These prices shall be full compensation for transporting, furnishing materials, and maintenance, for all preparation, assembly, and installation, and for all labor, equipment, tools, and incidentals necessary to complete this item to the provision and intent of the plans and specifications.

100-6.3 Low Profile Safety Barricade (Type I). Low Profile Safety Barricades (Type I) shall be included under Project Safety & Security, for all phases and include providing solar powered lights. The Contractor is also responsible for installation and maintenance for the duration of the project, and removal at phase or project completion. Barricade removal and relocation from one location to another location within the project limits, including installation at the relocated site are incidental to Project Safety & Security. Upon project completion, the Contractor will remove barricades from the project site.

100-6.4 Portable Concrete Barrier Rail (Type III). Concrete jersey barricade shall be furnished at the locations indicated in the drawings and/or as directed by the Program Manager and paid for under Project Safety & Security. Multiple installations and removals to accommodate project phasing are incidental to Project Safety & Security. This shall include all costs associated with transporting, furnishing materials including steady burn and flashing lights, maintenance, relocation, removal, all preparation, assembly, installation, and for all labor, equipment, tools, and incidentals necessary to complete this item to the provisions and intent of the plans and specifications. Upon project completion, the Contractor shall remove the concrete jersey barricades from Airport property.

100-6.5 Reflective Cones. Reflective cones shall be furnished at the locations indicated in the drawings and/or as directed by the Program Manager and paid for under Project Safety & Security. Multiple installations and removals to accommodate aircraft movement are incidental. This shall include all costs associated with transporting, furnishing materials, maintenance, relocation, removal, all preparation, assembly, installation, and for all labor, equipment, tools, and incidentals necessary to complete this item to the provisions and intent of the plans and specifications.

ISSUED FOR BID

100-6.6 Field Office Trailer and Curing Facilities. The price shall be full compensation for furnishing the Field Office Trailer and Curing Facilities. Payment shall be made at the contract lump sum price for completing this item to the satisfaction of the Program Manager as specified in this specification.

100-6.7 Crossing Gate Arm. Contractor furnished crossing gate arm shall be installed and maintained for the duration of the project as required for each AOA fence line . The unit price includes relocating to the site from a location on airport property, installation, relocation throughout the duration (up to but not including the completion) of the project. All contractor furnished crossing gate arms shall be removed from the project site upon project completion.

Payment will be made only once for each crossing gate arm used on the project, regardless if the crossing gate arm is moved. The price shall be full compensation for transporting, furnishing materials, and maintenance, for all preparation, assembly, and installation, and for all labor, equipment, tools, and incidentals necessary to complete this item to the provision and intent of the plans and specifications.

100-6.8 Project Safety & Security. Payment shall be made for airport safety and security measures for personnel or materials related to this specification item and incidentally required to satisfy the specified objective(s) under item S-100-6.6, Project Safety & Security. This shall be full compensation for furnishing all materials and for all labor, equipment, tools, and incidentals necessary to satisfactorily complete the item.

PARTIAL PAYMENTS. Partial payments will be made in accordance with the following:

- a. With first pay request, 25%.
- b. When 25% or more of the original contract amount in dollars is earned, an additional 25%.
- c. When 50% or more of the original contract amount in dollars is earned, an additional 40%.

After Final Inspection, Staging area clean-up and delivery of all Project Closeout materials as required by General Provision, Section 90-11, the final 10%

Payment will be made under:

Item S-100-6.1	Guard House – per Each
Item S-100-6.2	Field Office Trailer and Curing Facilities – per Lump Sum
Item S-100-6.3	Crossing Gate Arm– per Each
Item S-100-6.4	Project Safety & Security – per Lump Sum

END OF ITEM S-100

ISSUED FOR BID

PAGE INTENTIONALLY BLANK

ISSUED FOR BID

ITEM S-101 UNDERGROUND UTILITY MARKERS

DESCRIPTION

101-1.1 GENERAL

This item shall consist of the furnishing and installation of underground utility markers on the surface of the apron, in accordance with these specifications, and as directed by the Program Manager.

MATERIALS

101-2.1 UTILITY MARKER

The utility marker shall be flat top, bronze construction, four-inch diameter by 1/8 in. minimum thickness top with two-inch minimum length shank.

101-2.2 GROUT

Grout shall be non-shrink epoxy grout, with a minimum compressive strength (7 day) of 17,500 psi. (ASTM C579B), minimum tensile strength of 2,400 psi (ASTM C307), and a minimum flexural strength of 4,800 psi (ASTM C580).

CONSTRUCTION METHODS

101-3.1 UNDERGROUND UTILITY IDENTIFICATION

When conducting underground work, if existing underground utilities that have not been previously marked are located, the Contractor shall provide utility markers as required in this Section.

101-3.2 UNDERGROUND UTILITY MARKERS

Provide permanent utility markers for new underground utilities at the following locations, as a minimum:

1. Within two feet of each side of obstacles, or walls, or building entrances
2. At changes in direction
3. Within two feet of each connecting pipe at branch line connections
4. At a maximum spacing of 300 ft. along straight sections
5. Within two feet of utility termination

Provide permanent utility markers for existing utilities that are to remain in place after apron construction, but only for said utilities that are uncovered and exposed by other construction activities. It is not the intent of this specification that every existing utility within the project limits, that is to remain at project completion, is to be mapped and marked, unless directed otherwise by the Program Manager.

Markers shall be provided for the following underground utilities; subject to the following constraints:

<u>Utility</u>	<u>Usage Constraints</u>
Electrical/Power	Duct Banks Only
Hydrant Fuel	All Size Pipes
Storm Drainage	8 in. Dia. (Minimum)
Telecommunications	Duct Banks Only
Water	All Size Pipes
Other	As Directed by Program Manager

Coordinates of utility markers shall be determined by field survey, and shall be referenced to the airport

ISSUED FOR BID

coordinate system.

The marker top shall be inscribed with the following information:

- Utility Size (in inches) and Type
- Depth from finish grade (in inches)
- State Plane Coordinates (to nearest 0.10 foot)
- MSCAA Project Number

METHOD OF MEASUREMENT

101-4.1

Utility markers will be measured per each installed and accepted.

BASIS OF PAYMENT

101-5.1

Utility identification markers will be paid for at the contract unit price per each and shall be full compensation for all work described herein including all labor, equipment, materials and tools necessary to complete this item to the satisfaction of the Program Manager, including drilling and core drilling, chamfering of the concrete pavement, grouting, and cleanup.

Payment will be made under: Item S-101-5.1 Utility Markers -- per each.

END OF ITEM S-101

ISSUED FOR BID

ITEM S-102 POROUS BITUMINOUS BASE COURSE**DESCRIPTION****102-1.1 GENERAL**

Porous Bituminous Base Course (PBC) shall consist of an open-graded, bituminous base course drainage layer composed of mineral aggregate and bituminous material, mixed in a central mixing plant, and placed on a prepared surface in accordance with these specifications and shall conform to the dimensions shown on the plans.

MATERIALS**102-2.1 AGGREGATE**

The aggregate shall conform to ASTM C 33 and shall consist of crushed stone with or without other inert finely divided mineral aggregate. The aggregate shall be composed of clean, sound, tough, durable particles, free from clay balls, organic matter, and other deleterious substances. The crushed aggregate portion which is retained on the 3/8-inch (9.5 mm) sieve shall not contain more than 15 percent by weight of flat or elongated particles as defined in ASTM D 693. The aggregate shall be free of any deleterious substances in accordance with ASTM C 33. Coarse or fine aggregate containing or consisting of slag will not be allowed.

The crushed aggregate portion which is retained on the No. 4 (4.75 mm) sieve shall not show a percentage of wear greater than 30 when tested in accordance with ASTM C 131.

The crushed aggregate portion which passes the 3/4-inch (19.0 mm) sieve and is retained on the No. 4 (4.75 mm) sieve shall not show a total weighted average loss greater than 9 percent in sodium sulfate solution or a magnesium soundness loss exceeding 12 percent after 5 cycles when tested in accordance with ASTM C 88.

The asphalt shall be treated with an antistripping agent. The amount of antistripping agent used shall be sufficient to produce a coated area above 95 percent.

Any antistripping agent or additive that is required shall be heat stable, shall not change the asphalt cement viscosity beyond specifications, shall not contain any harmful ingredients, shall be added in recommended proportion by approved methods, and shall be a material that has been approved by the Tennessee Department of Transportation.

102-2.2 FILLER Not used**102-2.3 BITUMINOUS MATERIAL**

Bituminous material shall be PG 64-22.

COMPOSITION**102-3.1 COMPOSITION OF MIXTURES**

The porous base course shall be composed of a mixture of aggregate, filler, bituminous material, and antistripping agent (if required). The several aggregate fractions shall be sized, graded, and combined in

ISSUED FOR BID

the proportions that meet the requirements of the job mix formula. Recycled materials shall not be used unless approved by the Program Manager.

102-3.2 JOB MIX FORMULA

No bituminous mixture shall be produced for payment until the Contractor has submitted samples of the formula for each mixture to be used. The job mix formula for each mixture shall be in effect until modified in writing by the Program Manager. The job mix formula for each mixture shall establish a single percentage passing each required sieve size, a single percentage of bituminous material to be added to the aggregate, and a single temperature for the mixture as it is discharged into the hauling units.

The combined aggregate shall be of such size that the percentage composition by weight, as determined by laboratory sieves, will conform to the gradation shown in Table 1 when tested in accordance with ASTM C 136. Table 1 is representative of most crushed stone aggregates and is not intended to limit the bituminous content established in the job mix formula.

The gradations in Table 1 represent the limits which shall determine the suitability of the aggregate for use from the sources of supply. The aggregate, as finally selected, shall have a gradation within the limits designated in Table 1 and shall not vary from the low limit on one sieve to the high limit on the adjacent sieve, or vice versa, but shall be uniformly graded from coarse to fine.

TABLE 1. AGGREGATE-POROUS BASE COURSE

Sieve Size	Percentage by Weight Passing Sieve
2 in. (50.0 mm)	100
1-1/2 in. (37.5 mm)	94-100
3/4 in. (19.0 mm)	60-70
No. 4 (4.75 mm)	10-20
No. 8 (2.36 mm)	0-6

Compacted Thickness: 4 inch

Bituminous Cement: Min 2.0 percent by weight of total mix

The job mix tolerances shown in Table 2 shall be applied to the job mix formula to establish a job control grading band. The full tolerances will still apply if application of the job mix tolerances results in a job control grading band outside the master grading band.

**TABLE 2. JOB MIX FORMULA TOLERANCES
(Based on a Single Test)**

Material	Tolerance – Plus or Minus
Aggregate passing No. 4 sieve or larger	5.0 percent
Aggregate passing No. 8	4.0 percent
Bitumen	0.40 percent

ISSUED FOR BID

Temperature of mix	20° F
--------------------	-------

If a change is made in any component or in the source of the materials of the bituminous mix, a new job mix formula shall be established and approved by the Program Manager before any additional material on the project is produced and placed. When unsatisfactory results or other conditions make it necessary, the Program Manager may establish a new job mix formula.

102-3.3 TEST SECTIONS

Prior to full plant production, the Contractor shall prepare a quantity of Porous Bituminous Base Course (PBC) mixture according to the job mix formula. The amount of mixture should be sufficient to construct a test section at a minimum of 100' feet long, not to exceed a length of 300' long, and 20' wide. The test area will be designated by the Program Manager. The mixture shall be placed in two sections and shall be of the same depth specified on the plans. The underlying pavement on which the test section is to be constructed shall be the same as the remainder of the course represented by the test section. The equipment to be used in construction of the test section shall be the same type and weight to be used on the remainder of the course represented by the test section. No bituminous mixture shall be produced for production paving and payment prior to successful placement of a test strip by the Contractor with accompanying acceptance of the test strip by the Program Manager. Acceptable compaction shall be the maximum number of roller passes without fracturing aggregate as determined by visual inspection of test holes in the installed paving course. The maximum number of compaction passes shall be eight. A pass shall be considered the movement of a roller over the drainage layer area in one direction only.

If the test section should prove to be unsatisfactory, the necessary adjustments to the mix design, plant operation, and/or rolling procedures shall be made. Additional test sections, as required, shall be constructed and evaluated for conformance to the specifications. When test sections do not conform to specification requirements, the pavement shall be removed and replaced at the Contractor's expense. Full production shall not begin without approval of the Program Manager. Test sections will be paid for in accordance with paragraph 102-6.1.

CONSTRUCTION METHODS

102-4.1 WEATHER AND SEASONAL LIMITATIONS

The porous bituminous course shall be constructed only on a dry surface when the atmospheric temperature is in excess of 45°F and not expected to go below 42°F during placement, or is 40°F and rising (at calm wind conditions) and when the weather is not foggy, raining, or when rain is not imminent.

102-4.2 BITUMINOUS MIXING PLANT

Plants used for the preparation of bituminous mixtures shall conform to the requirements of ASTM D 995 with the following changes:

- a. **Requirements for all Plants.** Mixing plants shall be of sufficient capacity to adequately handle the proposed bituminous construction. The mixing plant shall have a minimum hourly production capability of 200 tons.
 - (1) **Truck Scales.** The bituminous mixture shall be weighed on approved scales furnished by the Contractor, or on public scales at the Contractor's expense. Such scales shall be inspected and sealed as often as the Program Manager deems necessary to assure their

ISSUED FOR BID

accuracy. Scales shall conform to the requirements of GP-90.

- (2) **Testing Laboratory.** All quality control and acceptance testing shall be in accordance with Section GP-100 and SC-160.
- (3) **Inspection of Plant.** The Program Manager, or his/her authorized representative, shall have access, at all times, to all parts of the plant for checking adequacy of equipment; inspection operation of the plant; verifying weights, proportions, and character of materials and checking the temperatures maintained in the preparation of the mixtures.
- (4) **Storage Bins and Surge Bins.** Paragraph 3.9 of ASTM D 995 is deleted. Instead, the following applies. Use of surge bins or storage bins for temporary storage of hot bituminous mixtures will be permitted as follows:

- (a) The bituminous mixtures may be stored in surge bins for period of time not to exceed 3 hours.
- (b) The bituminous mixture may be stored in insulated storage bins for a period of time not to exceed 24 hours, provided an inert gas atmosphere is maintained in the bin during the storage period.

The bins shall be such that mix drawn from them meets the same requirements as mix loaded directly into trucks.

If the Program Manager determines that there is an excessive amount of heat loss, segregation or oxidation of the mixture due to temporary storage, no overnight storage will be allowed.

102-4.3 HAULING EQUIPMENT

Trucks used for hauling the bituminous mixture shall have tight, clean, smooth metal beds. Petroleum products shall not be used for coating truck beds. To prevent the mixture from adhering to them, the truck beds shall be lightly coated with a minimum amount of concentrated hydrated lime and water solution. The truck beds shall be raised to drain any excess solution before loading the mixture in the trucks. Each truck shall have a suitable cover to protect the mixture from adverse weather or long hauls. An insulated bed may be required to maintain the mixture at the specified temperature during hauling.

102-4.4 BITUMINOUS PAVERS

Bituminous pavers shall be self-contained, power-propelled units with an activated screed or strike-off assembly, heated if necessary, and shall be capable of spreading and finishing courses of bituminous plant mix material which will meet the specified thickness, smoothness, and grade.

The paver shall have a receiving hopper of sufficient capacity to permit a uniform spreading operation. The hopper shall be equipped with a distribution system to place the mixture uniformly in front of the screed. The screed or strike-off assembly shall produce a finished surface of the required evenness and texture without tearing, shoving, or gouging the mixture.

The paver shall be capable of operating at forward speeds consistent with satisfactory laying of the mixture.

ISSUED FOR BID

If an automatic grade control device is used, the paver shall be equipped with a control system capable of automatically maintaining the screed elevation as specified herein. The control system shall be automatically actuated from either a reference line or a surface through a system of mechanical sensors or sensor-directed mechanisms or devices which will maintain the paver screed at a predetermined transverse slope and at the proper elevation to obtain the required surface. The transverse slope controller shall be capable of maintaining the screed at the desired slope within plus or minus 0.1 percent.

The controls shall be capable of working in conjunction with a taut wire set to grade.

102-4.5 ROLLERS

A minimum of two self-propelled steel-wheel rollers shall be furnished. They shall be in good condition, capable of reversing without backlash, and capable of operating at slow speeds to avoid displacement of the bituminous mixture. The wheels shall be equipped with adjustable scrapers, water tanks, and sprinkling apparatuses to prevent the bituminous mixture from sticking to the wheels. The weight of each roller shall be 10 tons minimum to 12 tons maximum. The use of equipment which results in excessive crushing of the aggregate will not be permitted. The necessary number, type, and weight of the rollers shall be sufficient to compact the mixture as directed by the Program Manager.

102-4.6 PREPARATION OF MINERAL AGGREGATE

The aggregate for the mixture shall be dried and heated at the central mixing plant before entering the mixer. When introduced into the mixer, the combined aggregate moisture content (weighted according to the composition of the blend) shall be less than 0.25 percent for aggregate blends with water absorption of 2.5 percent or less and less than 0.50 percent for aggregate blends with water absorption greater than 2.5 percent. Water absorption of aggregates shall be determined by ASTM C 127 and C 128. The water absorption for the aggregate blend shall be the weighted average of the absorption values for the coarse aggregate retained on the No. 4 (4.75 mm) sieve and the fine aggregate passing the No. 4 (4.75 mm) sieve. The water content test will be conducted in accordance with ASTM C 566. In no case shall the moisture content be such that foaming of the mixture occurs prior to placement. At the time of mixing, the temperature of the aggregate shall be within the range specified in the job mix formula. The maximum temperature and rate of heating shall be such that no damage occurs to the aggregates. Particular care shall be taken so that aggregates high in calcium or magnesium content are not damaged by overheating. The aggregate shall be screened to specified sizes and conveyed in separate bins ready for mixing with bituminous material.

102-4.7 PREPARATION OF BITUMINOUS MIXTURES

The bituminous mixture shall be prepared in a central mixing plant. The mixture shall be prepared at the temperature designated by the Program Manager within the range provided by the asphalt binder supplier in paragraph 102-2.3.

The dry aggregate shall be combined in the plant in the proportionate amounts of each aggregate size required to meet the specified gradation. The quantity of aggregate for each batch shall be determined, measured, and conveyed into the mixer. In case of volumetric proportioning, the size of the openings shall be determined, and the gates shall be locked in position.

The quantity of bituminous material for each batch or the calibrated amount for continuous mixers shall be acceptable to the Program Manager. It shall be measured by weight and introduced into the mixer within the temperature range specified in the job mix formula. For batch mixers, all aggregates shall be in the

mixer before the bituminous material is added. In no case shall the temperature of the aggregate be more than 25° F above the temperature of the bituminous material when adding the bituminous material. The mixing shall continue until all particles are coated uniformly.

102-4.8 TRANSPORTATION AND DELIVERY OF THE MIXTURE

The mixture shall be transported from the central mixing plant to the paving job in trucks described in paragraph 102-4.3. The mixture shall be placed at a temperature between 175° F and 250° F. Delivery of the mixture shall be scheduled so that spreading and rolling of a day's production can be completed during daylight hours the same day.

102-4.9 SPREADING AND LAYING

- a. Preparation of Existing Surfaces.** All porous base courses shall be constructed on a previously constructed base surface that is structurally sound; is in good condition; is constructed to the applicable smoothness criteria; and has been accepted by the Program Manager. Immediately before placing the porous bituminous base course (PBC), the underlying course shall be cleared of all loose or deleterious material with power blowers, power brooms, or hand brooms as directed. The underlying cement treated base course shall have been in place and obtained a compressive strength of at least 750 psi per Item P-304 before construction of the overlying PBC may begin, unless otherwise approved by the Program Manager.
- b. Placing.** Hauling over material already placed shall not be permitted until the material has been thoroughly compacted as specified and allowed to develop its stability for a period of at least 12 hours. During periods of very hot temperatures, and at the discretion of the Program Manager, no traffic will be allowed on the PBC until it has cooled overnight. Traffic should be discontinued if any significant rutting of the PBC is observed. The bituminous mixture shall be placed at the required minimum lane width of not less than 12 feet with an approved bituminous paver as specified in paragraph 102-4.4.

102-4.10 COMPACTION OF MIXTURE

After spreading, the mixture shall be thoroughly and uniformly compacted with power rollers. Rolling of the mixture shall begin as soon after spreading as it will bear the roller without undue displacement or hair-checking. Rolling will be withheld until the mixture has cooled to 150°-175° F and with the drive wheel toward the paving machine. The sequence of rolling the first paving lane should be to first roll the lower edge (with reference to the transverse slope) of the lane and then to roll the upper edge. The interior of the lane should then be rolled from the lower side toward the upper edge with overlapping roller paths. On adjoining paving lanes, rolling shall begin by overlapping the joint (with the previous lane) by 6 to 9 inches and then rolling the outside edge of the new lane. The interior should be rolled from the outside edge toward the compacted joint with overlapping wheel paths. Alternate trips of the roller shall be of slightly different lengths. The number of passes with a steel-wheel roller shall be as determined by the test section. The optimum weight of the roller shall also be determined during test section construction.

The speed of the roller shall be not greater than 1.5 miles per hour to avoid displacement of the hot mixture. Any displacement occurring as a result of reversing the direction of the roller, or from any other cause, shall be corrected at once by raking and applying fresh mixture.

Sufficient rollers shall be furnished to handle the output of the plant. Rolling shall continue until all roller

ISSUED FOR BID

marks are eliminated and the surface is of uniform texture and conforms to the required cross section.

To prevent adhesion of the mixture to the roller, the wheels shall be kept properly moistened, but excessive water will not be permitted. All rolling shall be in accordance with the pattern established in the test section. After rolling roller marks shall not be visible on the finished surface.

In areas not accessible to the roller, the mixture shall be thoroughly compacted with hot hand tampers.

Any mixture which becomes loose and broken, mixed with dirt, or in any way defective shall be removed full depth and replaced with fresh hot mixture and immediately compacted to conform to the surrounding area. This work will be done at the Contractor's expense. Skin patching and hand working of the PBC mixture will not be allowed.

102-4.11 JOINTS

The formation of all joints shall be made in such a manner as to ensure a continuous bond between old and new sections of the course. All joints shall present the same texture, density, and smoothness as other sections of the course.

The roller shall not pass over the unprotected end of the freshly laid mixture except when necessary to form a transverse joint. When necessary to form a transverse joint, it shall be made by means of placing a bulkhead or by tapering the course, in which case the edge shall be cut back to its full depth and width on a straight line to expose vertical face. In both methods, all contact surfaces shall be given a tack coat of bituminous material before placing any fresh mixture against the joint. Longitudinal joints which are irregular, damaged, or otherwise defective shall be cut back to expose a clean, sound surface for the full depth of the course. All contact surfaces shall be given a tack coat of bituminous material prior to placing any fresh mixture against the joint.

102-4.12 SHAPING EDGES Not used.

102-4.13 SURFACE TESTS

After completion of the final rolling, the finished surface shall be tested with a 12-foot straightedge (supplied by the contractor) and shall not vary more than 1/2 inch. The 12-foot straightedge shall be applied parallel with and at right angles to the runway centerline in a pattern that includes longitudinal and transverse joints. The 12-foot straightedge shall be advanced approximately 1/2 its length in the line of measurement. The surface shall not vary from plan grades by more than 1/2 inch. Modification for overlying concrete pavement (P-501) thickened edges will be necessary.

Areas of the porous base course exceeding the specified tolerances shall be corrected-at the Contractor's expense by removing the defective work and replacing it with new material. Skin patching or hand working will not be permitted.

102-4.14 SAMPLING PBC MIXTURE AND HOT BINS

Samples of the aggregate will be taken from the belt at the plant and tested to control uniformity of gradation. Samples shall be taken in accordance with ASTM D 75. Samples of the PBC mixture shall be taken at the point of discharge of hauling units and tested to control uniformity in the bituminous content and gradation. Samples shall be taken in accordance with ASTM D 979. Enough mixture shall be taken to prepare duplicate tests for bituminous content on each sample of mixture in accordance with ASTM D

2172. Samples shall be taken at least once for any central plant-run of more than 30 minutes and at least twice for any central plant-run of more than 5 hours. The field sample will be extracted and gradation checked as a secondary control.

Asphalt content will be determined by calibrated N-CAT oven in accordance with ASTM D 6307. The Contractor will provide samples, as required, for proper oven calibration. The bituminous content should fall within the tolerance of the job mix formula as specified in paragraph 102-3.2. Should the average bituminous content for two samples not fall within the job mix tolerances, the Program Manager may order the Contractor to cease production until such out-of-tolerance conditions have been remedied by the Contractor.

Completed PBC shall be determined "acceptable" or "unacceptable" on the basis of visual inspection by the Program Manager. The Program Manager shall immediately notify the Contractor of visual defects such as non-uniform texture, roller marks, bleeding of bituminous material, cracking and shoving of the mixture, evidence of aggregate crushing during the roller operations, or nonconformance to the surface smoothness criteria as specified in paragraph 102-4.13.

"Unacceptable" PBC shall be removed, leaving a vertical face at the remaining PBC. The underlying surface shall be cleaned and a tack coat applied prior to replacing the PBC. All such remedial work shall be at the Contractor's expense. Unacceptable PBC shall not be measured for payment.

Should gradation analysis or asphalt content fail to meet the tolerances of the job mix formula, the Program Manager may order another analysis in addition to the two analyses required each day to confirm the results of the previous tests, or direct the Contractor to cease plant production until such out-of-tolerance conditions have been corrected.

102-4.15 BITUMINOUS AND AGGREGATE MATERIAL (CONTRACTOR'S RESPONSIBILITY)

Samples of the bituminous and aggregate materials that the Contractor proposes to use, together with a statement of their source and character, shall be submitted for approval prior to use. The Contractor shall require the manufacturer or producer of the bituminous and aggregate material to furnish material subject to this and all other pertinent requirements of the contract. Only those materials which have been tested and approved for the intended use shall be acceptable.

The Contractor shall furnish the vendor's certified test reports for each carload or equivalent of bituminous material shipped to the project. The report shall be delivered to the Program Manager before permission is granted to use the material. Vendor's certified test report for the bituminous material shall not be interpreted as a basis for final acceptance. All test reports shall be subject to verification by testing sample materials received for such use on the project.

102-4.16 PROTECTION OF PAVEMENT

After final rolling, no vehicular traffic of any kind shall be permitted on the pavement until it has cured for a period of at least 12 hours, unless approved by the Program Manager. Damage from hauling or other construction operations will be repaired as specified herein at no additional cost to the Owner.

ISSUED FOR BID

METHOD OF MEASUREMENT

102-5.1

Porous bituminous base course shall be measured by the number of square yards of mixture used in the accepted work. This shall include the variable thickness extending over the longitudinal underdrains.

Only the areas of the porous base course meeting the following thickness requirements shall be measured for payment:

To determine the thickness of the finished PBC, the Contractor, at his expense, shall take one core sample, not less than 2 inches in diameter, at random from each unit of the completed PBC area. A unit of the completed area shall be one paving lane wide by 500 feet long. The last unit in any one paving lane shall include any remaining length in addition to the 500 feet.

When the measurement of any single core is more than the maximum or less than the minimum allowable thicknesses as shown in Table 3, additional cores shall be taken by the Contractor at his expense at 20-foot intervals (parallel to and at right angles to the runway/taxiway centerline) until the completed PBC is within such maximum or minimum thickness for the sub-unit being tested. Out-of-tolerance areas shall be delineated and paid at 50% of the Contract unit price. If, in the Program Manager's judgment, such out-of-tolerance areas warrant removal or if the PBC reduces the thickness of the P-501 (Concrete) beyond the P-501 tolerances, the PBC shall be removed and the underlying course shall be cleaned and the PBC reinstalled at no additional cost to the Owner. If only the initial core is out of tolerance, the entire lot shall be paid for at the full Contract unit price.

TABLE 3. ALLOWABLE FINISHED PBC THICKNESS (Per Lift)

Nominal (in.)	Maximum (in.)	Minimum (in.)
4.0	4.5	3.5

BASIS OF PAYMENT

102-6.1

Payment shall be made at the respective contract price per square yard for porous base course at the specified thickness. The price shall be full compensation for furnishing all materials; for all preparation and storage of materials; for cleaning the existing surface; for mixing, hauling, placing and compacting the mixture (including initial test section); and for all tools, equipment, and incidentals necessary to complete the item. No separate payment shall be made for furnishing and batching mineral filler, geotechnical fabric, or anti-stripping agents, should such items be required. Such items shall be considered incidental to those items requiring its use.

The price shall also include costs of modifications for the PBC due to the overlying concrete pavement thickened edges.

ISSUED FOR BID

Payment will be made under:

Item S-102-6.1 Porous Bituminous Base Course (4" Thick) – per square yard

TESTING REQUIREMENTS

AASHTO M320 Performance-Graded Asphalt Binder

ASTM C 33 Concrete Aggregate

ASTM C 88 Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate

ASTM C 127 Density, Relative Density, Specific Gravity and Absorption of Coarse Aggregate

ASTM C 128 Specific Gravity and Absorption of Fine Aggregate

ASTM C 131 Resistance to Abrasion of Small Size Coarse Aggregate by Use of the Los Angeles Machine

ASTM C 136 Sieve Analysis of Fine and Coarse Aggregates

ASTM C 566 Total Evaporable Moisture Content of Aggregate by Drying

ASTM D 75 Sampling Aggregates

ASTM D 693 Crushed Aggregate for Macadam Pavements

ASTM D 979 Sampling Bituminous Paving Mixtures

ASTM D 995 Mixing Plants for Hot-Mix, Hot Laid Bituminous Paving Mixtures

ASTM D 2172 Quantitative Extraction of Bitumen from Bituminous Paving Mixtures

ASTM D 6307 Asphalt Content of Hot Mix Asphalt by Ignition Method

MATERIAL REQUIREMENTS

ASTM D 242 Mineral Filler for Bituminous Paving Mixtures

ASTM D 946 Asphalt Cement for Use in Pavement Construction

ASTM D 3381 Viscosity-Graded Asphalt Cement for Use in Pavement Construction

END OF ITEM S-102

ISSUED FOR BID

ITEM S-103 EXTERIOR BUILDING REPAIRS**DESCRIPTION****102-1.1 GENERAL**

This item shall consist of the repairs to the concourse building exteriors as required due to changes in exterior grade and exposure.

MATERIALS**102-2.1**

Refer to specification sections 03700 and 09910 and detail 2 sheet C-HG-03.

CONSTRUCTION METHODS**102-3.1**

Refer to specification sections 03700 and 09910 and detail 2 sheet C-HG-03.

METHOD OF MEASUREMENT**102-4.1**

Measurement shall be made for the number of square feet of exterior building repairs accepted.

BASIS OF PAYMENT**102-5.1**

For "Exterior Building Repairs" payment shall be made at the contract unit price per square foot. This price shall be full compensation for furnishing all materials, tools, labor, spot demolition, cleaning, surface preparation, surface coatings and incidentals necessary to complete the item.

Payment will be made under: Item S-103-5.1 Exterior Building Repairs -- per square foot.

END OF ITEM S-103

THIS PAGE LEFT BLANK INTENTIONALLY

ITEM S-105 WATER DISTRIBUTION

DESCRIPTION

105-1.1 General. This item shall consist of the installation of the water distribution pipelines, valves, fittings and other related appurtenances as indicated in the drawings. The water system shall be constructed as shown on the drawings and shall be sterilized and tested before acceptance by Memphis, Light, Gas & Water (MLGW) and the Program Manager.

105-1.2 Requirements of regulatory agencies. Install all water piping and related appurtenances in accordance with all local and state codes, laws, ordinances, rules and regulations particular to this class of work. Coordinate all work with MLGW and the Program Manager.

105-1.3 Description of the system. The items of the water system covered under this section include the furnishing of all labor, tools, equipment and materials required to install a complete water system in accordance with the plans and specifications.

105-1.4 Submittals. Submittals shall be submitted to the Program Manager in accordance with the requirements of SC-110.

Submit approval affidavits from the manufacturers of pipe, fittings, valves, and other related appurtenances describing the materials proposed for use on the project for review by the Program Manager in coordination with the MLGW representative. Samples shall be submitted as requested by the Program Manager.

Contractor shall not deliver materials to the project until submittals have been approved in writing.

105-1.5 Protection. Contractor shall coordinate and protect all items of related installations and existing or newly installed work within the water system installation. Temporary sheeting, shoring, and bracing shall be in accordance with Item P-152. During construction, provide all necessary or required pumping and bailing operations to protect workmen and adjacent facilities. Contractor shall protect the mouth of the pipe by a stopper when work is not in progress.

Protect all underground and exposed piping and appurtenances during and after construction as required to obtain the necessary approval and acceptance of the system upon the completion of the project.

105-1.6 Storage and handling. Contractor shall store all materials delivered to the site at such locations as directed by the Program Manager and shall provide suitable storage facilities to adequately protect all materials from damage or deterioration in any way. Materials delivered in unopened containers may be stored in the same.

Contractor shall handle pipe, fittings, valves, meters, and other manufactured appurtenances with care to prevent breakage, contamination or other damage. Any damaged or deteriorated materials will be rejected.

105-1.7 Tests. All pipe and pipe fittings will be inspected and tested for compliance to this section by an independent testing laboratory, approved by the Program Manager, and each length of pipe and fittings delivered to the project site shall bear the testing laboratory's stamp of approval.

MATERIALS

105-2.1 Material furnished by the contractor. The Contractor shall furnish all the materials needed to construct the pipeline as shown on the plans and the specifications. This material shall include, but will not

ISSUED FOR BID

necessarily be limited to, water mains, fittings, valves, valve covers, meters, meter boxes, fire hydrants and other appurtenances.

The Contractor shall also furnish such expendable materials or supplies as may be necessary to use in order for the complete construction of the Work. These items may include, but not be limited to forming or shoring lumber; tie rods; stakes; flagging; concrete for blocking; trench boxes; gravel; or sand.

All material furnished must conform to the Buy American Certification as contained in the project specifications. The following standards apply to the pipeline materials and materials shall be approved by MLGW:

Items	Standards	Thickness or Pressure Class
6" - 12" Ductile Iron Pipe Cement Mortar Lined, Push-on Joints	ANSI A21.51	6" Thickness Class 52 12" Thickness Class 50
6" - 12" D.I. fittings cement lined with mechanical joint	ANSI A21.10 AWWA C110 ANSI A21.53 AWWA C153	6" - 12" Class 250 (Ductile Iron only) 6" - 12" Compact Class 350
Rubber Gasketed Joints for Ductile Iron Pressure Pipe and Fittings	ANSI A21.11 AWWA C111	
6" - 12" Gate valves with O-ring seals and mechanical joints	AWWA C500	Class 175 Open clockwise

The material descriptions above are general and not intended to be all-inclusive. No item will be accepted that is not approved by MLGW or in accordance with MLGW Specifications. If any questions of acceptability exist, contact the Program Manager for clarification.

Restrained joint pipe shall meet all pressure class ratings as listed in this section. The restrained joint shall be slip joint pipe or fastite joint pipe with fast-grip gasket manufactured by American Cast Iron Pipe Company; TR Flex Restrictive Joint Pipe or Ductile Iron Tyton Joint Pipe or Ductile Iron Tyton Joint Pipe with FIELD LOK Gaskets manufactured by U. S. Pipe & Foundry or the equivalent produced by McWane or Griffin Pipe Manufacturing.

MLGW's Approved Products are shown below and are subject to the aforementioned Buy American Certification. It is the contractor's responsibility to verify that all products to be utilized on this project conform to the Buy American Certification.

1. Pipe, ductile iron cement lined with push-on joints:

U.S. American Griffin McWane

2. Fittings ductile iron 4"-12"

Union Foundry

U. S. Pipe

Tyler Pipe

American Cast Iron

Pipeline Components, Inc.

ISSUED FOR BID

3. Tapping sleeve MJ/w flange connection:

U.S. Pipe #9MJ	JCM 414-0690x6
Tyler 5-149-CI	Mueller #H-615
M&H Valve & Fittings #74M	Clow #F5205
American Valve & Hydrant AD-84	Waterous 806C6A
4. Gate Valve 4"-12":

American Flow 2506-MM*	M & H Style 3067
U.S. Pipe Metroseal 250 #5460	Mueller #A-2360-20
Kennedy 8571R	

*American Flow sizes 6" (2508), 8" (2510), 10" (2512)
5. Retainer glands: (Wedge Type required)

Ford Uni-flange Model B Heavy Duty	U.S. Pipe
Union Foundry	Smith-Blair
EBBA Iron	
6. Corporation cock:

James Jones #J-89	Mueller #H-10003
Hays Mfg. Co. #5240	Ford Meter Box #F-800
7. Detectable tape, 3" wide:

Terra Tape, #1350, with Splice Kit, #0570001

105-2.2 Materials and workmanship. All materials furnished by the Contractor shall be subject to the approval by the Program Manager in coordination with the MLGW Representative whose decision thereon shall be final. It is the intent of these Specifications to describe definitely and fully the character of materials and workmanship required. Should any unexpected features arise during the progress of the Work that are not fully covered herein, the Specifications shall be interpreted by the Program Manager in coordination with the MLGW Representative and such interpretation shall be accepted by the Contractor. The Contractor shall employ only workmen who are competent to perform the work assigned to them and, in the case of skilled labor, who are adequately trained and experienced in their respective trades.

105-2.3. Corrosion. The Contractor shall purchase and install a polyethylene encasement for all ductile iron pipe and fittings. Polyethylene encasement shall be per ANSI/AWWA C105/A21.5 – Standard for Polyethylene Encasement for Ductile Iron Pipe Systems or the latest revision.

105-2.4 Water. Water for construction and testing purposes may be furnished from fire hydrants attached to the Memphis system provided the Contractor obtains the necessary permits from the Water Operations Department of MLGW and that suitable adaptors, control valves and wrenches are used at the hydrants. The amount of water must be metered. The meter shall be provided by MLGW. The Contractor shall be responsible for the cost of the water.

105-2.5 Power. All power for lighting, operation of the Contractor's plant or equipment, or for any other use as may be required for proper completion of the Work to be performed under the provisions of these Contract Documents shall be provided by the Contractor at his sole cost and expense.

CONSTRUCTION METHODS

105-3.1 Grade & lines. The elevations and grades shown on the drawings for the water pipeline are for guidance to the Contractor in preparing his bid and will be considered a rigid construction requirement. Elevations of existing facilities are shown according to the best available information. The intent of these specifications is to fit the proposed pipe line into the existing pattern without undue interference. The Contractor will be expected to maintain a minimum depth for the water main, as indicated, whenever possible to do so.

The path of the pipe construction has been planned to afford room for the proposed construction work with a minimum of interference. The Contractor shall conform to this line as closely as is possible or as directed by the Program Manager.

105-3.2 Sheeting and shoring. The Contractor, as his subsidiary obligation, shall provide and construct all sheeting, trench boxes, and shoring, required to protect and maintain the stability of existing structures, or of banks or sides of excavation, and to prevent caving, sliding or any movement of such tanks into the excavated area. All sheeting, shoring, and bracing shall adhere to OSHA standards and be coordinated with the Program Manager and shall be provided in accordance with Item P-152.

105-3.3 Trench excavation. Contractor shall perform all trench excavation required for the installation of the water system piping and appurtenances thereto as indicated on the plans and as specified in this section. The Contractor shall not open more trench in advance of pipe laying than is necessary to expedite the Work. In the event that pipe laying is stopped for any cause, 300 feet shall be the maximum length of open trench permitted on any line under construction.

Trenches shall be of sufficient width to provide ample working space for men engaged in handling pipe and making joints. In no case shall the width of the trench, inside sheeting and bracing lines, be more than 24 inches wider than the inside diameter of the pipe to be laid therein.

The bottom of each pipe trench shall be accurately graded with hand tools to provide a uniform and continuous bearing and support for the pipe on solid ground.

Excavation for concrete blocking to be placed at bends and branches in the pipe lines shall be as required to obtain the bearing area required per the utility details, and accepted by the Program Manager and the MLGW Representative, for the various bends and pipe sizes. Immediately prior to placing concrete for blocking, all loose excavated material shall be removed from the space to be occupied by the concrete and the bearing areas poured directly in contact with vertical undisturbed original earth surfaces.

Bell holes for mechanical joints or other bolted joints shall provide adequate working space for workmen and clearance for of the joints. Regardless of the type of joint, all bell holes shall be of sufficient size and depth that the joints can be properly made and that no part of the pipe bell is in contact with the trench bottom.

Refill excavations below required depth with sand or gravel in 3" maximum thickness loose layers and compact in accordance with specification P-152.

Trench depths will be required to provide the minimum cover over the tops of the pipes based on the final finished surface elevations. The minimum cover over pipes shall be 40 inches, as measured from the top of the pipe, or as directed by the Program Manager.

105-3.4 Pipe laying. This Specification applies to and covers the handling and installation of all water pipe, fittings, and valves for installation in the water main provided under this Contract. The installation of the water main should be in general conformity with the recommendations of the various manufacturers involved and as specifically mentioned in the following sections of this Specification. Additional reference is made to the following manuals as they may apply to the work involved:

ISSUED FOR BID

1. AWWA Standard C 600-10 or latest revision – *Installation of Ductile-Iron Water Mains and their Appurtenances*.
2. AWWA Standard C 651-05 or latest revision - *Disinfecting Water Mains*

Handling Pipe

Pipe, fittings, valves, and other pipe line accessories shall be loaded, transported, unloaded, stored, handled and installed by methods and in a manner that will insure their final installation in a sound and undamaged condition conforming in all respects to specified requirements. Under no circumstances shall pipe, fittings, or valves be dropped to the ground, onto or against hard or solid objects or materials or otherwise subjected to possible damage from impact or shock. Such materials shall be loaded and unloaded by lifting with hoists or by skidding. Pipe handled on skidways shall not be skidded or rolled against another pipe.

In distributing pipeline materials at the site of the Work, each piece shall be unloaded opposite, or as close as possible to, the point of installation in order to avoid unnecessary re-handling. Proper equipment, tools, facilities and methods satisfactory to the Program manager and the MLGW Representative shall be provided and used by the Contractor for the safe and convenient installation of all pipe line materials. All pipe, fittings, and valves shall be carefully lowered into the trench piece by piece by means of a derrick, ropes, or other suitable tools or equipment, in such a manner as to prevent damage thereto or to protective coatings thereof.

Protection and Repair of Coatings and Linings

Care should be taken that the pipe and fittings should be handled in such a manner as to avoid all possible damage to coatings and linings. The use of hooks inserted into the ends of pipe should be minimized.

All pipe coatings or linings damaged by the Contractor shall be repaired by removing the damaged portions, and applying two coats of pipe coating material of a type and quality equal to that used in originally coating the pipe. The first coat shall be dry and hard before applying the second coat.

Cutting Pipe

Cutting of ductile iron pipe for closure pieces, installation of valves or fittings, or for any other reason shall be done in a neat and workmanlike manner without damage to the pipe and so as to leave a smooth cut end at right angles to the axis of the pipe. All cutting of pipe shall be done by means of mechanical pipe cutters of an approved type or abrasive wheel saw.

The cut ends of ductile iron pipe to be inserted into slip joint bells must be beveled evenly all around the pipe before insertion in the bell.

Cleaning Pipe and Fittings

The interior of all pipe and fittings shall be thoroughly cleaned of all foreign matter before being installed and shall be kept clean until the work has been accepted. All lumps, blisters, and excess pipe coating shall be removed from exterior spigot and interior bell surfaces and such surfaces shall be wire brushed and wiped clean and dry before placing the spigot in the bell of the connecting pipe or fitting. All joint contact surfaces shall be kept clean until the joint is made.

The Contractor shall take precaution to prevent excess foreign material from entering the pipe during installation. If material enters the pipe, the Program Manager in coordination with the MLGW Representative may require that the open ends of the pipe be kept covered until actual jointing operations are started.

Whenever pipe laying is stopped at the end of the day's work, or because of rain or for any other reason, the open end of the line shall be sealed with a watertight plug. All water that may have entered the trench shall be removed prior to removing the plug. It is essential that no mud, trench water, or other foreign matter be

permitted to enter the pipe line at any time.

Inspection of Pipe and Fittings

During installation, and while suspended and hanging free, each pipe and fitting shall be inspected for defects. All defective, damaged, or otherwise unsound pipe and fittings shall be rejected and removed from the site of the Work as directed by Program Manager or the MLGW Representative.

Alignment of Pipe

Pipelines or runs intended to be straight shall be laid straight. Deflections from a straight line or grade, measured between the center lines extended of any two connecting piping units and expressed in inches per 18 linear feet, shall not exceed the deflections shown on the following table:

MAXIMUM DEFLECTION 18' LENGTH OF PIPE - PUSH-ON TYPE JOINT

<u>SIZE</u>	<u>MAX. JOINT DEFLECTION</u>	<u>DEFLECTION IN INCHES</u>
4"	5	19
6"	5	19
8"	5	19
10"	5	19
12"	5	19

Laying Pipe

Having been properly cleaned and inspected for soundness, each piece of pipe shall be laid on the previously graded trench bottom after the bell hole therefore has been dug. After thorough joint surface preparation, the spigot end of the pipe shall be centered in the adjacent pipe bell, and the pipe forced home and brought to proper alignment. The pipe shall then be secured and held in place by means of approved pipe embedment material tamped beneath and alongside the pipe as provided in the trench excavation specification.

Mechanical Joints

In the installation of mechanical joint fittings, it is important that the entering spigot is centered in, and that the gland or follower ring is parallel to the face of, the connecting bell. The gasket should be shoved home and the gland properly positioned with respect to the connected bell with the connecting pipes in as nearly perfect alignment as practicable.

Immediately prior to connecting any two mechanical joint piping units, all surfaces of the bell, spigot, and gland which will come in contact with the gasket at any time during assembly shall be wire brushed, wiped clean, coated with soapy water, and the gland and gasket slipped over the spigot end of the pipe. The spigot shall then be inserted to the full depth of the socket and then retracted 1/8 inch. The gasket shall then be coated with soapy water and carefully pushed into position and evenly seated in the bell. The gland shall then be shoved into place against the gasket, the bolts inserted, and the nuts tightened with the fingers until snug. Final tightening of the bolts shall be done with a ratchet torque wrench.

Ductile Iron Slip Joints

The bell socket and the plain end of the entering pipe must be absolutely clean and free of foreign matter before assembly of the joint is started. The gasket should be wiped clean, flexed, and then placed, properly, in the socket in the bell. Care should be taken to seat the gasket evenly and smoothly all around the circumference of the groove. A thin film of lubricant should be applied to the inside surface of the gasket which will be in contact with the entering plain end of the pipe and to the plain end of the entering pipe for about one inch back from the end.

The plain end of the pipe should then be carefully entered into the socket until it makes contact with the

ISSUED FOR BID

gasket and the joining pipe then aligned straight. The joint assembly should then be completed by forcing the plain end of the pipe past the gasket (which is thereby compressed) until it makes contact with the bottom of the socket. If assembly is not accomplished with the application of reasonable force, the plain end of the pipe should be removed to check for the proper positioning of the gasket.

105-3.5 Installation of valves. Valve boxes, lids and extension items as required by the plans shall be installed by the Contractor and are incidental to the valve installation. Six inch ductile iron pipe to be used for valve box extension items shall be cut and installed, as required and shown in the plans and are incidental to the valve installation.

Valves and valve boxes shall be set plumb and installed as shown in the plans. Each valve box shall be placed directly over the valve wrench nut it serves, with the top of the box brought flush with the finished pavement grade. Valve rims and covers shall be aircraft rated.

Before installing any valve, care shall be taken to see that all foreign substances are removed from within the valve body, and the valve opened and closed to see that all parts are in working condition.

105-3.6 Installation of tapping sleeves & valves. The tapping sleeves shall be mounted on the main to be tapped in the proper position and in accordance with the manufacturer's instructions. Care should be taken to ensure that the surface of the main is clean under the gasket and that a good seal is obtained. The hole in the main must be cut with a tapping machine correctly positioned and operated. Cutting the hole with a cutting torch will not be allowed.

105-3.7 Installation of hydrants. The contractor shall install hydrants at the locations shown on the plans. The hydrants shall be installed per the manufacturers' specifications. The contractor shall obtain hydrants meeting the properties of the hydrants shown in the plans. The contractor shall submit the specification for the hydrants to the Program Manager and the MLGW representative and gain approval of the chosen hydrant before installation begins.

105-3.8 Thrust blocking. All tees, elbows, plugs or any fittings that change the direction of the pipeline shall be blocked with concrete in accordance with the plans and approval of the Program Manager and MLGW Representative. Retaining glands or lock type gaskets may be used in lieu of blocking with the approval of the MLGW Representative and the Program Manager.

105-3.9 Trench backfill. The contractor shall not backfill pipe trenches until the pipe has been inspected and approved by the Program Manager and the MLGW representative. Compaction of backfill for water pipe installation shall be per Item P-152. Backfill shall be carefully placed to avoid dropping large clods or rocks on the pipe. Service lines and laterals must be assembled so that no strain is placed on the pipe during backfill.

Sand used for trench bedding shall be graded from fine to coarse and shall be free of lumps, cinders, rubbish, roots or other material which would be objectionable, in the opinion of the MLGW Representative. Sand used for bedding purposes shall contain no more than 10 percent by weight of clay and loam combined, and not more than 5 percent shall be retained on a No. 4 sieve. Sand shall be 6" thick on the bottom of the pipe and placed in 3" maximum thickness loose layers and compacted in accordance with Item P-152. The sand shall be placed until the top of the pipe is reached. Over the sand the trench shall be backfilled utilizing crushed recycled concrete in accordance with Item P-219 and compacted in accordance with Item P-152.

105-3.11 Testing and sterilizing. In order to facilitate the final chlorination of the water main, the Contractor shall furnish and place in the dry main, as it is being installed in the trench, a high-test calcium hypochlorite compound containing 65-70% chlorine. The product known as "HTH", "Perchloron", "Pitchlor" or "Pittabs" or equal, may be used.

The amount of chlorine-bearing compound to be used shall be as shown on the table below:

Main Size	Powder	Pit Tabs
-----------	--------	----------

ISSUED FOR BID

inches	Ounces/Length	Pellets/Length
4	0.1	1
6	0.2	2
8	0.4	3
10	0.6	5
12	0.8	7

Flushing and final chlorination of the main will be done by the Contractor under the supervision of the Program Manager and MLGW Representative.

General Requirements

Each pipeline, and part or valved-off section thereof, shall be subjected to pressure and leakage tests as specified herein and as directed by the Program Manager and the MLGW Representative. The pipeline shall be tested in sections between shut-off valves, or between a shut-off valve and a temporary plug as shown on the plans, or, at the Contractor's option, between other temporary plugs located elsewhere. If intermediate test plugs are used, at locations other than those shown on the Plans, they shall be furnished and installed by the Contractor at no additional expense.

All anchors, braces, blocks or other devices as may be required to withstand the hydrostatic pressure on any such plug or plugs shall be furnished and installed by the Contractor, and the costs, thereof, shall be included in the unit prices paid for pipe installation. The Contractor shall be solely responsible for any and all damage to the pipe line, and to public and private property, which may result from the failure of test plugs or plug supports.

The Contractor shall provide at his own expense all necessary piping and piping connections between the pipe line to be tested and the nearest available source of potable water supply, together with test pumping equipment, pressure gauge, and other equipment, materials, and facilities necessary to make the specified tests.

The Contractor must arrange for and provide a 2" connection from the existing water mains to the transmission main at the location required for the purpose of filling the new main. No other means of filling the main will be acceptable.

Filling the Line

When filling the line, or any section thereof, with water, for testing or for any other purpose, care shall be taken that all air valves and other venting facilities are installed and open in the section being filled. The rate of filling the line shall not exceed the venting capacity of the available air outlets.

The valve used for filling will not be left in the open position unattended. Operation of any valves in the existing main system will be done by MLGW personnel only. The Contractor shall contact MLGW prior to this service being needed.

All concrete reaction blocks and all bracing shall be installed before the time of initial filling of the line, and sufficient time shall be allowed for the concrete to develop enough strength to withstand the reaction thrust before pressure is allowed to build up in the line. Contractor shall coordinate with the Program Manager before beginning to fill the waterline.

Pressure/Leakage Tests

After the section of line to be tested has been filled with water, an initial pressure test shall be made for the purpose of testing for defective joints and line materials. The specified test pressure shall be applied and maintained in each case for not less than sixty (60) minutes and for whatever longer period as may be necessary for the Program Manager and the MLGW Representative to complete the inspection of the line under test and to locate any and all defective joints and pipe line materials. In the event that repairs are

ISSUED FOR BID

needed, such repairs shall be made, the line refilled as specified, and the test pressure applied as before. This operation shall be repeated until the pipeline, and all parts thereof, withstand the test pressure in a satisfactory manner to the Program Manager and the MLGW Representative.

The test pressure shall be applied by means of a force pump of such design and capacity that the required pressure can be applied and maintained, without interruption, for the duration of each test. The test pressure shall be measured by means of a properly calibrated test gauge approved by the Program Manager in coordination with the MLGW Representative.

Leakage measurements shall be started after a constant test pressure of 150 PSI has been established. Pipeline leakage shall be, and is hereby defined as, the total amount of water introduced into the line as measured during the leakage test. The line leakage shall be measured by pumping from a container of known volume. No pipeline, or tested section thereof, will be accepted if and while it has a leakage rate in excess of that rate determined by the following formula and calculated in the Table below:

$$L = \frac{(NDP)}{3700}$$

L = Maximum permissible leakage rate, in gallons per hour, throughout the entire length of line being tested.

N = Number of joints in the line under test.

D = Nominal internal diameter of the pipe in the line in inches.

P = The square root of 150 PSI (12.25).

<u>Size of Main</u>	<u>Leakage in Gallons Per Hour Per 1000' of Main</u>
6"	1.0
8"	1.5
10"	1.8
12"	2.2

It is the intent of these specifications and the Contract based thereon that (a) all joints in piping shall be watertight and free from visible leaks during the prescribed leakage test and (b) each and every leak which may be discovered at any time prior to the expiration of one year from and after the date of final acceptance of the Work by MLGW and the Program Manager shall be located and repaired by and at the expense of the Contractor, regardless of any amount that the total line leakage rate during the specified leakage test may be below the specified maximum rate. Leakage tests shall be performed and pipelines accepted and approved prior to the commencement of the overlying apron paving operations.

Leaks in mechanical joints or other bolted joints shall be repaired by dismantling, cleaning, realigning gland and gasket and re-bolting. Under no circumstances shall gland bolts be tightened beyond the specified and allowable torque limits in an attempt to reduce or stop leakage from a defective joint or for any other purpose.

Leaks in ductile iron main with push-on type joints shall be repaired by cutting out the leaking section and replacing with short main pieces and a mechanical joint sleeve.

Salvage Materials

All removed waterline piping shall remain property of the Contractor. All removed valves, tees, reducers, etc., will remain the property of Memphis Light, Gas and Water Division. Storage location(s) and transfer arrangements shall be made with MLGW's Representative.

ISSUED FOR BID

METHOD OF MEASUREMENT

105-4.1. The length of pipe shall be measured in linear feet of pipe in place, completed, and approved. It shall be measured along the centerline of the pipe from end to end of pipe. The several classes, types and size shall be measured separately. All fittings, valves and appurtenances shall be included in the footage as typical pipe sections in the pipe being measured.

BASIS OF PAYMENT

105-5.1. Payment will be made at the contract unit price per linear foot for each kind of the type and size designated.

These prices shall fully compensate the Contractor for furnishing all materials and for all preparation, excavation, installation, and testing of these materials; and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item S-105-5.1	12" Ductile Iron Pipe with Restrained Joints – per Linear Foot
Item S-105-5.2	6" Ductile Iron Pipe with Restrained Joints – per Linear Foot
Item S-105-5.3	Flush Mounted Fire Hydrant – per Each

MATERIAL REQUIREMENTS

ANSI/AWWA C105/A21.5	Standard for Polyethylene Encasement for Ductile Iron Pipe Systems
ANSI/AWWA C110/A21.10	American National Standard for Ductile-Iron and Gray-Iron Fittings, 3 In. Through 48 In., for Water
ANSI/AWWA C111/ A21.11	American National Standard for Rubber Gasket Joints for Ductile Iron and Gray Iron Pressure Pipe and Fittings
ANSI/AWWA C151/ A21.51	American National Standard for Ductile Iron Pipe, Centrifugally Cast, for Water
ANSI/AWWA C153/ A21.53	American National Standard for Ductile-Iron Compact Fittings for Water Service
ANSI/AWWA C500	Metal-Seated Gate Valves for Water Supply Service
ANSI/AWWA C600	Installation of Ductile-Iron Mains and Their Appurtenances
ANSI/AWWA C651	Disinfecting Water Mains

END OF ITEM S-105

ISSUED FOR BID

ITEM P-101 PREPARATION / REMOVAL OF EXISTING PAVEMENTS

DESCRIPTION

101-1 This item shall consist of preparation of existing pavement surfaces for overlay, surface treatments, removal of existing pavement, and other miscellaneous items. The work shall be accomplished in accordance with these specifications and the applicable plans.

EQUIPMENT AND MATERIALS

101-2 All equipment and materials shall be specified here and in the following paragraphs or approved by the Program Manager. The equipment shall not cause damage to the pavement, equipment, or structures identified to remain in place.

CONSTRUCTION

101-3.1 Removal of existing pavement.

The Contractor's removal operation shall be controlled to not damage adjacent pavement structure, base material, cables, utility ducts, pipelines, drainage structures, or other items identified to remain in place and protected from damage or which are to remain under the pavement.

a. Concrete pavement removal. This item shall include the removal and disposal of existing Portland Cement Concrete (PCC) pavement, both reinforced and un-reinforced, concrete sidewalks, concrete curb, concrete curb and gutter, concrete steps, concrete ramps, other miscellaneous concrete flatwork, and Portland cement stabilized base materials. Existing un-stabilized bases shall be excavated as Unclassified Excavation in accordance with the requirements provided under Technical Specification P-152 Excavation and Embankment.

Full depth saw cuts shall be made perpendicular to the slab surface. The Contractor shall saw through the full depth of the slab including any dowels at the joint, removing the pavement and installing new dowels as shown on the plans and per the specifications. Where the perimeter of the removal limits is not located on the joint and there are no dowels present, the perimeter shall be saw cut the full depth of the pavement. The pavement inside the saw cut shall be removed by methods which will not cause distress in the pavement which is to remain in place. All concrete pavements identified in the plan set for demolition, or as otherwise required by the Program Manager, shall be demolished, removed, and hauled to the project waste site for processing. Concrete pavements shall be processed in accordance with P-219. The cost of haul and disposal of these demolished pavements shall be incidental to the unit cost of pavement demolition provided under this specification. Breaking operations on-site and within 20-feet of a utility (such as but not limited to water, electrical, communications, sanitary sewer) shall not be permitted without prior approval from the Program Manager. Asphalt patches and joint seals shall be removed prior to demolition of concrete pavements. Conduit, light cans, steel dowels, reinforcement, joint seal material and any material other than concrete shall be separated and disposed of off-site. Concrete slabs that are damaged by under breaking shall be repaired or removed and replaced as directed by the Program Manager.

The edge of existing concrete pavement against which new pavement abuts shall be protected from damage at all times. Spall and underbreak repair shall be in accordance with the plans. Any underlying material that is to remain in place, shall be recompacted and/or replaced as shown on the plans. Adjacent areas damaged during repair shall be repaired or replaced at the Contractor's expense.

ISSUED FOR BID

b. Asphalt pavement removal. This item shall consist of the removal and disposal of existing bituminous pavement, bituminous overlays, existing bituminous shoulder pavements and bituminous stabilized bases. Existing un-stabilized base materials shall be excavated as Unclassified Excavation in accordance with the requirements provided under Technical Specification P-152 Excavation and Embankment. Asphalt pavement to be removed shall be cut to the full depth of the asphalt pavement around the perimeter of the area to be removed. If the material is to be wasted on the airport site, it shall be broken to a maximum size of 1 – ½ inches nominal maximum size. The pavement shall be removed so the joint for each layer of pavement replacement is offset 1 foot from the joint in the preceding layer. This does not apply if the removed pavement is to be replaced with concrete or soil.

c. Repair or removal of Base, Subbase, and/or Subgrade. All failed material including surface, base course, subbase course, and subgrade shall be removed and repaired as shown on the plans or as directed by the Program Manager. Materials and methods of construction shall comply with the applicable sections of these specifications. Any damage caused by Contractor's removal process shall be repaired at the Contractor's expense.

101-3.2 Preparation of joints and cracks prior to overlay/surface treatment. Remove all vegetation and debris from cracks to a minimum depth of 1 inch. If extensive vegetation exists, treat the specific area with a concentrated solution of a water-based herbicide approved by the Program Manager. Fill all cracks greater than 1/4 inch wide with a crack sealant per ASTM D6690. The crack sealant, preparation, and application shall be compatible with the surface treatment/overlay to be used. To minimize contamination of the asphalt with the crack sealant, underfill the crack sealant a minimum of 1/8 inch, not to exceed ¼ inch. Any excess joint or crack sealer shall be removed from the pavement surface.

101-3.3 Removal of Foreign Substances/contaminates prior to remarking. Removal of foreign substances/contaminates from existing pavement that will affect the bond of the new treatment shall consist of removal of rubber, fuel spills, oil, crack sealer, at least 90% of paint, and other foreign substances from the surface of the pavement, such as PCC pavement cure compounds. Areas that require removal are designated on the plans and as directed by the Program Manager in the field during construction.

High-pressure water or sandblasting may be used. Removal methods used shall not cause major damage to the pavement, or to any structure or utility within or adjacent to the work area. Major damage is defined as changing the properties of the pavement, removal of asphalt causing the aggregate to ravel, or removing pavement over 1/8 inch deep. If it is deemed by the Program Manager that damage to the existing pavement is caused by operational error, such as permitting the application method to dwell in one location for too long, the Contractor shall repair the damaged area without compensation and as directed by the Program Manager.

Removal of foreign substances shall not proceed until approved by the Program Manager. Water used for high-pressure water equipment shall be provided by the Contractor at the Contractor's expense. No material shall be deposited on the pavement shoulders. All waste materials shall be disposed of in areas indicated in this specification or as shown on the plans.

101-3.4 Concrete spall or failed asphaltic concrete pavement repair.

a. Repair of concrete spalls in areas to be overlaid with asphalt. The Contractor shall repair all spalled concrete as shown on the plans or as directed by the Program Manager. The perimeter of the repair shall be saw cut a minimum of 2 inches outside the affected area and 2 inches deep. The deteriorated material shall be removed to a depth where the existing material is firm or cannot be easily removed with a geologist pick. The removed area shall be filled with asphalt mixture with aggregate sized appropriately for the depth of the patch. The material shall be compacted with equipment approved by the Program Manager until the material is dense and no movement or marks are visible. The material shall not be placed in lifts over 4 inches in depth. This method of repair applies only to pavement to be overlaid.

b. Asphalt pavement repair. The Contractor shall repair all spalled concrete as shown on the plans or as directed by the Program Manager. The failed areas shall be removed as specified in paragraph 101-3.1b. All failed material including surface, base course, subbase course, and subgrade shall be removed. Materials and methods of construction shall comply with the applicable sections of these specifications.

101-3.5 Cold milling. Milling shall be performed with a power-operated milling machine or grinder, capable of producing a uniform finished surface. The milling machine or grinder shall operate without tearing or gouging the underlying surface. The milling machine or grinder shall be equipped with grade and slope controls, and a positive means of dust control. All millings shall be removed and disposed in areas designated on the plans. If the Contractor mills or grinds deeper or wider than the plans specify, the Contractor shall replace the material removed with new material at the Contractor's Expense.

a. Patching. The milling machine shall be capable of cutting a vertical edge without chipping or spalling the edges of the remaining pavement and it shall have a positive method of controlling the depth of cut. The Program Manager shall layout the area to be milled with a straightedge in increments of 1-foot widths. The area to be milled shall cover only the failed area. Any excessive area that is milled because the Contractor doesn't have the appropriate milling machine, or areas that are damaged because of his negligence, shall be repaired by the Contractor at the Contractor's Expense.

b. Profiling, grade correction, or surface correction. The milling machine shall have a minimum width of 7 feet and it shall be equipped with electronic grade control devices that will cut the surface to the grade specified. The tolerances shall be maintained within +0 inch and -1/4 inch of the specified grade. The machine must cut vertical edges and have a positive method of dust control. The machine must have the ability to remove the millings or cuttings from the pavement and load them into a truck. All millings shall be removed and disposed of in areas designated on the plans.

c. Clean-up. The Contractor shall sweep the milled surface daily and immediately after the milling until all residual materials are removed from the pavement surface. Prior to paving, the Contractor shall wet down the milled pavement and thoroughly sweep and/or blow the surface to remove loose residual material. Waste materials shall be collected and removed from the pavement surface and adjacent areas by sweeping or vacuuming. Waste materials shall be removed and disposed in areas designated on the plans.

101-3.6. Preparation of asphalt pavement surfaces prior to surface treatment. Existing asphalt pavements to be treated with a surface treatment shall be prepared as follows:

a. Patch asphalt pavement surfaces that have been softened by petroleum derivatives or have failed due to any other cause. Remove damaged pavement to the full depth of the damage and replace with new asphalt pavement similar to that of the existing pavement in accordance with paragraph 101-3.4b.

b. Repair joints and cracks in accordance with paragraph 101-3.2.

c. Remove oil or grease that has not penetrated the asphalt pavement by scrubbing with a detergent and washing thoroughly with clean water. After cleaning, treat these areas with an oil spot primer.

d. Clean pavement surface immediately prior to placing the surface treatment so that it is free of dust, dirt, grease, vegetation, oil or any type of objectionable surface film.

101-3.7 Maintenance. The Contractor shall perform all maintenance work necessary to keep the pavement in a satisfactory condition until the full section is complete and accepted by the Program Manager. The surface shall be kept clean and free from foreign material. The pavement shall be properly drained at all times. If cleaning is necessary or if the pavement becomes disturbed, any work repairs necessary shall be performed at the Contractor's expense.

101-3.8 Preparation of Joints in Rigid Pavement prior to resealing. Prior to application of sealant material, clean and dry the joints of all scale, dirt, dust, old sealant, curing compound, moisture and other foreign matter. The Contractor shall demonstrate, in the presence of the Program Manager, that the method used cleans the joint and does not damage the joint.

101-3.8.1 Removal of Existing Joint Sealant. All existing joint sealants will be removed by plowing or use of hand tools. Any remaining sealant and or debris will be removed by use of wire brushes or other tools as necessary. Resaw joints removing no more than 1/16 inch (~~2 mm~~) from each joint face. Immediately after sawing, flush out joint with water and other tools as necessary to completely remove the slurry.

101-3.8.2 Cleaning prior to sealing. Immediately before sealing, joints shall be cleaned by removing any remaining laitance and other foreign material. Allow sufficient time to dry out joints prior to sealing. Joint surfaces will be surface-dry prior to installation of sealant.

101-3.8.3 Joint sealant. Joint material and installation will be in accordance with Item P-605.

101-3.9 Preparation of Cracks in Flexible Pavement prior to sealing. Prior to application of sealant material, clean and dry the joints of all scale, dirt, dust, old sealant, curing compound, moisture and other foreign matter. The Contractor shall demonstrate, in the presence of the Program Manager, that the method used cleans the cracks and does not damage the pavement.

101-3.9.1 Preparation of Crack. Widen crack with a router by removing a minimum of 1/16 inch from each side of crack. Immediately before sealing, cracks will be blown out with a hot air lance combined with oil-free and water-free compressed air.

101-3.9.2 Removal of Existing Crack Sealant. Existing sealants will be removed by routing. Following routing, any remaining debris will be removed by use of a hot lance combined with oil-free and water-free compressed air.

101-3.9.4 Crack Sealant. Crack sealant material and installation will be in accordance with Item P-605.

101-3.9.4 Removal of Pipe and other Buried Structures. Refer to P-150 Demolition.

METHOD OF MEASUREMENT

101-4.1 Portland Cement Concrete (PCC) Pavement removal. The unit of measurement for PCC pavement removal shall be the number of square yards removed and processed or otherwise disposed of by the Contractor. Any pavement removed outside the limits of removal because the pavement was damaged by negligence on the part of the Contractor shall not be included in the measurement for payment. No direct measurement or payment shall be made for saw cutting. Saw cutting shall be incidental to pavement removal. Dowel bar installation shall be incidental to pavement removal. Payment for removal of base materials including but not limited to aggregate base course, subbase, and existing subgrade soils shall be paid under the "Excavation" pay item per specification P-152. The thickness identified in the following bid items are nominal and may vary. No additional measurement or compensation will be made for pavements that are thicker or thickened at A-joint locations. Such measurement shall include both reinforced and unreinforced PCC pavements.

101-4.2 Hot Mix Asphalt (HMA) Pavement removal. The unit of measurement for HMA pavement removal shall be the number of square yards removed, to the depths indicated, and properly removed and processed or otherwise disposed of by the Contractor. Any pavement removed outside the limits of removal because the pavement was damaged by negligence on the part of the Contractor shall not be included in the measurement for payment. No direct measurement or payment shall be made for saw cutting. Saw cutting shall be incidental to pavement removal. Payment for removal of base materials including but not limited to aggregate base course, subbase, and existing subgrade soils shall be paid under the "Excavation" pay item per specification P-152. The thickness identified in the following bid items are nominal and may vary. No additional measurement or compensation will be made for pavements that are thicker.

101-4.3 Stabilized Base removal. The unit of measurement for Portland Cement stabilized base removal shall be the number of square yards removed, to the depths indicated, and properly removed and processed

ISSUED FOR BID

or otherwise disposed of by the Contractor. Any stabilized base material removed outside the limits of removal because the base was damaged by negligence on the part of the Contractor shall not be included in the measurement for payment. No direct measurement or payment shall be made for saw cutting. Saw cutting shall be incidental to removal. Payment for removal of un-stabilized base materials including but not limited to aggregate base course, subbase, and existing subgrade soils shall be paid under the "Excavation" pay item per specification P-152. The thickness identified in the following bid items are nominal and may vary. No additional measurement or compensation will be made for pavements that are thicker.

BASIS OF PAYMENT

101-5.1 Payment. Payment shall be made at the contract unit price for the unit of measurement as specified above. This price shall be full compensation for furnishing all materials and for all preparation, hauling, and placing of the material and for all labor, equipment, tools, and incidentals necessary to complete this item.

Item P 101-5.1	Pavement Demolition, Concrete (All Thickness and Types) – per square yard
Item P 101-5.2	Pavement Demolition, Asphalt (All Thickness and Types) – per square yard
Item P 101-5.3	Stabilized Base Demolition, Concrete (All Thickness and Types) – per square yard

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

Advisory Circulars (AC)

AC 150/5380-6	Guidelines and Procedures for Maintenance of Airport Pavements.
---------------	---

ASTM International (ASTM)

ASTM D6690	Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements
------------	--

END OF ITEM P-101

PAGE INTENTIONALLY BLANK

ISSUED FOR BID

ITEM P-150 DEMOLITION

DESCRIPTION

150-1.1 General. This item shall consist of the of the removal of existing storm drain pipes and manholes, removal of existing water pipes and fire hydrants, and sanitary sewer pipes and manholes. Demolition of other miscellaneous items, such as, but not limited to, concrete pads, concrete and metal bollards, metal hand rails, duct markers, utility valves, parking bumpers, portable barrier rails, underdrain pipes, cleanouts, miscellaneous or abandoned underground wires, conduits and duct banks, miscellaneous concrete and asphalt debris, and other miscellaneous items shall be considered a subsidiary obligation to contract. Concrete and asphalt pavement demolition shall be in accordance with section P-101. Marking removal shall be in accordance with section P-620.

150-1.2 Waste Disposal. Disposal of all material demolished or removed under these items shall be off airport property in landfills appropriate for the type of material to be disposed of or as indicated in the construction documents or as directed by the Program Manager. Cost of disposal will not be paid for separately and shall be considered incidental to each item. Items identified for removal and salvage shall be carefully decommissioned and removed from service, avoiding damage to the item, and turned over to the airport or Program Manager. The airport or Program Manager shall be allowed first right of refusal, where the Contractor shall then be required to dispose of the item as previously specified.

CONSTRUCTION METHODS

150-2.1 Miscellaneous Demolition. The Contractor shall remove and dispose of all miscellaneous items as necessary to permit construction. Miscellaneous items are defined as all items that are not identified with a separate pay item, such as, but not limited to, concrete pads, concrete and metal bollards, metal hand rails, duct markers, utility valves, parking bumpers, portable barrier rails, underdrain pipes, cleanouts, miscellaneous or abandoned underground wires, conduits and duct banks, miscellaneous concrete and asphalt debris, or any other item that interferes with construction. Excavated areas shall be filled and compacted in accordance with Item P-152. Filling and compaction for these items shall be considered incidental to the demolition pay item requiring its use.

150-2.2 Storm Drain pipe and Manholes. The Contractor shall remove and dispose of all storm drain pipes and manholes as shown on the plans. Excavated areas shall be filled and compacted in accordance with Item P-152.

150-2.3 Sanitary Sewers and Manholes. The Contractor shall remove and dispose of all sanitary sewer pipes and manholes as shown on the plans. Excavated areas shall be filled and compacted in accordance with Item P-152.

150-2.4 Water Pipes and Flush Mounted Fire Hydrants. The Contractor shall remove and dispose of all water pipes and flush mounted fire hydrants as shown on the plans. Excavated areas shall be filled and

compacted in accordance with Item P-152.

METHOD OF MEASUREMENT

150-3.1 Miscellaneous Demolition. No separate measurement shall be made for demolition of items other than those specified herein or under separate specification. All items not identified with a separate pay item shall be considered incidental to the project and will not be measured and paid for separately.

150-3.2 Demolition of Existing Storm Drain Pipe (All Sizes). Measurement shall be made for the number of linear feet of existing storm drain pipe removed as measured along the centerline of the pipe from end or inside face of structure to the end or inside face of structure, whichever is applicable, regardless of depth. Price shall include all excavation, labor, tools, materials, disposal and backfill necessary to complete this item. All demolished pipes shall be crushed and added to the on-Airport crushed concrete stockpile.

150-3.3 Demolition of Existing Storm Drain Manhole. Measurement shall be made per each of the existing manhole demolished including all excavation, labor, tools, materials, disposal and backfill necessary to complete this item. All demolished structures constructed of concrete shall be crushed and added to the on-Airport crushed concrete stockpile. The structures metal parts and fittings shall become property of the Contractor.

150-3.4 Demolition of Existing Sanitary Sewer Pipe (All Sizes). Measurement shall be made for the number of linear feet of existing sanitary sewer pipes removed as measured along the centerline of the pipe from end or inside face of structure to the end or inside face of structure, whichever is applicable, regardless of depth. Price shall include all excavation, labor, tools, materials, disposal and backfill necessary to complete this item. Demolished pipe shall become property of Contractor.

150-3.5 Demolition of Existing Sanitary Sewer Manhole. Measurement shall be made per each sanitary sewer manhole demolished, regardless of size depth, or type. Including all excavation, labor, tools, materials, disposal and backfill necessary to complete this item. All demolished structures constructed of concrete shall be crushed and added to the on-Airport crushed concrete stockpile. The structures metal parts and fittings shall become property of the Contractor.

150-3.6 Demolition of Existing Water Pipe (All Sizes). Measurement shall be made for the number of linear feet of existing water pipe, regardless of size, type, or depth. Price shall include all excavation, labor, tools, materials, disposal and backfill necessary to complete this item. Demolished pipe shall become property of Contractor.

150-3.7 Remove Existing Flush Mounted Fire Hydrant. Measurement shall be made per each of the existing flush mounted fire hydrants removed including all excavation, labor, tools, materials, disposal and backfill necessary to complete this item. Pit and fire hydrant to remain property of MLGW.

150-3.8 Demolition of Existing Metal Guardrail. Measurement shall be made for the number of linear feet of existing metal guardrail system removed, along the guardrail centerline, from the connection point to existing or free end, to the other free end or connection point. Price shall include all excavation, labor, tools, materials, disposal, and incidentals, including the rail, posts, anchor plates, and end treatments. Removed materials to become property of the Contractor.

150-3.9 Demolition of Existing Abandoned Passenger Boarding Bridge Foundations. Measurement shall be made per each for the number of existing abandoned passenger boarding bridge foundations

ISSUED FOR BID

demolished. Price shall include all demolitions, excavation, labor, tools, materials, disposal, and incidentals for the foundation demolition, regardless of depth, size, and reinforcing. Demolition to be to proposed subgrade only; concrete to be crushed and added to the on-Airport stockpile.

150-3.10 Remove Existing Water Cabinets. Measurement shall be made per each for the number of existing water cabinets removed as shown on the plans. Water cabinets are stainless steel, approximately 4 ft. by 2.5 ft. x 5 ft., and weigh between 500 and 1,000 lbs. each. Electrical supply 120 VAC. Water cabinet to become property of MSCAA.

150-3.11 Remove Existing Passenger Boarding Bridge Cargo Lift. Measurement shall be made per each existing passenger boarding bridge cargo lift removed as shown on the plans. Dimensions approximately 4.5 ft. by 6.5 ft. by 20 ft.; Electrical supply 480 VAC. If salvageable, the Cargo lifts to become property of MSCAA.

150-3.12 Remove Existing Light Pole and Foundation. Measurement shall be made per each existing light pole and foundation removed as shown on the plans. Light pole height is approximately 40 ft. If salvageable, the light poles to become property of MSCAA.

BASIS OF PAYMENT

Payment shall be full compensation for all work and incidentals necessary to complete each item of work.

150-4.1 Miscellaneous Demolition. No separate payment shall be made for demolition of items other than those specified herein or under separate specification.

150-4.2 Demolition of Existing Storm Drain Pipe (All Sizes). Payment will be made at the contract unit price per linear foot for storm drain pipe demolished.

150-4.3 Demolition of Existing Storm Drain Manhole. Payment will be made at the contract unit price per each of the existing storm drain manhole demolished.

150-4.4 Demolition of Existing Sanitary Sewer Pipe (All Sizes). Payment will be made at the contract unit price per linear foot for sanitary sewer pipe demolished.

150-4.5 Demolition of Existing Sanitary Sewer Manhole. Payment will be made at the contract unit price per each sanitary sewer manhole demolished.

150-4.6 Demolition of Existing Water Pipe (All Sizes). Payment will be made at the contract unit price per linear foot for water pipe demolished.

150-4.7 Remove Existing Flush Mounted Fire Hydrant. Payment will be made at the contract unit price per each flush mounted fire hydrant removed.

150-4.8 Demolition of Existing Metal Guardrail. Payment will be made at the contract unit price per linear foot of existing metal guardrail demolished.

150-4.9 Demolition of Existing Abandoned Passenger Boarding Bridge Foundations. Payment will be

made at the contract unit price per each foundation demolished.

150-4.10 Remove Existing Water Cabinets. Measurement shall be made at the contract unit price per each water cabinet removed.

150-4.11 Remove Existing Passenger Boarding Bridge Cargo Lift. Payment will be made at the contract unit price per each passenger boarding bridge cargo lift removed.

150-4.12 Remove Existing Light Pole and Foundation. Payment will be made at the contract unit price per each light pole and foundation removed.

Payment will be made under:

Item P-150-4.1	Demolition of Existing Storm Drain Pipe (All Sizes) – per linear foot
Item P-150-4.2	Demolition of Existing Storm Drain Manhole – per each
Item P-150-4.3	Demolition of Existing Sanitary Sewer Pipe (All Sizes) – per linear foot
Item P-150-4.4	Demolition of Existing Sanitary Sewer Manhole – per each
Item P-150-4.5	Demolition of Existing Water Pipe (All Sizes) – per linear foot
Item P-150-4.6	Remove Existing Flush Mounted Fire Hydrant – per each
Item P-150-4.7	Demolition of Existing Metal Guardrail – per linear foot
Item P-150-4.8	Demolition of Existing Abandoned Passenger Boarding Bridge Foundations – per each
Item P-150-4.9	Remove Existing Water Cabinet – per each
Item P-150-4.10	Remove Existing Passenger Boarding Bridge Cargo Lift – per each
Item P-150-4.11	Remove Existing Light Pole and Foundation – per each

END OF ITEM P-150

ISSUED FOR BID

ITEM P-152 EXCAVATION, SUBGRADE, AND EMBANKMENT

DESCRIPTION

152-1.1 This item covers excavation, disposal, placement, and compaction of all materials within the limits of the work required to construct safety areas, runways, taxiways, aprons, and intermediate areas as well as other areas for drainage, building construction, parking, access roads, haul roads, or other purposes in accordance with these specifications and in conformity to the dimensions and typical sections shown on the plans.

152-1.2 Classification. All material excavated shall be classified as defined below:

a. Unclassified excavation. Unclassified excavation shall consist of the excavation and disposal of all material, regardless of its nature which is not otherwise classified. This excludes removal of cement stabilized soil bases and subbases. Suitable material shall be used in fill areas and shaped and compacted as specified herein. All excess material shall remain on airport property and be transported to a waste area identified within McKeller Park or as directed by the Program Manager.

Unclassified Excavation shall include, as incidental, the placement of the excavated material as embankment as needed or at a waste area designated by the Program Manager, in successive lifts, and at the compaction requirement specified in Section 152-2.8.

b. Undercut Excavation. This item shall consist of the removal and disposal of deposits of mixtures of soils not suitable for use as subgrade material, as determined by the Program Manager. This shall also include excavation and disposal of material soft spots encountered in the subgrade observed during the performance of proofrolling operations. Such over-excavation of material soft spots shall not include over-saturated material resulting from the Contractor's failure to properly drain the grade or due to over application of water during subgrade preparation. This item shall also include, as incidental, the replacement of the over-excavated material with excess Unclassified Excavation materials obtained from grading operations or granular backfill as approved by the Program Manager, compacted and brought to grade as required in this specification.

c. Unsuitable Material Excavation. This item shall consist of the removal and disposal of contaminated soils, unsuitable material for use in subgrade construction, embankment fill, or topsoil. Unsuitable material excavations shall include any materials containing vegetative or organic matter such as muck, peat, organic silt, sod, and/or garbage; materials containing rubbish, trash and/or debris; materials containing waste such as bulky waste, commercial solid waste, construction and demolition waste, domestic waste, farming waste, industrial waste, landscaping waste, and/or land clearing waste. Unsuitable material excavation shall also include petroleum impacted soils and other such hazardous waste. Materials designated by the Program Manager as petroleum impacted soils or hazardous waste shall be handled under the direction of the MSCAA Environmental Department and when released by the Program Manager, disposed of off airport property at the Contractor's expense. This item shall also include, as incidental, the replacement of the excavated unsuitable material with excess Unclassified Excavation materials obtained from grading operations or granular backfill as approved by the Program Manager, compacted and brought to grade as required in this specification.

The Tennessee Department of Environment and Conservation (TDEC) defines some of the above listed waste materials in accordance with Chapter 0400-11-01, as follows:

ISSUED FOR BID

Bulky Waste: large items of solid waste such as white goods, furniture, autos or large auto parts, trees, branches, stumps, and other oversize waste whose large size precludes or otherwise complicates their handling by normal collection, processing or disposal methods.

Commercial Solid Waste: all types of solid waste generated by stores, offices, restaurants, warehouses, and other manufacturing activities, excluding domestic and industrial waste.

Construction/Demolition Waste: waste other than special waste resulting from construction, remodeling, repair and demolition of structures and/or road construction. Such waste includes, but is not limited to, bricks, concrete, masonry materials, rock, lumber, road spoils, rebar, asphalt and other such paving materials. These types of waste are not associated with, and shall not be paid for as, demolition of pavements otherwise identified for demolition as a part of this project unless otherwise directed by the Engineer.

Domestic Waste: any solid waste, including garbage and trash, derived from single and multiple residence households, hotels, motels, bunkhouses, ranger stations, crew quarters, campgrounds, picnic grounds, and day-use recreational areas.

Farming Waste: means the wastes from the customary and generally accepted activities, practices, and procedures that farmers adopt, use, or engage in during the production and preparation for market of poultry, livestock, and associated farm products; and in the production and harvesting of agricultural crops which include agronomic, horticultural, and silvicultural crops and wastes resulting from aquaculture activities. However, the term does not include special wastes such as waste oils or other lubricants, unused fertilizers, or pesticide containers or residues.

Hazardous Waste: hazardous waste shall be as defined in subparagraph (1)(c) of Rule 0400-12-01-.02.

Industrial Waste: solid waste produced in, or generated by, industrial or manufacturing processes. The term does not include commercial, domestic, mining, or hazardous waste regulated under and subject to the Resource Conservation and Recovery Act (RCRA) Subtitle C), or oil and gas waste.

Landscaping and Land Clearing Waste: trees, stumps, brush, dirt, branches, leaves, clippings, etc. from landscaping and land clearing activities.

Mixed Solid Waste: a mixture of organic and inorganic discards and may contain household and other municipal solid wastes that are excluded from regulation as hazardous wastes.

Special Waste: are solid wastes that are either difficult or dangerous to manage and may include sludges, bulky wastes, pesticide wastes, medical wastes, industrial wastes, hazardous wastes which are not subject to regulations under Rules 0400-12-01-.03 through 0400-12-01-.07, liquid wastes, friable asbestos wastes, and combustion wastes.

d. Borrow excavation. Borrow excavation shall consist of approved material required for the construction of embankments or for other portions of the work in excess of the quantity of usable material available from required excavations. Borrow material shall be obtained from areas designated by the Program Manager within the limits of the airport property but outside the normal limits of necessary grading, or from areas outside the airport boundaries.

152-1.3 Granular backfill. Granular backfill shall consist of material meeting the requirement of Item P-209 Crushed Aggregate Base Course or P-219 Recycled Concrete Aggregate Base Course.

152-1.4 Subgrade preparation. Subgrade preparation shall consist of the stripping, subgrade evaluation, providing a proof roll, and preparation of the underlying subgrade in areas to be overlain with full strength airfield pavements, airfield shoulders, parking areas, service road and service road shoulders per Section P-152-2.9. Subgrade preparation shall occur and subsequent acceptance by the Program Manager shall be obtained prior to the placement of any overlying materials. The subgrade areas designated under pavement

ISSUED FOR BID

shall be prepared in accordance with this specification to meet compaction, grade, and smoothness acceptance criteria.

CONSTRUCTION METHODS

152-2.1 General. The suitability of material to be placed in embankments shall be subject to approval by the Program Manager. All unsuitable material shall be transported to a waste area identified within McKeller Park or as directed by the Program Manager. All waste areas shall be graded to allow positive drainage of the area and adjacent areas. The surface elevation of waste areas shall be specified on the plans or approved by the Program Manager.

When the Contractor's excavating operations encounter artifacts of historical or archaeological significance, the operations shall be temporarily discontinued and the Program Manager notified per Section 70, paragraph 70-20. At the direction of the Program Manager, the Contractor shall excavate the site in such a manner as to preserve the artifacts encountered and allow for their removal. Such excavation will be paid for as extra work.

If it is necessary to interrupt existing surface drainage, sewers or under-drainage, conduits, utilities, or similar underground structures, the Contractor shall be responsible for and shall take all necessary precautions to preserve them or provide temporary services. When such facilities are encountered, the Contractor shall notify the Program Manager, who shall arrange for their removal if necessary. The Contractor, at their own expense, shall satisfactorily repair or pay the cost of all damage to such facilities or structures that may result from any of the Contractor's operations during the period of the contract.

The Contractor shall maintain positive drainage at the project site at all times. When drainage pipes cross project phase lines, the Contractor shall take those steps necessary to maintain temporary positive drainage of the affected system. Temporary drainage shall be required and, unless otherwise specified, shall be considered incidental to those operations requiring its use in order to complete the work.

Lime may be allowed at the Program Manager's discretion for the sole purpose of drying soils with high moisture contents where aeration and manipulation of the soil have failed to reduce the moisture content to within tolerance of optimum. Lime shall also be allowed, at the Program Manager's discretion, to protect the Contractor's progress by acceleration of compaction efforts in advance of anticipated rain events. Code "L", Hydrated, or Quicklime are acceptable for use. Use of agricultural lime shall not be allowed.

152-2.2 Excavation. No excavation shall be started until the work has been staked out by the Contractor on a maximum 50' x 50' grid for both horizontal and vertical control and the Program Manager has obtained from the Contractor, the survey notes of the elevations and measurements of the ground surface. The Contractor and Program Manager shall agree that the original ground lines shown on the original topographic mapping are accurate or agree to any adjustments made to the original ground lines.

Digital terrain model (DTM) files of the existing surfaces, finished surfaces and other various surfaces were used to develop the design plans.

Volumetric quantities were calculated by comparing DTM files of the applicable design surfaces and generating Triangle Volume Reports. Electronic copies of DTM files and a paper copy of the original topographic map will be issued to the successful bidder.

Existing grades on the design cross sections or DTM's, where they do not match the locations of actual spot elevations shown on the topographic map, were developed by computer interpolation from those spot elevations. Prior to disturbing original grade, Contractor shall verify the accuracy of the existing ground surface by verifying spot elevations at the same locations where original field survey data was obtained as indicated on the topographic map. Contractor shall recognize that, due to the interpolation process, the

actual ground surface at any particular location may differ somewhat from the interpolated surface shown on the design cross sections or obtained from the DTM's. Contractor's verification of original ground surface, however, shall be limited to verification of spot elevations as indicated herein, and no adjustments will be made to the original ground surface unless the Contractor demonstrates that spot elevations shown are incorrect. For this purpose, spot elevations which are within 0.1 foot of the stated elevations for ground surfaces, or within 0.04 foot for hard surfaces (pavements, buildings, foundations, structures, etc.) shall be considered "no change". Only deviations in excess of these will be considered for adjustment of the original ground surface. If Contractor's verification identifies discrepancies in the topographic map, Contractor shall notify the Program Manager in writing at least two weeks before disturbance of existing grade to allow sufficient time to verify the submitted information and make adjustments to the design cross sections or DTM's. Disturbance of existing grade in any area shall constitute acceptance by the Contractor of the accuracy of the original elevations shown on the topographic map for that area.

The Contractor shall perform all bracing, sheathing, or shoring necessary to implement and protect all excavations as required for safety, conformance to governing laws, or to prevent damage to surrounding items or features. The cost of said bracing, sheathing, and shoring shall be included in the unit price bid for the item requiring excavation.

Excavation of non-stabilized (unbound) pavement bases and subbases such as granular bases and sub-bases will be paid for as Unclassified Excavation. Removal of stabilized (bound) pavement bases and subbases such as Porous Bituminous Base Courses and Soil-Cement Subbase Courses shall be paid for under P-101 Preparation/Removal of Existing Pavements.

The grade shall be maintained so that the surface is well drained at all times.

When the volume of the excavation exceeds that required to construct the embankments to the grades as indicated on the plans, the excess shall be used to grade the areas of ultimate development or disposed as directed by the Program Manager. When the volume of excavation is not sufficient for constructing the embankments to the grades indicated, the deficiency shall be obtained from borrow areas approved by the Program Manager.

a. Selective grading. When selective grading is indicated on the plans, the more suitable material designated by the Program Manager shall be used in constructing the embankment or in capping the pavement subgrade. If, at the time of excavation, it is not possible to place this material in its final location, it shall be stockpiled in approved areas until it can be placed. The more suitable material shall then be placed and compacted as specified. Selective grading shall be considered incidental to the work involved. The cost of stockpiling and placing the material shall be included in the various pay items of work involved.

b. Undercutting. Rock, shale, hardpan, loose rock, boulders, or other material unsatisfactory for safety areas, subgrades, roads, shoulders, or any areas intended for turf shall be excavated to a minimum depth of 12 inches below the subgrade or to the depth specified by the Program Manager. Muck, peat, matted roots, or other yielding material, unsatisfactory for subgrade foundation, shall be removed to the depth specified.

Excavation of unsuitable material shall be paid for as Unsuitable Material Excavation and Disposal at the contract unit price per cubic yard as measured in its original position. The excavated areas shall be refilled with suitable material, obtained from the grading operations or, if approved by the Program Manager, replaced with compacted granular backfill. Granular material used to backfill undercut areas will be measured for payment, if the undercut and use of granular backfill has been authorized by the Program Manager. Back filling of undercut areas with material obtained from grading operations (unclassified excavation) will not be measured for additional payment but shall be considered incidental to grading operations.

ISSUED FOR BID

Excessive moisture content alone shall not constitute a reason for classifying any material as unsuitable and performing Undercut Excavation. Material that is too wet for compaction but otherwise suitable as determined by the Program Manager shall be aerated, dried and compacted at the Contractor's expense. Soils which become oversaturated from percolation of ground water after drying shall be considered for Undercut Excavation, dependent on approval from the Program Manager. The Contractor shall take all reasonable steps necessary to protect subgrade and embankment areas from excessive moisture. Such protection may include, but is not limited to, providing positive temporary drainage, sealing off of embanked or subgrade soils with a smooth drum wheeled roller prior to rain events, limiting disturbed soil areas, and/or constructing diversion ditches or berms. The cost of said protection will be incidental to the contract cost of subgrade preparation or embankments constructed under this project. Soils excavated due to percolation of ground water shall be dried and reused in the embankment or stockpiled on airport property, as directed by the Program Manager.

Unsuitable materials shall be transported to a waste area identified within McKeller Park or as directed by the Program Manager. Materials designated by the Program Manager as petroleum impacted soils or hazardous waste shall be handled under the direction of the MSCAA Environmental Department and when released by the Program Manager, disposed of off airport property at the Contractor's expense. The cost of disposal is incidental to this item. This excavated material shall be paid for at the contract unit price per cubic yard for Unsuitable Material Excavation and Disposal. The excavated area shall be backfilled with suitable material obtained from the grading operations or borrow areas and compacted to specified densities. The necessary backfill will constitute a part of the embankment. Where rock cuts are made, backfill with select material. Any pockets created in the rock surface shall be drained in accordance with the details shown on the plans.

c. Over-break. Over-break, including slides, is that portion of any material displaced or loosened beyond the finished work as planned or authorized by the Program Manager. All over-break shall be graded or removed by the Contractor and disposed of as directed by the Program Manager. The Program Manager shall determine if the displacement of such material was unavoidable and their own decision shall be final. Payment will not be made for the removal and disposal of over-break that the Program Manager determines as avoidable. Unavoidable over-break will be classified as "Unclassified Excavation."

d. Removal of utilities. The removal of existing structures and utilities required to permit the orderly progress of work will be accomplished by the Contractor as indicated on the plans. All existing foundations shall be excavated at least 2 feet below the top of subgrade or as indicated on the plans, and the material disposed of as directed by the Program Manager. All foundations thus excavated shall be backfilled with suitable material and compacted as specified for embankment or as shown on the plans.

152-2.3 Borrow excavation. Borrow areas within the airport property are not indicated on the plans. Borrow material shall be obtained from areas designated by the Program Manager within the limits of the airport property but outside the normal limits of necessary grading, or from areas outside the airport boundaries. Borrow excavation shall be made only at these designated locations and within the horizontal and vertical limits as staked or as directed by the Program Manager. All unsuitable material shall be disposed of by the Contractor as shown on the plans. All borrow pits shall be opened to expose the various strata of acceptable material to allow obtaining a uniform product. Borrow areas shall be drained and left in a neat, presentable condition with all slopes dressed uniformly. Borrow areas shall not create a hazardous wildlife attractant.

152-2.4 Drainage excavation. Drainage excavation shall consist of excavating drainage ditches including intercepting, inlet, or outlet ditches; or other types as shown on the plans. The work shall be performed in sequence with the other construction. Ditches shall be constructed prior to starting adjacent excavation operations. All satisfactory material shall be placed in embankment fills; unsuitable material shall be placed in designated waste areas on airport property or as directed by the Program Manager. All necessary work

shall be performed true to final line, elevation, and cross-section. The Contractor shall maintain ditches constructed on the project to the required cross-section and shall keep them free of debris or obstructions until the project is accepted. There shall be no separate measurement or payment for drainage excavation which shall be considered incidental to the drainage items requiring its use.

152-2.5 Preparation of cut areas or areas where existing pavement has been removed. In those areas on which a subbase or base course is to be placed, the top **24 inches** of subgrade shall be compacted to not less than **95%** of maximum density for non-cohesive and **90%** of maximum density for cohesive soils as determined by **ASTM D1557**. The subgrade shall then be proof rolled in accordance with P 152-2.9. If the material has greater than 30% retained on the 3/4-inch (19.0 mm) sieve, follow AASHTO T-180 Annex Correction of maximum dry density and optimum moisture for oversized particles.

152-2.6 Preparation of embankment area. All sod and vegetative matter shall be removed from the surface upon which the embankment is to be placed. The cleared surface shall be broken up by plowing or scarifying to a depth of 6 inches and shall then be compacted per paragraph 152-2.10.

Sloped surfaces steeper than one (1) vertical to four (4) horizontal shall be plowed, stepped, benched, or broken up so that the fill material will bond with the existing material. When the subgrade is part fill and part excavation or natural ground, the excavated or natural ground portion shall be scarified to a depth of 12 inches and compacted as specified for the adjacent fill.

No direct payment shall be made for the work performed under this section. The necessary quantity of excavation removed and quantity of subgrade preparation will be paid for under the respective items of work.

152-2.7 Control Strip. The first half-day of construction of subgrade and/or embankment shall be considered as a control strip for the Contractor to demonstrate, in the presence of the Program Manager, that the materials, equipment, and construction processes meet the requirements of this specification. The sequence and manner of rolling necessary to obtain specified density requirements shall be determined. The maximum compacted thickness may be increased to a maximum of 12 inches upon the Contractor's demonstration that approved equipment and operations will uniformly compact the lift to the specified density. The Program Manager must witness this demonstration and approve the lift thickness prior to full production.

Control strips that do not meet specification requirements shall be reworked, re-compacted, or removed and replaced at the Contractor's expense. Full operations shall not begin until the control strip has been accepted by the Program Manager. The Contractor shall use the same equipment, materials, and construction methods for the remainder of construction, unless adjustments made by the Contractor are approved in advance by the Program Manager.

152-2.8 Formation of embankments. The material shall be constructed in lifts as established in the control strip, but not less than 6 inches nor more than 8 inches of compacted thickness.

When more than one lift is required to establish the layer thickness shown on the plans, the construction procedure described here shall apply to each lift. No lift shall be covered by subsequent lifts until tests verify that compaction requirements have been met. The Contractor shall rework, re-compact and retest any material placed which does not meet the specifications.

The lifts shall be placed, to produce a soil structure as shown on the typical cross-section or as directed by the Program Manager. Materials such as brush, hedge, roots, stumps, grass and other organic matter, shall not be incorporated or buried in the embankment.

Existing soil cement base and subbase materials identified for demolition may be utilized in the formation of embankments provided that the material is broken into 4-inch (max) clods, meets requirements for the construction of subgrade and infield surfaces, and the Contractor has obtained approval from the Program

ISSUED FOR BID

Manager. If approval is not provided, the Contractor shall dispose of the soil cement materials off-site or stockpile the material on airport property as directed by the Program Manager.

Earthwork operations shall be suspended at any time when satisfactory results cannot be obtained due to rain, freezing, or other unsatisfactory weather conditions in the field. Frozen material shall not be placed in the embankment nor shall embankment be placed upon frozen material. Material shall not be placed on surfaces that are muddy, frozen, or contain frost. The Contractor shall drag, blade, or slope the embankment to provide surface drainage at all times.

The material in each lift shall be within $\pm 2\%$ of optimum moisture content before rolling to obtain the prescribed compaction. The material shall be moistened or aerated as necessary to achieve a uniform moisture content throughout the lift. Natural drying may be accelerated by blending in dry material or manipulation alone to increase the rate of evaporation.

The Contractor shall make the necessary corrections and adjustments in methods, materials or moisture content to achieve the specified embankment density.

The Program Manager will take samples of excavated materials which will be used in embankment for testing to obtain a Moisture-Density Relations of Soils Report (Proctor) in accordance with **ASTM D1557**. A new Proctor shall be obtained for each soil type based on visual classification.

Density tests will be taken for quality acceptance purposes for every **1,000** square yards of compacted embankment for each lift which is required to be compacted, or other appropriate frequencies as determined by the Program Manager.

If the material has greater than 30% retained on the 3/4-inch (19.0 mm) sieve, follow AASHTO T-180 Annex Correction of maximum dry density and optimum moisture for oversized particles.

Rolling operations shall be continued until the embankment is compacted. Under all areas to be paved, the embankments shall be compacted to a depth of **24 inches** and to a density of not less than **95** percent of the maximum dry density for non-cohesive soils and **90** percent of the maximum dry density for cohesive soils as determined by **ASTM D1557**. As used in this specification, "non-cohesive" shall mean those soils having a plasticity index (PI) of less than 3 as determined by **ASTM D4318**.

The in-place field density shall be determined in accordance with **ASTM 6938** using Procedure A, the direct transmission method, and **ASTM D6938** shall be used to determine the moisture content of the material. The machine shall be calibrated in accordance with **ASTM D6938**. The Contractor's laboratory shall perform all density tests in the Program Manager's presence and provide the test results upon completion to the Program Manager for acceptance. If the specified density is not attained, the area represented by the test or as designated by the Program Manager shall be reworked and/or re-compacted and additional random tests made. This procedure shall be followed until the specified density is reached.

Compaction areas shall be kept separate, and no lift shall be covered by another lift until the proper density is obtained.

During construction of the embankment, the Contractor shall route all construction equipment evenly over the entire width of the embankment as each lift is placed. Lift placement shall begin in the deepest portion of the embankment fill. As placement progresses, the lifts shall be constructed approximately parallel to the finished pavement grade line.

Rock and existing pavement use within embankment shall be approved in advance by the Program Manager. When rock, concrete pavement, asphalt pavement, and other embankment material are excavated at approximately the same time as the subgrade, the material shall be incorporated into the outer portion of the embankment and the subgrade material shall be incorporated under the future paved areas. Stones, fragmentary rock, and recycled pavement larger than 4 inches in their greatest dimensions will not be allowed in the top 12 inches of the subgrade. Rockfill shall be brought up in lifts as specified or as directed

ISSUED FOR BID

by the Program Manager and the finer material shall be used to fill the voids forming a dense, compact mass. Rock, cement concrete pavement, asphalt pavement, and other embankment material shall not be disposed of except at places and in the manner designated on the plans or by the Program Manager.

When the excavated material consists predominantly of rock fragments of such size that the material cannot be placed in lifts of the prescribed thickness without crushing, pulverizing or further breaking down the pieces, such material may be placed in the embankment as directed in lifts not exceeding 2 feet in thickness. Each lift shall be leveled and smoothed with suitable equipment by distribution of spalls and finer fragments of rock. The lift shall not be constructed above an elevation of 4 feet below the finished subgrade.

Backfill of utility structures and drainage and utility trenches, whether resulting from new construction or demolition of existing, under proposed pavements, shoulders, inside runway, or taxiway safety areas will be compacted to not less than **95%** of maximum density as determined by ASTM **D1557**, regardless of depth. The cost of compaction of trenches shall be incidental to the item for which it is constructed. At Contractor's option, CLSM (Item P-153) may be used to backfill trenches, but no measurement and payment will be made if P-153 is utilized.

There will be no separate measurement of payment for compacted embankment. All costs incidental to placing in lifts, compacting, discing, watering, mixing, sloping, and other operations necessary for construction of embankments will be included in the contract price for excavation, borrow, or other items.

152-2.9 Proof rolling. The purpose of proof rolling the subgrade is to identify any weak areas in the subgrade and not for compaction of the subgrade. Before start of embankment, and after compaction is completed, the subgrade area shall be proof rolled with a 20 ton Proof Roller Tandem axle Dual Wheel Dump Truck loaded to the legal limit with tires inflated to 100 psi in the presence of the Program Manager. Apply a minimum of 1 coverage, or as specified by the Program Manager, under pavement areas. A coverage is defined as the application of one tire print over the designated area. Soft areas of subgrade that deflect more than 1 inch or show permanent deformation greater than 1 inch shall be removed and replaced with suitable material or reworked to conform to the moisture content and compaction requirements in accordance with these specifications. Under Program Manager direction, removal and replacement of soft areas up to a maximum depth of 2 feet shall be measured and paid for as subgrade preparation.

152-2.10 Compaction requirements. The subgrade under areas to be paved shall be compacted to a depth of **24 inches** and to a density of not less than **95** percent of the maximum dry density for non-cohesive soils and **90** percent of the maximum dry density for cohesive soils as determined by ASTM **D1557**. The subgrade in areas outside the limits of the pavement areas shall be compacted to a depth of **12 inches** and to a density of not less than **90** percent of the maximum density as determined by ASTM **D1557**.

The material to be compacted shall be within $\pm 2\%$ of optimum moisture content before being rolled to obtain the prescribed compaction (except for expansive soils). When the material has greater than 30 percent retained on the $\frac{3}{4}$ inch (19.0 mm) sieve, follow the methods in ASTM D1557. Tests for moisture content and compaction will be taken at a minimum of **1 test per 1,000** square yards of subgrade per each lift. All quality assurance testing shall be done by the Contractor's laboratory in the presence of the Program Manager, and density test results shall be furnished upon completion to the Program Manager for acceptance determination.

The in-place field density shall be determined in accordance with ASTM D6938 using Procedure A, the direct transmission method, and ASTM D6938 shall be used to determine the moisture content of the material. The machine shall be calibrated in accordance with ASTM D6938 within 12 months prior to its use on this contract. The gage shall be field standardized daily.

Density tests will be taken for quality acceptance purposes for every **1,000** square yards of completed subgrade which shall be paid for under Subgrade Preparation. If a nuclear gage is used for density determination, two random readings shall be made for each **1,000** square yards.

ISSUED FOR BID

Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified. If the specified density is not attained, the entire lot shall be re-worked and/or re-compacted and additional random tests made. This procedure shall be followed until the specified density is reached.

All cut-and-fill slopes shall be uniformly dressed to the slope, cross-section, and alignment shown on the plans or as directed by the Program Manager and the finished subgrade shall be maintained.

152-2.11 Finishing and protection of subgrade. Finishing and protection of the subgrade is incidental to Subgrade Preparation. Grading and compacting of the subgrade shall be performed so that it will drain readily. All low areas, holes or depressions in the subgrade shall be brought to grade. Scarifying, blading, rolling and other methods shall be performed to provide a thoroughly compacted subgrade shaped to the lines and grades shown on the plans. All ruts or rough places that develop in the completed subgrade shall be graded, re-compacted, and retested. The Contractor shall protect the subgrade from damage and limit hauling over the finished subgrade to only traffic essential for construction purposes.

The Contractor shall maintain the completed course in satisfactory condition throughout placement of subsequent layers. No subbase, base, or surface course shall be placed on the subgrade until the subgrade has been accepted by the Program Manager.

152-2.12 Haul. All hauling within the work area or to/from the identified staging and storage areas will be considered a necessary and incidental part of the work. The Contractor shall include the cost in the contract unit price for the pay of items of work involved. No payment will be made separately or directly for hauling on any part of the work within the project limits or to/from the identified staging and storage areas. The Contractor will be paid for the hauling off-site of "Unclassified Excavation – Excess".

The Contractor's equipment shall not cause damage to any excavated surface, compacted lift or to the subgrade as a result of hauling operations. Any damage caused as a result of the Contractor's hauling operations shall be repaired at the Contractor's expense.

The Contractor shall be responsible for providing, maintaining and removing any haul roads or routes within or outside of the work area, and shall return the affected areas to their former condition, unless otherwise authorized in writing by the Owner. No separate payment will be made for any work or materials associated with providing, maintaining and removing haul roads or routes.

152-2.13 Surface Tolerances. In those areas on which a subbase or base course is to be placed, the surface shall be tested for smoothness and accuracy of grade and crown. Any portion lacking the required smoothness or failing in accuracy of grade or crown shall be scarified to a depth of at least 3 inches, reshaped and re-compacted to grade until the required smoothness and accuracy are obtained and approved by the Program Manager. The Contractor shall perform all final smoothness and grade checks in the presence of the Program Manager. Any deviation in surface tolerances shall be corrected by the Contractor at the Contractor's expense.

- a. **Smoothness.** The finished surface shall not vary more than $\pm 1/2$ inch when tested with a Contractor supplied 12-foot straightedge applied parallel with and at right angles to the centerline. The straightedge shall be moved continuously forward at half the length of the 12-foot straightedge for the full length of each line on a 50-foot grid.
- b. **Grade.** The grade and crown shall be measured on a 25-foot grid and shall be within ± 0.05 feet of the specified grade.

152-2.14 Topsoil. Not used.

METHOD OF MEASUREMENT

152-3.1 Measurement for payment specified by the cubic yard shall be computed by the comparison of digital terrain model (DTM) surfaces for computation of neat line quantities. The end area is that bound by the original ground line established by field cross-sections and the final theoretical pay line established by contours shown on the plans, subject to verification by the Program Manager. After completion of all earthwork operations, the final grade shall be verified by the Program Manager by means of field elevations.

152-3.2 Unclassified Excavation. The quantity of unclassified excavation placed as embankment within the project area shall be the number of cubic yards measured in its original position. Measurement shall not include the quantity of materials excavated without authorization beyond normal slope lines, or the quantity of material used for purposes other than those directed.

152-3.3 Undercut Excavation. The quantity of undercut excavation shall be the number of cubic yards measured for the undercut areas as designated by the Program Manager in its original position.

152-3.4 Unsuitable Material Excavation and Disposal. Unsuitable material, as defined in Section 152-1.2(c), will be paid on the basis of the number of cubic yards measured in its original position, excavated. Unsuitable material shall be transported to a waste area identified within McKeller Park or as directed by the Program Manager. Materials designated by the Program Manager as petroleum impacted soils or hazardous waste shall be handled under the direction of the MSCAA Environmental Department and when released by the Program Manager, disposed of off airport property at the Contractor's expense. Petroleum impacted soils or hazardous waste generated by the Contractor, whether intentionally, accidentally or by vandalism, will not be measured for payment and the material shall be handled in the same manner as above.

152-3.5 Borrow Excavation. The quantity of borrow excavation placed as embankment within the project area shall be the number of cubic yards measured in its original position.

152-3.6 Subgrade Preparation. The quantity for subgrade preparation shall be the number of square yards in "plan view" of exposed subgrade in embankment areas and the constructed subgrade in excavation areas underneath full-strength airfield pavements and shoulders that is scarified, manipulated, compacted and proofrolled in accordance with Section 152-2.9 and 152-2.10. No separate measurement will be made for subsequent subgrade preparation work in embankments constructed under this contract in the same "plan view" area if the initial effort at a higher elevation does not produce a stable subgrade. Each "plan view" area shall be measured once. (For example: If after proofrolling, unstable material must be removed to a lower elevation, the Contractor will provide subgrade preparation at this lower elevation at no additional expense to the Owner.) Subgrade preparation includes the processing of the top 24 inches, per 152-2.10, including blading, shaping, aerating, and compacting. Yielding or unstable subgrade material shall be reprocessed to 24 inches maximum depth as directed by the Program Manager. Excavation as directed by the Program Manager in excess of 24 inch maximum will be paid for as undercut excavation.

152-3.7 Granular Backfill. The quantity of granular backfill shall be the neat theoretical number of cubic yards of granular material placed in the embankment. Measurement shall be made in its final position from field measurements taken prior to and immediately after placement of granular materials into the embankment. Only those areas authorized by the Program Manager for granular backfill will be considered for payment.

152-3.8 Lime. The quantity of lime shall be the actual tons placed in the embankment. Only those areas authorized by the Program Manager for lime treatment will be considered for payment. The quantity of lime indicated in the plans or proposal is an estimate only. Unused quantities of lime shall not be the basis of a claim or adjustment of unit costs under GP-50.

ISSUED FOR BID

BASIS OF PAYMENT

152-4.1 “Unclassified excavation” payment shall be made at the contract unit price per cubic yard. This price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item.

152-4.2 “Undercut Excavation” payment shall be made at the contract unit price per cubic yard. This price shall be full compensation for all materials, equipment, labor, tools and incidentals necessary to complete the item regardless of the depth encountered. Only the undercut authorized by the Program Manager shall be paid for.

152-4.3 “Unsuitable Material Excavation and Disposal” payment shall be made at the contract unit price per cubic yard. This price shall be full compensation for furnishing all materials, labor, equipment, tools and incidentals necessary to excavate, load, and transport to a waste area identified within McKeller Park or as directed by the Program Manager. Materials designated by the Program Manager as petroleum impacted soils or hazardous waste shall be handled under the direction of the MSCAA Environmental Department and when released by the Program Manager, disposed of off airport property at the Contractor’s expense, including any tipping or dump fees.

152-4.4 “Borrow excavation” payment shall be made at the contract unit price per cubic yard. This price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item.

152-4.5 “Subgrade Preparation” payment shall be made at the contract unit price per square yard. This price shall be full compensation for furnishing all materials, labor, surveying, equipment, tools and incidentals necessary to complete the item. This price includes the scarifying, moisture adjustment, proof rolling and compaction in accordance with the plans and specifications. For embankments constructed under this project, no payment shall be made for subsequent subgrade preparation work in the same "plan view" area if the initial effort at a higher elevation does not produce a stable subgrade. Each "plan view" area shall be measured once.

152-4.6 “Granular Backfill” payment shall be made at the contract unit price per cubic yard. This price shall be full compensation for furnishing all materials, placement of the materials into the embankment as specified, and furnishing all equipment, labor, surveying, tools, filter fabric, and incidentals necessary to complete the item.

152-4.7 “Lime” payment shall be made at the contract unit price per ton. This price shall be full compensation for furnishing all materials, placement of the material into the embankment and furnishing all equipment, labor and incidentals necessary to complete the item as described under this specification.

Payment will be made under:

Item P-152-4.1	Unclassified Excavation – per cubic yard
Item P-152-4.2	Undercut Excavation – per cubic yard
Item P-152-4.3	Unsuitable Material Excavation and Disposal – per cubic yard
Item P-152-4.4	Borrow Excavation – per cubic yard
Item P-152-4.5	Subgrade Preparation – per square yard
Item P-152-4.6	Granular Backfill – per cubic yard
Item P-152-4.7	Lime – per ton

ISSUED FOR BID

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

American Association of State Highway and Transportation Officials (AASHTO)

AASHTO T-180	Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop
--------------	---

ASTM International (ASTM)

ASTM D698	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft ³ (600 kN-m/m ³))
-----------	--

ASTM D1556	Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
------------	---

ASTM D1557	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft ³ (2700 kN-m/m ³))
------------	---

ASTM D6938	Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
------------	--

Advisory Circulars (AC)

AC 150/5370-2	Operational Safety on Airports During Construction Software
---------------	---

Software

FAARFIELD – FAA Rigid and Flexible Iterative Elastic Layered Design

U.S. Department of Transportation

FAA RD-76-66	Design and Construction of Airport Pavements on Expansive Soils
--------------	---

END OF ITEM P-152

ISSUED FOR BID

ITEM P-153 CONTROLLED LOW-STRENGTH MATERIAL (CLSM)**DESCRIPTION**

153-1.1 This item shall consist of furnishing, transporting, and placing a controlled low-strength material (CLSM) as flowable backfill in trenches or at other locations shown on the plans or as directed by the Program Manager.

MATERIALS**153-2.1 Materials.**

a. Cement. Cement shall conform to the requirements of ASTM C150 Type I, low alkali.

b. Fly ash. Fly ash shall conform to ASTM C618, Class F.

c. Fine aggregate (sand). Fine aggregate shall conform to the requirements of ASTM C33 except for aggregate gradation. Any aggregate gradation which produces the specified performance characteristics of the CLSM and meets the following requirements, will be accepted.

Sieve Size	Percent Passing by weight
3/4 inch (19.0 mm)	100
No. 200 (75 µm)	0 - 12

d. Water. Water used in mixing or curing shall be from potable water sources. Other sources shall be tested in accordance with ASTM C1602 prior to use.

MIX DESIGN

153-3.1 Proportions. The Contractor shall submit, to the Program Manager, a mix design including the proportions and source of aggregate, fly ash, cement, water, and approved admixtures. No CLSM mixture shall be produced for payment until the Program Manager has given written approval of the proportions. The proportions shall be prepared by a laboratory and shall remain in effect for the duration of the project. The proportions shall establish a single percentage or weight for aggregate, fly ash, cement, water, and any admixtures proposed. Laboratory costs are incidental to this item.

a. Compressive strength. CLSM shall be designed to achieve a 28-day compressive strength of 100 to 200 psi when tested in accordance with ASTM D4832, with no significant strength gain after 28 days.

b. Consistency. Design CLSM to achieve a consistency that will produce an approximate 8-inch diameter circular-type spread without segregation. CLSM consistency shall be determined per ASTM D6103.

CONSTRUCTION METHODS**153-4.1 Placement.****ISSUED FOR BID**

a. Placement. CLSM may be placed by any reasonable means from the mixing unit into the space to be filled. Agitation is required during transportation and waiting time. Placement shall be performed so structures or pipes are not displaced from their final position and intrusion of CLSM into unwanted areas is avoided. The material shall be brought up uniformly to the fill line shown on the plans or as directed by the Program Manager. Each placement of CLSM shall be as continuous an operation as possible. If CLSM is placed in more than one lift, the base lift shall be free of surface water and loose foreign material prior to placement of the next lift.

b. Contractor Quality Control. The Contractor shall collect all batch tickets to verify the CLSM delivered to the project conforms to the mix design. The Contractor shall verify daily that the CLSM is consistent with 153-3.1a and 153-3.1b. Adjustments shall be made as necessary to the proportions and materials as needed. The Contractor shall provide all batch tickets to the Program Manager.

c. Limitations of placement. CLSM shall not be placed on frozen ground. Mixing and placing may begin when the air or ground temperature is at least 35°F and rising. Mixing and placement shall stop when the air temperature is 40°F and falling or when the anticipated air or ground temperature will be 35°F or less in the 24-hour period following proposed placement. At the time of placement, CLSM shall have a temperature of at least 40°F.

153-4.2 Curing and protection

a. Curing. The air in contact with the CLSM shall be maintained at temperatures above freezing for a minimum of 72 hours. If the CLSM is subjected to temperatures below 32°F, the material may be rejected by the Program Manager if damage to the material is observed.

b. Protection. The CLSM shall not be subject to loads and shall remain undisturbed by construction activities for a period of 48 hours or until a compressive strength of 15 psi is obtained. The Contractor shall be responsible for providing evidence to the Program Manager that the material has reached the desired strength. Acceptable evidence shall be based upon compressive tests made in accordance with paragraph 153-3.1a.

153-4.3 Quality Assurance (QA) Acceptance. CLSM QA acceptance shall be based upon batch tickets provided by the Contractor to the Program Manager to confirm that the delivered material conforms to the mix design.

METHOD OF MEASUREMENT

153-5.1 Measurement. No separate measurement for payment shall be made for controlled low strength material (CLSM). CLSM shall be considered necessary and incidental to the work of this Contract.

BASIS OF PAYMENT

153-6.1 Payment. No payment will be made separately or directly for controlled low strength material (CLSM). CLSM shall be considered necessary and incidental to the work of this Contract.

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM C33

Standard Specification for Concrete Aggregates

ISSUED FOR BID

ASTM C150	Standard Specification for Portland Cement
ASTM C618	Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C595	Standard Specification for Blended Hydraulic Cements
ASTM C1602	Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete
ASTM D4832	Standard Test Method for Preparation and Testing of Controlled Low-Strength Material (CLSM) Test Cylinders
ASTM D6103	Flow Consistency of Controlled Low Strength Material (CLSM)

END OF ITEM P-153

PAGE INTENTIONALLY BLANK

ISSUED FOR BID

ITEM P-155 LIME-TREATED SUBGRADE

DESCRIPTION

155-1.1 This item shall be used for soil modification that require strength gain to a specific level. This item shall consist of constructing one or more courses of a mixture of soil, lime, and water in accordance with this specification, and in conformity with the lines, grades, thicknesses, and typical cross-sections shown on the plans.

MATERIALS

155-2.1 Lime. “Code L” lime, hydrated lime, and either high-calcium dolomitic, or magnesium lime, as defined by ASTM C51, shall conform to the requirements of ASTM C977. Lime not produced from calcining limestone is not permitted.

155-2.2 Commercial lime slurry. Commercial lime slurry shall be a pumpable suspension of solids in water. The water or liquid portion of the slurry shall not contain dissolved material injurious or objectionable for the intended purpose. The solids portion of the mixture, when considered on the basis of “solids content,” shall consist principally of hydrated lime of a quality and fineness sufficient to meet the following chemical composition and residue requirements.

a. Chemical composition. The “solids content” of the lime slurry shall consist of a minimum of 70%, by weight, of calcium and magnesium oxides.

b. Residue. The percent by weight of residue retained in the “solids content” of lime slurry shall conform to the following requirements:

Residue retained on a No. 6 (3.35 μ m) sieve = maximum 0.0%

Residue retained on a No. 10 (2.00 μ m) sieve = maximum 1.0%

Residue retained on a No. 30 (600 μ m) sieve = maximum 2.5%

c. Grade. Commercial lime slurry shall conform to one of the following two grades:

Grade 1. The “dry solids content” shall be at least 31% by weight, of the slurry.

Grade 2. The “dry solids content” shall be at least 35%, by weight, of the slurry.

155-2.3 Water. Water used in mixing or curing shall be from potable water sources. Other sources shall be tested in accordance with ASTM C1602 prior to use.

155-2.4 Soil. The soil for this work shall consist of on-site materials free of roots, sod, weeds, and stones larger than 2-1/2 inches and have a sulfate content of less than 0.3%.

COMPOSITION

155-3.1 Soil-lime mixture. Ten (10) days prior to the commencement of the work, the Contractor shall submit a soil-lime mixture, developed by the Contractor’s laboratory, showing the amount of lime and water required per cubic yard, and procedures for blending the lime/subgrade mixture for each type of existing soil as needed. The soil-lime mixture shall include process type and number of: lime applications, stages of mixing, slurry injection depths, mixing depths, and depths of compaction lifts. Also, the Contractor shall submit a list of equipment to be used and their relation to method of mix proportioning, spreading,

ISSUED FOR BID

pulverizing and compacting subgrade, slurry injection, jet slurry mixing, and other related work. The soil-lime mixture shall also contain amount of lime, either in sacks or pounds per cubic yard and the amount of water to be used, if slurry method is used. Use the ASTM D3551 laboratory test method when applicable.

155-3.2 Tolerances. At final compaction, the lime and water content for each course of subgrade treatment shall conform to the following tolerances:

Tolerances

Material	Tolerance
Lime	+ 0.5%
Water	+ 2%, -0%

WEATHER LIMITATIONS

155-4.1 Weather limitation. Subgrade shall not be constructed when weather conditions detrimentally affect the quality of the materials. Lime shall not be applied unless the air temperature is at least 40°F and rising. Lime shall not be applied to soils that are frozen or contain frost. Protect completed lime-treated areas by approved methods against the detrimental effects of freezing if the air temperature falls below 35°F. Remove and replace any damaged portion of the completed soil-lime treated area with new soil-lime material in accordance with this specification.

EQUIPMENT

155-5.1 Equipment. All equipment necessary to grade, scarify, spread, mix and compact the material shall be provided. The Program Manager must approve the Contractor's proposed equipment prior to the start of the treatment.

CONSTRUCTION METHODS

155-6.1 General. This specification is to construct a subgrade consisting of a uniform lime mixture which shall be free from loose or segregated areas. The subgrade shall be of uniform density and moisture content, well mixed for its full depth, and have a smooth surface suitable for placing subsequent lifts. The Contractor shall be responsible to meet the above requirements.

Prior to any treatment, the subgrade shall be constructed as specified in Item P-152, Excavation, Subgrade and Embankment, and shaped to conform to the typical sections, lines, and grades as shown on the plans.

The mixing equipment must give visible indication at all times that it is cutting, pulverizing and mixing the material uniformly to the proper depth over the full width of the cut.

155-6.2 Application. Lime shall be uniformly spread only over an area where the initial mixing operations can be completed during the same work day. Lime shall not be applied when wind conditions are detrimental to proper application. A motor grader shall not be used to spread the lime. Adequate moisture shall be added to the cement/soil mixture to maintain the proper moisture content. Materials shall be handled, stored, and applied in accordance with all federal, state, and local requirements.

155-6.3 Mixing. The mixing procedure shall be as described below:

a. Preliminary mixing. The full depth of the treated subgrade shall be mixed with an approved mixing machine. Lime shall not be left exposed for more than six (6) hours. The mixing machine shall make

ISSUED FOR BID

two coverages. Water shall be added to the subgrade during mixing to provide a moisture content approximately 3% to 5% above the optimum moisture of the material and to ensure chemical reaction of the lime and subgrade. After mixing, the subgrade shall be lightly rolled to seal the surface and help prevent evaporation of moisture. The water content of the subgrade mixture shall be maintained at a moisture content above the optimum moisture content for a minimum of 4 to 24 hours or until the material becomes friable. During the mellowing period, the material shall be sprinkled as directed by the Program Manager.

b. Final mixing. After the required mellowing time, the material shall be uniformly mixed by approved methods. Any clods shall be reduced in size by blading, discing, harrowing, scarifying, or by the use of other approved pulverization methods. After curing, pulverize lime treated material until 100% of soil particles pass a one-inch (25.0 mm) sieve and 60% pass the No. 4 (4.75 mm) sieve when tested dry by laboratory sieves. If resultant mixture contains clods, reduce their size by scarifying, remixing, or pulverization to meet specified gradation.

155-6.4 Control Strip. The first half-day of construction shall be considered the control strip. The Contractor shall demonstrate, in the presence of the Program Manager, that the materials, equipment, and construction processes meet the requirements of the specification. The sequence and manner of rolling necessary to obtain specified density requirements shall be determined. Control strips that do not meet specification requirements shall be reworked, re-compacted, or removed and replaced at the Contractor's expense. Full operations shall not continue until the control strip has been accepted by the Program Manager. Upon acceptance of the control strip by the Program Manager, the Contractor shall use the same equipment, materials, and construction methods for the remainder of construction, unless adjustments made by the Contractor are approved in advance by the Program Manager.

155-6.5 Treatment Application and Depth Checks. The depth and amount of stabilization shall be measured by the Contractor with no less than 2 tests per day of material placed; test shall be witnessed by the Program Manager. Measurements shall be made in test holes excavated to show the full depth of mixing and the pH checked by spraying the side of the test hole with a pH indicator such as phenolphthalein. Phenolphthalein changes from clear to red between pH 8.3 and 10. The color change indicates the location of the bottom of the mixing zone. pH indicators other than phenolphthalein can be used to measure pH levels. If the pH is not at least 8.3 and/or if the depth of the treated subgrade is more than 1/2 inch deficient, additional lime treatment shall be added and the material remixed. The Contractor shall correct all such areas in a manner satisfactory to the Program Manager.

155-6.6 Compaction. Compaction of the mixture shall immediately follow the final mixing operation with the mixture compacted within 1 to 4 hours after final mixing. The material shall be at the moisture content specified in paragraph 155-3.2 during compaction. The field density of the compacted mixture shall be at least **93%** of the maximum density as specified in paragraph 155-6.10. Perform in-place density test to determine degree of compaction between 24 and 72 hours after final compaction and the 24-hour moist cure period. If the material fails to meet the density requirements, it shall be reworked to meet the density requirements. Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

155-6.7 Finishing and curing. After the final lift or course of lime-treated subgrade has been compacted, it shall be brought to the required lines and grades in accordance with the typical sections. The completed section shall then be finished by rolling, as directed by the Program Manager, with a pneumatic or other suitable roller sufficiently light to prevent hairline cracking. The finished surface shall not vary more than 1/2-inch when tested with a Contractor provided 12-foot straightedge applied parallel with and at right angles to the pavement centerline. Any variations in excess of this tolerance shall be corrected by the Contractor at the Contractor's expense in a manner satisfactory to the Program Manager.

The completed section shall be moist-cured for a minimum of seven (7) days before further courses are added or any traffic is permitted, unless otherwise directed by the Program Manager. The final lift should not be exposed for more than 14 days without protection or the placement of a base course material.

155-6.8 Maintenance. The Contractor shall protect and maintain the lime-treated subgrade from yielding until the lime-treated subgrade is covered by placement of the next lift. When material has been exposed to excessive rain, snow, or freeze-thaw conditions, prior to placement of additional material, the Contractor shall verify that materials still meets all specification requirements. The maintenance cost shall be incidental to this item.

155-6.9 Surface tolerance. In those areas on which a subbase or base course is to be placed, the surface shall be tested for smoothness and accuracy of grade and crown. Any portion lacking the required smoothness or failing in accuracy of grade or crown shall be scarified to a depth of at least 3, reshaped and re-compacted to grade until the required smoothness and accuracy are obtained and approved by the Program Manager. The Contractor shall perform all final smoothness and grade checks in the presence of the Program Manager. Any deviation in surface tolerances shall be corrected by the Contractor at the Contractor's expense.

a. Smoothness. The finished surface shall not vary more than $\pm \frac{1}{2}$ inch when tested with a Contractor provided 12-foot straightedge applied parallel with and at right angles to the centerline. The straightedge shall be moved continuously forward at half the length of the 12-foot straightedge for the full length of each line on a 50-foot grid.

b. Grade. The grade and crown shall be measured on a 50-foot grid and shall be within ± 0.05 feet of the specified grade.

155-6.10 Acceptance sampling and testing. The lime treated subgrade shall be accepted for density and thickness on an area basis. Testing frequency shall be a minimum of one compaction and thickness test per **1,000 square yards** of lime treated subgrade, but not less than four (4) tests per day of production. Sampling locations will be determined on a random basis per ASTM D3665.

a. Density. All testing shall be done by the Contractor's laboratory in the presence of the Program Manager and density test results shall be furnished upon completion to the Program Manager for acceptance determination.

The field density of the compacted mixture shall be at least **93%** of the maximum density of laboratory specimens prepared from samples taken from the material in place. The specimens shall be compacted and tested in accordance with ASTM D698 to determine maximum density and optimum moisture content. The in-place field density shall be determined in accordance with ASTM D6938, Procedure A, direct transmission method. If the material fails to meet the density requirements, the area represented by the failed test shall be reworked to meet the density requirements. Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

b. Thickness. The thickness of the course shall be within $+0$ and $-1/2$ inch of the specified thickness as determined by depth tests taken by the Contractor in the presence of the Program Manager for each area. Where the thickness is deficient by more than $1/2$ -inch, the Contractor shall correct such areas at no additional cost. The Contractor shall replace, at his expense, material where depth tests have been taken.

155-6.11 Handling and safety. The Contractor shall obtain and enforce the lime supplier's instructions for proper safety and handling of the lime to prevent physical eye or skin contact with lime during transport or application.

ISSUED FOR BID

METHOD OF MEASUREMENT

155-7.1 Lime shall be paid by the number of tons of Hydrated Lime applied at the application rate specified in paragraph 155-3.1.

a. “Code L” lime and Hydrated lime delivered to the project in dry form will be measured according to the actual tonnage either spread on the subgrade or batched on site into a slurry, whichever is applicable.

b. Lime delivered to the project in slurry form will be measured for payment in tons, dry weight of hydrated lime or equivalent hydrated lime in accordance with paragraph b above.

BASIS OF PAYMENT

155-8.1 Payment for “Code-L” Lime subgrade stabilization meeting all acceptance criteria as specified under P-155 shall be based on the contract unit price as indicated under P-152. These prices shall be full compensation for furnishing all materials and for all preparation, delivery and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item. No separate pay item shall be included under this specification.

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM C51	Standard Terminology Relating to Lime and Limestone (as used by the Industry)
ASTM C977	Standard Specification for Quicklime and Hydrated Lime for Soil Stabilization
ASTM C1602	Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete
ASTM D698	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft ³) (600 kN-m/m ³)
ASTM D1556	Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D2487	Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D6938	Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

Software

FAARFIELD – FAA Rigid and Flexible Iterative Elastic Layered Design

END OF ITEM P-155

ISSUED FOR BID

PAGE INTENTIONALLY BLANK

ISSUED FOR BID

ITEM P-209 CRUSHED AGGREGATE BASE COURSE

DESCRIPTION

209-1.1 This item consists of a base course composed of crushed aggregate base constructed on a prepared course in accordance with these specifications and in conformity to the dimensions and typical cross-sections shown on the plans.

MATERIALS

209-2.1 Crushed aggregate base. Crushed aggregate shall consist of clean, sound, durable particles of crushed stone, crushed gravel, and shall be free from coatings of clay, silt, organic material, clay lumps or balls or other deleterious materials or coatings. The method used to produce the crushed gravel shall result in the fractured particles in the finished product as consistent and uniform as practicable. Fine aggregate portion, defined as the portion passing the No. 4 (4.75 mm) sieve shall consist of fines from the coarse aggregate crushing operation. The fine aggregate shall be produced by crushing stone, gravel, that meet the coarse aggregate requirements for wear and soundness. Aggregate base material requirements are listed in the following table.

Crushed Aggregate Base Material Requirements

Material Test	Requirement	Standard
Coarse Aggregate		
Resistance to Degradation	Loss: 45% maximum	ASTM C131
Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate	Loss after 5 cycles: 12% maximum using Sodium sulfate - or - 18% maximum using magnesium sulfate	ASTM C88
Percentage of Fractured Particles	Minimum 90% by weight of particles with at least two fractured faces and 100% with at least one fractured face ¹	ASTM D5821
Flat Particles, Elongated Particles, or Flat and Elongated Particles	10% maximum, by weight, of flat, elongated, or flat and elongated particles ²	ASTM D4791
Fine Aggregate		
Liquid limit	Less than or equal to 25	ASTM D4318
Plasticity Index	Not more than five (5)	ASTM D4318

¹ The area of each face shall be equal to at least 75% of the smallest mid-sectional area of the piece. When two fractured faces are contiguous, the angle between the planes of fractures shall be at least 30 degrees to count as two fractured faces.

² A flat particle is one having a ratio of width to thickness greater than five (5); an elongated particle is one having a ratio of length to width greater than five (5).

209-2.2 Gradation requirements. The gradation of the aggregate base material shall meet the requirements of the gradation given in the following table when tested per ASTM C117 and ASTM C136. The gradation

ISSUED FOR BID

shall be well graded from coarse to fine and shall not vary from the lower limit on one sieve to the high limit on an adjacent sieve or vice versa.

Gradation of Aggregate Base

Sieve Size	Design Range Percentage by Weight passing	Contractor's Final Gradation	Job Control Grading Band Tolerances ¹ (Percent)
2 inch (50 mm)	100		0
1-1/2 inch (37.5 mm)	95-100		±5
1 inch (25.0 mm)	70-95		±8
3/4 inch (19.0 mm)	55-85		±8
No. 4 (4.75 mm)	30-60		±8
No. 40 ² (425 µm)	10-30		±5
No. 200 ² (75 µm)	0-10		±3

¹ The "Job Control Grading Band Tolerances for Contractor's Final Gradation" in the table shall be applied to "Contractor's Final Gradation" to establish a job control grading band. The full tolerance still applies if application of the tolerances results in a job control grading band outside the design range.

² The fraction of material passing the No 200 (75 µm) sieve shall not exceed two-thirds the fraction passing the No 40 (425 µm) sieve.

209-2.3 Sampling and Testing.

a. Aggregate base materials. The Contractor shall take samples of the aggregate base in accordance with ASTM D75 to verify initial aggregate base requirements and gradation. Material shall meet the requirements in paragraph 209-2.1. This sampling and testing will be the basis for approval of the aggregate base quality requirements. Aggregate gradation verification checks for base acceptance shall be performed for each source of material, each material source change, and no less than every 90 Calendar Day period.

b. Gradation requirements. The Contractor shall take two aggregate base samples per day in the presence of the Program Manager to check the final gradation. Sampling shall be per ASTM D75. Material shall meet the requirements in paragraph 209-2.2. The samples shall be taken from the in-place, un-compacted material at sampling points and intervals designated by the Program Manager.

CONSTRUCTION METHODS

209-3.1 Control strip. The first half-day of construction shall be considered the control strip. The Contractor shall demonstrate, in the presence of the Program Manager, that the materials, equipment, and construction processes meet the requirements of the specification. The sequence and manner of rolling necessary to obtain specified density requirements shall be determined. The maximum compacted thickness may be increased to a maximum of 12 inches upon the Contractor's demonstration that approved equipment

ISSUED FOR BID

and operations will uniformly compact the lift to the specified density. The Program Manager must witness this demonstration and approve the lift thickness prior to full production.

Control strips that do not meet specification requirements shall be reworked, re-compacted or removed and replaced at the Contractor's expense. Full operations shall not continue until the control strip has been accepted by the Program Manager. The Contractor shall use the same equipment, materials, and construction methods for the remainder of construction, unless adjustments made by the Contractor are approved by the Program Manager.

209-3.2 Preparing underlying subgrade and/or subbase. The underlying subgrade and/or subbase shall be checked and accepted by the Program Manager before base course placing and spreading operations begin. Re-proof rolling of the subgrade or proof rolling of the subbase in accordance with Item P-152, at the Contractor's expense, may be required by the Program Manager if the Contractor fails to ensure proper drainage or protect the subgrade and/or subbase. Any ruts or soft, yielding areas due to improper drainage conditions, hauling, or any other cause, shall be corrected before the base course is placed. To ensure proper drainage, the spreading of the base shall begin along the centerline of the pavement on a crowned section or on the high side of the pavement with a one-way slope.

209-3.3 Production. The aggregate shall be uniformly blended and, when at a satisfactory moisture content per paragraph 209-3.5, the approved material may be transported directly to the placement.

209-3.4 Placement. The aggregate shall be placed and spread on the prepared underlying layer by spreader boxes or other devices as approved by the Program Manager, to a uniform thickness and width. The equipment shall have positive thickness controls to minimize the need for additional manipulation of the material. Dumping from vehicles that require re-handling shall not be permitted. Hauling over the uncompacted base course shall not be permitted.

The aggregate shall meet gradation and moisture requirements prior to compaction. The base course shall be constructed in lifts as established in the control strip, but not less than 4 inches nor more than 12 inches of compacted thickness.

When more than one lift is required to establish the layer thickness shown on the plans, the construction procedure described here shall apply to each lift. No lift shall be covered by subsequent lifts until tests verify that compaction requirements have been met. The Contractor shall rework, re-compact and retest any material placed which does not meet the specifications at the Contractor's expense.

209-3.5 Compaction. Immediately after completion of the spreading operations, compact each layer of the base course, as specified, with approved compaction equipment. The number, type, and weight of rollers shall be sufficient to compact the material to the required density within the same day that the aggregate is placed on the subgrade.

The field density of each compacted lift of material shall be at least **100%** of the maximum density of laboratory specimens prepared from samples of the subbase material delivered to the jobsite. The laboratory specimens shall be compacted and tested in accordance with **ASTM D1557**. The moisture content of the material during placing operations shall be within ± 2 percentage points of the optimum moisture content as determined by ASTM D6938. Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

209-3.6 Weather limitations. Material shall not be placed unless the ambient air temperature is at least 40°F and rising. Work on base course shall not be conducted when the subgrade or subbase is wet or frozen or the base material contains frozen material.

209-3.7 Maintenance. The base course shall be maintained in a condition that will meet all specification requirements. When material has been exposed to excessive rain, snow, or freeze-thaw conditions, prior to placement of additional material, the Contractor shall verify that materials still meet all specification

requirements. Equipment may be routed over completed sections of base course, provided that no damage results and the equipment is routed over the full width of the completed base course. Any damage resulting to the base course from routing equipment over the base course shall be repaired by the Contractor at the Contractor's expense.

209-3.8 Surface tolerances. After the course has been compacted, the surface shall be tested for smoothness and accuracy of grade and crown. Any portion lacking the required smoothness or failing in accuracy of grade or crown shall be scarified to a depth of at least 3 inches, reshaped and recompacted to grade until the required smoothness and accuracy are obtained and approved by the Program Manager. Any deviation in surface tolerances shall be corrected by the Contractor at the Contractor's expense. The smoothness and accuracy requirements specified here apply only to the top layer when base course is constructed in more than one layer.

a. Smoothness. The finished surface shall not vary more than 3/8-inch when tested with a 12-foot straightedge applied parallel with and at right angles to the centerline. The straightedge shall be moved continuously forward at half the length of the 12-foot straightedge for the full length of each line on a 50-foot grid.

b. Grade. The grade and crown shall be measured on a 50-foot grid and shall be within +0 and -1/2 inch of the specified grade.

209-3.9 Acceptance sampling and testing. Crushed aggregate base course shall be accepted for density and thickness on an area basis. Two tests shall be made for density and thickness for each 1,200 square yards. Sampling locations will be determined on a random basis per ASTM D3665.

a. Density. The Contractor's laboratory shall perform all density tests in the Program Manager's presence and provide the test results upon completion to the Program Manager for acceptance.

Each area shall be accepted for density when the field density is at least **100%** of the maximum density of laboratory specimens compacted and tested per ASTM **D1557**. The in-place field density shall be determined per ASTM D6938 using Procedure A, the direct transmission method, and ASTM D6938 shall be used to determine the moisture content of the material. The machine shall be calibrated in accordance with ASTM D6938. If the specified density is not attained, the area represented by the failed test must be reworked and/or recompacted and two additional random tests made. This procedure shall be followed until the specified density is reached. Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

b. Thickness. Depth tests shall be made by test holes at least 3 inches in diameter that extend through the base. The thickness of the base course shall be within +0 and -1/2 inch of the specified thickness as determined by depth tests taken by the Contractor in the presence of the Program Manager for each area. Where the thickness is deficient by more than 1/2-inch, the Contractor shall correct such areas at no additional cost by scarifying to a depth of at least 3 inches, adding new material of proper gradation, and the material shall be blended and recompacted to grade. The Contractor shall replace, at his expense, base material where depth tests have been taken.

The Contractor may elect to determine acceptance of thickness by survey before and after placement. Survey intervals shall be no more than 50-foot longitudinally and 25-foot transversely for each proposed lot. Survey data shall be obtained by a state licensed land surveyor.

METHOD OF MEASUREMENT

209-4.1 The quantity of crushed aggregate base course will be determined by measurement of the number of cubic yards of material actually constructed and accepted by the Program Manager as complying with the plans and specifications. Base materials shall not be included in any other excavation quantities.

ISSUED FOR BID

BASIS OF PAYMENT

209-5.1 Payment shall be made at the contract unit price per cubic yard for crushed aggregate base course. This price shall be full compensation for furnishing all materials, for preparing and placing these materials, and for all labor, equipment tools, and incidentals necessary to complete the item.

Payment will be made under:

Item P-209-5.1 Crushed Aggregate Base Course - per cubic yard

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM C29	Standard Test Method for Bulk Density (“Unit Weight”) and Voids in Aggregate
ASTM C88	Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C117	Standard Test Method for Materials Finer than 75-μm (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C131	Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C136	Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregates
ASTM C142	Standard Test Method for Clay Lumps and Friable Particles in Aggregates
ASTM D75	Standard Practice for Sampling Aggregates
ASTM D698	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft ³ (600 kN-m/m ³))
ASTM D1556	Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D1557	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft ³ (2700 kN-m/m ³))
ASTM D2167	Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method
ASTM D2419	Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate
ASTM D3665	Standard Practice for Random Sampling of Construction Materials
ASTM D4318	Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D4491	Standard Test Methods for Water Permeability of Geotextiles by Permittivity

ISSUED FOR BID

ASTM D4643	Standard Test Method for Determination of Water Content of Soil and Rock by Microwave Oven Heating
ASTM D4751	Standard Test Methods for Determining Apparent Opening Size of a Geotextile
ASTM D4791	Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
ASTM D5821	Standard Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate
ASTM D6938	Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
ASTM D7928	Standard Test Method for Particle-Size Distribution (Gradation) of Fine-Grained Soils Using the Sedimentation (Hydrometer) Analysis
American Association of State Highway and Transportation Officials (AASHTO)	
M288	Standard Specification for Geosynthetic Specification for Highway Applications

END OF ITEM P-209

ISSUED FOR BID

ITEM P-219 RECYCLED CONCRETE AGGREGATE BASE COURSE**DESCRIPTION**

219-1.1 This item consists of a base course composed of recycled concrete aggregate, crushed to meet a particular gradation, constructed on a prepared course per these specifications and in conformity to the dimensions and typical cross-sections shown on the plans.

MATERIALS

219-2.1 Aggregate. Recycled concrete aggregate shall consist of cement concrete. The recycled concrete material shall be free of reinforcing steel and expansion material. Asphalt overlays and any full slab asphalt panels shall be removed from the concrete surface prior to removal and crushing.

Recycled concrete aggregate shall consist of at least 90%, by weight, cement concrete; virgin aggregates may be added to meet the 90% minimum concrete requirement. The remaining 10% may consist of the following materials:

Deleterious Materials

Material	Quantity
Wood	0.1% maximum
Brick, mica, schist, or other friable materials	4% maximum
Asphalt concrete	10% maximum
Total	10 % maximum

Recycled Concrete Aggregate Base Material Requirements

Material Test	Requirement	Standard
Coarse Aggregate		
Resistance to Degradation	Loss: 45% maximum	ASTM C131
Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate	Loss after 5 cycles: 12% maximum using Sodium sulfate - or - 18% maximum using magnesium sulfate	ASTM C88
Flat Particles, Elongated Particles, or Flat and Elongated Particles ¹	10% maximum, by weight, for fraction retained on the ½ inch (12.5mm) sieve and 20% maximum, by weight, for the fraction passing the 1/2-inch (12.5 mm) sieve	ASTM D4791
Clay lumps and friable particles	Less than or equal to 3 percent	ASTM C142
Fine Aggregate Portion		
Liquid limit	Less than or equal to 25	ASTM D4318
Plasticity Index	Not more than four (4)	ASTM D4318

¹ A flat particle is one having a ratio of width to thickness greater than three (3); an elongated particle is one having a ratio of length to width greater than three (3).

The fine aggregate shall be produced by crushing stone, gravel, slag, or recycled concrete that meet the requirements for wear and soundness specified for coarse aggregate. Fine aggregate may be added to produce the correct gradation.

Each source of recycled concrete aggregate shall meet the above requirements.

Recycled concrete aggregate shape depends on the characteristics of the recycled concrete, plant type, and plant operation speed. This may require a number of trial batches before crushed recycled concrete aggregate meeting the shape and gradation requirements can be produced.

219-2.2 Gradation requirements. The gradation (job mix) of the final mixture shall fall within the design range indicated in the following table, when tested per ASTM C117 and ASTM C136. The final gradation shall be continuously graded from coarse to fine and shall not vary from the low limit on one sieve to the high limit on an adjacent sieve or vice versa.

ISSUED FOR BID

Gradation of Recycled Concrete Aggregate Base

Sieve Size	Percentage by Weight Passing Sieves	Job Mix Tolerances (Percent)
2 inch (50 mm)	100	--
1-1/2 inch (37.5 mm)	95 - 100	±5
1 inch (25.0 mm)	70 - 95	±8
3/4 inch (19.0 mm)	55 - 85	±8
No. 4 (4.75 mm)	30 - 60	±8
No. 30 (600 µm)	12 - 30	±5
No. 200 (75 µm)	0 - 10	±3

The job mix tolerances in the table shall be applied to the job mix gradation to establish a job control gradation band. The full tolerance still will apply if application of the tolerances results in a job control gradation band outside the design range.

219-2.3 Sampling and testing.

a. Aggregate base materials. The Contractor shall take samples of the aggregate base in accordance with ASTM D75 to verify initial aggregate base requirements and gradation. Material shall meet the requirements in paragraphs 219-2.1 and 219-2.2. This sampling and testing will be the basis for approval of the aggregate base quality requirements.

b. Gradation requirements. The Contractor shall take at least two aggregate base samples per day in the presence of the Program Manager to check the final gradation during production. Sampling shall be per ASTM D75. Material shall meet the requirements in paragraph 219-2.2. The samples shall be taken from the source of supply in accordance with ASTM D75 at intervals designated by the Program Manager.

219-2.4 Separation Geotextile. Not used.

CONSTRUCTION METHODS

219-3.1 Control Strip. The first half-day of construction shall be considered the control strip. The Contractor shall demonstrate, in the presence of the Program Manager, that the materials, equipment, and construction processes meet the requirements of the specification. The sequence and manner of rolling necessary to obtain specified density requirements shall be determined. The maximum compacted thickness may be increased to a maximum of 12 inches upon the Contractor's demonstration that approved equipment and operations will uniformly compact the lift to the specified density. The Program Manager must witness this demonstration and approve the lift thickness prior to full production.

Control strips that do not meet specification requirements shall be reworked, re-compacted or removed and replaced at the Contractor's expense. Full operations shall not continue until the control strip has been accepted by the Program Manager. The Contractor shall use the same equipment, materials, and construction methods for the remainder of construction, unless adjustments made by the Contractor are approved by the Program Manager.

219-3.2 Preparing underlying course. The underlying course shall be checked by the Program Manager before placing and spreading operations are started. Any ruts or soft yielding places caused by improper drainage conditions, hauling, or any other cause shall be corrected at the Contractor's expense before the base course is placed there. Material shall not be placed on frozen material.

ISSUED FOR BID

To protect the existing layers and to ensure proper drainage, the spreading of the recycled concrete aggregate base course shall begin along the centerline of the pavement on a crowned section or on the greatest contour elevation of a pavement with a variable uniform cross slope.

219-3.3 Placement. The aggregate shall be placed and spread on the prepared underlying layer by spreader boxes or other devices as approved by the Program Manager, to a uniform thickness and width. The equipment shall have positive thickness controls to minimize the need for additional manipulation of the material. Dumping from vehicles that require re-handling shall not be permitted. Hauling over the uncompacted base course shall not be permitted.

The aggregate shall meet gradation and moisture requirements prior to compaction. The subbase course shall be constructed in lifts as established in the control strip, but not less than 4 inches nor more than 12 inches of compacted thickness.

When more than one lift is required to establish the layer thickness shown on the plans, the construction procedure described here shall apply to each lift. No lift shall be covered by subsequent lifts until tests verify that compaction requirements have been met. The Contractor shall rework, re-compact and retest any material placed which does not meet the specifications.

219-3.4 Compaction. Immediately upon completion of the spreading operations, compact each layer of the base course, as specified, with approved compaction equipment. The number, type, and weight of rollers shall be sufficient to compact the material to the required density within the same day that the aggregate is placed on the subgrade.

The field density of each compacted lift of material shall be at least 100% of the maximum density of laboratory specimens prepared from samples of the subbase material delivered to the jobsite. The laboratory specimens shall be compacted and tested in accordance with ASTM D1557. The moisture content of the material during placing operations shall be within ± 2 percentage points of the optimum moisture content as determined by ASTM D1557. Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

219-3.5 Weather limitations. Material shall not be placed unless the ambient air temperature is at least 40°F and rising. Work on base course shall not be conducted when the subgrade or subbase is wet or frozen or the base material contains frozen material.

219-3.6 Maintenance. The base course shall be maintained in a condition that will meet all specification requirements. When material has been exposed to excessive rain, snow, or freeze-thaw conditions, prior to placement of additional material, the Contractor shall verify that materials still meet all specification requirements. Equipment may be routed over completed sections of base course, provided that no damage results and the equipment is routed over the full width of the completed base course. Any damage resulting to the base course from routing equipment over the base course shall be repaired by the Contractor at their expense.

219-3.7 Surface tolerances. After the course has been compacted, the surface shall be tested for smoothness and accuracy of grade and crown. Any portion lacking the required smoothness or failing in accuracy of grade or crown shall be scarified to a depth of at least 3 inches, reshaped and recompact to grade until the required smoothness and accuracy are obtained and approved by the Program Manager. Any deviation in surface tolerances shall be corrected by the Contractor at the Contractor's expense. The smoothness and accuracy requirements specified here apply only to the top layer when base course is constructed in more than one layer.

a. Smoothness. The finished surface shall not vary more than 3/8-inch when tested with a 12-foot straightedge applied parallel with and at right angles to the centerline. The straightedge shall be moved continuously forward at half the length of the 12-foot straightedge for the full length of each line on a 50-foot grid.

ISSUED FOR BID

b. Grade. The grade and crown shall be measured on a 50-foot grid and shall be within +0 and 1/2 inch of the specified grade.

219-3.8 Acceptance sampling and testing for density. Recycled Concrete Aggregate base course shall be accepted for density and thickness on an area basis. Two tests shall be made for density and thickness for each 1,200 square yards. Sampling locations will be determined on a random basis per ASTM D3665

a. Density. The Contractor's laboratory shall perform all density tests in the Program Manager's presence and provide the test results upon completion to the Program Manager for acceptance.

Each area shall be accepted for density when the field density is at least 100% of the maximum density of laboratory specimens compacted and tested per ASTM D1557. The in-place field density shall be determined per ASTM D6938 using Procedure A, the direct transmission method, and ASTM D6938 shall be used to determine the moisture content of the material. The machine shall be calibrated in accordance with ASTM D6938. If the specified density is not attained, the area represented by the failed test must be reworked and/or recompact and two additional random tests made. This procedure shall be followed until the specified density is reached. Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

b. Thickness. Depth tests shall be made by test holes at least 3 inches in diameter that extend through the base. The thickness of the base course shall be within +0 and -1/2 inch of the specified thickness as determined by depth tests taken by the Contractor in the presence of the Program Manager for each area. Where the thickness is deficient by more than 1/2-inch, the Contractor shall correct such areas at no additional cost by scarifying to a depth of at least 3 inches, adding new material of proper gradation, and the material shall be blended and recompact to grade. The Contractor shall replace, at his expense, base material where depth tests have been taken.

The Contractor may elect to determine acceptance of thickness by survey before and after placement. Survey intervals shall be no more than 50-foot longitudinally and 25-foot transversely for each proposed lot. Survey data shall be obtained by a state licensed land surveyor.

METHOD OF MEASUREMENT

219-4.1 The quantity of recycled concrete aggregate base course will be determined by measurement of the number of cubic yards of material actually constructed and accepted as complying with the plans and specifications.

BASIS OF PAYMENT

219-5.1 Payment shall be made at the contract unit price per cubic yard for recycled concrete aggregate base course. This price shall be full compensation for furnishing all materials, for preparing and placing these materials, and for all labor, equipment tools, and incidentals necessary to complete the item.

Item P-219-5.1 Recycled Concrete Aggregate for General Use - per cubic yard

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ISSUED FOR BID

ASTM International (ASTM)

ASTM C29	Standard Test Method for Bulk Density (“Unit Weight”) and Voids in Aggregate
ASTM C88	Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C117	Standard Test Method for Materials Finer than 75 µm (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C131	Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C136	Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregate
ASTM D75	Standard Practice for Sampling Aggregates
ASTM D698	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft ³ (600 kN-m/m ³))
ASTM D1556	Standard Test Method for Density and Unit Weight of Soil in Place by the Sand Cone Method
ASTM D1557	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft ³ (2700 kN-m/m ³))
ASTM D2419	Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate
ASTM D3665	Standard Practice for Random Sampling of Construction Materials
ASTM D4318	Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D4643	Standard Test Method for Determination of Water (Moisture) Content of Soil by Microwave Oven Heating
ASTM D4791	Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
ASTM D6938	Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

END OF ITEM P-219

ISSUED FOR BID

ITEM P-220 CEMENT TREATED SOIL SUBBASE COURSE

DESCRIPTION

220-1.1 This item shall consist of constructing a subbase course by uniformly mixing soil, cement, and water. The mixed material shall be spread, shaped, and compacted in accordance with these specifications and in conformity to the dimensions and typical cross-section shown on the plans.

Runway, taxiway, service road, or apron pavements shall be built in a series of parallel lanes using a plan that reduces the number of longitudinal and transverse joints to a minimum.

MATERIALS

220-2.1 Cement. Cement shall conform to the requirements of ASTM C150, Type I, low alkali.

220-2.2 Water. Water used in mixing or curing shall be from potable water sources. Other sources shall be tested in accordance with ASTM C1602 prior to use.

220-2.3 Soil. The soil for this work shall consist of on-site materials and shall be free of roots, sod, weeds, and stones larger than 2-1/2 inches with a sulfate content of less than 0.3%.

220-2.4 Asphalt material. The types, grades, controlling specifications, and application temperatures for the asphalt materials used for curing the soil-cement are listed in Table 1. The Program Manager shall approve the specific material used.

Table 1
Bituminous Materials

Type and Grade	Specification	Application Temperature	
		Degrees F	Degrees C
Emulsified Asphalt			
RS-1, SS-1	ASTM D977	75-130	25-55
CRS-1	ASTM D2397	75-130	25-55

MIX DESIGN

220-3.1 Proportions. Before the start of subbase course construction, tests shall be made on the soil or soil-aggregate material to be stabilized to determine the quantity of cement required for the mix design. These tests shall be performed by the Contractor at his/her own expense. Test results and the completed mix design shall be submitted to the Program Manager for approval at least two weeks prior to the start of mixing operations.

Test specimens containing various amounts of cement shall be compacted per ASTM D558, and the optimum moisture determined for each test specimen. Samples at the optimum moisture shall be subjected to the wet-dry and the freeze-thaw test in accordance with ASTM D559 and ASTM D560, respectively.

The specified cement content for construction shall be that which produces laboratory compacted specimens exhibiting a compressive strength of at least 300 psi at 7 days when tested in accordance with ASTM D1633,

ISSUED FOR BID

Method A, and have a weight loss of 14% or less for granular soils, 10% for the more plastic granular and silty soils, and 7% for clay soils after 12 cycles of the durability test.

CONSTRUCTION METHODS

220-4.1 Control Strip. The first half-day of construction shall be considered the control strip. The Contractor shall demonstrate, in the presence of the Program Manager, that the materials, equipment, and construction processes meet the requirements of the specification. The sequence and manner of rolling necessary to obtain specified density requirements shall be determined. The maximum compacted thickness may be increased to a maximum of 12 inches upon the Contractor's demonstration that approved equipment and operations will uniformly compact the lift to the specified density. The Program Manager must witness this demonstration and approve the lift thickness prior to full production.

Control strips that do not meet specification requirements shall be reworked, re-compacted or removed and replaced at the Contractor's expense. Full operations shall not continue until the control strip has been accepted by the Program Manager. The Contractor shall use the same equipment, materials, and construction methods for the remainder of construction, unless adjustments made by the Contractor are approved by the Program Manager.

220-4.2 Weather limitations. The material shall not be mixed or placed while the atmospheric temperature is below 40°F or when conditions indicate that the temperature may fall below 40°F within 24 hours, or when the weather is foggy or rainy (including between rain showers or when rain is imminent), or to soils that are frozen or contain frost, or when the underlying material is frozen.

220-4.3 Maintenance. The material shall be maintained in a condition that will meet all specification requirements. When material has been exposed to excessive rain, snow, or freeze-thaw conditions, prior to placement of additional material, the Contractor shall verify that materials still meet all specification requirements. Equipment may be routed over completed sections of base course, provided that no damage results and the equipment is routed over the full width of the completed base course. Any damage resulting to the base course from routing equipment over the base course shall be repaired by the Contractor at their expense.

220-4.4 Equipment. The course shall be constructed with equipment that will meet the requirements for soil pulverization, cement application, mixing, water application, incorporation of materials, compaction, finishing, and curing specified here.

220-4.5 Preparation. The area to be stabilized shall be graded and shaped to conform to the lines, grades and cross-section shown on the plans. Any soft or yielding areas in the subgrade shall be removed and replaced with acceptable soil and compacted to the specified density, as provided in Technical Specification P-152.

220-4.6 Pulverization. After completion of moist-mixing, the soil for the subbase course shall be pulverized so that 100% by dry weight passes a 1-inch (25.0 mm) sieve and a minimum of 80% passes a No. 4 (4.75 mm) sieve.

220-4.7 Cement application, mixing, and finishing. Mixing of the soil, cement, and water shall be accomplished by the mixed-in-place method. Shape pulverized material to the cross-section indicated. Cement shall be applied so that when uniformly mixed with the soil, the specified cement content is obtained, and a sufficient quantity of cement-treated soil is produced to construct a compacted cement-treated course conforming to the lines, grades, and cross-section indicated. Immediately after the cement has been distributed, it shall be mixed with the soil. The cement shall not be mixed below the required depth. Continue mixing until the cement has been sufficiently blended with the soil to prevent the formation of cement balls when water is applied. Determine moisture content of the mixture immediately after

ISSUED FOR BID

completion of mixing of the soil and cement. Provide water supply and pressure distributing equipment that will permit the application within three (3) hours of all mixing water on the section being processed. Incorporate water in the mix so that concentration of water near the surface does not occur. After all mixing water has been applied, continue mixing until the water is uniformly distributed throughout the full depth of the mixture. Do not apply cement if the soil moisture content exceeds the optimum moisture content specified for the cement-treated mixture. After mixing is complete, the proportions of the mixture shall be in accordance with the approved mix design.

The Contractor shall coordinate the application and mixing of cement with the Program Manager. If weather conditions such as high winds exist which, in the opinion of the Program Manager, will cause an adverse impact on operations of the Airport or excessive loss of cement, soil cement operations will cease, and corrective measures will be taken as directed by the Program Manager to eliminate the problems. All such corrective measures shall be at the cost of the Contractor.

220-4.8 Compaction. Compaction of the course shall begin within 30 minutes after mixing the cement into the subgrade. All compaction operations shall be completed within 2 hours from the start of mixing.

The field density of the compacted mixture shall be at least 98% of the maximum density as determined by ASTM D558. The in-place moisture content shall be determined in accordance with ASTM D2216. The moisture content of the mixture at the start of compaction shall be within ± 3 percentage points of the optimum moisture content. Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

The soil-cement subbase course shall be accepted for density on a lot basis. A lot shall consist of 4,000 square yards and will be divided into four equal sublots. One test shall be made for each subplot. Sampling locations shall be determined by the Program Manager on a random basis in accordance with statistical procedures contained in ASTM D3665.

220-4.9 Finishing and curing. After the final lift or course of treated subgrade has been compacted, it shall be brought to the required lines and grades in accordance with the typical sections.

Finished portions of treated subgrade shall be protected to prevent equipment from marring, permanently deforming, or damaging completed work.

Not later than 24 hours after completion of final finishing, the surface shall be cured by application of an emulsified asphalt uniformly applied to the surface of the completed base course at the rate of approximately 0.2 gallons per square yard. The curing material shall be maintained and applied as needed by the Contractor during the 7-day protection period.

Sufficient protection from freezing shall be provided for at least 7 days after its construction or as approved by the Program Manager.

220-4.10 Construction limitations. At the end of each day's construction and/or when operations after application of the cement are interrupted for more than 30 minutes, a straight transverse construction joint shall be formed by a header or by cutting back into the compacted material to form a true vertical face.

Completed portions may be opened to light traffic, if approved by the Program Manager, and provided the curing is not impaired.

220-4.11 Surface tolerance. In those areas on which a subbase or base course is to be placed, the surface shall be tested for smoothness and accuracy of grade and crown. Any portion lacking the required smoothness or failing in accuracy of grade or crown shall be scarified to a depth of at least 3 inches, reshaped and re-compacted to grade until the required smoothness and accuracy are obtained and approved by the Program Manager. The Contractor shall perform all final smoothness and grade checks in the presence of

the Program Manager. Any deviation in surface tolerances shall be corrected by the Contractor at the Contractor's expense.

a. Smoothness. The finished surface shall not vary more than $\pm 3/8$ inch when tested with a 12-foot straightedge applied parallel with and at right angles to the centerline. The straightedge shall be moved continuously forward at half the length of the 12-foot straightedge for the full length of each line on a 50-foot grid.

b. Grade. The grade and crown shall be measured on a 50-foot grid and shall be within ± 0.05 feet of the specified grade.

220-4.12 Acceptance sampling and testing. Cement Treated Solid Base course shall be accepted for density and thickness on an area basis. Two test will be made for density and thickness for each 1200 square yards, but not less than four (4) tests per day of production. Sampling locations will be determined on a random basis per ASTM D3665.

a. Density. The Contractor's laboratory shall perform all density tests in the Program Manager's presence and provide the test results upon completion to the Program Manager for acceptance.

Each area shall be accepted for density when the field density is at least 100% of the maximum density of laboratory specimens compacted and tested per ASTM D1557. The in-place field density shall be determined per ASTM D1556 or ASTM D6938 using Procedure A, the direct transmission method, and ASTM D6938 shall be used to determine the moisture content of the material. The machine shall be calibrated in accordance with ASTM D6938. The in-place moisture content shall be determined in accordance with ASTM D2216. Perform in-place density test immediately after completion of compaction to determine degree of compaction. Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified. If the specified density is not attained, the area represented by the failed test must be reworked and/or recompacted at the Contractor's expense and two additional random tests made. This procedure shall be followed until the specified density is reached. Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

b. Thickness. Depth tests shall be made by test holes or cores at least 3 inches in diameter that extend through the base. The thickness of the base course shall be within ± 0 and $-1/2$ inch of the specified thickness as determined by depth tests taken by the Contractor in the presence of the Program Manager for each subplot. Where the thickness is deficient by more than $1/2$ -inch, the material shall be removed to full depth and replaced, at Contractor's expense.

METHOD OF MEASUREMENT

220-5.1 The quantity of cement treated soil base course shall be the number of square yards of completed and accepted base course.

220-5.2 Cement shall be measured by the ton.

BASIS OF PAYMENT

220-6.1 Payment shall be made at the contract unit price per square yard for cement treated soil base course. This price shall be full compensation for furnishing all materials, except cement, and for all preparation, delivering, placing, and mixing of these materials; and for all labor, equipment, tools and incidentals necessary to complete the item.

ISSUED FOR BID

220-6.2 Payment shall be made at the contract unit price per ton for cement. This price shall be full compensation for furnishing this material and for all delivery, placing, and incorporation of this material, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item P-220-6.1	Cement Treated Soil Base Course - per square yard
Item P-220-6.2	Cement - per ton

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM C136	Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregates
ASTM C150	Standard Specification for Portland Cement
ASTM C1602	Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete
ASTM C1632	Standard Practice for Making and Curing Soil-Cement Compression and Flexure Test Specimens in the Laboratory1
ASTM C1633	Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders
ASTM D558	Standard Test Methods for Moisture-Density (Unit Weight) Relations of Soil-Cement Mixtures
ASTM D559	Standard Test Methods for Wetting and Drying Compacted Soil-Cement Mixtures
ASTM D560	Standard Test Methods for Freezing and Thawing Compacted Soil-Cement Mixtures
ASTM D977	Standard Specification for Emulsified Asphalt
ASTM D1556	Standard Test Method for Density and Unit Weight of Soil In-Place by the Sand Cone Method
ASTM D2027	Standard Specification for Cutback Asphalt (Medium-Curing Type)
ASTM D2028	Standard Specification for Cutback Asphalt (Rapid-Curing Type)
ASTM D2397	Standard Specification for Cationic Emulsified Asphalt
ASTM D2487	Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D6938	Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

END OF ITEM P-220

ISSUED FOR BID

PAGE INTENTIONALLY BLANK

ISSUED FOR BID

ITEM P-304 CEMENT-TREATED AGGREGATE BASE COURSE (CTB)

DESCRIPTION

304-1.1 This item shall consist of a cement-treated base (CTB) course composed of mineral aggregate and cement, uniformly blended and mixed with water. The mixed material shall be spread and shaped with a mechanical spreader, and compacted with rollers in accordance with these specifications and in conformance to the lines, grades, dimensions, and cross-sections shown on the plans. The base course shall be built in a series of parallel lanes using a plan of processing that reduces longitudinal and transverse joints to a minimum.

MATERIALS

304-2.1 Aggregate. The aggregate shall be select granular materials, comprised of crushed or uncrushed gravel and/or stone, or recycled cement concrete. The material shall be free of roots, sod, and weeds. The crushed or uncrushed aggregate shall consist of hard, durable particles meeting the requirements in the table below. Coarse or fine aggregate containing or consisting of slag shall not be permitted.

Cement Treated Aggregate Base Material Requirements

Material Test	Requirement	Standard
Coarse Aggregate Portion (retained on the No. 4 (4.75 mm) sieve)		
Resistance to Degradation	Loss: 40% maximum	ASTM C131
Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate	Loss after 5 cycles: 10% maximum using Sodium sulfate - or - 15% maximum using magnesium sulfate	ASTM C88
Flat Particles, Elongated Particles, or Flat and Elongated Particles ¹	10% maximum, by weight, for fraction retained on the ½ inch (12.5mm) sieve and 20% maximum, by weight, for the fraction passing the 1/2-inch (12.5 mm) sieve	ASTM D4791
Clay lumps and friable particles	Less than or equal to 3 percent	ASTM C142
Fine Aggregate Portion (Passing the No. 40 (425µm) sieve)		
Liquid limit	Less than or equal to 25	ASTM D4318
Plasticity Index	Not more than 6	ASTM D4318

¹ A flat particle is one having a ratio of width to thickness greater than three (3); an elongated particle is one having a ratio of length to width greater than three (3).

304-2.2 Gradation Requirements. The aggregate shall conform to the gradation(s) shown in the table below per ASTM C136. A dense, well-graded aggregate blend that meets the requirements of the table shall be selected by the Contractor and used in the final mix design. The final aggregate blend shall be well graded from coarse to fine within the limits designated in the table and shall not vary from the low limit on one sieve to the high limit on adjacent sieves, or vice versa.

ISSUED FOR BID

Aggregate Gradation for CTB Material

Sieve Size	Design Range Percentage by Weight Passing	Contractor's Final Gradation	Job Control Grading Band Tolerances for Contractor's Final Gradation ² Percent
2 inch (50 mm)	100		±0
1 inch (25.0 mm)	90-100		±5
No. 4 (4.75 mm)	45-95		±8
No. 10 (2.00 mm)	37-80		±8
No. 40 (425 µm)	15-50		±5
No. 200 (75 µm)	0-15		±3

For Contractor quality control, sample the aggregate stockpile in accordance with ASTM D75 and perform gradation tests in accordance with ASTM C136 a minimum of once per week during production of CTB.

304-2.3 Sampling and testing.

a. Aggregate base materials. The Contractor shall take samples of the aggregate base in accordance with ASTM D75 to verify initial aggregate base requirements and gradation in the presence of the Program Manager. Material shall meet the requirements in paragraphs 304-2.1 and 304-2.2. This sampling and testing will be the basis for approval of the aggregate base quality requirements. In lieu of aggregate sample testing, the Program Manager may accept certified State Department of Transportation test results indicating that the aggregates meet specification requirements. The results must be for tests performed within the last six months at the time of submittal. No aggregates shall be used in production of mixtures without prior acceptance.

b. Gradation requirements. The Contractor shall take at least two aggregate base samples per day in the presence of the Program Manager to check the final gradation. Sampling shall be per ASTM D75. Material shall meet the requirements in paragraph 304-2.2. The samples shall be taken from the in-place, un-compacted material at sampling points and intervals designated by the Program Manager.

304-2.4 Cement. Cement shall conform to the requirements of ASTM C150 Type I, low alkali.

304-2.5 Cementitious additives. Not applicable.

304-2.6 Water. Water used in mixing or curing shall be from potable water sources. Other sources shall be tested in accordance with ASTM C1602 prior to use.

304-2.7 Curing materials. Curing material shall be an emulsified asphalt conforming to ASTM D977.

304-2.8 Sand blotter. Sand shall be applied, when required, to prevent tracking of the emulsion curing materials. The sand material shall be clean, dry, and non-plastic.

COMPOSITION OF MIXTURE

304-3.1 General. The CTB material shall be composed of a mixture of aggregate, cementitious material, and water.

304-3.2 Mix design. The mix design shall use a cement content that shall not be less than 3% by weight of dry aggregate and, when tested in the laboratory per ASTM D1633, produces a 7-day compressive strength

ISSUED FOR BID

a minimum 750 psi with the following exceptions in testing procedures: The compressive strength specimen shall be soaked in water for 4 hours immediately prior to testing; cap and break specimens in compression in accordance with ASTM D1633.

Wet-dry and/or freeze-thaw tests shall be performed in accordance with ASTM D559 and ASTM D560 respectively. The weight loss for each type of test shall not exceed 14% after 12 cycles.

The mix design shall include a complete list of materials, including type, brand, source, and amount of cement, fine aggregate, coarse aggregate, water, and cementitious additives.

Should a change be made in aggregate sources or type of cement, or if cementitious additives are added or deleted from the mix, production of the CTB mix shall be stopped and a new mix design shall be submitted.

304-3.3 Submittals. At least 30 days prior to the placement of the CTB, the Contractor shall submit certified test reports to the Program Manager for those materials proposed for use during construction, as well as the mix design information for the CTB material. Tests older than six (6) months shall not be used. The certification shall show the ASTM or AASHTO specifications or tests for the material, the name of the company performing the tests, the date of the tests, the test results, and a statement that the material did or did not comply with the applicable specifications. The submittal package shall include the following:

- a. Source(s) of materials, including aggregate, cement, cementitious additives, curing, and bond-breaking materials.
- b. Physical properties of the aggregates, cement, cementitious additives, curing, and bond-breaking materials.
- c. Mix design:
 - Mix identification number
 - Aggregate gradation
 - Cement content
 - Water content
 - Cementitious materials content
 - Compaction and strength results
 - Laboratory compaction characteristics (maximum dry density and optimum moisture content)
 - Compressive strength at seven (7) days
 - Wet-dry and/or freeze-thaw weight loss

No CTB material shall be placed until the submittal is accepted in writing by the Program Manager.

During production, the Contractor shall submit batch tickets for each delivered load.

EQUIPMENT

304-4.1 Mixing. The mixer shall be a batch or continuous-flow type stationary mixer that produces a well-blended, uniform mixture of aggregate, cement, water, and pozzolan. The mixer shall be equipped with calibrated metering and feeding devices that introduce the aggregate, cement, water, and cementitious additives (if used) into the mixer in the specified quantities.

The Program Manager shall have free access to the plant at all times for inspection of the plant's equipment and operation and for sampling the CTB mixture.

ISSUED FOR BID

304-4.2 Hauling. The CTB material shall be transported from the plant to the job site in trucks or other hauling equipment having beds that are smooth, clean, and tight. Truck bed covers shall be provided and used to protect the CTB from weather. CTB material that becomes wet during transport shall be rejected.

304-4.3 Placing. CTB material shall be placed with a mechanical spreader capable of receiving, spreading, and shaping the mixture without segregation into a uniform layer or lift. The equipment shall be equipped with a strike-off plate and end gates capable of being adjusted to the layer thickness and width. The spreaders shall be automatically controlled by sensors operating off acceptable methods of control, as established in the construction of the Control Strip identified under Section 304-4.4, and shall be capable of placing and finishing the base course within the tolerances specified. Spreading of the base material by motor grader or bulldozer shall not be permitted except for small or irregularly shaped areas as approved by the Program Manager.

304-4.4 Compaction. The number, type, and weight of rollers and/or compactors shall be sufficient to compact the mixture to the required density.

CONSTRUCTION METHODS

304-5.1 Control Strip. The first half-day of construction shall be considered the control strip. The Contractor shall demonstrate, in the presence of the Program Manager, that the materials, equipment, and construction processes meet the requirements of the specification. Control strips that do not meet specification requirements shall be removed and replaced at the Contractor's expense. Full operations shall not continue until the control strip has been accepted by the Program Manager. Upon acceptance of the control strip by the Program Manager, the Contractor shall use the same equipment, materials, and construction methods for the remainder of construction, unless adjustments made by the Contractor are approved in advance by the Program Manager.

304-5.2 Weather limitations. The CTB shall not be placed on frozen surfaces or when weather conditions will detrimentally affect quality of the finished course. Apply cement when the ambient temperature is a minimum of 40°F and rising and aggregate are not frozen or contain frost. If ambient temperature falls below 40°F, protect completed CTB areas against freezing.

The Contractor should stop operations prior to and during rain allowing time to cover and protect any freshly placed material. Areas damaged by rain shall be replaced at the Contractor's expense.

304-5.3 Maintenance. Completed portions of the cement-stabilized area may be opened to local traffic provided the curing process is not impaired and to other traffic after the curing period has elapsed, provided that the cement-stabilized course has hardened sufficiently to prevent surface marring or distortion by equipment or traffic. Protect finished portions of cement stabilized base from traffic of equipment used in constructing adjoining sections in a manner to prevent marring or damaging completed work. The CTB shall be protected from freezing until covered.

304-5.4 Preparation of underlying course. The underlying course shall be checked by the Program Manager before placing and spreading operations are started. Prior to placing the material, the final grade should be firm, moist and free of frost. Use of chemicals to eliminate frost will not be permitted. The underlying course shall be wetted in advance of placing the CTB layer.

304-5.5 Grade control. Grade control between the edges of the CTB shall be accomplished at intervals of 50 feet on the longitudinal grade and at 25 feet on the transverse grade.

304-5.6 Placing. The CTB mixture shall be deposited on the moistened subgrade or subbase and spread into a uniform layer of specified width and thickness that, when compacted and trimmed, conforms to the required line, grade, and cross-section. The longitudinal joints shall be located so there is no offset from

ISSUED FOR BID

planned joints in any overlying layer. Placement of the material shall begin along the centerline of the pavement on a crowned section or on the highest elevation contour of a pavement with variable cross slope.

The Contractor shall install the CTB layer in single compacted layer no greater than 8 inches thick. In multi-lift construction, the surface of the compacted lift shall be kept moist until covered with the next lift. Successive lifts shall be placed and compacted so that the required total depth of the CTB layer is completed within 12 hours.

304-5.7 Compaction. All compaction operations shall be completed within 2 hours from the start of mixing. The field density of the compacted mixture shall be at least 98% of the maximum density in accordance with paragraph 304-6.1a. At the start of compaction, the moisture content shall be within ± 2 percentage points of the specified optimum moisture. Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

304-5.8 Finishing. After compaction, shape the surface of the CTB layer to the specified lines, grades, and cross-section. During the finishing process, the surface shall be kept moist by means of fog-type sprayers. Compaction and finishing shall produce a smooth, dense surface, free of ruts, cracks, ridges, and loose material.

304-5.9 Construction limitations. All placement, compaction, and finishing operations shall be completed within two (2) hours from the start of mixing. Material not completed within the 2-hour time limit shall be removed and replaced at the Contractor's expense.

At the end of each day's construction and/or when operations are interrupted for more than 30 minutes, a straight transverse construction joint shall be formed by a header or by cutting back into the compacted material to form a true vertical face.

Completed portions may be opened to light traffic, if approved by the Program Manager, the CTB has achieved a compressive strength of at least 750 psi, and the curing is not impaired.

No construction of subsequent pavement section materials may be placed until the CTB has achieved a compressive strength of at least 750 psi, the Program Manager has provided approval, and acceptance for the area of interest has been obtained.

304-5.10 Curing. The compacted and finished CTB shall be cured with the approved curing agents as soon as possible, but in no case later than two (2) hours after completion of the finishing operations. Curing material(s) shall meet the requirements in paragraph 304-2.7. The layer shall be kept moist using a moisture-retaining cover or a light application of water until the curing material is applied.

The entire surface of the CTB layer shall be uniformly sprayed with an asphalt emulsion at a rate of between 0.15 and 0.30 gallons per square yard; the exact temperature and rate of application being that required to achieve complete and uniform coverage without runoff. Apply sand to treated surfaces requiring protection from traffic.

The curing seal shall be maintained and protected until the pavement is placed. If the surface of the finished CTB and/or the curing seal becomes damaged, additional curing material shall be applied at the time it is damaged or when the damage is first observed.

304-5.11 Surface tolerance. The Contractor shall perform smoothness and grade checks in the presence of the Program Manager. Any area not meeting smoothness and grade shall be corrected by the Contractor at the Contractor's expense.

a. a. Smoothness. The finished surface shall not vary more than $\pm 3/8$ -inch when tested with a 12-foot straightedge applied parallel with and at right angles to the centerline, and, moved continuously forward at half the length of the 12-foot straightedge for the full length of each line on a 50-foot grid.

b. b. Grade. The grade shall be measured on a 50-foot grid and shall be within +/-0.05 feet of the specified grade.

MATERIAL ACCEPTANCE

304-6.1 Acceptance sampling and testing. Cement Treated Aggregate base course shall be accepted for density and thickness on an area basis. Two tests shall be made for density and thickness for each 1,200 square yards, but not less than four (4) tests per day of production. Sampling locations will be determined on a random basis per ASTM D3665.

a. Density testing. CTB samples representing the material placed shall be taken to establish density and moisture requirements in accordance with ASTM D558. Additional CTB samples will be taken as necessary to verify density and moisture requirements. The Contractor's laboratory shall perform all density tests in the Program Manager's presence and provide the test results upon completion to the Program Manager for acceptance.

Each area shall be accepted for density when the field density is at least 98% of the maximum density of laboratory specimens. The in-place field density shall be determined in accordance with ASTM D6938, Procedure A, direct transmission method. The in-place moisture content shall be determined in accordance with ASTM D2216. Perform in-place density test immediately after completion of compaction to determine degree of compaction. If the material fails to meet the density requirements, compaction shall continue or the material shall be removed and replaced at the Contractor's expense. Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

b. Thickness. Thickness shall be determined by measuring the depth of core holes in the CTB at random locations, per ASTM D3665. The resulting core holes shall be filled by the Contractor with CTB or non-shrink grout.

The Contractor may elect to determine acceptance of thickness by survey before and after placement. Survey intervals shall be no more than 50-foot longitudinally and 25-foot transversely for each proposed lot. Survey data shall be obtained by a state licensed land surveyor.

When the thickness measurement is deficient by more than 1/2 inch, the area represented by the tests shall be removed and replaced at the Contractor's expense.

METHOD OF MEASUREMENT

304-7.1 Cement-treated base course. The quantity of cement-treated base course will be determined by measurement of the number of square yards of CTB actually constructed and accepted by the Program Manager as complying with the plans and specifications.

BASIS OF PAYMENT

304-8.1 Cement-treated base course. Payment shall be made at the contract unit price per square yard for cement-treated base course. This price shall be full compensation for furnishing all materials, including cement; for all preparation, manipulation, placing, and curing of these materials; and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item P-304-8.1 Cement-Treated Aggregate Base Course (8-inch Thick) – per square yard

ISSUED FOR BID

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM C88	Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C150	Standard Specification for Portland Cement
ASTM C131	Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C136	Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregate
ASTM C174	Standard Test Method for Measuring Thickness of Concrete Elements Using Drilled Concrete Cores
ASTM C309	Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C595	Standard Specification for Blended Hydraulic Cements
ASTM C618	Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C989	Standard Specification for Slag Cement for Use in Concrete and Mortars
ASTM C1602	Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete
ASTM D75	Standard Practice for Sampling Aggregates
ASTM D558	Standard Test Methods for Moisture-Density (Unit Weight) Relations of Soil-Cement Mixtures
ASTM D559	Standard Test Methods for Wetting and Drying Compacted Soil-Cement Mixtures
ASTM D560	Standard Test Methods for Freezing and Thawing Compacted Soil-Cement Mixtures
ASTM D977	Standard Specification for Emulsified Asphalt
ASTM D1556	Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D1633	Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders
ASTM D2397	Standard Specification for Cationic Emulsified Asphalt
ASTM D3665	Standard Practice for Random Sampling of Construction Materials

ISSUED FOR BID

ASTM D3666	Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials
ASTM D4318	Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D6938	Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

END OF ITEM P-304

ISSUED FOR BID

ITEM P-306 LEAN CONCRETE BASE COURSE

DESCRIPTION

306-1.1 This item shall consist of a lean concrete subbase material that is composed of aggregate and cement uniformly blended together and mixed with water. The mixture may also include approved cementitious additives, in the form of fly ash or slag, and chemical admixtures. The mixed material shall be spread, shaped, and consolidated using concrete paving equipment in accordance with these specifications and in conformity to the lines, grades, dimensions, and typical cross-sections shown on the plans.

MATERIALS

306-2.1 Aggregate. The coarse aggregate fraction shall be crushed stone, crushed or uncrushed gravel, crushed and adequately seasoned, air-cooled, iron blast furnace slag, crushed recycled concrete, or a combination thereof. The fine aggregate fraction may be part of the natural aggregate blend as obtained from the borrow source or it may be natural sand that is added at the time of mixing. The aggregate shall meet the gradation and material requirements in the tables below.

Aggregate Material Requirements

Material Test	Requirement	Standard
Coarse Aggregate Portion (retained on the No. 4 (4.75 mm) sieve)		
Resistance to Degradation	Loss: 40% maximum	ASTM C131
Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate	Loss after 5 cycles: 10% maximum using Sodium sulfate - or - 15% maximum using magnesium sulfate	ASTM C88
Flat Particles, Elongated Particles, or Flat and Elongated Particles ¹	10% maximum, by weight, for fraction retained on the ½ inch (12.5mm) sieve and 10% maximum, by weight, for the fraction passing the 1/2-inch (12.5 mm) sieve	ASTM D4791
Clay lumps and friable particles	Less than or equal to 3 percent	ASTM C142
Fine Aggregate Portion (passing the No. 40 (425µm) sieve)		
Clay lumps and friable particles	Less than or equal to 3 percent	ASTM C142
Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate	Loss after 5 cycles: 10% maximum using Sodium sulfate - or - 15% maximum using magnesium sulfate	ASTM C88

¹ A flat particle is one having a ratio of width to thickness greater than five (5); an elongated particle is one having a ratio of length to width greater than five (5).

Aggregate Gradation for Lean Concrete

Sieve Size (square openings)	Percentage by Weight Passing Sieves	
	Gradation A	Gradation B
1-1/2 inch (37.5 mm)	100	--
1 inch (25.0 mm)	70 - 95	100
3/4 inch (19.0 mm)	55 - 85	70 - 100
No. 4 (4.75 mm)	30 - 60	35 - 65
No. 40 (425 µm)	10 - 30	15 - 30
No. 200 (75 µm)	0 - 15	0 - 15

306-2.2 Sampling and testing.

a. Aggregate base materials. The Contractor shall take samples of the aggregate base stockpile in accordance with ASTM D75 to verify initial aggregate base requirements and gradation. Material shall meet the requirements in paragraphs 306-2.1 and 306-2.2. This sampling and testing will be the basis for approval of the aggregate base quality requirements.

306-2.3 Cement. Cement shall conform to the requirements of ASTM 150, Type I, Low Alkali.

306-2.4 Cementitious additives. Pozzolan and slag cement may be added to the lean concrete mix. If used, each material must meet the following requirements:

a. Pozzolan. Pozzolan materials must meet the requirements of ASTM C618, Class F, or N with the exception of loss of ignition, where the maximum shall be less than 6%. The supplementary optional physical requirements of Table 3 contained in ASTM C618 shall apply.

b. Slag cement (ground granulated blast furnace (GGBF) slag). Slag shall conform to ASTM C989, Grade 100 or 120.

306-2.5 Chemical admixtures. The Contractor shall submit certificates indicating that the material to be furnished meets all the requirements listed below. In addition, the PROGRAM MANAGER may require the Contractor to submit complete test data showing that the material to be furnished meets all the requirements of the cited specification.

a. Air-entraining admixtures. Air-entraining admixtures shall meet the requirements of ASTM C260.

b. Water-reducing admixtures. Water-reducing, set-controlling admixtures shall meet the requirements of ASTM C494, Type A, D, E, F, or G. Water-reducing admixtures shall be added at the mixer separately from air-entraining admixtures in accordance with the manufacturer's printed instructions. The air entrainment agent and the water-reducing admixture shall be compatible.

c. Retarding admixtures. Retarding admixtures shall meet the requirements of ASTM C494, Type B or D.

d. Accelerating admixtures. Accelerating admixtures shall meet the requirements of ASTM C494, Type C.

306-2.6 Water. Water used in mixing or curing shall be from potable water sources. Other sources shall be tested in accordance with ASTM C1602 prior to use.

ISSUED FOR BID

306-2.7 Curing materials. Curing materials shall conform to one of the following specifications:

- a. White-pigmented, liquid membrane-forming compound conforming to ASTM C309, Type 2, Class B, or clear or translucent Type 1-D, Class B with white fugitive dye. Clear membrane-forming compounds will not be allowed.
- b. White polyethylene film for curing concrete shall conform to the requirements of ASTM C 171.
- c. White burlap polyethylene sheeting for curing concrete shall conform to the requirements of ASTM C 171.
- d. WateProgram Manageroof paper for curing concrete shall conform to the requirements of ASTM C 171.

306-2.8 Bond Breaker. Choke stone shall be an ASTM C33 Number 89 stone. Fabric shall meet the requirements of AASHTO M 288 Class I fabric with elongation not less than 50% at the specified strengths, and a minimum weight of 14.5 oz/sy. A certificate of compliance (COC) shall be provided by the fabric manufacturer that the material may be used as a bond breaker. Liquid membrane forming compound shall be in accordance with paragraph 306-2.7.

COMPOSITION OF MIXTURE

306-3.1 Mix design. The lean concrete mix design shall be based on trial batch results conducted in the laboratory. The lean concrete shall be designed to meet the criteria in this section.

Compressive strength shall not be less than 500 pounds per square inch nor greater than 800 pounds per square inch at seven (7) days. Compressive strengths shall be taken as the average of two compressive strength test results. All compressive strength specimens shall be prepared and tested in accordance with ASTM C192 and ASTM C39, respectively.

The percentage of air entrainment shall be 6%, $\pm 1/2\%$. Air content shall be determined by testing in accordance with ASTM C231 for gravel and stone coarse aggregate and ASTM C173 for slag and other highly porous coarse aggregate.

If there is a change in aggregate sources, type of cement used, or pozzolanic materials, a new mix design must be submitted

306-3.2 Submittals. At least 30 days prior to the placement of the lean concrete, the Contractor shall submit certified test reports to the Program Manager for those materials proposed for use during construction, as well as the mix design information for the lean concrete material. The certification shall identify the specifications and test standard, the name of the testing laboratory, the date of the tests, and a statement that the materials comply with the applicable specifications. Tests older than six (6) months shall not be used. The submittal package shall include the following:

- a. Sources of materials, including aggregate, cement, admixtures, and curing and bond breaking materials.
- b. Physical properties of the aggregates, cement, admixtures, curing and bond breaking materials.
- c. Mix design:
 - Mix identification number
 - Weight of saturated surface-dry aggregates (fine and coarse)

ISSUED FOR BID

- Combined aggregate gradation
- Cement factor
- Water content
- Water-cementitious material ratio (by weight)
- Volume of admixtures and yield for one cubic yard of lean concrete
- Laboratory test results:
 - Slump
 - Unit weight
 - Air content
 - Compressive strength at 3, 7, and 28 days (average values)
 - Wet-dry and/or Freeze-thaw weight loss

Where applicable, the Contractor shall submit a jointing plan for transverse joints in the lean concrete layer for approval by the Program Manager.

During production, the Contractor shall submit batch tickets for each delivered load.

EQUIPMENT

306-4.1 All equipment necessary to mix, transport, place, compact, and finish the lean concrete material shall be furnished by the Contractor and is subject to inspection and approval by the Program Manager. The Contractor shall provide certification that all equipment conforms to the requirements of ASTM C94.

306-4.2 Forms. Straight side forms shall be made of steel and shall be furnished in sections not less than 10 feet in length. Forms shall have a depth equal to the pavement thickness at the edge. Flexible or curved forms of proper radius shall be used for curves of 100 feet radius or less. Forms shall be provided with adequate devices for secure settings so that when in place they will withstand, without visible spring or settlement, the impact and vibration of the consolidating and finishing equipment. Forms with battered top surfaces and bent, twisted or broken forms shall not be used. Built-up forms shall not be used, except as approved by the Program Manager. The forms shall contain provisions for locking the ends of abutting sections together tightly for secure setting. Wood forms may be used under special conditions, when accepted by the Program Manager.

306-4.3 Concrete pavers. A fixed form or slip-form concrete paver may be used to place lean concrete. The paver shall be fully energized, self-propelled and capable of spreading, consolidating, and finishing the lean concrete material, true to grade, tolerances, and cross-sections. The paver shall be of sufficient weight and power to construct the maximum specified concrete paving lane width, at adequate forward speed, without transverse, longitudinal or vertical instability or without displacement. Slip-form pavers shall be equipped with electronic or hydraulic horizontal and vertical control devices. Bridge deck pavers are approved as paver-finishing machines for lean concrete, provided they are capable of handling the amount of lean concrete required for the full-lane width specified, and capable of spreading, consolidating, and finishing the lean concrete material, true to grade, tolerances, and cross-sections.

306-4.4 Vibrators. For fixed-form construction, vibrators may be either the surface pan type or internal type with either immersed tube or multiple spuds for the full width of the slab. They may be attached to

ISSUED FOR BID

the spreader, the finishing machine, or mounted on a separate carriage. They shall not come in contact with the subgrade or forms.

For slip-form construction, the paver shall be accomplished by internal vibrators for the full width and depth of the pavement being placed. The number, spacing, frequency, and eccentric weights of vibrators shall be provided to achieve acceptable consolidation without segregation and finishing quality. Internal vibrators may be supplemented by vibrating screeds operating on the surface of the lean concrete. Vibrators and screeds shall automatically stop operation when forward motion ceases. An override switch shall be provided.

Hand held vibrators may be used in irregular areas.

306-4.5 Joint saws. The Contractor shall provide a sufficient number of saws with adequate power to cut contraction or construction joints to the required dimensions as shown on the plans. The Contractor shall provide at least one standby saw in good working order.

CONSTRUCTION METHODS

306-5.1 Control Strip. The first half-day of construction shall be considered the control strip. The Contractor shall demonstrate, in the presence of the Program Manager, that the materials, equipment, and construction processes meet the requirements of the specification. Control strips that do not meet specification requirements shall be removed and replaced at the Contractor's expense. Full operations shall not continue until the control strip has been accepted by the Program Manager. Upon acceptance of the control strip by the Program Manager, the Contractor shall use the same equipment, materials, and construction methods for the remainder of construction, unless adjustments made by the Contractor are approved in advance by the Program Manager.

306-5.2 Weather limitations. The Contractor shall follow the recommended practices in American Concrete Institute (ACI) 306R, Guide to Cold Weather Concreting. The temperature of the mixed lean concrete shall not be less than 50°F at the time of placement. The lean concrete shall not be placed when the ambient temperature is below 40°F or when conditions indicate that the temperature may fall below 35°F within 24 hours. The lean concrete shall not be placed on frozen underlying courses.

The Contractor shall follow the recommended practices in ACI 305R, Guide to Hot Weather Concreting. The lean concrete temperature from initial mixing through final cure shall not exceed 90°F. When the maximum daily air temperature exceeds 85°F, the forms and/or the underlying material shall be sprinkled with water before placing the lean concrete.

The Contractor should stop operations prior to and during rain allowing time to cover and protect any plastic lean concrete. Areas damaged by rain shall be refinished or replaced at the Contractor's expense.

306-5.3 Maintenance. The Contractor shall protect the lean concrete from environmental or mechanical damage. Traffic shall not be allowed on the pavement until test specimens made per ASTM C31 have attained a compressive strength of 500 psi when tested per ASTM C39. The Contractor shall maintain continuity of the applied curing method for the entire curing period.

306-5.4 Form setting. Form sections shall be tightly locked and shall be free from play or movement in any direction. The forms shall not deviate from true line by more than 1/4 inch at any joint. The top face

of the form shall not vary from a true plane more than 1/8 inch in 10 feet, and the upstanding leg shall not vary more than 1/4 inch. Forms shall be cleaned and oiled prior to the placing of lean concrete.

306-5.5 Preparation of underlying course. The underlying course shall be checked and accepted by the Program Manager before placing operations begin. Prior to placing the material, the final grade should be firm, moist and free of frost. Use of chemicals to eliminate frost will not be permitted. The underlying course shall be wetted in advance of placing the lean concrete base course.

306-5.6 Grade control. Grade control shall be as necessary to construct the layer to the profile and cross-sections as shown on the plans.

306-5.7 Mixing. The batch plant site, layout, equipment, and provisions for transporting material shall assure a continuous supply of material to the work. Stockpiles shall be constructed in a manner that prevents segregation and intermixing of deleterious materials.

All lean concrete shall be mixed and delivered to the site per the requirements of ASTM C94. The mixing time should be adequate to produce lean concrete that is uniform in appearance, with all ingredients evenly distributed. Mixing time shall be measured from the time all materials are emptied into the drum (provided all the water is added before one-fourth the preset mixing time has elapsed) and continues until the time the discharge chute is opened to deliver the lean concrete.

If mixing in a batch plant, the mixing time shall not be less than 50 or greater than 90 seconds. If mixing in a truck mixer, the mixing time shall not be less than 70 or more than 125 truck-drum revolutions at a mixing speed of not less than six (6) or more than 18 truck-drum revolutions per minute.

The elapsed time from the addition of cementitious material to the mix until the lean concrete is deposited in place at the work site shall not exceed 45 minutes when the concrete is hauled in non-agitating trucks, or 90 minutes when it is hauled in truck mixers or truck agitators.

Re-tempering lean concrete will not be permitted, except when delivered in truck mixers. With truck mixers, additional water may be added to the batch materials if the addition of water is added within 45 minutes after the initial mixing operations and the water/cement ratio specified in the mix design is not exceeded.

306-5.8 Placing. The lean concrete material shall be placed continuously at a uniform rate on the underlying course minimizing segregation and handling of the mix. Rakes shall not be allowed for spreading the lean concrete.

306-5.9 Finishing. Shape the finished surface of the lean concrete base layer to the specified lines, grades, and cross-section. Hand finishing will not be permitted except in areas where the mechanical finisher cannot operate. The surface of the lean concrete shall not be textured.

306-5.10 Construction limitations. All placement and finishing operations shall be completed within two (2) hours from the start of mixing. Material not completed within the 2-hour time limit shall be removed and replaced at the Contractor's expense.

At the end of each day's construction and/or when operations are interrupted for more than 30 minutes, a straight transverse construction joint shall be formed by a header or by cutting back into the compacted material to form a true vertical face.

ISSUED FOR BID

Completed portions may be opened to light traffic when it has achieved its 7-day strength and the curing is not damaged.

306-5.11 Joints. Locate all longitudinal and transverse construction joints as shown on the plans. Longitudinal joints shall be within 6 inches of planned joints in the overlaying concrete pavement and transverse joints shall be within 3 inches the planned joints of the overlying concrete surface. Joints shall be sawn as soon as the base can support the saws without damage to the lean concrete base. Joints shall be constructed by sawing the hardened lean concrete to a depth of at least one-third the thickness of the lean concrete base, or 1/5th the depth of the lean concrete base when constructed using early entry saws.

306-5.12 Curing. Immediately after the finishing operations are complete and within two (2) hours of placement of the lean concrete, the entire surface and edges of the newly placed lean concrete shall be cured in accordance with paragraph 306-2.7. The layer should be kept moist using a moisture-retaining cover or a light application of water until the curing material is applied. The curing compound shall not be applied during rainfall.

The curing material shall be applied at a maximum coverage of 200 square feet per gallon using pressurized mechanical sprayers. The spraying equipment shall be a fully atomizing type equipped with a tank agitator. At the time of use, the curing compound in the tank shall be thoroughly and uniformly mixed with the pigment. During application, the curing compound shall be continuously stirred by mechanical means. Edges of the lean concrete layer shall be sprayed with curing compound immediately following placement with slip-form pavers or when side-forms are removed. Hand spraying of odd widths or shapes and lean concrete surfaces exposed by the removal of forms is permitted.

The lean concrete temperature during curing shall be in accordance with paragraph 306-5.2.

If the curing material becomes damaged from any cause, including sawing operations, within the required 7-day curing period or until the overlying course is constructed, the Contractor shall immediately repair the damaged areas by application of additional curing compound or other means approved by the Program Manager.

306-5.13 Surface tolerance. The Contractor shall perform smoothness and grade checks daily. Any area not meeting smoothness and grade shall be corrected by the Contractor at the Contractor's expense. The Contractor shall provide smoothness and grade data to the Program Manager on a daily basis.

a. Smoothness. The finished surface shall not vary more than $\pm 3/8$ -inch when tested with a 12-foot straightedge applied parallel with and at right angles to the centerline, and, moved continuously forward at half the length of the 12-foot straightedge for the full length of each line on a 50-foot grid. The Contractor shall correct any high spots more than $3/8$ inch in 12-foot with a grinding machine or remove and replace the material at the Contractor's expense. Any areas that have been ground shall have curing compound reapplied.

b. Grade. The grade shall be measured on a 50-foot grid and shall be within ± 0.05 feet of the specified grade. When the surface is more than $1/2$ inch above the grade shown in the plans, the surface shall be corrected at the Contractor's expense to an elevation that falls within a tolerance of $1/4$ inch.

306-5.14 Bond-breaker. Choke stone per paragraph 306-2.8 shall be placed on the surface of the lean concrete to prevent bonding. The choke stone shall be placed in a layer approximately $1/4$ -inch thick. Fabric per paragraph 306-2.8 shall be placed on the surface of the lean concrete to prevent bonding. The fabric shall be placed with a minimum 1 foot of overlap where adjoining sections of fabric come together. Liquid membrane forming compound per paragraph 306-2.8 shall be placed on the surface of the lean

concrete to prevent bonding. The liquid membrane forming compound when used as a bond breaker shall be applied at least eight (8) hours and not more than 24 hours before placement of the concrete pavement. The curing material shall be applied at a maximum coverage rate of 200 square feet per gallon using pressurized mechanical sprayers.

MATERIAL ACCEPTANCE

306-6.1 Sampling and testing. Acceptance sampling and testing to determine conformance with the requirements specified in this section will be performed by the Program Manager for each 1200 square yards. Sampling locations will be determined by the Program Manager on a random basis per ASTM D3665.

a. Compressive Strength. One sample of freshly delivered lean concrete will be taken for compressive strength for each 1200 square yards in accordance with ASTM C172 and air content tests in accordance with ASTM C231. Two test cylinders will be made and cured from the sample per ASTM C31 and the 7-day compressive strength of each cylinder determined per ASTM C39. The compressive strength will be computed by averaging the two 7-day compressive strengths.

The Contractor shall provide for the initial curing of cylinders in accordance with ASTM C31 during the 24 hours after molding.

b. Thickness. Cores shall be drilled by the Contractor at two different sampling locations for thickness determination for each 1200 square yards. Thickness will be determined by measuring the depth of core holes and computed by averaging the thickness determination of the two locations. Core holes shall be filled by the Contractor with lean concrete base or non-shrink grout.

306-6.2 Acceptance.

a. Strength. If the lean concrete fails to meet the minimum compressive strength requirements, the Contractor shall remove and replaced the material at the Contractor's expense.

b. Thickness. If the average thickness is not deficient by more than 1/2 inch (12 mm) from the plan thickness, full payment shall be made. When such measurement is deficient by more than 1/2 inch (12 mm) but less than one inch (25 mm) from the plan thickness, the area **represented by the test** shall be removed and replaced at the Contractor's expense or shall be permitted to remain in-place at an adjusted payment of 75% of the contract unit price.

METHOD OF MEASUREMENT

306-7.1 The quantity of lean concrete base course will be determined by the number of square yard of lean concrete actually constructed and accepted by the Program Manager as complying with the plans and specifications.

BASIS OF PAYMENT

306-8.1 The accepted quantities of lean concrete will be paid for at the contract unit price per square yard for lean concrete base course. The price and payment shall be full compensation for furnishing and placing all materials, provided; however, for any pavement found deficient in thickness as specified in paragraph 306-6.2b, the reduced unit price shall be paid.

ISSUED FOR BID

Item P-306-8.1 Lean Concrete Base Course - per square yard

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM C31	Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C33	Standard Specification for Concrete Aggregates
ASTM C39	Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C94	Standard Specification for Ready-Mixed Concrete
ASTM C136	Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregates
ASTM C150	Standard Specification for Portland Cement
ASTM C172	Standard Practice for Sampling Freshly Mixed Concrete
ASTM C173	Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
ASTM C174	Standard Test Method for Measuring Thickness of Concrete Elements Using Drilled Concrete Cores
ASTM C192	Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory
ASTM C231	Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C260	Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C1260	Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
ASTM C309	Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C494	Standard Specification for Chemical Admixtures for Concrete
ASTM C595	Standard Specification for Blended Hydraulic Cements
ASTM C618	Specification for Coal Fly Ash and Raw and Calcined Natural Pozzolans for Use in Concrete
ASTM C989	Standard Specification for Slag Cement for Use in Concrete and Mortars
ASTM C1567	Standard Test Method for Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregates (Accelerated Mortar-Bar Method)

ISSUED FOR BID

ASTM C1602 Standard Specification for Mixing Water Used in the Production of
Hydraulic Cement Concrete

American Association of State Highway and Transportation Officials (AASHTO)

AASHTO T136 Standard Method of Test for Freezing-and-Thawing Tests of Compacted
Soil-Cement Mixtures

ASTM D3665 Standard Practice for Random Sampling of Construction Materials

American Concrete Institute (ACI)

ACI 305R Guide to Hot Weather Concreting

ACI 306R Guide to Cold Weather Concreting

END OF ITEM P-306

ISSUED FOR BID

ITEM P-501 CEMENT CONCRETE PAVEMENT

DESCRIPTION

501-1.1 This work shall consist of pavement composed of cement concrete, both with reinforcement and without reinforcement, constructed on a prepared underlying surface in accordance with these specifications and shall conform to the lines, grades, thickness, and typical cross-sections shown on the plans. The terms cement concrete, Portland Cement Concrete (PCC), hydraulic cement concrete, and concrete are interchangeable in this specification.

MATERIALS

501-2.1 Aggregates.

a. Reactivity. Fine and Coarse aggregates to be used in PCC on this project shall be tested and evaluated by the Contractor for alkali-aggregate reactivity in accordance with both ASTM C1260 and ASTM C1567. Fine and Coarse aggregates shall also be evaluated for commercial E-36 deicer reactivity utilizing a modified version of ASTM C1260 or ASTM C1567. Tests must be representative of aggregate sources which will be providing material for production. ASTM C1260 and ASTM C1567 tests may be run concurrently.

(1) Coarse aggregate and fine aggregate shall be tested separately in accordance with ASTM C1260, however, the length of test shall be extended to 28 days (30 days from casting). Tests must have been completed within 6 months of the date of the concrete mix submittal.

(2) The combined coarse and fine aggregate shall be tested in accordance with ASTM C1567, modified for combined aggregates, using the proposed mixture design proportions of aggregates, cementitious materials, and/or specific reactivity reducing chemicals. If the expansion does not exceed 0.10% at 28 days, the proposed combined materials will be accepted. If the expansion is greater than 0.10% at 28 days, the aggregates will not be accepted unless adjustments to the combined materials mixture can reduce the expansion to less than 0.10% at 28 days, or new aggregates shall be evaluated and tested.

(3) If lithium nitrate is proposed for use with or without supplementary cementitious materials, the aggregates shall be tested in accordance with Corps of Engineers (COE) Concrete Research Division (CRD) C662 in lieu of ASTM C1567. If lithium nitrate admixture is used, it shall be nominal 30% \pm 0.5% weight lithium nitrate in water. If the expansion does not exceed 0.10% at 28 days, the proposed combined materials will be accepted. If the expansion is greater than 0.10% at 28 days, the aggregates will not be accepted unless adjustments to the combined materials mixture can reduce the expansion to less than 0.10% at 28 days, or new aggregates shall be evaluated and tested.

(4) The commercial E-36 deicer reactivity tests shall be conducted using mortar bars following a modified version of ASTM C1260 or ASTM C1567. Use ASTM C1260 for proposed mixtures using only Portland cement; use ASTM C1567 for proposed mixtures with Portland cement and fly ash. Modify the tests so the mortar bars are prepared from samples of all the proposed materials combined using the proposed production concrete proportions. The mortar bars shall be soaked in commercial E-36 potassium acetate deicer solution (50% by weight potassium acetate, 6.4 molar). The Contractor shall coordinate and obtain a sample of the deicer solution from the MSCAA. Do not dilute the commercial deicer from its packaged concentration. The acceptance criteria are modified to the maximum allowable expansion of less than 0.10 percent at 30 days after casting.

ISSUED FOR BID

b. Fine aggregate. Grading of the fine aggregate, as delivered to the mixer, shall conform to the requirements of ASTM C33 and the parameters identified in the fine aggregate material requirements below. Fine aggregate material requirements and deleterious limits are shown in the table below.

Fine Aggregate Material Requirements		
Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate	Loss after 5 cycles: 10% maximum using Sodium sulfate - or - 15% maximum using magnesium sulfate	ASTM C88
Sand Equivalent	45 minimum	ASTM D2419
Fineness Modulus (FM)	$2.50 \leq FM \leq 3.40$	ASTM C136
Limits for Deleterious Substances in Fine Aggregate for Concrete		
Clay lumps and friable particles	1.0% maximum	ASTM C142
Coal and lignite	0.5% using a medium with a density of Sp. Gr. of 2.0	ASTM C123
Total Deleterious Material	1.0% maximum	

c. Coarse aggregate. The maximum size coarse aggregate shall be 1-1/2-inch.

Aggregates delivered to the mixer shall be clean, hard, uncoated aggregates consisting of crushed stone, crushed or uncrushed gravel, crushed recycled concrete pavement, or a combination thereof. The aggregates shall have no known history of detrimental pavement staining. Steel blast furnace slag shall not be permitted. Coarse aggregate material requirements and deleterious limits are shown in the table below; washing may be required to meet aggregate requirements.

Coarse Aggregate Material Requirements

Material Test	Requirement	Standard
Resistance to Degradation	Loss: 40% maximum	ASTM C131
Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate	Loss after 5 cycles: 12% maximum using Sodium sulfate - or - 18% maximum using magnesium sulfate	ASTM C88
Flat, Elongated, or Flat and Elongated Particles	8% maximum, by weight, of flat, elongated, or flat and elongated particles at 5:1 for any size group coarser than 3/8 (9.5 mm) sieve ¹	ASTM D4791
D-cracking (Freeze-Thaw) ²	Durability factor ≥ 95	ASTM C666

¹ A flat particle is one having a ratio of width to thickness greater than five (5); an elongated particle is one having a ratio of length to width greater than five (5).

² Coarse aggregate may only be accepted from sources that have a 20-year service history for the same gradation to be supplied with no history of D-Cracking. Aggregates that do not have a 20-year record of service free from major repairs (less than 5% of slabs replaced) in similar conditions without D-cracking shall not be used unless

ISSUED FOR BID

the material currently being produced has a durability factor greater than or equal to 95 per ASTM C666. The Contractor shall submit a current certification and test results to verify the aggregate acceptability. Test results will only be accepted from a State Department of Transportation (DOT) materials laboratory or an accredited laboratory. Certification and test results which are not dated or which are over one (1) year old or which are for different gradations will not be accepted.

The amount of deleterious material in the coarse aggregate shall not exceed the following limits:

Limits for Deleterious Substances in Coarse Aggregate

Deleterious material	ASTM	Percentage by Mass
Clay Lumps and friable particles	ASTM C142	1.0
Material finer than No. 200 sieve (75 µm)	ASTM C117	1.0 ¹
Lightweight particles	ASTM C123 using a medium with a density of Sp. Gr. of 2.0	0.5
Chert ² (less than 2.40 Sp Gr.)	ASTM C123 using a medium with a density of Sp. Gr. of 2.40)	1.0 ³
Total of all deleterious Material		3.0 ¹

¹ The limit for material finer than 75-µm is allowed to be increased to 1.5% for crushed aggregates consisting of dust of fracture that is essentially free from clay or shale. Test results supporting acceptance of increasing limit to 1.5% with statement indicating material is dust of fracture must be submitted with Concrete mix. Acceptable techniques to characterizing these fines include methylene blue adsorption or X-ray diffraction analysis. The total of all deleterious materials increases up to 3.5%.

² Chert and aggregates with less than 2.4 specific gravity.

d. Combined aggregate gradation. This specification is targeted for a combined aggregate gradation developed following the guidance presented in United States Air Force Engineering Technical Letter (ETL) 97-5: *Proportioning Concrete Mixtures with Graded Aggregates for Rigid Airfield Pavements*. Base the aggregate grading upon a combination of all the aggregates (coarse and fine) to be used for the mixture proportioning. Three aggregate sizes may be required to achieve an optimized combined gradation that will produce a workable concrete mixture for its intended use. Use aggregate gradations that produce concrete mixtures with well-graded or optimized aggregate combinations. The Contractor shall submit complete mixture information necessary to calculate the volumetric components of the mixture. The combined aggregate grading shall meet the following requirements:

(1) The materials selected and the proportions used shall be such that when the Coarseness Factor (CF) and the Workability Factor (WF) are plotted on a diagram as described in paragraph 501-2.1d(4) below, the point thus determined shall fall within the parallelogram described therein.

(2) The CF shall be determined from the following equation:

$$CF = \frac{\text{(cumulative percent retained on the 3/8 in. (9.5 mm) sieve) (100)}}{\text{(cumulative percent retained on the No. 8 (2.36 mm) sieve)}}$$

(3) The WF is defined as the percent passing the No. 8 (2.36 mm) sieve based on the combined gradation. However, WF shall be adjusted, upwards only, by 2.5 percentage points for each 94 pounds of cementitious material per cubic yard greater than 564 pounds per cubic yard.

(4) A diagram shall be plotted using a rectangular scale with WF on the Y-axis with units from 20 (bottom) to 45 (top), and with CF on the X-axis with units from 80 (left side) to 30 (right side). On this diagram a parallelogram shall be plotted with corners at the following coordinates (CF-75, WF-28), (CF-75, WF-40), (CF-45, WF-32.5), and (CF-45, WF-44.5). If the point determined by the intersection of the computed CF and WF does not fall within the above parallelogram, the grading of each size of aggregate used and the proportions selected shall be changed as necessary. The point determined by the plotting of the CF and WF may be adjusted during production ± 3 WF and ± 5 CF. Adjustments to gradation may not take the point outside of the parallelogram.

e. **Contractors combined aggregate gradation.** The Contractor shall submit their combined aggregate gradation using the following format:

Contractor's Combined Aggregate Gradation

Sieve Size	Contractor's Concrete mix Gradation (Percent passing by weight)
2 inch (50 mm)	*
1-1/2 inch (37.5 mm)	*
1 inch (25.0 mm)	*
3/4 inch (19.0 mm)	*
1/2 inch (12.5 mm)	*
3/8 inch (9.5 mm)	*
No. 4 (4.75 mm)	*
No. 8 (2.36 mm)	*
No. 16 (1.18 mm)	*
No. 30 (600 μ m)	*
No. 50 (300 μ m)	*
No. 100 (150 μ m)	*

501-2.2 Cement. Cement shall conform to the requirements of ASTM C150 Type I, low alkali.

501-2.3 Cementitious materials.

a. **Fly ash.** Fly ash shall meet the requirements of ASTM C618, with the exception of loss of ignition, where the maximum shall be less than 6%. Fly ash shall have a Calcium Oxide (CaO) content of less than 15% and a total alkali content less than 3% per ASTM C311. The Contractor shall furnish the previous three most recent, consecutive ASTM C618 reports for each source of fly ash proposed in the concrete mix, and shall furnish each additional report as they become available during the project. The reports can be used for acceptance or the material may be tested independently by the Program Manager.

b. **Slag cement (ground granulated blast furnace (GGBF)).** Slag cement shall conform to ASTM C989, Grade 100 or Grade 120. Slag cement shall be used only at a rate between 25% and 55% of the total cementitious material by mass.

c. **Raw or calcined natural pozzolan.** Natural pozzolan shall be raw or calcined and conform to ASTM C618, Class N, including the optional requirements for uniformity and effectiveness in controlling

ISSUED FOR BID

Alkali-Silica reaction and shall have a loss on ignition not exceeding 6%. Class N pozzolan for use in mitigating Alkali-Silica Reactivity shall have a total available alkali content less than 3%.

501-2.4 Joint seal. The joint seal for the joints in the concrete pavement shall meet the requirements of Item P-605 and shall be of the type specified in the plans.

501-2.5 Isolation joint filler. Premolded joint filler for isolation joints shall conform to the requirements of ASTM D1751 or ASTM D1752 and shall be where shown on the plans. The filler for each joint shall be furnished in a single piece for the full depth and width required for the joint, unless otherwise specified by the Program Manager. When the use of more than one piece is required for a joint, the abutting ends shall be fastened securely and held accurately to shape by stapling or other positive fastening means satisfactory to the Program Manager.

501-2.6 Steel reinforcement. Reinforcing shall consist of welded wire fabric or welded deformed steel wire fabric conforming to the requirements of ASTM A 1064. Welded wire fabric shall be furnished in flat sheets only.

501-2.7 Dowel and tie bars. Dowel bars shall be plain steel bars conforming to ASTM A615 and shall be free from burring or other deformation restricting slippage in the concrete.

a. Dowel Bars. Before delivery to the construction site each dowel bar shall be epoxy coated per ASTM A1078, Type 1, with a coating thickness after curing greater than 10 mils. Patched ends are not required for Type 1 coated dowels. The dowels shall be coated with a bond-breaker recommended by the manufacturer. Dowel sleeves or inserts are not permitted. Grout retention rings shall be fully circular metal or plastic devices capable of supporting the dowel until the grout hardens.

b. Tie Bars. Tie bars shall be deformed steel bars and conform to the requirements of ASTM A615. Tie bars designated as Grade 60 in ASTM A615 or ASTM A706 shall be used for construction requiring bent bars.

501-2.8 Water. Water used in mixing or curing shall be potable. If water is taken from other sources considered non-potable, it shall meet the requirements of ASTM C1602.

501-2.9 Material for curing concrete. Curing materials shall conform to one of the following specifications:

a. Liquid membrane-forming compounds (white) for curing concrete shall conform to the requirements of ASTM C309, Type 2, Class A, or Class B. Clear membrane-forming compounds will not be permitted for use.

b. White polyethylene film for curing concrete shall conform to the requirements of ASTM C171.

c. White burlap-polyethylene sheeting for curing concrete shall conform to the requirements of ASTM C171.

d. Waterproof paper for curing concrete shall conform to the requirements of ASTM C171.

501-2.10 Admixtures. Admixtures shall conform to the following specifications:

a. Air-entraining admixtures. Air-entraining admixtures shall meet the requirements of ASTM C260 and shall consistently entrain the air content in the specified ranges under field conditions. The air-entraining agent and any water reducer admixture shall be compatible.

b. Water-reducing admixtures. Water-reducing admixture shall meet the requirements of ASTM C494, Type A, B, or D.

c. Other admixtures. The use of set retarding and set-accelerating admixtures shall be approved by the Program Manager prior to developing the concrete mix. Retarding admixtures shall meet the

requirements of ASTM C494, Type A, B, or D and set-accelerating admixtures shall meet the requirements of ASTM C494, Type C. Calcium chloride and admixtures containing calcium chloride shall not be used.

d. Lithium Nitrate. The lithium admixture shall be a nominal 30% aqueous solution of Lithium Nitrate, with a density of 10 pounds/gallon, and shall have the approximate chemical form as shown below:

Lithium Admixture

Constituent	Limit (Percent by Mass)
LiNO ₃ (Lithium Nitrate)	30 ±0.5
SO ₄ (Sulfate Ion)	0.1 (max)
Cl (Chloride Ion)	0.2 (max)
Na (Sodium Ion)	0.1 (max)
K (Potassium Ion)	0.1 (max)

The lithium nitrate admixture dispensing and mixing operations shall be verified and certified by the lithium manufacturer's representative.

501-2.11 Epoxy-resin. All epoxy-resin materials shall be two-component materials conforming to the requirements of ASTM C881, Class as appropriate for each application temperature to be encountered, except that in addition, the materials shall meet the following requirements:

- a.** Material for use for embedding dowels and anchor bolts shall be Type IV, Grade 3.
- b.** Material for use as patching materials for complete filling of spalls and other voids and for use in preparing epoxy resin mortar shall be Type III, Grade as approved.
- c.** Material for use for injecting cracks shall be Type IV, Grade 1.
- d.** Material for bonding freshly mixed Portland cement concrete or mortar or freshly mixed epoxy resin concrete or mortar to hardened concrete shall be Type V, Grade as approved.

501-2.12 Bond Breaker. Liquid membrane forming compound shall be in accordance with paragraph 501-2.9-a.

CONCRETE MIX

501-3.1. General. No concrete shall be placed until an acceptable concrete mix has been submitted to the Program Manager for review and the Program Manager has taken appropriate action. The Program Manager's review shall not relieve the Contractor of the responsibility to select and proportion the materials to comply with this section.

501-3.2 Concrete Mix Laboratory. The laboratory used to develop the concrete mix shall be accredited in accordance with ASTM C1077. The laboratory accreditation must be current and listed on the accrediting authority's website. All test methods required for developing the concrete mix must be included in the lab accreditation. A copy of the laboratory's current accreditation and accredited test methods shall be submitted to the Program Manager prior to start of construction.

501-3.3 Concrete Mix Proportions. Develop the mix using the procedures contained in Portland Cement Association (PCA) publication, "Design and Control of Concrete Mixtures." Concrete shall be proportioned to achieve a 28-day flexural strength that meets or exceeds the acceptance criteria contained in paragraph 501-6.6 for a flexural strength of **650** psi per ASTM C78.

ISSUED FOR BID

The minimum cementitious material shall be adequate to ensure a workable, durable mix. The minimum cementitious material (cement plus fly ash, or slag cement) shall be **500** pounds per cubic yard. The ratio of water to cementitious material, including free surface moisture on the aggregates but not including moisture absorbed by the aggregates shall be between 0.38 – 0.45 by weight.

Flexural strength test specimens shall be prepared in accordance with ASTM C192 and tested in accordance with ASTM C78. At the start of the project, the Contractor shall determine an allowable slump as determined by ASTM C143 not to exceed 2 inches for slip-form placement. For fixed-form placement, the slump shall not exceed 3 inches. For hand placement, the slump shall not exceed 4 inches.

The results of the concrete mix shall include a statement giving the maximum nominal coarse aggregate size and the weights and volumes of each ingredient proportioned on a one cubic yard basis. Aggregate quantities shall be based on the mass in a saturated surface dry condition.

If a change in source(s) is made, or admixtures added or deleted from the mix, a new concrete mix must be submitted to the Program Manager for approval.

The Program Manager may request samples at any time for testing, prior to and during production, to verify the quality of the materials and to ensure conformance with the applicable specifications.

501-3.4 Concrete Mix submittal. The concrete mix shall be submitted to the Program Manager at least 30 days prior to the start of operations. The submitted concrete mix shall not be more than 180 days old and must use the materials to be used for production for the project. Production shall not begin until the concrete mix is approved in writing by the Program Manager.

Each of the submitted concrete mixes (i.e., slip form, side form machine finish and side form hand finish) shall be stamped or sealed by the responsible professional Engineer of the laboratory and shall include the following items and quantities as a minimum:

- Certified material test reports for aggregate in accordance with paragraph 501-2.1. Certified reports must include all tests required; reporting each test, test method, test result, and requirement specified (criteria).
- Combined aggregate gradations and analysis; and including plots of the fine aggregate fineness modulus.
- Reactivity Test Results.
- Coarse aggregate quality test results, including deleterious materials.
- Fine aggregate quality test results, including deleterious materials.
- Mill certificates for cement and supplemental cementitious materials.
- Certified test results for all admixtures, including Lithium Nitrate if applicable.
- Specified flexural strength, slump, and air content.
- Recommended proportions/volumes for proposed mixture and trial water-cementitious materials ratio, including actual slump and air content.
- Flexural and compressive strength summaries and plots, including all individual beam and cylinder breaks.
- Correlation ratios for acceptance testing and Contractor QC testing, when applicable.
- Historical record of test results documenting production standard deviation, when applicable.

501-3.5 Cementitious materials.

a. Fly ash. When fly ash is used as a partial replacement for cement, the replacement rate shall be determined from laboratory trial mixes, and shall be between 20% and 30% by weight of the total cementitious material. If fly ash is used in conjunction with slag cement the maximum replacement rate shall not exceed 10% by weight of total cementitious material.

b. Slag cement (ground granulated blast furnace (GGBF)). Slag cement may be used. The slag cement, or slag cement plus fly ash if both are used, may constitute between 25% to 55% of the total cementitious material by weight.

c. Raw or calcined natural pozzolan. Natural pozzolan may be used in the concrete mix. When pozzolan is used as a partial replacement for cement, the replacement rate shall be determined from laboratory trial mixes, and shall be between 20% and 30% by weight of the total cementitious material. If pozzolan is used in conjunction with slag cement the maximum replacement rate shall not exceed 10% by weight of total cementitious material.

501-3.6 Admixtures.

a. Air-entraining admixtures. Air-entraining admixture are to be added in such a manner that will ensure uniform distribution of the agent throughout the batch. The air content of freshly mixed air-entrained concrete shall be based upon trial mixes with the materials to be used in the work adjusted to produce concrete of the required plasticity and workability. The percentage of air in the mix shall be 5.5%. Air content shall be determined by testing in accordance with ASTM C231 for gravel and stone coarse aggregate and ASTM C173 for slag and other highly porous coarse aggregate.

b. Water-reducing admixtures. Water-reducing admixtures shall be added to the mix in the manner recommended by the manufacturer and in the amount necessary to comply with the specification requirements. Tests shall be conducted with the materials to be used in the work, in accordance with ASTM C494.

c. Other admixtures. Set controlling, and other approved admixtures shall be added to the mix in the manner recommended by the manufacturer and in the amount necessary to comply with the specification requirements. Tests shall be conducted with the materials to be used in the work, in accordance with ASTM C494.

d. Lithium nitrate. Lithium nitrate shall be added to the mix in the manner recommended by the manufacturer and in the amount necessary to comply with the specification requirements in accordance with paragraph 501-2.10d.

CONSTRUCTION METHODS

501-4.1 Control Strip. The control strip(s) shall be to the next planned joint after the initial 250 feet of each type of pavement construction (slip-form pilot lane, slip-form fill-in lane, or fixed form). The Contractor shall demonstrate, in the presence of the Program Manager, that the materials, concrete mix, equipment, construction processes, and quality control processes meet the requirements of the specifications. The concrete mixture shall be extruded from the paver meeting the edge slump tolerance and with little or no finishing. Pilot, fill-in, and fixed-form control strips will be accepted separately. Minor adjustments to the mix design may be required to place an acceptable control strip. The production mix will be the adjusted mix design used to place the acceptable control strip. Upon acceptance of the control strip by the Program Manager, the Contractor must use the same equipment, materials, and construction methods for the remainder of concrete paving. Any adjustments to processes or materials must be approved in advance by the Program Manager. The acceptable control strip shall be paid for in accordance with paragraph 501-6.6.

ISSUED FOR BID

501-4.2 Equipment. The Contractor is responsible for the proper operation and maintenance of all equipment necessary for handling materials and performing all parts of the work to meet this specification.

a. Plant and equipment. The plant and mixing equipment shall conform to the requirements of ASTM C94 and/or ASTM C685. Each truck mixer shall have attached in a prominent place a manufacturer's nameplate showing the capacity of the drum in terms of volume of mixed concrete and the speed of rotation of the mixing drum or blades. The truck mixers shall be examined daily for changes in condition due to accumulation of hard concrete or mortar or wear of blades. The pickup and throwover blades shall be replaced when they have worn down 3/4 inch or more. The Contractor shall have a copy of the manufacturer's design on hand showing dimensions and arrangement of blades in reference to original height and depth.

Equipment for transferring and spreading concrete from the transporting equipment to the paving lane in front of the finishing equipment shall be provided. The equipment shall be specially manufactured, self-propelled transfer equipment which will accept the concrete outside the paving lane and will spread it evenly across the paving lane in front of the paver and strike off the surface evenly to a depth which permits the paver to operate efficiently.

b. Finishing equipment.

(1) Slip-form. The standard method of constructing concrete pavements shall be with an approved slip-form paving equipment designed and operated to spread, consolidate, screed, and finish the freshly placed concrete in one complete pass of the machine so that the end result is a dense and homogeneous pavement which is achieved with a minimum of hand finishing. The paver-finisher shall be a heavy duty, self-propelled machine designed specifically for paving and finishing high quality concrete pavements.

(2) Fixed-form. On projects requiring less than 10,000 cubic yards of concrete pavement or irregular areas at locations inaccessible to slip-form paving equipment, concrete pavement may be placed with equipment specifically designed for placement and finishing using stationary side forms. Methods and equipment shall be reviewed and accepted by the Program Manager. Hand screeding and float finishing may only be used on small irregular areas as allowed by the Program Manager.

c. Vibrators. Vibrator shall be the internal type. The rate of vibration of each vibrating unit shall be sufficient to consolidate the pavement without segregation or voids. The number, spacing, and frequency shall be as necessary to provide a dense and homogeneous pavement and meet the recommendations of American Concrete Institute (ACI) 309R, Guide for Consolidation of Concrete. Adequate power to operate all vibrators shall be available on the paver. The vibrators shall be automatically controlled so that they shall be stopped as forward motion ceases. The Contractor shall provide an electronic or mechanical means to monitor vibrator status. The checks on vibrator status shall occur a minimum of two times per day or when requested by the Program Manager.

Hand held vibrators may only be used in irregular areas and shall meet the recommendations of ACI 309R, Guide for Consolidation of Concrete.

d. Concrete saws. The Contractor shall provide sawing equipment adequate in number of units and power to complete the sawing to the required dimensions. The Contractor shall provide at least one standby saw in good working order and a supply of saw blades at the site of the work at all times during sawing operations.

e. Fixed forms. Straight side fixed forms shall be made of steel and shall be furnished in sections not less than 10 feet in length. Forms shall be provided with adequate devices for secure settings so that when in place they will withstand, without visible spring or settlement, the impact and vibration of the consolidating and finishing equipment. Forms with battered top surfaces and bent, twisted or broken forms shall not be used. Built-up forms shall not be used, except as approved by the Program Manager. The top face of the form shall not vary from a true plane more than 1/8 inch in 10 feet, and the upstanding leg shall

ISSUED FOR BID

not vary more than 1/4 inch. The forms shall contain provisions for locking the ends of abutting sections together tightly for secure setting. Wood forms may be used under special conditions, when approved by the Program Manager. The forms shall extend the full depth of the pavement section.

501-4.3 Form setting. Forms shall be set to line and grade as shown on the plans, sufficiently in advance of the concrete placement, to ensure continuous paving operation. Forms shall be set to withstand, without visible spring or settlement, the impact and vibration of the consolidating and finishing equipment. Forms shall be cleaned and oiled prior to the concrete placement. When any form has been disturbed or any grade has become unstable, the form shall be reset and rechecked.

501-4.4 Base surface preparation prior to placement. Any damage to the prepared base, subbase, and subgrade shall be corrected full depth by the Contractor prior to concrete placement. The underlying surface shall be entirely free of frost when concrete is placed. The prepared grade shall be moistened with water, without saturating, immediately ahead of concrete placement to prevent rapid loss of moisture from concrete. Bond breaker shall be applied in accordance with 501-2.12.

501-4.5 Handling, measuring, and batching material. Aggregate stockpiles shall be constructed and managed in such a manner that prevents segregation and intermixing of deleterious materials. Aggregates from different sources shall be stockpiled, weighed and batched separately at the concrete batch plant. Aggregates that have become segregated or mixed with earth or foreign material shall not be used. All aggregates produced or handled by hydraulic methods, and washed aggregates, shall be stockpiled or binned for draining at least 12 hours before being batched. Store and maintain all aggregates at a uniform moisture content prior to use. A continuous supply of materials shall be provided to the work to ensure continuous placement.

501-4.6 Mixing concrete. The concrete may be mixed at the work site, in a central mix plant or in truck mixers. The mixer shall be of an approved type and capacity. Mixing time shall be measured from the time all materials are placed into the drum until the drum is emptied into the truck. All concrete shall be mixed and delivered to the site in accordance with the requirements of ASTM C94 or ASTM C685.

Mixed concrete from the central mixing plant shall be transported in truck mixers, truck agitators, or non-agitating trucks. The elapsed time from the addition of cementitious material to the mix until the concrete is discharged from the truck should not exceed 30 minutes when the concrete is hauled in non-agitating trucks, nor 90 minutes when the concrete is hauled in truck mixers or truck agitators. In no case shall the temperature of the concrete when placed exceed 90°F. Retempering concrete by adding water or by other means will not be permitted. With transit mixers additional water may be added to the batch materials and additional mixing performed to increase the slump to meet the specified requirements provided the addition of water is performed within 45 minutes after the initial mixing operations and provided the water/cementitious ratio specified is not exceeded.

501-4.7 Weather Limitations on mixing and placing. No concrete shall be mixed, placed, or finished when the natural light is insufficient, unless an adequate and approved artificial lighting system is operated.

a. Cold weather. Unless authorized in writing by the Program Manager, mixing and concreting operations shall be discontinued when a descending air temperature in the shade and away from artificial heat reaches 40°F and shall not be resumed until an ascending air temperature in the shade and away from artificial heat reaches 35°F.

The aggregate shall be free of ice, snow, and frozen lumps before entering the mixer. The temperature of the mixed concrete shall not be less than 50°F at the time of placement. Concrete shall not be placed on frozen material nor shall frozen aggregates be used in the concrete.

When concreting is authorized during cold weather, water and/or the aggregates may be heated to not more than 150°F. The apparatus used shall heat the mass uniformly and shall be arranged to preclude the possible occurrence of overheated areas which might be detrimental to the materials.

ISSUED FOR BID

Curing during cold weather shall be in accordance with paragraph 501-4.13d.

b. Hot weather. During periods of hot weather when the maximum daily air temperature exceeds 85°F, the following precautions shall be taken:

- The forms and/or the underlying surface shall be sprinkled with water immediately before placing the concrete. The concrete shall be placed at the coolest temperature practicable, and in no case shall the temperature of the concrete when placed exceed 90°F. The aggregates and/or mixing water shall be cooled as necessary to maintain the concrete temperature at or not more than the specified maximum.
- The concrete placement shall be protected from exceeding an evaporation rate of 0.2 psf per hour. When conditions are such that problems with plastic cracking can be expected, and particularly if any plastic cracking begins to occur, the Contractor shall immediately take such additional measures as necessary to protect the concrete surface. If the Contractor's measures are not effective in preventing plastic cracking, paving operations shall be immediately stopped.
- Curing during hot weather shall be in accordance with paragraph 501-4.13e.

c. Temperature management program. Prior to the start of paving operation for each day of paving, the Contractor shall provide the Program Manager with a Temperature Management Program for the concrete to be placed to assure that uncontrolled cracking is avoided. (Federal Highway Administration HIPERPAV 3 is one example of a temperature management program.) As a minimum, the program shall address the following items:

- (1) Anticipated tensile strains in the fresh concrete as related to heating and cooling of the concrete material.
- (2) Anticipated weather conditions such as ambient temperatures, wind velocity, and relative humidity; and anticipated evaporation rate using Figure 19-9, PCA, Design and Control of Concrete Mixtures.
- (3) Anticipated timing of initial sawing of joint.
- (4) Anticipated number and type of saws to be used.

d. Rain. The Contractor shall have available materials for the protection of the concrete during inclement weather. Such protective materials shall consist of rolled polyethylene sheeting at least 4 mils thick of sufficient length and width to cover the plastic concrete slab and any edges. The sheeting may be mounted on either the paver or a separate movable bridge from which it can be unrolled without dragging over the plastic concrete surface. When rain appears imminent, all paving operations shall stop and all available personnel shall begin covering the surface of the unhardened concrete with the protective covering.

501-4.8 Concrete Placement. At any point in concrete conveyance, the free vertical drop of the concrete from one point to another or to the underlying surface shall not exceed 3 feet. The finished concrete product must be dense and homogeneous, without segregation and conforming to the standards in this specification. Backhoes and grading equipment shall not be used to distribute the concrete in front of the paver. Front end loaders will not be used. All concrete shall be consolidated without voids or segregation, including under and around all load-transfer devices, joint assembly units, and other features embedded in the pavement. Hauling equipment or other mechanical equipment can be permitted on adjoining previously constructed pavement when the concrete strength reaches a flexural strength of 550 psi, based on the average of four field cured specimens per 2,000 cubic yards of concrete placed. The Contractor must determine that the

above minimum strengths are adequate to protect the pavement from overloads due to the construction equipment proposed for the project.

The Contractor shall have available materials for the protection of the concrete during cold, hot and/or inclement weather in accordance with paragraph 501-4.7.

a. Slip-form construction. The concrete shall be distributed uniformly into final position by a self-propelled slip-form paver without delay. The alignment and elevation of the paver shall be regulated from outside reference lines established for this purpose. The paver shall vibrate the concrete for the full width and depth of the strip of pavement being placed and the vibration shall be adequate to provide a consistency of concrete that will stand normal to the surface with sharp well-defined edges. The sliding forms shall be rigidly held together laterally to prevent spreading of the forms. The plastic concrete shall be effectively consolidated by internal vibration with transverse vibrating units for the full width of the pavement and/or a series of equally placed longitudinal vibrating units. The space from the outer edge of the pavement to longitudinal unit shall not exceed 9 inches for slipform and at the end of the dowels for the fill-in lanes. The spacing of internal units shall be uniform and shall not exceed 18 inches.

The term internal vibration means vibrating units located within the specified thickness of pavement section.

The rate of vibration of each vibrating unit shall be sufficient to consolidate the pavement without, segregation, voids, or vibrator trails and the amplitude of vibration shall be sufficient to be perceptible on the surface of the concrete along the entire length of the vibrating unit and for a distance of at least one foot. The frequency of vibration or amplitude should be adjusted proportionately with the rate of travel to result in a uniform density and air content. The paving machine shall be equipped with a tachometer or other suitable device for measuring and indicating the actual frequency of vibrations.

The concrete shall be held at a uniform consistency. The slip-form paver shall be operated with as nearly a continuous forward movement as possible and all operations of mixing, delivering, and spreading concrete shall be coordinated to provide uniform progress with stopping and starting of the paver held to a minimum. If for any reason, it is necessary to stop the forward movement of the paver, the vibratory and tamping elements shall also be stopped immediately. No tractive force shall be applied to the machine, except that which is controlled from the machine.

When concrete is being placed adjacent to an existing pavement, that part of the equipment which is supported on the existing pavement shall be equipped with protective pads on crawler tracks or rubber-tired wheels on which the bearing surface is offset to run a sufficient distance from the edge of the pavement to avoid breaking the pavement edge.

Not more than 15% of the total free edge of each 500-foot segment of pavement, or fraction thereof, shall have an edge slump exceeding 1/4 inch, and none of the free edge of the pavement shall have an edge slump exceeding 3/8 inch. The total free edge of 500 feet of pavement will be considered the cumulative total linear measurement of pavement edge originally constructed as nonadjacent to any existing pavement; that is, 500 feet of paving lane originally constructed as a separate lane will have 1,000 feet of free edge, 500 feet of fill-in lane will have no free edge, etc.). The area affected by the downward movement of the concrete along the pavement edge shall be limited to not more than 18 inches from the edge.

When excessive edge slump cannot be corrected before the concrete has hardened, the area with excessive edge slump will be removed the full width of the slip form lane and replaced at the expense of the Contractor as directed by the Program Manager.

b. Fixed-form (side form) construction. Forms shall be drilled in advance of being placed to line and grade to accommodate tie bars / dowel bars where these are specified.

ISSUED FOR BID

Immediately in advance of placing concrete and after all subbase operations are completed, side forms shall be trued and maintained to the required line and grade for a distance sufficient to prevent delay in placing.

Side forms shall remain in place at least 12 hours after the concrete has been placed, and in all cases until the edge of the pavement no longer requires the protection of the forms. Curing compound shall be applied to the concrete immediately after the forms have been removed.

Side forms shall be thoroughly cleaned and coated with a release agent each time they are used and before concrete is placed against them.

Concrete shall be spread, screed, shaped and consolidated by one or more self-propelled machines. These machines shall uniformly distribute and consolidate concrete without segregation so that the completed pavement will conform to the required cross-section with a minimum of handwork.

The number and capacity of machines furnished shall be adequate to perform the work required at a rate equal to that of concrete delivery. The equipment must be specifically designed for placement and finishing using stationary side forms. Methods and equipment shall be reviewed and accepted by the Program Manager.

Concrete for the full paving width shall be effectively consolidated by internal vibrators. The rate of vibration of each vibrating unit shall be sufficient to consolidate the pavement without segregation, voids, or leaving vibrator trails.

Power to vibrators shall be connected so that vibration ceases when forward or backward motion of the machine is stopped.

c. Consolidation. Concrete shall be consolidated with the specified type of lane-spanning, gang-mounted, mechanical, immersion type vibrating equipment mounted in front of the paver, supplemented, in rare instances as specified, by hand-operated vibrators. The vibrators shall be inserted into the concrete to a depth that will provide the best full-depth consolidation but not closer to the underlying material than 2 inches. Vibrators shall not be used to transport or spread the concrete. For each paving train, at least one additional vibrator spud, or sufficient parts for rapid replacement and repair of vibrators shall be maintained at the paving site at all times. Any evidence of inadequate consolidation (honeycomb along the edges, large air pockets, or any other evidence) or over-consolidation (vibrator trails, segregation, or any other evidence) shall require the immediate stopping of the paving operation and adjustment of the equipment or procedures as approved by the Program Manager.

If a lack of consolidation of the hardened concrete is suspected by the Program Manager, referee testing may be required. Referee testing of hardened concrete will be performed by the Program Manager by cutting cores from the finished pavement after a minimum of 24 hours curing. The Program Manager shall visually examine the cores for evidence of lack of consolidation. Density determinations will be made by the Program Manager based on the water content of the core as taken. ASTM C642 shall be used for the determination of core density in the saturated-surface dry condition. When required, referee cores will be taken at the minimum rate of one for each 500 cubic yards of pavement, or fraction thereof. The Contractor shall be responsible for all referee testing cost if they fail to meet the required density.

The average density of the cores shall be at least 97% of the original concrete mix density, with no cores having a density of less than 96% of the original concrete mix density. Failure to meet the referee tests will be considered evidence that the minimum requirements for vibration are inadequate for the job conditions. Additional vibrating units or other means of increasing the effect of vibration shall be employed so that the density of the hardened concrete conforms to the above requirements.

501-4.9 Strike-off of concrete and placement of reinforcement. Following the placing of the concrete, it shall be struck off to conform to the cross-section shown on the plans and to an elevation that when the

concrete is properly consolidated and finished, the surface of the pavement shall be at the elevation shown on the plans. When reinforced concrete is placed, the reinforcement shall be placed and secured on approved high chairs as detailed in the drawings. All reinforcing shall remain in their specified positions after concrete placement. Reinforcement vibrated in after the concrete is placed will not be allowed.

Reinforcing steel, at the time concrete is placed, shall be free of mud, oil, or other organic matter that may adversely affect or reduce bond. Reinforcing steel with rust, mill scale or a combination of both will be considered satisfactory, provided the minimum dimensions, weight, and tensile properties of a hand wire-brushed test specimen are not less than the applicable ASTM specification requirements.

501-4.10 Joints. Joints shall be constructed as shown on the plans and in accordance with these requirements. All joints shall be constructed with their faces perpendicular to the surface of the pavement and finished or edged as shown on the plans. Joints shall not vary more than 1/2-inch from their designated position and shall be true to line with not more than 1/4-inch variation in 10 feet. The surface across the joints shall be tested with a 12-foot straightedge as the joints are finished and any irregularities in excess of 1/4 inch shall be corrected before the concrete has hardened. All joints shall be so prepared, finished, or cut to provide a groove of uniform width and depth as shown on the plans.

a. Construction. Longitudinal construction joints shall be slip-formed or formed against side forms as shown in the plans.

Transverse construction joints shall be installed at the end of each day's placing operations and at any other points within a paving lane when concrete placement is interrupted for more than 30 minutes or it appears that the concrete will obtain its initial set before fresh concrete arrives. The installation of the joint shall be located at a planned contraction or expansion joint. If placing of the concrete is stopped, the Contractor shall remove the excess concrete back to the previous planned joint.

b. Contraction. Contraction joints shall be installed at the locations and spacing as shown on the plans. Contraction joints shall be installed to the dimensions required by forming a groove or cleft in the top of the slab while the concrete is still plastic or by sawing a groove into the concrete surface after the concrete has hardened. When the groove is formed in plastic concrete the sides of the grooves shall be finished even and smooth with an edging tool. If an insert material is used, the installation and edge finish shall be according to the manufacturer's instructions. The groove shall be finished or cut clean so that spalling will be avoided at intersections with other joints. Grooving or sawing shall produce a slot at least 1/8 inch wide and to the depth shown on the plans.

c. Isolation (expansion). Isolation joints shall be installed as shown on the plans. The premolded filler of the thickness as shown on the plans, shall extend for the full depth and width of the slab at the joint. The filler shall be fastened uniformly along the hardened joint face with no buckling or debris between the filler and the concrete interface, including a temporary filler for the sealant reservoir at the top of the slab. The edges of the joint shall be finished and tooled while the concrete is still plastic

d. Dowels and Tie Bars for Joints

(1) Tie bars. Tie bars shall consist of deformed bars installed in joints as shown on the plans. Tie bars shall be placed at right angles to the centerline of the concrete slab and shall be spaced at intervals shown on the plans. They shall be held in position parallel to the pavement surface and in the middle of the slab depth and within the tolerances in paragraph 501-4.10(f.). When tie bars extend into an unpaved lane, they may be bent against the form at longitudinal construction joints, unless threaded bolt or other assembled tie bars are specified. Tie bars shall not be painted, greased, or enclosed in sleeves. When slip-form operations call for tie bars, two-piece hook bolts can be installed.

(2) Dowel bars. Dowel bars shall be placed across joints in the proper horizontal and vertical alignment as shown on the plans. The dowels shall be coated with a bond-breaker or other lubricant

ISSUED FOR BID

recommended by the manufacturer and approved by the Program Manager. Dowel bars at longitudinal construction joints shall be bonded in drilled holes.

(3) Placing dowels and tie bars. Horizontal spacing of dowels shall be within a tolerance of $\pm 3/4$ inch. The vertical location on the face of the slab shall be within a tolerance of $\pm 1/2$ inch. The method used to install dowels shall ensure that the horizontal and vertical alignment will not be greater than $1/4$ inch per foot, except for those across the crown or other grade change joints. Dowels across crowns and other joints at grade changes shall be measured to a level surface. Horizontal alignment shall be checked perpendicular to the joint edge. The portion of each dowel intended to move within the concrete or expansion cap shall be wiped clean and coated with a thin, even film of lubricating oil or light grease before the concrete is placed. Dowels shall be installed as specified in the following subparagraphs.

(a) Contraction joints. Dowels and tie bars in longitudinal and transverse contraction joints within the paving lane shall be held securely in place by means of rigid metal frames or basket assemblies of an approved type. The basket assemblies shall be held securely in the proper location by means of suitable pins or anchors. Do not cut or crimp the dowel basket tie wires.

At the Contractor's option, dowels and tie bars in contraction joints may be installed by insertion into the plastic concrete using approved equipment and procedures per the paver manufacturer's design. Approval of installation methods will be based on the results of the control strip showing that the dowels and tie bars are installed within specified tolerances as verified by cores or non-destructive rebar location devices approved by the Program Manager.

(b) Construction joints. Install dowels and tie bars by the cast-in-place or the drill-and-dowel method. Installation by removing and replacing in preformed holes will not be permitted. Dowels and tie bars shall be prepared and placed across joints where indicated, correctly aligned, and securely held in the proper horizontal and vertical position during placing and finishing operations, by means of devices fastened to the forms.

(c) Joints in hardened concrete. Install dowels in hardened concrete by bonding the dowels into holes drilled into the concrete. The concrete shall have cured for seven (7) days or reached a minimum flexural strength of 450 psi before drilling begins. Holes $1/8$ inch greater in diameter than the dowels shall be drilled into the hardened concrete using rotary-core drills. Rotary-percussion drills may be used, provided that excessive spalling does not occur. Spalling beyond the limits of the grout retention ring will require modification of the equipment and operation. Depth of dowel hole shall be within a tolerance of $\pm 1/2$ inch of the dimension shown on the drawings. On completion of the drilling operation, the dowel hole shall be blown out with oil-free, compressed air. Dowels shall be bonded in the drilled holes using epoxy resin. Epoxy resin shall be injected at the back of the hole before installing the dowel and extruded to the collar during insertion of the dowel so as to completely fill the void around the dowel. Application by buttering the dowel will not be permitted. The dowels shall be held in alignment at the collar of the hole by means of a suitable metal or plastic grout retention ring fitted around the dowel.

e. Sawing of joints. Sawing shall commence, without regard to day or night, as soon as the concrete has hardened sufficiently to permit cutting without chipping, spalling, or tearing and before uncontrolled shrinkage cracking of the pavement occurs and shall continue without interruption until all joints have been sawn. All slurry and debris produced in the sawing of joints shall be removed by vacuuming and washing. Curing compound or system shall be reapplied in the initial saw-cut and maintained for the remaining cure period.

Joints shall be cut in locations as shown on the plans. The initial joint cut shall be a minimum 1/8 inch wide and to the depth shown on the plans. Prior to placement of joint sealant or seals, the top of the joint shall be widened by sawing as shown on the plans.

501-4.11 Finishing. Finishing operations shall be a continuing part of placing operations starting immediately behind the strike-off of the paver. Initial finishing shall be provided by the transverse screed or extrusion plate. The sequence of operations shall be transverse finishing, longitudinal machine floating if used, straightedge finishing, edging of joints, and then texturing. Finishing shall be by the machine method. The hand method shall be used only on isolated areas of odd slab widths or shapes and in the event of a breakdown of the mechanical finishing equipment. Supplemental hand finishing for machine finished pavement shall be kept to an absolute minimum. Any machine finishing operation which requires appreciable hand finishing, other than a moderate amount of straightedge finishing, shall be immediately stopped and proper adjustments made or the equipment replaced. Equipment, mixture, and/or procedures which produce more than 1/4 inch of mortar-rich surface shall be immediately modified as necessary to eliminate this condition or operations shall cease. Compensation shall be made for surging behind the screeds or extrusion plate and settlement during hardening and care shall be taken to ensure that paving and finishing machines are properly adjusted so that the finished surface of the concrete (not just the cutting edges of the screeds) will be at the required line and grade. Finishing equipment and tools shall be maintained clean and in an approved condition. At no time shall water be added to the surface of the slab with the finishing equipment or tools, or in any other way. Fog (mist) sprays or other surface applied finishing aids specified to prevent plastic shrinkage cracking, approved by the Program Manager, may be used in accordance with the manufacturers requirements.

a. Machine finishing with slipform pavers. The slipform paver shall be operated so that only a very minimum of additional finishing work is required to produce pavement surfaces and edges meeting the specified tolerances. Any equipment or procedure that fails to meet these specified requirements shall immediately be replaced or modified as necessary. A self-propelled non-rotating pipe float may be used while the concrete is still plastic, to remove minor irregularities and score marks. Only one pass of the pipe float shall be allowed. Equipment, mixture, and/or procedures which produce more than 1/4 inch of mortar-rich surface shall be immediately modified as necessary to eliminate this condition or operations shall cease. Remove excessive slurry from the surface with a cutting straightedge and wipe off the edge. Any slurry which does run down the vertical edges shall be immediately removed by hand, using stiff brushes or scrapers. No slurry, concrete or concrete mortar shall be used to build up along the edges of the pavement to compensate for excessive edge slump, either while the concrete is plastic or after it hardens.

b. Machine finishing with fixed forms. The machine shall be designed to straddle the forms and shall be operated to screed and consolidate the concrete. Machines that cause displacement of the forms shall be replaced. The machine shall make only one pass over each area of pavement. If the equipment and procedures do not produce a surface of uniform texture, true to grade, in one pass, the operation shall be immediately stopped and the equipment, mixture, and procedures adjusted as necessary.

c. Other types of finishing equipment. Clary screeds, other rotating tube floats, or bridge deck finishers are not allowed on mainline paving, but may be allowed on irregular or odd-shaped slabs, and near buildings or trench drains, subject to the Program Manager's approval.

Bridge deck finishers shall have a minimum operating weight of 7500 pounds and shall have a transversely operating carriage containing a knock-down auger and a minimum of two immersion vibrators. Vibrating screeds or pans shall be used only for isolated slabs where hand finishing is permitted as specified, and only where specifically approved.

d. Hand finishing. Hand finishing methods will not be permitted, except under the following conditions: (1) in the event of breakdown of the mechanical equipment, hand methods may be used to finish

ISSUED FOR BID

the concrete already deposited on the grade and (2) in areas of narrow widths or of irregular dimensions where operation of the mechanical equipment is impractical.

e. Straightedge testing and surface correction. After the pavement has been struck off and while the concrete is still plastic, it shall be tested for trueness with a 12-foot finishing straightedge swung from handles capable of spanning at least one-half the width of the slab. The straightedge shall be held in contact with the surface in successive positions parallel to the centerline and the whole area gone over from one side of the slab to the other, as necessary. Advancing shall be in successive stages of not more than one-half the length of the straightedge. Any excess water and laitance in excess of 1/8 inch thick shall be removed from the surface of the pavement and wasted. Any depressions shall be immediately filled with freshly mixed concrete, struck off, consolidated, and refinished. High areas shall be cut down and refinished. Special attention shall be given to assure that the surface across joints meets the smoothness requirements. Straightedge testing and surface corrections shall continue until the entire surface is found to be free from observable departures from the straightedge and until the slab conforms to the required grade and cross-section. The use of long-handled wood floats shall be confined to a minimum; they may be used only in emergencies and in areas not accessible to finishing equipment.

501-4.12 Surface texture. The surface of the pavement shall be finished as designated below for all newly constructed concrete pavements. It is important that the texturing equipment not tear or unduly roughen the pavement surface during the operation. The texture shall be uniform in appearance and approximately 1/16 inch in depth. Any imperfections resulting from the texturing operation shall be corrected to the satisfaction of the Program Manager.

a. Brush or broom finish. Shall be applied when the water sheen has practically disappeared. The equipment shall operate transversely across the pavement surface.

b. Burlap drag finish. Not used.

c. Artificial turf finish. Not used.

501-4.13 Curing. Immediately after finishing operations are completed and bleed water is gone from the surface, all exposed surfaces of the newly placed concrete shall be cured for a 7-day cure period in accordance with one of the methods below. Failure to provide sufficient cover material of whatever kind the Contractor may elect to use, or lack of water to adequately take care of both curing and other requirements, shall be cause for immediate suspension of concreting operations. The concrete shall not be left exposed for more than 1/2 hour during the curing period.

When a two-saw-cut method is used to construct the contraction joint, the curing compound shall be applied to the saw-cut immediately after the initial cut has been made. The sealant reservoir shall not be sawed until after the curing period has been completed. When the one cut method is used to construct the contraction joint, the joint shall be cured with wet rope, wet rags, or wet blankets. The rags, ropes, or blankets shall be kept moist for the duration of the curing period.

a. Impervious membrane method. Curing with liquid membrane compounds should not occur until bleed and surface moisture has evaporated. All exposed surfaces of the pavement shall be sprayed uniformly with white pigmented curing compound immediately after the finishing of the surface and before the set of the concrete has taken place. The curing compound shall not be applied during rainfall. Curing compound shall be applied by mechanical sprayers under pressure at the rate of one gallon to not more than 150 square feet. The spraying equipment shall be of the fully atomizing type equipped with a tank agitator. At the time of use, the compound shall be in a thoroughly mixed condition with the pigment uniformly dispersed throughout the vehicle. During application, the compound shall be stirred continuously by mechanical means. Hand spraying of odd widths or shapes and concrete surfaces exposed by the removal of forms will be permitted. When hand spraying is approved by the Program Manager, a double application rate shall be used to ensure coverage. Should the film become damaged from any cause, including sawing operations,

within the required curing period, the damaged portions shall be repaired immediately with additional compound or other approved means. Upon removal of side forms, the sides of the exposed slabs shall be protected immediately to provide a curing treatment equal to that provided for the surface.

b. White burlap-polyethylene sheets. The surface of the pavement shall be entirely covered with the sheeting. The sheeting used shall be such length (or width) that it will extend at least twice the thickness of the pavement beyond the edges of the slab. The sheeting shall be placed so that the entire surface and both edges of the slab are completely covered. The sheeting shall be placed and weighted to remain in contact with the surface covered, and the covering shall be maintained fully saturated and in position for seven (7) days after the concrete has been placed.

c. Water method. The entire area shall be covered with burlap or other water absorbing material. The material shall be of sufficient thickness to retain water for adequate curing without excessive runoff. The material shall be kept wet at all times and maintained for seven (7) days. When the forms are stripped, the vertical walls shall also be kept moist. It shall be the responsibility of the Contractor to prevent ponding of the curing water on the subbase.

d. Concrete protection for cold weather. Maintain the concrete at a temperature of at least 50°F for a period of 72 hours after placing and at a temperature above freezing for the remainder of the 7-day curing period. The Contractor shall be responsible for the quality and strength of the concrete placed during cold weather; and any concrete damaged shall be removed and replaced at the Contractor's expense.

e. Concrete protection for hot weather. Concrete should be continuously moisture cured for the entire curing period and shall commence as soon as the surfaces are finished and continue for at least 24 hours. However, if moisture curing is not practical beyond 24 hours, the concrete surface shall be protected from drying with application of a liquid membrane-forming curing compound while the surfaces are still damp. Other curing methods may be approved by the Program Manager.

501-4.14 Removing forms. Unless otherwise specified, forms shall not be removed from freshly placed concrete until it has hardened sufficiently to permit removal without chipping, spalling, or tearing. After the forms have been removed, the sides of the slab shall be cured in accordance with paragraph 501-4.13.

If honeycombed areas are evident when the forms are removed, materials, placement, and consolidation methods must be reviewed and appropriate adjustments made to assure adequate consolidation at the edges of future concrete placements. Honeycombed areas that extend into the slab less than approximately 1 inch, shall be repaired with an approved grout, as directed by the Program Manager. Honeycombed areas that extend into the slab greater than a depth of 1 inch shall be considered as defective work and shall be removed and replaced in accordance with paragraph 501-4.19.

501-4.15 Saw-cut grooving. If shown on the plans, grooved surfaces shall be provided in accordance with the requirements of Item P-621.

501-4.16 Sealing joints. The joints in the pavement shall be sealed in accordance with Item P-605.

501-4.17 Protection of pavement. The Contractor shall protect the pavement and its appurtenances against both public traffic and traffic caused by the Contractor's employees and agents until accepted by the Program Manager. This shall include watchmen to direct traffic and the erection and maintenance of warning signs, lights, pavement bridges, crossovers, and protection of unsealed joints from intrusion of foreign material, etc. Any damage to the pavement occurring prior to final acceptance shall be repaired or the pavement replaced at the Contractor's expense.

Aggregates, rubble, or other similar construction materials shall not be placed on airfield pavements. Traffic shall be excluded from the new pavement by erecting and maintaining barricades and signs until the concrete is at least seven (7) days old, or for a longer period if directed by the Program Manager.

ISSUED FOR BID

In paving intermediate lanes between newly paved pilot lanes, operation of the hauling and paving equipment will be permitted on the new pavement after the pavement has been cured for seven (7) days, the joints are protected, the concrete has attained a minimum field cured flexural strength of 450 psi, and the slab edge is protected.

All new and existing pavement carrying construction traffic or equipment shall be kept clean and spillage of concrete and other materials shall be cleaned up immediately.

Damaged pavements shall be removed and replaced at the Contractor's expense. Slabs shall be removed to the full depth, width, and length of the slab.

501-4.18 Opening to construction traffic. The pavement shall not be opened to traffic until test specimens molded and cured in accordance with ASTM C31 have attained a flexural strength of 450 pounds per square inch when tested in accordance with ASTM C78. If such tests are not conducted, the pavement shall not be opened to traffic until 14 days after the concrete was placed. Prior to opening the pavement to construction traffic, all joints shall either be sealed or protected from damage to the joint edge and intrusion of foreign materials into the joint. As a minimum, backer rod or tape may be used to protect the joints from foreign matter intrusion.

501-4.19 Repair, removal, or replacement of slabs. New pavement slabs that are broken or contain cracks or are otherwise defective or unacceptable as defined by acceptance criteria in paragraph 501-6.6 shall be removed and replaced or repaired, as directed by the Program Manager, at the Contractor's expense. Spalls along joints shall be repaired as specified. Removal of partial slabs is not permitted. Removal and replacement shall be full depth, shall be full width of the slab, and the limit of removal shall be normal to the paving lane and to each original transverse joint. The Program Manager will determine whether cracks extend full depth of the pavement and may require cores to be drilled on the crack to determine depth of cracking. Such cores shall be have a diameter of 2 inches to 4 inches, shall be drilled by the Contractor and shall be filled by the Contractor with a well consolidated concrete mixture bonded to the walls of the hole with a bonding agent, using approved procedures. Drilling of cores and refilling holes shall be at no expense to the Owner. Repair of cracks as described in this section shall not be allowed if in the opinion of the Program Manager the overall condition of the pavement indicates that such repair is unlikely to achieve an acceptable and durable finished pavement. No repair of cracks shall be allowed in any panel that demonstrates segregated aggregate with an absence of coarse aggregate in the upper 1/8 inch of the pavement surface.

a. Shrinkage cracks. Shrinkage cracks which do not exceed one-third of the pavement depth shall be cleaned and either high molecular weight methacrylate (HMWM) applied; or epoxy resin (Type IV, Grade 1) pressure injected using procedures recommended by the manufacturer and approved by the Program Manager. Sandblasting of the surface may be required following the application of HMWM to restore skid resistance. Care shall be taken to ensure that the crack is not widened during epoxy resin injection. All epoxy resin injection shall take place in the presence of the Program Manager. Shrinkage cracks which exceed one-third the pavement depth shall be treated as full depth cracks in accordance with paragraphs 501-4.19b and 501-19c.

b. Slabs with cracks through interior areas. Interior area is defined as that area more than 6 inches from either adjacent original transverse joint. The full slab shall be removed and replaced at no cost to the Owner, when there are any full depth cracks, or cracks greater than one-third the pavement depth, that extend into the interior area.

c. Cracks close to and parallel to joints. All full-depth cracks within 6 inches either side of the joint and essentially parallel to the original joints, shall be treated as follows.

(1) Full depth cracks and original joint not cracked. The full-depth crack shall be treated as the new joint and the original joint filled with an epoxy resin.

ISSUED FOR BID

(a) Full-depth crack. The joint sealant reservoir for the crack shall be formed by sawing to a depth of 3/4 inches, $\pm 1/16$ inch, and to a width of 5/8 inch, $\pm 1/8$ inch. The crack shall be sawed with equipment specially designed to follow random cracks. Any equipment or procedure which causes raveling or spalling along the crack shall be modified or replaced to prevent raveling or spalling. The joint shall be sealed with sealant in accordance with P-605 or as directed by the Program Manager.

(b) Original joint. If the original joint sealant reservoir has been sawed out, the reservoir and as much of the lower saw cut as possible shall be filled with epoxy resin, Type IV, Grade 2, thoroughly tooled into the void using approved procedures.

If only the original narrow saw cut has been made, it shall be cleaned and pressure injected with epoxy resin, Type IV, Grade 1, using approved procedures.

Where a parallel crack goes part way across paving lane and then intersects and follows the original joint which is cracked only for the remainder of the width, it shall be treated as specified above for a parallel crack, and the cracked original joint shall be prepared and sealed as originally designed.

(2) Full depth cracks and original joint cracked. If there is any place in the lane width where a parallel crack and a cracked portion of the original joint overlap, the entire slab containing the crack shall be removed and replaced.

d. Removal and replacement of full slabs. Make a full depth cut perpendicular to the slab surface along all edges of the slab with a concrete saw cutting any dowels or tie-bars. Remove damaged slab protecting adjacent pavement from damage. Damage to adjacent slabs may result in removal of additional slabs as directed by the Program Manager at the Contractor's expense.

The underlying material shall be repaired, re-compacted and shaped to grade.

Dowels of the size and spacing specified for other joints in similar pavement on the project shall be installed along all four (4) edges of the new slab in accordance with paragraph 501-4.10d.

Placement of concrete shall be as specified for original construction. The joints around the new slab shall be prepared and sealed as specified for original construction.

e. Spalls along joints.

(1) Spalls less than one inch wide and less than the depth of the joint sealant reservoir, shall be filled with joint sealant material.

(2) Spalls larger than one inch and/or deeper than the joint reservoir, but less than $\frac{1}{2}$ the slab depth, and less than 25% of the length of the adjacent joint shall be repaired as follows:

(a) Make a vertical saw cut at least one inch outside the spalled area and to a depth of at least 2 inches. Saw cuts shall be straight lines forming rectangular areas surrounding the spalled area.

(b) Remove unsound concrete and at least 1/2 inch of visually sound concrete between the saw cut and the joint or crack with a light chipping hammer.

(c) Clean cavity with high-pressure water jets supplemented with compressed air as needed to remove all loose material.

(d) Apply a prime coat of epoxy resin, Type III, Grade I, to the dry, cleaned surface of all sides and bottom of the cavity, except any joint face.

(e) Fill the cavity with low slump concrete or mortar or with epoxy resin concrete or mortar.

(f) An insert or other bond-breaking medium shall be used to prevent bond at all joint faces.

ISSUED FOR BID

(g) A reservoir for the joint sealant shall be sawed to the dimensions required for other joints, or as required to be routed for cracks. The reservoir shall be thoroughly cleaned and sealed with the sealer specified for the joints.

(3) Spalls deeper than 1/2 of the slab depth or spalls longer than 25% of the adjacent joint require replacement of the entire slab.

f. Diamond grinding of Concrete surfaces. Diamond grinding shall be completed prior to pavement grooving. Diamond grinding of the hardened concrete should not be performed until the concrete is at least 14 days old and has achieved full minimum strength. Equipment that causes ravels, aggregate fractures, spalls or disturbance to the joints will not be permitted. The depth of diamond grinding shall not exceed 1/2 inch and all areas in which diamond grinding has been performed will be subject to the final pavement thickness tolerances specified.

Diamond grinding shall be performed with a machine specifically designed for diamond grinding capable of cutting a path at least 3 feet wide. The saw blades shall be 1/8-inch wide with sufficient number of flush cut blades that create grooves between 0.090 and 0.130 inches wide; and peaks and ridges approximately 1/32 inch higher than the bottom of the grinding cut. The Contractor shall determine the number and type of blades based on the hardness of the aggregate. Contractor shall demonstrate to the Program Manager that the grinding equipment will produce satisfactory results prior to making corrections to surfaces.

Grinding will be tapered in all directions to provide smooth transitions to areas not requiring grinding. The slurry resulting from the grinding operation shall be continuously removed and the pavement left in a clean condition. All grinding shall be at the expense of the Contractor.

CONTRACTOR QUALITY CONTROL (CQC)

501-5.1 Quality control program. The Contractor shall develop a Quality Control Program in accordance with Item C-100. No partial payment will be made for materials that are subject to specific quality control requirements without an approved quality control program.

501-5.2 Contractor Quality Control (CQC). The Contractor shall provide or contract for testing facilities in accordance with Item C-100. The Program Manager shall be permitted unrestricted access to inspect the Contractor's QC facilities and witness QC activities. The Program Manager will advise the Contractor in writing of any noted deficiencies concerning the QC facility, equipment, supplies, or testing personnel and procedures. When the deficiencies are serious enough to be adversely affecting the test results, the incorporation of the materials into the work shall be suspended immediately and will not be permitted to resume until the deficiencies are satisfactorily corrected.

501-5.3 Contractor QC testing. The Contractor shall perform all QC tests necessary to control the production and construction processes applicable to this specification and as set forth in the approved CQCP. The testing program shall include, but not necessarily be limited to, tests for aggregate gradation, aggregate moisture content, slump, and air content. A QC Testing Plan shall be developed and approved by the Program Manager as part of the CQCP.

The Program Manager may at any time, notwithstanding previous plant acceptance, reject and require the Contractor to dispose of any batch of concrete mixture which is rendered unfit for use due to contamination, segregation, or improper slump. Such rejection may be based on only visual inspection. In the event of such rejection, the Contractor may take a representative sample of the rejected material in the presence of the Program Manager, and if it can be demonstrated in the laboratory, in the presence of the Program

Manager, that such material was erroneously rejected, payment will be made for the material at the contract unit price.

a. Fine aggregate.

(1) Gradation. A sieve analysis shall be made at least twice daily in accordance with ASTM C136 from randomly sampled material taken from the discharge gate of storage bins or from the conveyor belt.

(2) Moisture content. If an electric moisture meter is used, at least two direct measurements of moisture content shall be made per week to check the calibration. If direct measurements are made in lieu of using an electric meter, two tests shall be made per day. Tests shall be made in accordance with ASTM C70 or ASTM C566.

(3) Deleterious substances. Fine aggregate as delivered to the mixer shall be tested for deleterious substances in fine aggregate for concrete as specified in paragraph 501-2.1b, prior to production of the control strip, and a minimum of every 30-days during production or more frequently as necessary to control deleterious substances.

b. Coarse Aggregate.

(1) Gradation. A sieve analysis shall be made at least twice daily for each size of aggregate. Tests shall be made in accordance with ASTM C136 from randomly sampled material taken from the discharge gate of storage bins or from the conveyor belt.

(2) Moisture content. If an electric moisture meter is used, at least two direct measurements of moisture content shall be made per week to check the calibration. If direct measurements are made in lieu of using an electric meter, two tests shall be made per day. Tests shall be made in accordance with ASTM C566.

(3) Deleterious substances. Coarse aggregate as delivered to the mixer shall be tested for deleterious substances in coarse aggregate for concrete as specified in paragraph 501-2.1c, prior to production of the control strip, and a minimum of every 30-days during production or more frequently as necessary to control deleterious substances.

c. Slump. One test shall be made for each subplot. Slump tests shall be performed in accordance with ASTM C143 from material randomly sampled from material discharged from trucks at the paving site. Material samples shall be taken in accordance with ASTM C172.

d. Air content. One test shall be made for each subplot. Air content tests shall be performed in accordance with ASTM C231 for gravel and stone coarse aggregate and ASTM C173 for slag or other porous coarse aggregate, from material randomly sampled from trucks at the paving site. Material samples shall be taken in accordance with ASTM C172.

e. Unit weight and Yield. One test shall be made for each subplot. Unit weight and yield tests shall be in accordance with ASTM C138. The samples shall be taken in accordance with ASTM C172 and at the same time as the air content tests.

f. Temperatures. Temperatures shall be checked at least four times per lot at the job site in accordance with ASTM C1064.

g. Smoothness for Contractor Quality Control. The Contractor shall perform smoothness testing in transverse and longitudinal directions daily to verify that the construction processes are producing pavement with variances less than ¼ inch in 12 feet, identifying areas that may pond water which could

ISSUED FOR BID

lead to hydroplaning of aircraft. If the smoothness criteria is not met, appropriate changes and corrections to the construction process shall be made by the Contractor before construction continues

The Contractor may use a 12-foot straightedge or a rolling inclinometer meeting the requirements of ASTM E2133. Straight-edge testing shall start with one-half the length of the straightedge at the edge of pavement section being tested and then moved ahead one-half the length of the straightedge for each successive measurement. Testing shall be continuous across all joints. The surface irregularity shall be determined by placing the freestanding (unleveled) straightedge on the pavement surface and allowing it to rest upon the two highest spots covered by its length and measuring the maximum gap between the straightedge and the pavement surface in the area between the two high points. If the rolling inclinometer is used, the data may be evaluated using the FAA profile program, ProFAA, using the 12-foot straightedge simulation function.

Smoothness readings shall not be made across grade changes or cross slope transitions. The transition between new and existing pavement shall be evaluated separately for conformance with the plans.

(1) Transverse measurements. Transverse measurements shall be taken for each day's production placed. Transverse measurements shall be taken perpendicular to the pavement centerline each 50 feet or more often as determined by the Program Manager. The joint between lanes shall be tested separately to facilitate smoothness between lanes.

(2) Longitudinal measurements. Longitudinal measurements shall be taken for each day's production placed. Longitudinal tests shall be parallel to the centerline of paving; at the center of paving lanes when widths of paving lanes are less than 20 feet; and at the third points of paving lanes when widths of paving lanes are 20 ft or greater.

Deviations on the final surface course in either the transverse or longitudinal direction that will trap water greater than 1/4 inch shall be corrected with diamond grinding per paragraph 501-4.19f or by removing and replacing the surface course to full depth. Grinding shall be tapered in all directions to provide smooth transitions to areas not requiring grinding. All areas in which diamond grinding has been performed shall be subject to the final pavement thickness tolerances specified in paragraph 501-6.6.

Control charts shall be kept showing the area of each day's placement and the percentage of corrective grinding required. Corrections to production and placement shall be initiated when corrective grinding is required. If the Contractor's machines and/or methods produce significant areas that need corrective actions in excess of 10 percent of a day's production, production shall be stopped until corrective measures are implemented by the Contractor.

h. Grade. Grade will be evaluated prior to and after placement of the concrete surface.

Measurements will be taken at appropriate gradelines (as a minimum at center and edges of paving lane) and longitudinal spacing as shown on cross-sections and plans. The final surface of the pavement will not vary from the gradeline elevations and cross-sections shown on the plans by more than 1/2 inch vertically and 0.1 feet laterally. The documentation will be provided by the Contractor to the Program Manager within 48 hours.

Areas with humps or depressions that exceed grade or smoothness and that retain water on the surface must be ground off provided the course thickness after grinding is not more than 1/2 inch less than the thickness specified on the plans. If these areas cannot be corrected with grinding, then the slabs that are retaining water must be removed and replaced in accordance with paragraph 501-4.19d. Grinding shall be in accordance with paragraph 501-4.19f. All corrections will be at the Contractors expense.

501-5.4 Control charts. The Contractor shall maintain linear control charts for fine and coarse aggregate gradation, slump, and air content. The Contractor shall also maintain a control chart plotting the coarseness factor/workability factor from the combined gradations in accordance with paragraph 501-2.1d.

Control charts shall be posted in a location satisfactory to the Program Manager and shall be kept up to date at all times. As a minimum, the control charts shall identify the project number, the contract item number, the test number, each test parameter, the Action and suspension Limits, or Specification limits, applicable to each test parameter, and the Contractor's test results. The Contractor shall use the control charts as part of a process control system for identifying potential problems and assignable causes before they occur. If the Contractor's projected data during production indicates a potential problem and the Contractor is not taking satisfactory corrective action, the Program Manager may halt production or acceptance of the material.

a. Fine and coarse aggregate gradation. The Contractor shall record the running average of the last five gradation tests for each control sieve on linear control charts. Superimposed on the control charts shall be the action and suspension limits. Gradation tests shall be performed by the Contractor per ASTM C136. The Contractor shall take at least two samples per lot to check the final gradation. Sampling shall be per ASTM D75 from the flowing aggregate stream or conveyor belt.

b. Slump and air content. The Contractor shall maintain linear control charts both for individual measurements and range (that is, difference between highest and lowest measurements) for slump and air content in accordance with the following Action and Suspension Limits.

c. Combined gradation. The Contractor shall maintain a control chart plotting the coarseness factor and workability factor on a chart in accordance with paragraph 501-2.1d.

Control Chart Limits¹

Control Parameter	Individual Measurements	
	Action Limit	Suspension Limit
Gradation ²	* ³	* ³
Coarseness Factor (CF)	±3.5	±5
Workability Factor (WF)	±2	±3
Slump	+0.5 to -1 inch	+1 to -1.5 inch
Air Content	±1.5%	±2.0%

¹ Control charts shall be developed and maintained for each control parameter indicated.

² Control charts shall be developed and maintained for each sieve size.

³ Action and suspension limits shall be determined by the Contractor.

501-5.5 Corrective action at Suspension Limit. The CQCP shall indicate that appropriate action shall be taken when the process is believed to be out of control. The CQCP shall detail what action will be taken to bring the process into control and shall contain sets of rules to gauge when a process is out of control. As a minimum, a process shall be deemed out of control and corrective action taken if any one of the following conditions exists.

a. Fine and coarse aggregate gradation. When two consecutive averages of five tests are outside of the suspension limits, immediate steps, including a halt to production, shall be taken to correct the grading.

b. Coarseness and Workability factor. When the CF or WF reaches the applicable suspension limits, the Contractor, immediate steps, including a halt to production, shall be taken to correct the CF and WF.

ISSUED FOR BID

c. Fine and coarse aggregate moisture content. Whenever the moisture content of the fine or coarse aggregate changes by more than 0.5%, the scale settings for the aggregate batcher and water batcher shall be adjusted.

d. Slump. The Contractor shall halt production and make appropriate adjustments whenever:

(1) (1) one point falls outside the Suspension Limit line for individual measurements

OR

(2) (2) two points in a row fall outside the Action Limit line for individual measurements.

e. Air content. The Contractor shall halt production and adjust the amount of air-entraining admixture whenever:

(1) (1) one point falls outside the Suspension Limit line for individual measurements

OR

(2) (2) two points in a row fall outside the Action Limit line for individual measurements.

501-5.6 Contractor Paving Plan and Pre-work Conference.

a. Paving Plan. At least 15 days prior to the start of paving, the Contractor shall submit a detailed Paving Plan to the Program Manager. The paving plan shall include all elements associated with the subbase preparation, transporting PCC materials, placing, finishing, curing, texturing, joint formation, dowel placement, sealing, and required defective work programs. The Paving Plan shall conform to the Innovative Pavement Research Foundation (IPRF) Report IPRF-01-G-002-1, “*Best Practices for Airport Concrete Pavement Construction (Rigid Airport Pavement)*”.

b. Pre-work Conference. At least 7 days before and not more than 30 days before concrete placement, the Contractor shall hold a pre-paving conference with the Program Manager and airport personnel to review project specific requirements related to the concrete paving and related project planning activities. The conference shall be attended by at least the Contractor’s general superintendent, paving superintendent or foreman, and plant manager or foreman for the project. The following items shall be reviewed:

- Submittals and status of submittals
- Critical material supply/availability issues.
- Concrete plant and aggregate stockpile management
- Concrete paving requirements
- Paving schedule
- Weather management plan
- Control strip / test section requirements
- Contractor quality control testing requirements
- Acceptance testing requirements
- Stop work authority; and under what criteria shall a stop work order be issued
- Issues and disputes resolution hierarchy

MATERIAL ACCEPTANCE

501-6.1 Quality Assurance (QA) Acceptance sampling and testing. All acceptance sampling and testing necessary to determine conformance with the requirements specified in this section, with the exception of coring for thickness determination, will be performed by the Program Manager. The Contractor shall

provide adequate facilities for the initial curing of beams. The Contractor shall bear the cost of providing initial curing facilities and coring and filling operations, per paragraph 501-6.5b (1).

The samples will be transported while in the molds. The curing, except for the initial cure period, will be accomplished using the immersion in saturated lime water method. During the 24 hours after molding, the temperature immediately adjacent to the specimens must be maintained in the range of 60° to 80°F, and loss of moisture from the specimens must be prevented. The specimens may be stored in tightly constructed wooden boxes, damp sand pits, temporary buildings at construction sites, under wet burlap in favorable weather, or in heavyweight closed plastic bags, or using other suitable methods, provided the temperature and moisture loss requirements are met.

501-6.2 Quality Assurance (QA) testing laboratory. Quality assurance testing organizations performing these acceptance tests will be accredited in accordance with ASTM C1077. The quality assurance laboratory accreditation must be current and listed on the accrediting authority's website. All test methods required for acceptance sampling and testing must be listed on the lab accreditation. A copy of the laboratory's current accreditation and accredited test methods will be submitted to the Program Manager prior to start of construction.

501-6.3 Lot size. Concrete will be accepted for strength and thickness on a lot basis. A lot will consist of a day's production not to exceed 4,000 square yards. Each lot will be divided into approximately equal sublots with individual sublots between 800 to 1,300 square yards. Where three sublots are produced, they will constitute a lot. Where one or two sublots are produced, they will be incorporated into the previous or next lot. Where more than one plant is simultaneously producing concrete for the job, the lot sizes will apply separately for each plant.

501-6.4 Partial lots. When operational conditions cause a lot to be terminated before the specified number of tests have been made for the lot or for overages or minor placements to be considered as partial lots, the following procedure will be used to adjust the lot size and the number of tests for the lot.

Where three sublots have been produced, they will constitute a lot. Where one or two sublots have been produced, they will be incorporated into the next lot or the previous lot and the total number of sublots will be used in the acceptance criteria calculation, that is, $n=5$ or $n=6$.

501-6.5 Acceptance Sampling and Testing.

a. Strength.

(1) Sampling. One sample will be taken for each subplot from the concrete delivered to the job site. Sampling locations will be determined by the Program Manager in accordance with random sampling procedures contained in ASTM D3665. The concrete will be sampled in accordance with ASTM C172.

(2) Test Specimens. The Program Manager will be responsible for the casting, initial curing, transportation, and curing of specimens in accordance with ASTM C31. Two (2) specimens will be made from each sample and slump, air content, unit weight, and temperature tests will be conducted for each set of strength specimens. Within 24 to 48 hours, the samples will be transported from the field to the laboratory while in the molds. Samples will be cured in saturated lime water.

The strength of each specimen will be determined in accordance with ASTM C78. The strength for each subplot will be computed by averaging the results of the two test specimens representing that subplot.

(3) Acceptance. Acceptance of pavement for strength will be determined by the Program Manager in accordance with paragraph 501-6.6b(1). All individual strength tests within a lot will be checked for outliers in accordance with ASTM E178, at a significance level of 5%. Outliers will be discarded and the remaining test values will be used to determine acceptance in accordance with paragraph 501-6.5b.

b. Pavement thickness.

ISSUED FOR BID

(1) Sampling. One core will be taken by the Contractor for each subplot in the presence of the Program Manager. Sampling locations will be determined by the Program Manager in accordance with random sampling procedures contained in ASTM D3665. Areas, such as thickened edges, with planned variable thickness, will be excluded from sample locations.

Cores shall be a minimum 4 inch in diameter neatly cut with a core drill. The Contractor will furnish all tools, labor, and materials for cutting samples and filling the cored hole. Core holes will be filled by the Contractor with a non-shrink grout approved by the Program Manager within one day after sampling.

(2) Testing. The thickness of the cores will be determined by the Program Manager by the average caliper measurement in accordance with ASTM C174. Each core shall be photographed and the photograph included with the test report.

(3) Acceptance. Acceptance of pavement for thickness will be determined by the Program Manager in accordance with paragraph 501-6.6.

501-6.6 Acceptance criteria.

a. General. Acceptance will be based on the following characteristics of the completed pavement discussed in paragraph 501-6.5b:

- (1) Strength**
- (2) Thickness**
- (3) Grade**
- (4) Profilograph smoothness**
- (5) Adjustments for repairs**

Acceptance for strength, thickness, and grade, will be based on the criteria contained in accordance with paragraph 501-6.6b (1), 501-6.6b (2), and 501-6.6b (3), respectively. Acceptance for profilograph smoothness will be based on the criteria contained in paragraph 501-6.6b (4). Production quality must achieve 90 PWL or higher to receive full payment.

Strength and thickness will be evaluated for acceptance on a lot basis using the method of estimating PWL. Production quality must achieve 90 PWL or higher to receive full pavement. The PWL will be determined in accordance with procedures specified in Item C-110.

The lower specification tolerance limit (L) for strength and thickness will be:

Lower Specification Tolerance Limit (L)

Strength	$0.93 \times \text{strength specified in paragraph 501-3.3}$
Thickness	Lot Plan Thickness in inches, - 0.50 in

b. Acceptance criteria.

(1) Strength. If the PWL of the lot equals or exceeds 90%, the lot will be acceptable. Acceptance and payment for the lot will be determined in accordance with paragraph 501-8.1.

(2) Thickness. If the PWL of the lot equals or exceeds 90%, the lot will be acceptable. Acceptance and payment for the lot will be determined in accordance with paragraph 501-8.1.

(3) Grade. The final finished surface of the pavement of the completed project will not vary from the gradeline elevations and cross-sections shown on the plans by more than 1/2 inch vertically or 0.1

ISSUED FOR BID

feet laterally. The documentation, stamped and signed by a licensed surveyor shall be in accordance with paragraph 501-5.3h. Payment for sublots that do not meet grade for over 25% of the subplot shall be reduced by 5% and not be more than 95%.

(4) Profilograph roughness for QA Acceptance. The final profilograph shall be the full length of the project to facilitate testing of roughness between lots. The Contractor, in the presence of the Program Manager shall perform a profilograph roughness test on the completed project with a profilograph meeting the requirements of ASTM E1274 or a Class I inertial profiler meeting ASTM E950. Data and results shall be provided within 48 hrs. of profilograph roughness tests.

The pavement shall have an average profile index less than 15 inches per mile per 1/10 mile. The equipment shall utilize electronic recording and automatic computerized reduction of data to indicate “must grind” bumps and the Profile Index for the pavement using a 0.2-inch blanking band. The bump template must span one inch with an offset of 0.4 inches. The profilograph must be calibrated prior to use and operated by a factory or State DOT approved, trained operator. Profilograms shall be recorded on a longitudinal scale of one inch equals 25 feet and a vertical scale of one inch equals one inch. Profilograph shall be performed one foot right and left of project centerline and 15 feet right and left of project centerline. Any areas that indicate “must grind” shall be corrected with diamond grinding per paragraph 501-4.19f or by removing and replacing full depth of surface course as directed by the Program Manager. Where corrections are necessary, a second profilograph run shall be performed to verify that the corrections produced an average profile index of 15 inches per mile per 1/10 mile or less.

(5) Adjustments for repair. Sublots with spall repairs, crack repairs, or partial panel replacement, will be limited to no more than 95% payment.

(6) Adjustment for grinding. For sublots with grinding over 25% of a subplot, payment will be reduced 5%.

METHOD OF MEASUREMENT

501-7.1 Concrete pavement shall be measured by the number of square yards of plain or reinforced pavement as specified in-place, completed and accepted. Pavement that is thickened or reinforced, unless specifically identified as a pay item, will not be measure separately for payment and will be included in the measurement for Portland Cement concrete pavement.

BASIS OF PAYMENT

501-8.1 Payment. Payment for concrete pavement meeting all acceptance criteria as specified in paragraph 501-6.6. *Acceptance Criteria* shall be based on results of strength, smoothness, and thickness tests. Payment for acceptable lots of concrete pavement shall be adjusted in accordance with paragraph 501-8.1a for strength and thickness; 501-8.1b for repairs; 501-8.1c for grinding; and 501-8.1d for smoothness, subject to the limitation that:

The total project payment for concrete pavement shall not exceed 100 percent of the product of the contract unit price and the total number of square yards of concrete pavement used in the accepted work (See Note 1 under the Price Adjustment Schedule table below).

Payment shall be full compensation for all labor, materials, tools, equipment, and incidentals required to complete the work as specified herein and on the drawings. Pavement that is thickened or reinforced, unless specifically identified as a pay item, will not be measured separately for payment and will be included in the measurement for Portland Cement concrete pavement.

ISSUED FOR BID

a. Basis of adjusted payment. The pay factor for each individual lot shall be calculated in accordance with the Price Adjustment Schedule table below. A pay factor shall be calculated for both strength and thickness. The lot pay factor shall be the higher of the two values when calculations for both strength and thickness are 100% or higher. The lot pay factor shall be the product of the two values when only one of the calculations for either strength or thickness is 100% or higher. The lot pay factor shall be the lower of the two values when calculations for both strength and thickness are less than 100%.

Price Adjustment Schedule¹

Percentage of Materials Within Specification Limits (PWL)	Lot Pay Factor (Percent of Contract Unit Price)
96 – 100	106
90 – 95	PWL + 10
75 – 90	0.5 PWL + 55
55 – 74	1.4 PWL – 12
Below 55	Reject ²

¹ Although it is theoretically possible to achieve a pay factor of 106% for each lot, actual payment in excess of 100% shall be subject to the total project payment limitation specified in paragraph 501-8.1.

² The lot shall be removed and replaced unless, after receipt of FAA concurrence, the Owner and Contractor agree in writing that the lot will remain; the lot paid at 50% of the contract unit price; and the total project payment limitation reduced by the amount withheld for that lot.

For each lot accepted, the adjusted contract unit price shall be the product of the lot pay factor for the lot and the contract unit price. Payment shall be subject to the total project payment limitation specified in paragraph 501-8.1. Payment in excess of 100% for accepted lots of concrete pavement shall be used to offset payment for accepted lots of concrete pavement that achieve a lot pay factor less than 100%; except for rejected lots which remain in place and/or sublots with adjustments for repairs.

b. Adjusted payment for repairs. The PWL lot pay factor shall be reduced by 5% and be no higher than 95% for sublots which contain repairs in accordance with paragraph 501-4.19 on more than 20% of the slabs within the subplot. Payment factors greater than 100 percent for the strength and thickness cannot be used to offset adjustments for repairs.

c. Adjusted payment for grinding. The PWL lot pay factor shall be reduced by 5% and be no higher than 95% for sublots with grinding over 25% of a subplot.

d. Profilograph Roughness. The Contractor will receive full payment when the profilograph average profile index is in accordance with paragraph 501-6.6b (4). When the final average profile index for the entire length of pavement does not exceed 15 inches per mile per 1/10 mile, payment will be made at the contract unit price for the completed pavement.

e. Payment. Payment shall be made under:

Item P-501-8.1 Portland Cement Concrete Pavement (18 inch thick) – per square yard

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ISSUED FOR BID

ASTM International (ASTM)

ASTM A184	Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement
ASTM A615	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A704	Standard Specification for Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement
ASTM A706	Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM A775	Standard Specification for Epoxy-Coated Steel Reinforcing Bars
ASTM A884	Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement
ASTM A934	Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars
ASTM A996	Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement
ASTM A1035	Standard Specification for Deformed and Plain, Low-Carbon, Chromium, Steel Bars for Concrete Reinforcement
ASTM A1064	Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
ASTM A1078	Standard Specification for Epoxy-Coated Steel Dowels for Concrete Pavement
ASTM C29	Standard Test Method for Bulk Density (“Unit Weight”) and Voids in Aggregate
ASTM C31	Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C33	Standard Specification for Concrete Aggregates
ASTM C39	Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C70	Standard Test Method for Surface Moisture in Fine Aggregate
ASTM C78	Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)
ASTM C88	Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C94	Standard Specification for Ready-Mixed Concrete
ASTM C114	Standard Test Methods for Chemical Analysis of Hydraulic Cement
ASTM C117	Standard Test Method for Materials Finer than 75- μ m (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C123	Standard Test Method for Lightweight Particles in Aggregate

ISSUED FOR BID

ASTM C136	Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C131	Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C136	Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregates
ASTM C138	Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
ASTM C142	Standard Test Method for Clay Lumps and Friable Particles in Aggregates
ASTM C143	Standard Test Method for Slump of Hydraulic-Cement Concrete
ASTM C150	Standard Specification for Portland Cement
ASTM C171	Standard Specification for Sheet Materials for Curing Concrete
ASTM C172	Standard Practice for Sampling Freshly Mixed Concrete
ASTM C173	Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
ASTM C174	Standard Test Method for Measuring Thickness of Concrete Elements Using Drilled Concrete Cores
ASTM C227	Standard Test Method for Potential Alkali Reactivity of Cement-Aggregate Combinations (Mortar-Bar Method)
ASTM C231	Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C260	Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C295	Standard Guide for Petrographic Examination of Aggregates for Concrete
ASTM C309	Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C311	Standard Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use in Portland Cement Concrete
ASTM C494	Standard Specification for Chemical Admixtures for Concrete
ASTM C566	Standard Test Method for Total Evaporable Moisture Content of Aggregates by Drying
ASTM C595	Standard Specification for Blended Hydraulic Cements
ASTM C618	Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C642	Standard Test Method for Density, Absorption, and Voids in Hardened Concrete
ASTM C666	Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing

ASTM C685	Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing
ASTM C881	Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete
ASTM C989	Standard Specification for Slag Cement for Use in Concrete and Mortars
ASTM C1017	Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete
ASTM C1064	Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete
ASTM C1077	Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
ASTM C1157	Standard Performance Specification for Hydraulic Cement
ASTM C1260	Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
ASTM C1365	Standard Test Method for Determination of the Proportion of Phases in Portland Cement and Portland-Cement Clinker Using X-Ray Powder Diffraction Analysis
ASTM C1567	Standard Test Method for Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)
ASTM C1602	Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete
ASTM D75	Standard Practice for Sampling Aggregates
ASTM D1751	Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D1752	Standard Specification for Preformed Sponge Rubber and Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction
ASTM D2419	Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate
ASTM D3665	Standard Practice for Random Sampling of Construction Materials
ASTM D4791	Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
ASTM E178	Standard Practice for Dealing with Outlying Observations
ASTM E1274	Standard Test Method for Measuring Pavement Roughness Using a Profilograph
ASTM E2133	Standard Test Method for Using a Rolling Inclinator to Measure Longitudinal and Transverse Profiles of a Traveled Surface

ISSUED FOR BID

American Concrete Institute (ACI)

ACI 305R	Guide to Hot Weather Concreting
ACI 306R	Guide to Cold Weather Concreting
ACI 309R	Guide for Consolidation of Concrete

Advisory Circulars (AC)

AC 150/5320-6	Airport Pavement Design and Evaluation
---------------	--

Federal Highway Administration (FHWA)

HIPERPAV 3, version 3.2

Portland Concrete Association (PCA)

PCA	Design and Control of Concrete Mixtures, 16 th Edition
-----	---

U.S. Army Corps of Engineers (USACE) Concrete Research Division (CRD)

CRD C662	Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials, Lithium Nitrate Admixture and Aggregate (Accelerated Mortar-Bar Method)
----------	---

United States Air Force Engineering Technical Letter (ETL)

ETL 97-5	Proportioning Concrete Mixtures with Graded Aggregates for Rigid Airfield Pavements
----------	---

END ITEM P-501

ISSUED FOR BID

PAGE INTENTIONALLY BLANK

ISSUED FOR BID

ITEM P-605 JOINT SEALANTS FOR PAVEMENTS

DESCRIPTION

605-1.1 This item shall consist of providing and installing a resilient and adhesive joint sealing material capable of effectively sealing joints in pavement; joints between different types of pavements; and cracks in existing pavement.

MATERIALS

605-2.1 Joint sealants. Joint sealant materials shall meet the requirements of ASTM D5893 or ASTM D6690.

Each lot or batch of sealant shall be delivered to the jobsite in the manufacturer's original sealed container. Each container shall be marked with the manufacturer's name, batch or lot number, the safe heating temperature, and shall be accompanied by the manufacturer's certification stating that the sealant meets the requirements of this specification.

605-2.2 Backer rod. The material furnished shall be a compressible, non-shrinking, non-staining, non-absorbing material that is non-reactive with the joint sealant in accordance with ASTM D5249. The backer-rod material shall be $25\% \pm 5\%$ larger in diameter than the nominal width of the joint.

605-2.3 Bond breaking tapes. Provide a bond breaking tape or separating material that is a flexible, non-shrinkable, non-absorbing, non-staining, and non-reacting adhesive-backed tape. The material shall have a melting point at least 5°F greater than the pouring temperature of the sealant being used when tested in accordance with ASTM D789. The bond breaker tape shall be approximately 1/8 inch wider than the nominal width of the joint and shall not bond to the joint sealant.

CONSTRUCTION METHODS

605-3.1 Time of application. Joints shall be sealed as soon after completion of the curing period as feasible and before the pavement is opened to traffic, including construction equipment. Joints shall be sealed at the temperatures indicated and in accordance with the manufacturer's recommendations and warranty criteria.

605-3.2 Equipment. Machines, tools, and equipment used in the performance of the work required by this section shall be approved by the Program Manager before the work is started and maintained in a satisfactory condition at all times. The Contractor shall submit a list of proposed equipment to be used in performance of construction work, including descriptive data, **30** days prior to use on the project.

a. Concrete saw. Provide a self-propelled power saw, with water-cooled diamond or abrasive saw blades, for cutting joints to the depths and widths specified.

b. Sandblasting equipment. The Contractor must demonstrate sandblasting equipment including the air compressor, hose, guide and nozzle size, under job conditions, before approval in accordance with paragraph 605-3.3. The Contractor shall demonstrate, in the presence of the Program Manager, that the method cleans the joint and does not damage the joint.

c. Waterblasting equipment. The Contractor must demonstrate waterblasting equipment including the pumps, hose, guide and nozzle size, under job conditions, before approval in accordance with paragraph

ISSUED FOR BID

605-3.3. The Contractor shall demonstrate, in the presence of the Program Manager, that the method cleans the joint and does not damage the joint.

d. Hand tools. Hand tools may be used, when approved, for removing defective sealant from a crack and repairing or cleaning the crack faces. Hand tools should be carefully evaluated for potential spalling effects prior to approval for use.

e. Hot-poured sealing equipment. The unit applicators used for heating and installing ASTM D6690 joint sealant materials shall be mobile and shall be equipped with a double-boiler, agitator-type kettle with an oil medium in the outer space for heat transfer; a direct-connected pressure-type extruding device with a nozzle shaped for inserting in the joint to be filled; positive temperature devices for controlling the temperature of the transfer oil and sealant; and a recording type thermometer for indicating the temperature of the sealant. The applicator unit shall be designed so that the sealant will circulate through the delivery hose and return to the inner kettle when not in use.

f. Cold-applied, single-component sealing equipment. The equipment for installing ASTM D5893 single component joint sealants shall consist of an extrusion pump, air compressor, following plate, hoses, and nozzle for transferring the sealant from the storage container into the joint opening. The dimension of the nozzle shall be such that the tip of the nozzle will extend into the joint to allow sealing from the bottom of the joint to the top. Maintain the initially approved equipment in good working condition, serviced in accordance with the supplier's instructions, and unaltered in any way without obtaining prior approval. Small hand-held air-powered equipment (i.e., caulking guns) may be used for small applications.

605-3.3 Preparation of joints. Pavement joints for application of material in this specification must be dry, clean of all scale, dirt, dust, curing compound, and other foreign matter. The Contractor shall demonstrate, in the presence of the Program Manager, that the method cleans the joint and does not damage the joint.

a. Sawing. All joints shall be sawed in accordance with specifications and plan details. Immediately after sawing the joint, the resulting slurry shall be completely removed from joint and adjacent area by flushing with a jet of water, and by use of other tools as necessary.

b. Sealing. Immediately before sealing, the joints shall be thoroughly cleaned of all remaining laitance, curing compound, filler, protrusions of hardened concrete, old sealant and other foreign material from the sides and upper edges of the joint space to be sealed. Cleaning shall be accomplished by sandblasting, concrete saw, and waterblaster as specified in paragraph 605-3.2. The newly exposed concrete joint faces and the pavement surface extending a minimum of 1/2 inch from the joint edge shall be sandblasted clean. Sandblasting shall be accomplished in a minimum of two passes. One pass per joint face with the nozzle held at an angle directly toward the joint face and not more than 3 inches from it. After final cleaning and immediately prior to sealing, blow out the joints with compressed air and leave them completely free of debris and water. The joint faces shall be surface dry when the seal is applied.

c. Backer Rod. When the joint opening is of a greater depth than indicated for the sealant depth, plug or seal off the lower portion of the joint opening using a backer rod in accordance with paragraph 605-2.2 to prevent the entrance of the sealant below the specified depth. Take care to ensure that the backer rod is placed at the specified depth and is not stretched or twisted during installation.

d. Bond-breaking tape. Where inserts or filler materials contain bitumen, or the depth of the joint opening does not allow for the use of a backup material, insert a bond-separating tape breaker in accordance with paragraph 605-2.3 to prevent incompatibility with the filler materials and three-sided adhesion of the sealant. Securely bond the tape to the bottom of the joint opening so it will not float up into the new sealant.

605-3.4 Installation of sealants. Joints shall be inspected for proper width, depth, alignment, and preparation, and shall be approved by the Program Manager before sealing is allowed. Sealants shall be installed in accordance with the following requirements:

ISSUED FOR BID

Immediately preceding, but not more than 50 feet ahead of the joint sealing operations, perform a final cleaning with compressed air. Fill the joints from the bottom up to 1/4 inch \pm 1/16 inch below the top of pavement surface; or bottom of groove for grooved pavement. Remove and discard excess or spilled sealant from the pavement by approved methods. Install the sealant in such a manner as to prevent the formation of voids and entrapped air. In no case shall gravity methods or pouring pots be used to install the sealant material. Traffic shall not be permitted over newly sealed pavement until authorized by the Program Manager. When a primer is recommended by the manufacturer, apply it evenly to the joint faces in accordance with the manufacturer's instructions. Check the joints frequently to ensure that the newly installed sealant is cured to a tack-free condition within the time specified.

605-3.5 Inspection. The Contractor shall inspect the joint sealant for proper rate of cure and set, bonding to the joint walls, cohesive separation within the sealant, reversion to liquid, entrapped air and voids. Sealants exhibiting any of these deficiencies at any time prior to the final acceptance of the project shall be removed from the joint, wasted, and replaced as specified at no additional cost to the airport.

605-3.6 Clean-up. Upon completion of the project, remove all unused materials from the site and leave the pavement in a clean condition.

METHOD OF MEASUREMENT

605-4.1 No measurement shall be made of joint sealing materials required in the construction of new pavements. The cost of furnishing and installing joint materials shall be included in the price for the items which require its use.

BASIS OF PAYMENT

605-5.1 No separate payment will be made for sawing, joint sealing, adhesives, or other materials, equipment, tools, labor, and incidentals required to complete joint sealing for newly constructed pavements. All joint sealing and/or joint sealing filler shall be considered incidental to the items requiring its use.

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM D789	Standard Test Method for Determination of Relative Viscosity of Polyamide (PA)
ASTM D5249	Standard Specification for Backer Material for Use with Cold- and Hot-Applied Joint Sealants in Portland-Cement Concrete and Asphalt Joints
ASTM D5893	Standard Specification for Cold Applied, Single Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements
ASTM D6690	Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt

Advisory Circulars (AC)

AC 150/5340-30	Design and Installation Details for Airport Visual Aids
----------------	---

ISSUED FOR BID

END ITEM P-605

PAGE INTENTIONALLY BLANK

ISSUED FOR BID

ITEM P-610 CONCRETE FOR MISCELLANEOUS STRUCTURES

DESCRIPTION

610-1.1 This item shall consist of concrete and reinforcement, as shown on the plans, prepared and constructed in accordance with these specifications. This specification shall be used for all concrete other than airfield pavement which are cast-in-place.

MATERIALS

610-2.1 General. Only approved materials, conforming to the requirements of these specifications, shall be used in the work. Materials may be subject to inspection and tests at any time during their preparation or use. The source of all materials shall be approved by the Program Manager before delivery or use in the work. Representative preliminary samples of the materials shall be submitted by the Contractor, when required, for examination and test. Materials shall be stored and handled to ensure preservation of their quality and fitness for use and shall be located to facilitate prompt inspection. All equipment for handling and transporting materials and concrete must be clean before any material or concrete is placed in them.

The use of pit-run aggregates shall not be permitted unless the pit-run aggregate has been screened and washed, and all fine and coarse aggregates stored separately and kept clean. The mixing of different aggregates from different sources in one storage stockpile or alternating batches of different aggregates shall not be permitted.

a. Reactivity. Fine aggregate and coarse aggregates to be used in all concrete shall have been tested separately within six months of the project in accordance with ASTM C1260. Test results shall be submitted to the Program Manager. The aggregate shall be considered innocuous if the expansion of test specimens, tested in accordance with ASTM C1260, does not exceed 0.08% at 14 days (16 days from casting). If the expansion of either or both test specimens is greater than 0.08% at 14 days, but less than 0.20%, a minimum of 25% of Type F fly ash, or between 40% and 55% of slag cement shall be used in the concrete mix.

If the expansion is greater than 0.20% the aggregates shall not be used, and test results for other aggregates must be submitted for evaluation.

610-2.2 Coarse aggregate. The coarse aggregate for concrete shall meet the requirements of ASTM C33 and the requirements of Table 4, Class Designation 5S; and the grading requirements shown below, as required for the project.

Coarse Aggregate Grading Requirements

Maximum Aggregate Size	ASTM C33, Table 3 Grading Requirements (Size No.)
1 1/2 inch (37.5 mm)	467 or 4 and 67
1 inch (25 mm)	57
3/4 inch (19 mm)	67
1/2 inch (12.5 mm)	7

ISSUED FOR BID

610-2.3 Fine aggregate. The fine aggregate for concrete shall meet all fine aggregate requirements of ASTM C33.

610-2.4 Cement. Cement shall conform to the requirements of ASTM C150 Type I, low alkali.

610-2.5 Cementitious materials.

a. Fly ash. Fly ash shall meet the requirements of ASTM C618, with the exception of loss of ignition, where the maximum shall be less than 6%. Fly ash shall have a Calcium Oxide (CaO) content of less than 13% and a total available alkali content less than 3% per ASTM C311. Fly ash produced in furnace operations using liming materials or soda ash (sodium carbonate) as an additive shall not be acceptable. The Contractor shall furnish the previous three most recent, consecutive ASTM C618 reports for each source of fly ash proposed in the concrete mix, and shall furnish each additional report as they become available during the project. The reports can be used for acceptance or the material may be tested independently by the Program Manager.

b. Slag cement (ground granulated blast furnace (GGBF)). Slag cement shall conform to ASTM C989, Grade 100 or Grade 120. Slag cement shall be used only at a rate between 25% and 55% of the total cementitious material by mass.

610-2.6 Water. Water used in mixing or curing shall be from potable water sources. Other sources shall be tested in accordance with ASTM C1602 prior to use.

610-2.7 Admixtures. The Contractor shall submit certificates indicating that the material to be furnished meets all of the requirements indicated below. In addition, the Program Manager may require the Contractor to submit complete test data from an approved laboratory showing that the material to be furnished meets all of the requirements of the cited specifications. Subsequent tests may be made of samples taken by the Program Manager from the supply of the material being furnished or proposed for use on the work to determine whether the admixture is uniform in quality with that approved.

a. Air-entraining admixtures. Air-entraining admixtures shall meet the requirements of ASTM C260 and shall consistently entrain the air content in the specified ranges under field conditions. The air-entrainment agent and any water reducer admixture shall be compatible.

b. Water-reducing admixtures. Water-reducing admixture shall meet the requirements of ASTM C494, Type A, B, or D. ASTM C494, Type F and G high range water reducing admixtures and ASTM C1017 flowable admixtures shall not be used.

c. Other chemical admixtures. The use of set retarding, and set-accelerating admixtures shall be approved by the RPR. Retarding shall meet the requirements of ASTM C494, Type A, B, or D and set-accelerating shall meet the requirements of ASTM C494, Type C. Calcium chloride and admixtures containing calcium chloride shall not be used.

610-2.8 Premolded joint material. Premolded joint material for expansion joints shall meet the requirements of ASTM D1751.

610-2.9 Joint filler. The filler for joints shall meet the requirements of Item P-605, unless otherwise specified.

610-2.10 Steel reinforcement. Reinforcing shall consist of either welded steel wire fabric, welded deformed steel fabric, or bars conforming to the requirements of the following:

ISSUED FOR BID

Steel Reinforcement

Reinforcing Steel	ASTM A615, ASTM A706, ASTM A775, ASTM A934
Welded Steel Wire Fabric	ASTM A1064
Welded Deformed Steel Fabric	ASTM A1064
Bar Mats	ASTM A184 or ASTM A704

610-2.11 Materials for curing concrete. Curing materials shall conform to one of the following specifications:

Materials for Curing

Waterproof paper	ASTM C171
Clear or white Polyethylene Sheeting	ASTM C171
White-pigmented Liquid Membrane-Forming Compound, Type 2, Class B	ASTM C309

CONSTRUCTION METHODS

610-3.1 General. The Contractor shall furnish all labor, materials, and services necessary for, and incidental to, the completion of all work as shown on the drawings and specified here. All machinery and equipment used by the Contractor on the work, shall be of sufficient size to meet the requirements of the work. All work shall be subject to the inspection and approval of the Program Manager.

610-3.2 Concrete Mixture. The concrete shall develop a compressive strength of 4,000 psi in 28 days as determined by test cylinders made in accordance with ASTM C31 and tested in accordance with ASTM C39. The concrete shall contain not less than 470 pounds of cementitious material per cubic yard. The water cementitious ratio shall not exceed 0.45 by weight. The air content of the concrete shall be 5% +/- 1.2% as determined by ASTM C231 and shall have a slump of not more than 4 inches (100 mm) as determined by ASTM C143.

610-3.3 Mixing. Concrete may be mixed at the construction site, at a central point, or wholly or in part in truck mixers. The concrete shall be mixed and delivered in accordance with the requirements of ASTM C94 or ASTM C685.

The concrete shall be mixed only in quantities required for immediate use. Concrete shall not be mixed while the air temperature is below 40°F without the Program Manager's approval. If approval is granted for mixing under such conditions, aggregates or water, or both, shall be heated and the concrete shall be placed at a temperature not less than 50°F nor more than 100°F. The Contractor shall be held responsible for any defective work, resulting from freezing or injury in any manner during placing and curing, and shall replace such work at his expense.

Retempering of concrete by adding water or any other material is not permitted.

The rate of delivery of concrete to the job shall be sufficient to allow uninterrupted placement of the concrete.

610-3.4 Forms. Concrete shall not be placed until all the forms and reinforcements have been inspected and approved by the Program Manager. Forms shall be of suitable material and shall be of the type, size,

ISSUED FOR BID

shape, quality, and strength to build the structure as shown on the plans. The forms shall be true to line and grade and shall be mortar-tight and sufficiently rigid to prevent displacement and sagging between supports. The surfaces of forms shall be smooth and free from irregularities, dents, sags, and holes. The Contractor shall be responsible for their adequacy.

The internal form ties shall be arranged so no metal will show in the concrete surface or discolor the surface when exposed to weathering when the forms are removed. All forms shall be wetted with water or with a non-staining mineral oil, which shall be applied immediately before the concrete is placed. Forms shall be constructed so they can be removed without injuring the concrete or concrete surface.

610-3.5 Placing reinforcement. All reinforcement shall be accurately placed, as shown on the plans, and shall be firmly held in position during concrete placement. Bars shall be fastened together at intersections. The reinforcement shall be supported by approved metal chairs. Shop drawings, lists, and bending details shall be supplied by the Contractor when required.

610-3.6 Embedded items. Before placing concrete, all embedded items shall be firmly and securely fastened in place as indicated. All embedded items shall be clean and free from coating, rust, scale, oil, or any foreign matter. The concrete shall be spaded and consolidated around and against embedded items. The embedding of wood shall not be allowed.

610-3.7 Concrete Consistency. The Contractor shall monitor the consistency of the concrete delivered to the project site; collect each batch ticket; check temperature; and perform slump tests on each truck at the project site in accordance with ASTM C143.

610-3.8 Placing concrete. All concrete shall be placed during daylight hours, unless otherwise approved. The concrete shall not be placed until the depth and condition of foundations, the adequacy of forms and falsework, and the placing of the steel reinforcing have been approved by the Program Manager. Concrete shall be placed as soon as practical after mixing, but in no case later than one (1) hour after water has been added to the mix. The method and manner of placing shall avoid segregation and displacement of the reinforcement. Troughs, pipes, and chutes shall be used as an aid in placing concrete when necessary. The concrete shall not be dropped from a height of more than 5 feet. Concrete shall be deposited as nearly as practical in its final position to avoid segregation due to rehandling or flowing. Do not subject concrete to procedures which cause segregation. Concrete shall be placed on clean, damp surfaces, free from running water, or on a properly consolidated soil foundation.

610-3.9 Vibration. Vibration shall follow the guidelines in American Concrete Institute (ACI) Committee 309R, Guide for Consolidation of Concrete.

610-3.10 Joints. Joints shall be constructed as indicated on the plans.

610-3.11 Finishing. All exposed concrete surfaces shall be true, smooth, and free from open or rough areas, depressions, or projections. All concrete horizontal plane surfaces shall be brought flush to the proper elevation with the finished top surface struck-off with a straightedge and floated.

610-3.12 Curing and protection. All concrete shall be properly cured in accordance with the recommendations in American Concrete Institute (ACI) 308R, Guide to External Curing of Concrete. The concrete shall be protected from damage until project acceptance.

610-3.13 Cold weather placing. When concrete is placed at temperatures below 40°F, follow the cold weather concreting recommendations found in ACI 306R, Cold Weather Concreting.

610-3.14 Hot weather placing. When concrete is placed in hot weather greater than 85°F, follow the hot weather concreting recommendations found in ACI 305R, Hot Weather Concreting.

ISSUED FOR BID

QUALITY ASSURANCE (QA)

610-4.1 Quality Assurance sampling and testing. Concrete will be accepted on the basis of the compressive strength specified in paragraph 610-3.2 on a lot basis. A lot shall consist of one (1) days production not to exceed 1,000 cubic yards. The Program Manager will sample the concrete in accordance with ASTM C172; test the slump in accordance with ASTM C143; test air content in accordance with ASTM C231; make and cure compressive strength specimens in accordance with ASTM C31; and test in accordance with ASTM C39. The QA testing agency will meet the requirements of ASTM C1077.

The Contractor shall provide adequate facilities for the initial curing of cylinders.

610-4.2 Defective work. Any defective work that cannot be satisfactorily repaired as determined by the RPR, shall be removed and replaced at the Contractor's expense. Defective work includes, but is not limited to, uneven dimensions, honeycombing and other voids on the surface or edges of the concrete.

METHOD OF MEASUREMENT

610-5.1 For structural Portland cement concrete identified as incidental to separate bid items, no measurement will be made for direct payment of any Portland cement concrete and reinforcing steel. The cost of the Portland cement concrete and reinforcing steel shall be considered as incidental to those items requiring its use.

610-5.2 Steel Pipe Bollards shall be measured per each.

610-5.3 Structural Portland cement concrete utilized in the construction of Protective Concrete Apron, Type 2 Concrete Landing with Ramps, and Type 3 Concrete Landing with Ramps, and Elevated Protective Concrete Apron will be measured by the square foot in place. The square foot measurement will only pertain to the horizontal plane, and will not include vertical surfaces.

BASIS OF PAYMENT

610-6.1 The cost of structural Portland cement concrete and reinforcing steel shall be considered incidental to all other items of work requiring structural concrete and identified in separate bid items unless specifically identified as a pay item under this specification below. Its payment shall be included in the cost of those items and considered incidental to that item requiring its use. These prices shall be full compensation for furnishing all materials and for all preparation, delivery and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

610-5.2 Payment for structural Portland cement concrete meeting all acceptance criteria as specified in paragraph 610-3.3 and identified as a pay item below shall be based on the contract unit price per square yard, each, or linear foot as indicated. These prices shall be full compensation for furnishing all materials and for all preparation, delivery and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

These prices shall be full compensation for furnishing all materials and for all preparation, delivery and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

- | | |
|----------------|---|
| Item P-610-6.1 | Steel Pipe Bollards – per each |
| Item P-610-6.2 | Protective Concrete Apron – per square foot |

ISSUED FOR BID

Item P-610-6.3	Type 2 Concrete Landing with Ramps – per square foot
Item P-610-6.4	Type 3 Concrete Landing with Ramps – per square foot
Item P-610-6.5	Pedestrian Handrail – per linear foot
Item P-610-6.6	Wall Mount Pedestrian Handrail – per linear foot
Item P-610-6.7	Elevated Protective Concrete Apron – per square foot

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM A184	Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement
ASTM A615	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A704	Standard Specification for Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement
ASTM A706	Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM A775	Standard Specification for Epoxy-Coated Steel Reinforcing Bars
ASTM A884	Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement
ASTM A934	Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars
ASTM A1064	Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
ASTM C31	Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C33	Standard Specification for Concrete Aggregates
ASTM C39	Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C94	Standard Specification for Ready-Mixed Concrete
ASTM C136	Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregates
ASTM C114	Standard Test Methods for Chemical Analysis of Hydraulic Cement
ASTM C136	Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C143	Standard Test Method for Slump of Hydraulic-Cement Concrete
ASTM C150	Standard Specification for Portland Cement
ASTM C171	Standard Specification for Sheet Materials for Curing Concrete

ISSUED FOR BID

ASTM C172	Standard Practice for Sampling Freshly Mixed Concrete
ASTM C231	Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C260	Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C309	Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C311	Standard Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use in Portland-Cement Concrete
ASTM C494	Standard Specification for Chemical Admixtures for Concrete
ASTM C618	Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C666	Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing
ASTM C685	Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing
ASTM C989	Standard Specification for Slag Cement for Use in Concrete and Mortars
ASTM C1017	Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete
ASTM C1077	Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
ASTM C1157	Standard Performance Specification for Hydraulic Cement
ASTM C1260	Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
ASTM C1365	Standard Test Method for Determination of the Proportion of Phases in Portland Cement and Portland-Cement Clinker Using X-Ray Powder Diffraction Analysis
ASTM C1602	Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete
ASTM D1751	Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Asphalt Types)
ASTM D1752	Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction
American Concrete Institute (ACI)	
ACI 305R	Hot Weather Concreting
ACI 306R	Cold Weather Concreting
ACI 308R	Guide to External Curing of Concrete

ISSUED FOR BID

ACI 309R

Guide for Consolidation of Concrete

END OF ITEM P-610

ISSUED FOR BID

ITEM P-620 RUNWAY AND TAXIWAY MARKING

DESCRIPTION

620-1.1 This item shall consist of the preparation and painting of markings and stripes on the surface of aprons and roadways in accordance with these specifications and at the locations shown on the plans, or as directed by the Program Manager. The terms “paint” and “marking material” as well as “painting” and “application of markings” are interchangeable throughout this specification.

MATERIALS

620-2.1 Materials acceptance. The Contractor shall furnish manufacturer’s certified test reports, for materials shipped to the project. The certified test reports shall include a statement that the materials meet the specification requirements. This certification along with a copy of the paint manufacturer’s surface preparation; marking materials, including adhesion, flow promoting and/or floatation additive; and application requirements must be submitted and approved by the Program Manager prior to the initial application of markings. The reports can be used for material acceptance or the Program Manager may perform verification testing. The reports shall not be interpreted as a basis for payment. The Contractor shall notify the Program Manager upon arrival of a shipment of materials to the site. All material shall arrive in sealed containers that are easily quantifiable for inspection by the Program Manager.

620-2.2 Marking materials.

Table 1. Marking Materials

Paint ¹				Glass Beads ²	
Type	Color	Fed Std. 595 Number	Application Rate Maximum	Type	Application Rate Minimum
I	white	37925	115 ft ² /gal	Type I, Gradation A	7 lb/gal
I	Black	37038	115 ft ² /gal	N.A.	N.A.

¹ See paragraph 620-2.2a

² See paragraph 620-2.2b

a. Paint. Paint shall be waterborne in accordance with the requirements of this paragraph. Paint colors shall comply with Federal Standard No. 595. Paint shall meet the requirements of Federal Specification TT-P-1952F, Type I. The non-volatile portion of the vehicle for all paint types shall be composed of a 100% acrylic polymer as determined by infrared spectral analysis.

b. Reflective media. Not used.

CONSTRUCTION METHODS

620-3.1 Weather limitations. Painting shall only be performed when the surface is dry, and the ambient temperature and the pavement surface temperature meet the manufacturer’s recommendations in accordance with paragraph 620-2.1. Painting operations shall be discontinued when the ambient or surface temperatures does not meet the manufacturer’s recommendations. Markings shall not be applied when the

ISSUED FOR BID

wind speed exceeds 10 mph unless windscreens are used to shroud the material guns. Markings shall not be applied when weather conditions are forecasts to not be within the manufacturers' recommendations for application and dry time.

620-3.2 Equipment. Equipment shall include the apparatus necessary to properly clean the existing surface, a mechanical marking machine, a bead dispensing machine, and such auxiliary hand-painting equipment as may be necessary to satisfactorily complete the job.

The mechanical marker shall be an atomizing spray-type or airless type marking machine with automatic glass bead dispensers suitable for application of traffic paint. It shall produce an even and uniform film thickness and appearance of both paint and glass beads at the required coverage and shall apply markings of uniform cross-sections and clear-cut edges without running or spattering and without over spray. The marking equipment for both paint and beads shall be calibrated daily.

620-3.3 Preparation of surfaces. Immediately before application of the paint, the surface shall be dry and free from dirt, grease, oil, laitance, or other contaminants that would reduce the bond between the paint and the pavement. Use of any chemicals or impact abrasives during surface preparation shall be approved in advance by the Program Manager. After the cleaning operations, sweeping, blowing, or rinsing with pressurized water shall be performed to ensure the surface is clean and free of grit or other debris left from the cleaning process.

a. Preparation of new pavement surfaces. The area to be painted shall be cleaned by broom, blower, water blasting, or by other methods approved by the Program Manager to remove all contaminants, including PCC curing compounds, minimizing damage to the pavement surface.

b. Preparation of pavement to remove existing markings. Existing pavement markings shall be removed by rotary grinding, water blasting, or by other methods approved by the Program Manager minimizing damage to the pavement surface. The removal area may need to be larger than the area of the markings to eliminate ghost markings. After removal of markings on asphalt pavements, apply a fog seal or seal coat to 'block out' the removal area to eliminate 'ghost' markings.

c. Preparation of pavement markings prior to remarking. Prior to remarking existing markings, loose existing markings must be removed minimizing damage to the pavement surface, with a method approved by the Program Manager. After removal, the surface shall be cleaned of all residue or debris.

Prior to the application of markings, the Contractor shall certify in writing that the surface is dry and free from dirt, grease, oil, laitance, or other foreign material that would prevent the bond of the paint to the pavement or existing markings. This certification along with a copy of the paint manufacturers application and surface preparation requirements must be submitted to the Program Manager prior to the initial application of markings.

620-3.4 Layout of markings. The proposed markings shall be laid out in advance of the paint application. The locations of markings to receive glass beads shall be shown on the plans.

620-3.5 Application. A period of 3 days shall elapse between placement of surface course or seal coat and application of the permanent paint markings. Paint shall be applied at the locations and to the dimensions and spacing shown on the plans. Paint shall not be applied until the layout and condition of the surface has been approved by the Program Manager.

The edges of the markings shall not vary from a straight line more than 1/2 inch in 50 feet, and marking dimensions and spacing shall be within the following tolerances:

ISSUED FOR BID

Marking Dimensions and Spacing Tolerance

Dimension and Spacing	Tolerance
36 inch or less	±1/2 inch
greater than 36 inch to 6 feet	±1 inch
greater than 6 feet to 60 feet	±2 inch
greater than 60 feet	±3 inch

Any markings that do not meet the installation tolerances provided in this specification shall be removed and reinstalled at the Contractor's expense.

The paint shall be mixed in accordance with the manufacturer's instructions and applied to the pavement with a marking machine at the rate shown in Table 1. The addition of thinner will not be permitted.

Glass beads shall be distributed upon the marked areas at the locations shown on the plans to receive glass beads immediately after application of the paint. A dispenser shall be furnished that is properly designed for attachment to the marking machine and suitable for dispensing glass beads. Glass beads shall be applied at the rate shown in Table 1. Glass beads shall not be applied to black paint or green paint. Glass beads shall adhere to the cured paint or all marking operations shall cease until corrections are made. Different bead types shall not be mixed. Regular monitoring of glass bead embedment and distribution should be performed.

620-3.6 Application--preformed thermoplastic airport pavement markings. Preformed thermoplastic pavement markings not used.

620-3.7 Control strip. Prior to the full application of airfield markings, the Contractor shall prepare a control strip in the presence of the Program Manager. The Contractor shall demonstrate the surface preparation method and all striping equipment to be used on the project. The marking equipment must achieve the prescribed application rate of paint and population of glass beads (per Table 1) that are properly embedded and evenly distributed across the full width of the marking. Prior to acceptance of the control strip, markings must be evaluated during darkness to ensure a uniform appearance.

620-3.8 Retro-reflectance. Not used.

Minimum Retro-Reflectance Values

Material	Retro-reflectance mcd/m ² /lux		
	White	Yellow	Red
Initial Type I	300	175	35
Initial Type III	600	300	35
Initial Thermoplastic	225	100	35
All materials, remark when less than ¹	100	75	10

¹ Prior to remarking determine if removal of contaminants on markings will restore retro-reflectance

620-3.9 Protection and cleanup. After application of the markings, all markings shall be protected from damage until dry. All surfaces shall be protected from excess moisture and/or rain and from disfiguration by spatter, splashes, spillage, or drippings. The Contractor shall remove from the work area all debris,

ISSUED FOR BID

waste, loose reflective media, and by-products generated by the surface preparation and application operations to the satisfaction of the Program Manager. The Contractor shall dispose of these wastes in strict compliance with all applicable state, local, and federal environmental statutes and regulations.

METHOD OF MEASUREMENT

The quantity of markings to be paid for shall be measured by the number of square feet of painting performed and installed in accordance with the specifications and accepted by the Program Manager.

620-4.2 The quantity of existing airfield marking removals too be paid for shall be the number of square feet of airfield markings removed, regardless of the method or number of methods required to remove the markings. Removals shall be in accordance with the specifications and accepted by the Program Manager. Multiple operations to remove the same marking will not be measured separately.

BASIS OF PAYMENT

620-5.1 Payment shall be made at the respective contract price per square foot for permanent markings. This price shall be full compensation for furnishing all materials and for all labor, equipment, tools, and incidentals necessary to complete the item. Reflective media shall not be measured separately but shall be included in the unit price for marking and shall be considered incidental to the item requiring its use.

620-5.2 Payment shall be made at the contract price per square foot for removal of existing paint markings as indicated in the plans or as required by the Program Manager.

Item P-620-5.1 Pavement Marking without Reflective Beads – per square foot

Item P-620-5.2 Existing Paint Marking Removal – per square foot

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM D476	Standard Classification for Dry Pigmentary Titanium Dioxide Products
ASTM D968	Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive
ASTM D1652	Standard Test Method for Epoxy Content of Epoxy Resins
ASTM D2074	Standard Test Method for Total, Primary, Secondary, and Tertiary Amine Values of Fatty Amines by Alternative Indicator Method
ASTM D2240	Standard Test Method for Rubber Property - Durometer Hardness
ASTM D7585	Standard Practice for Evaluating Retroreflective Pavement Markings Using Portable Hand-Operated Instruments
ASTM E303	Standard Test Method for Measuring Surface Frictional Properties Using the British Pendulum Tester
ASTM E1710	Standard Test Method for Measurement of Retroreflective Pavement Marking Materials with CEN-Prescribed Geometry Using a Portable Retroreflectometer

ISSUED FOR BID

ASTM E2302 Standard Test Method for Measurement of the Luminance Coefficient Under Diffuse Illumination of Pavement Marking Materials Using a Portable Reflectometer

ASTM G154 Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials

Code of Federal Regulations (CFR)

40 CFR Part 60, Appendix A-7, Method 24
Determination of volatile matter content, water content, density, volume solids, and weight solids of surface coatings

29 CFR Part 1910.1200 Hazard Communication

Federal Specifications (FED SPEC)

FED SPEC TT-B-1325D Beads (Glass Spheres) Retro-Reflective

FED SPEC TT-P-1952F Paint, Traffic and Airfield Marking, Waterborne

FED STD 595 Colors used in Government Procurement

Commercial Item Description

A-A-2886B Paint, Traffic, Solvent Based

Advisory Circulars (AC)

AC 150/5340-1 Standards for Airport Markings

AC 150/5320-12 Measurement, Construction, and Maintenance of Skid Resistant Airport Pavement Surfaces

END OF ITEM P-620

ISSUED FOR BID

PAGE INTENTIONALLY BLANK

ISSUED FOR BID

ITEM D-701 PIPE FOR STORM DRAINS AND CULVERTS

DESCRIPTION

701-1.1 This item shall consist of the construction of pipe culverts and storm drains in accordance with these specifications and in reasonably close conformity with the lines and grades shown on the plans.

MATERIALS

701-2.1 Materials shall meet the requirements shown on the plans and specified below. Underground piping and components used in drainage systems for terminal and aircraft fueling ramp drainage shall be noncombustible and inert to fuel in accordance with National Fire Protection Association (NFPA) 415.

Reinforced Concrete Pipe, Class V ASTM C76

701-2.2 Pipe. The pipe shall be of the type called for on the plans or in the proposal and shall be in accordance with the following appropriate requirements:

AASHTO R73	Standard Practice for Evaluation of Precast Concrete Drainage Productions
ASTM C76	Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
ASTM C655	Standard Specification for Reinforced Concrete D-Load Culvert, Storm Drain, and Sewer Pipe
ASTM C1433	Standard Specification for Precast Reinforced Concrete Monolithic Box Sections for Culverts, Storm Drains, and Sewers
ASTM C1479	Standard Practice for Installation of Precast Concrete Sewer, Storm Drain, and Culvert Pipe Using Standard Installations
ASTM C1577	Standard Specification for Precast Reinforced Concrete Monolithic Box Sections for Culverts, Storm Drains, and Sewers Designed According to AASHTO LRFD
ASTM C1786	Standard Specification for Segmental Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers Designed According to AASHTO LRFD
ASTM C1840	Standard Practice for Inspection and Acceptance of Installed Reinforced Concrete Culvert, Storm Drain, and Storm Sewer Pipe

701-2.3 Concrete. Concrete for pipe cradles shall have a minimum compressive strength of 2000 psi at 28 days and conform to the requirements of ASTM C94. Concrete for pipe cradles shall not be paid for separately but shall be considered incidental to the installation of pipe requiring its use.

701-2.4 Rubber gaskets. Rubber gaskets for rigid pipe shall conform to the requirements of ASTM C443. Rubber gaskets for precast box culverts shall conform to the requirements of ASTM C1677.

ISSUED FOR BID

701-2.5 Joint mortar. Pipe joint mortar shall consist of one part Portland cement and two parts sand. The Portland cement shall conform to the requirements of ASTM C150, Type I low alkali. The sand shall conform to the requirements of ASTM C144.

701-2.6 Joint fillers. Not Used.

701-2.7 Plastic gaskets. Not Used.

701-2.8. Controlled low-strength material (CLSM). Use of CLSM as backfill material shall be at the discretion of the Program Manager. If approved for use, controlled low-strength material shall conform to the requirements of Item P-153. When CLSM is used, all joints shall have gaskets.

701-2.9 Precast box culverts. Manufactured in accordance with and conforming to ASTM C1433.

701-2.10 Precast concrete pipe. Precast concrete structures shall be furnished by a plant meeting National Precast Concrete Association Plant Certification Program or another Program Manager approved third party certification program.

CONSTRUCTION METHODS

701-3.1 Excavation. The width of the pipe trench shall be sufficient to permit satisfactory jointing of the pipe and thorough tamping of the bedding material under and around the pipe, but it shall not be less than the external diameter of the pipe plus a minimum of 12 inches to a maximum of 24 inches on each side. The trench walls shall be approximately vertical.

The Contractor shall comply with all current federal, state and local rules and regulations governing the safety of men and materials during the excavation, installation and backfilling operations. Specifically, the Contractor shall observe that all requirements of the Occupational Safety and Health Administration (OSHA) relating to excavations, trenching and shoring are strictly adhered to. The width of the trench shall be sufficient to permit satisfactorily jointing of the pipe and thorough compaction of the bedding material under the pipe and backfill material around the pipe, but it shall not be greater than the widths shown on the plans trench detail.

Where rock, hardpan, or other unyielding material is encountered, the Contractor shall remove it from below the foundation grade for a depth of at least 8 inch or 1/2 inch for each foot of fill over the top of the pipe (whichever is greater) but for no more than three-quarters of the nominal diameter of the pipe. The excavation below grade should be filled with granular material to form a uniform foundation.

Where a firm foundation is not encountered at the grade established, due to soft, spongy, or other unstable soil, the unstable soil shall be removed and replaced with approved granular material for the full trench width. The Program Manager shall determine the depth of removal necessary. The granular material shall be compacted to provide adequate support for the pipe. The Program Manager may also require that Class A bedding, as defined within the plans, be utilized in soft soil conditions.

The excavation for pipes placed in embankment fill shall not be made until the embankment has been completed to a height above the top of the pipe as shown on the plans.

701-3.2 Bedding. The bedding surface for the pipe shall provide a foundation of uniform density to support the pipe throughout its entire length.

a. Rigid pipe. Class A bedding shall be in accordance with the plans and as defined under section 701-3.5-1. Class B bedding shall be constructed uniformly for the full length of the pipe barrel, as required on the plans. The maximum aggregate size shall be 1 in when the bedding thickness is less than 6 inches, and 1-1/2 in when the bedding thickness is greater than 6 inches. Bedding material and granular backfill shall

ISSUED FOR BID

be as specified in P-219 and shall be placed in maximum 6-inch lifts. Compaction shall be by vibratory tampers.

701-3.3 Laying pipe. The pipe laying shall begin at the lowest point of the trench and proceed upgrade. The lower segment of the pipe shall be in contact with the bedding throughout its full length. Bell or groove ends of rigid pipes and outside circumferential laps of flexible pipes shall be placed facing upgrade.

701-3.4 Joining pipe. Joints shall be made with rubber gaskets.

Rubber ring gaskets shall be installed to form a flexible watertight seal.

a. Concrete pipe. Concrete pipe may be either bell and spigot or tongue and groove. Pipe sections at joints shall be fully seated and the inner surfaces flush and even. Concrete pipe joints shall be sealed with rubber gaskets meeting ASTM C443 when leak resistant joints are required. Joints shall be thoroughly wetted before applying mortar or grout.

701-3.5 Embedment and Overfill. Pipes shall be inspected before any fill material is placed; any pipes found to be out of alignment, unduly settled, or damaged shall be removed and re-laid or replaced at the Contractor's expense.

701-3.5-1 Embedment Material Requirements

a. Concrete Pipe. Embedment material and compaction requirements shall be in accordance with the plans. If a concrete cradle or CLSM embedment material is used, it shall conform to the plan details and shall only be used when directed or approved by the Program Manager.

701-3.5-2 Placement of Embedment Material

The embedment material shall be compacted in layers not exceeding 6 inches on each side of the pipe and shall be brought up to a minimum of one foot above the top of the pipe. Thoroughly compact the embedment material under the haunches of the pipe without displacing the pipe. Material shall be brought up evenly on each side of the pipe for the full length of the pipe.

When the top of the pipe is above the top of the trench, the embedment material shall be compacted in layers not exceeding 6 inches and shall be brought up evenly on each side of the pipe to a minimum of one foot above the top of the pipe. All embedment material shall be compacted to a density required under Item P-152. All excavation and backfill below finished grade shall be considered incidental to installation of the pipe and will not be measured or compensated separately.

Concrete cradles and flowable fills, such as controlled low strength material (CLSM) or controlled density fill (CDF), may be used, when approved or directed by the Program Manager, for embedment provided adequate flotation resistance can be achieved by restraints, weighing, or placement technique.

It shall be the Contractor's responsibility to protect installed pipes and culverts from damage due to construction equipment operations. The Contractor shall be responsible for installation of any extra strutting or backfill required to protect pipes from the construction equipment.

701-3.6 Overfill

Pipes shall be inspected before any overfill is in place. Any pipes found to be out of alignment, unduly settled, or damaged shall be removed and relaid or replaced at the Contractor's expense. Evaluation of any damage to RCP shall be evaluated based on AASHTO R73.

Overfill material shall be placed and compacted in layers as required to achieve compaction to at least 95 percent standard proctor per ASTM D1557 in accordance with Item P-152 requirements. The soil shall contain no debris, organic matter, frozen material, or stones with a diameter greater than one half the thickness of the compacted layers being placed.

701-3.7 Inspection Requirements

An post installation inspection shall be performed by the Contractor at the direction of the Program Manager no sooner than 30 days after completion of installation and final backfill. Clean or flush all lines prior to inspection.

The Contractor shall use a camera with lighting suitable to allow a clear picture of the entire periphery of the pipe interior. Center the camera in the pipe both vertically and horizontally and be able to pan and tilt to a 90 degree angle with the axis of the pipe rotating 360 degrees. Use equipment to move the camera through the pipe that will not obstruct the camera's view or interfere with proper documentation of the pipe's condition. The video image shall be clear, focused, and relatively free from roll, static, or other image distortion qualities that would prevent the reviewer from evaluating the condition of the pipe.

The Contractor shall incorporate specific inspection requirements for the various types of pipes beneath the general inspection requirements as an element of the Contractor Quality Control Plan (CQCP), reference Specification C-100.

Reinforced concrete pipe shall be inspected, evaluated, and reported on in accordance with ASTM C1840, "Standard Practice for Inspection and Acceptance of Installed Reinforced Concrete Culvert, Storm Drain, and Storm Sewer Pipe." Any issues reported shall include still photo and video documentation. The zoom ratio shall be provided for all still or video images that document any issues of concern by the inspection firm.

701-3.8 Miscellaneous Removals. Miscellaneous removals shall be performed in the areas denoted on the plans and shall be done at a satisfactory distance in advance of any grading operations. The removal of any existing structures, culverts, storm drainage pipe and other existing improvements required to permit the orderly progress of work shall be accomplished by the Contractor, unless otherwise shown on the plans. All existing concrete and structures shall be removed full depth, unless otherwise specified on the plans in accordance with Specification P-101.

Concrete structure removal shall be performed without damage to any portion of the structure that is to remain in place. Any damage to the existing structure to remain in place shall be repaired to a condition equal to that prior to the start of the removal operations, and acceptable to the Program Manager. All costs associated with repairing the damaged structure due to the Contractor's operations shall solely be at the Contractor's expense.

The Contractor shall perform modifications as necessary to maintain the existing drainage system that is to remain in place, including but not limited to, capping existing pipe, blocking existing manhole penetrations after pipe removal, and installation of controlled low strength material as required.

Material for backfilling the voids after miscellaneous removals shall be in accordance with item P-152. At the Contractor's option and with the Program Manager's approval, backfilling the voids after removals may be performed utilizing item P-153, Controlled Low Strength Material. The design mix of the material proposed for use in this manner shall be submitted to the Engineer for review and approval prior to use.

METHOD OF MEASUREMENT

701-4.1 The length of pipe shall be measured in linear feet of pipe in place, completed, and accepted. It shall be measured along the centerline of the pipe from end or inside face of structure to the end or inside face of structure, whichever is applicable. The several classes, types, and sizes shall be measured separately.

ISSUED FOR BID

All fittings shall be included in the footage as typical pipe sections in the pipe being measured. All required excavation, sheeting and bracing, all required backfilling, restoration of all surfaces, dewatering and all fittings shall be included in the footage as typical pipe sections in the pipe being measured and shall be considered incidental to this item. All concrete for pipe cradles, bedding (Class A), and encasement shall also be considered incidental to this item.

701-4.2. The volume of concrete for pipe plugs and collars to be paid for shall be the number of cubic yards of concrete which is completed in place and accepted.

BASIS OF PAYMENT

701-5.0 These prices shall fully compensate the Contractor for furnishing all materials and for all preparation, excavation, aggregate bedding, aggregate pipe backfill, backfill, compaction, temporary shoring, sheeting trench protection, jointing materials, plugging of lift holes, and installation of these materials; and for all labor, equipment, tools, dewatering, and incidentals necessary to complete the item.

701-5.1 Payment will be made at the contract unit price per linear foot for each kind of pipe of the type and size designated.

Payment will be made under:

Item D-701-5.1	18 inch Reinforced Concrete Pipe (Class V) – per linear foot
Item D-701-5.2	24 inch Reinforced Concrete Pipe (Class V) – per linear foot
Item D-701-5.3	Concrete for Pipe Plugs and Collars – per cubic yard

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

American Association of State Highway and Transportation Officials (AASHTO)

AASHTO M167	Standard Specification for Corrugated Steel Structural Plate, Zinc-Coated, for Field-Bolted Pipe, Pipe-Arches, and Arches
AASHTO M190	Standard Specification for Bituminous-Coated Corrugated Metal Culvert Pipe and Pipe Arches
AASHTO M196	Standard Specification for Corrugated Aluminum Pipe for Sewers and Drains
AASHTO M219	Standard Specification for Corrugated Aluminum Alloy Structural Plate for Field-Bolted Pipe, Pipe-Arches, and Arches
AASHTO M243	Standard Specification for Field Applied Coating of Corrugated Metal Structural Plate for Pipe, Pipe-Arches, and Arches
AASHTO M252	Standard Specification for Corrugated Polyethylene Drainage Pipe
AASHTO M294	Standard Specification for Corrugated Polyethylene Pipe, 300- to 1500-mm (12- to 60-in.) Diameter
AASHTO M304	Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Wall Drain Pipe and Fittings Based on Controlled Inside Diameter

ISSUED FOR BID

AASHTO MP20	Standard Specification for Steel Reinforced Polyethylene (PE) Ribbed Pipe, 300- to 900-mm (12- to 36-in.) Diameter
ASTM International (ASTM)	
ASTM A760	Standard Specification for Corrugated Steel Pipe, Metallic Coated for Sewers and Drains
ASTM A761	Standard Specification for Corrugated Steel Structural Plate, Zinc Coated, for Field-Bolted Pipe, Pipe-Arches, and Arches
ASTM A762	Standard Specification for Corrugated Steel Pipe, Polymer Precoated for Sewers and Drains
ASTM A849	Standard Specification for Post-Applied Coatings, Pavings, and Linings for Corrugated Steel Sewer and Drainage Pipe
ASTM B745	Standard Specification for Corrugated Aluminum Pipe for Sewers and Drains
ASTM C14	Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe
ASTM C76	Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
ASTM C94	Standard Specification for Ready Mixed Concrete
ASTM C144	Standard Specification for Aggregate for Masonry Mortar
ASTM C150	Standard Specification for Portland Cement
ASTM C443	Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
ASTM C506	Standard Specification for Reinforced Concrete Arch Culvert, Storm Drain, and Sewer Pipe
ASTM C507	Standard Specification for Reinforced Concrete Elliptical Culvert, Storm Drain and Sewer Pipe
ASTM C655	Standard Specification for Reinforced Concrete D-Load Culvert, Storm Drain and Sewer Pipe
ASTM C990	Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants
ASTM C1433	Standard Specification for Precast Reinforced Concrete Monolithic Box Sections for Culverts, Storm Drains, and Sewers
ASTM C1677	Standard Specification for Joints for Concrete Box, Using Rubber Gaskets
ASTM D1056	Standard Specification for Flexible Cellular Materials Sponge or Expanded Rubber
ASTM D3034	Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
ASTM D3212	Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals

ISSUED FOR BID

ASTM D3262	Standard Specification for "Fiberglass" (Glass-Fiber Reinforced Thermosetting Resin) Sewer Pipe
ASTM D3282	Standard Practice for Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes
ASTM D4161	Standard Specification for "Fiberglass" (Glass-Fiber Reinforced Thermosetting Resin) Pipe Joints Using Flexible Elastomeric Seals
ASTM D6690	Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements
ASTM F477	Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
ASTM F667	Standard Specification for 3 through 24 in. Corrugated Polyethylene Pipe and Fittings
ASTM F714	Standard Specification for Polyethylene (PE) Plastic Pipe (DR PR) Based on Outside Diameter
ASTM F794	Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe & Fittings Based on Controlled Inside Diameter
ASTM F894	Standard Specification for Polyethylene (PE) Large Diameter Profile Wall Sewer and Drain Pipe
ASTM F949	Standard Specification for Poly (Vinyl Chloride) (PVC) Corrugated Sewer Pipe with a Smooth Interior and Fittings
ASTM F2435	Standard Specification for Steel Reinforced Polyethylene (PE) Corrugated Pipe
ASTM F2562	Specification for Steel Reinforced Thermoplastic Ribbed Pipe and Fittings for Non-Pressure Drainage and Sewerage
ASTM F2736	Standard Specification for 6 to 30 in. (152 to 762 mm) Polypropylene (PP) Corrugated Single Wall Pipe and Double Wall Pipe
ASTM F2764	Standard Specification for 30 to 60 in. (750 to 1500 mm) Polypropylene (PP) Triple Wall Pipe and Fittings for Non-Pressure Sanitary Sewer Applications
ASTM F2881	Standard Specification for 12 to 60 in. (300 to 1500 mm) Polypropylene (PP) Dual Wall Pipe and Fittings for Non-Pressure Storm Sewer Applications
National Fire Protection Association (NFPA)	
NFPA 415	Standard on Airport Terminal Buildings, Fueling Ramp Drainage, and Loading Walkways

END ITEM D-701

ISSUED FOR BID

PAGE INTENTIONALLY BLANK

ISSUED FOR BID

ITEM D-705 PIPE UNDERDRAINS FOR AIRPORTS

DESCRIPTION

705-1.1 This item shall consist of the construction of pipe underdrains of the type, classes, sizes, and dimensions required on the plans, furnished and installed at the places designated on the plans and profiles in accordance with these specifications and in reasonably close conformity with the lines and grades shown on the plans.

MATERIALS

705-2.1 General. Materials shall meet the requirements shown on the plans and specified below.

705-2.2 Pipe. The pipe shall be of the type called for on the plans or in the proposal and shall be in accordance with the following appropriate requirements.

a. Plastic pipe (smooth wall PVC). The pipe for underdrains shall be SDR 35 PVC pipe with solid wall and smooth interior conforming to ASTM D 3034. The pipe shall be either perforated or non-perforated as indicated in the drawings. Perforated pipe shall have holes or slots evenly spaced on the underside of the pipe; the holes or slots shall be clean, smooth, and free of burrs. Slots or holes shall provide a water inlet area of at least 1.5 square inches per foot of pipe length. Joints shall be solvent glued; the solvent shall conform to ASTM D 2564.

Fittings shall be solvent glued, shall not restrict flow, and shall be of the same composition and have the same properties as the pipe.

PVC pipe supplied as meeting this specification shall be marked with the manufacturer's identification symbols regularly at not more than 10 ft. intervals and in addition may be required to carry an approved symbol designating the manufacturer's assurance of compliance also at regular intervals along the pipe. Fittings shall bear the identification symbols of the manufacturer. Each bundle shall bear the date, month and year of manufacture.

b. Plastic pipe (corrugated PVC). As an acceptable alternative to a. above, the pipe for underdrains shall be PVC pipe with corrugated exterior and smooth interior conforming to ASTM F 949. The pipe shall be either perforated or non-perforated as indicated in the drawings. Perforated pipe shall have holes or slots evenly spaced on the underside of the pipe; the holes or slots shall be clean, smooth, and free of burrs. Slots or holes shall provide a water inlet area of at least 1.5 square inches per foot of pipe length. Joints shall be elastomeric seal gasketed conforming to ASTM F 477.

Fittings shall be gasketed, shall not restrict flow, and shall be of the same composition and have the same properties as the pipe.

PVC pipe supplied as meeting this specification shall be marked with the manufacturer's identification symbols regularly at not more than 10 ft. intervals and in addition may be required to carry an approved symbol designating the manufacturer's assurance of compliance also at regular intervals along the pipe. Fittings shall bear the identification symbols of the manufacturer. Each bundle shall bear the date, month and year of manufacture.

ISSUED FOR BID

AASHTO M196	Standard Specification for Corrugated Aluminum Pipe for Sewers and Drains
AASHTO M252	Standard Specification for Corrugated Polyethylene Drainage Pipe
AASHTO M304	Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Wall Drain Pipe and Fittings Based on Controlled Inside Diameter
ASTM F758	Standard Specification for Smooth-Wall Poly (Vinyl Chloride) (PVC) Plastic Underdrain Systems for Highway, Airport, and Similar Drainage
ASTM F794	Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe & Fittings Based on Controlled Inside Diameter
ASTM F949	Standard Specification for Poly (Vinyl Chloride) (PVC) Corrugated Sewer Pipe with a Smooth Interior and Fittings

705-2.3 Joint mortar (grout). Pipe joint mortar (grout) for pipe connections to other drainage structures shall consist of one part by volume of Portland cement and two parts sand. The Portland cement shall conform to the requirements of ASTM C150, Type I. The sand shall conform to the requirements of ASTM C144. The mortar (grout) shall also contain an approved non-shrink additive to prevent shrinkage of mortar around pipes and masonry. Said additive shall be mixed and used in accordance with manufacturer's recommendation. The mortar (grout) may also consist of an approved non-shrink commercially available product.

705-2.4 Elastomeric seals. Elastomeric seals shall conform to the requirements of ASTM F477.

705-2.5 Porous backfill and bedding. Porous backfill and bedding shall be clean, hard, durable stone or gravel free of clay, humus, or other objectionable matter, and shall conform to the gradation in Table 1 when tested in accordance with ASTM C136.

Table 1. Gradation of Porous Backfill and Bedding

Sieve Designation (square openings)	Percentage by Weight Passing Sieves
	Porous Material No. 2
1-1/2 inch (37.5 mm)	100
1 inch (25.0 mm)	90-100
3/8 inch (9.5 mm)	25-60
No. 4 (4.75 mm)	5-40
No. 8 (2.36 mm)	0-20

705-2.6 Granular material. Granular material used for backfilling shall conform to the requirements of ASTM D2321 for Class IA, IB, or II materials.

705-2.7 Filter fabric. The filter fabric shall conform to the requirements of AASHTO M288 Class 2 or equivalent.

The fabric shall meet the following physical requirements:

ISSUED FOR BID

Table 2. Fabric Properties

Fabric Property	Test Method	Test Requirement
Grab Tensile Strength, lbs	ASTM D4632	125 min
Grab Tensile Elongation %	ASTM D4632	50 min
Burst Strength, psi	ASTM D3785	125 min
Trapezoid Tear Strength, lbs	ASTM D4533	55 min
Puncture Strength, lbs	ASTM D4833	40 min
Abrasion, lbs	ASTM D4886	15 max loss
Equivalent Opening Size	ASTM D4751	70-100
Permittivity sec ⁻¹	ASTM D4491	0.80
Accelerated Weathering (UV Stability) (Strength Retained - %)	ASTM D4355 *(500 hrs exposure)	70

The Contractor shall furnish certified test reports with each shipment of material attesting that the fabric meets the requirements of this provision.

Anchor pins shall be steel, 3/16 inch in diameter, pointed at one end, and fabricated with head to retain a steel washer having an outside diameter of no less than 1.5 inches. Alternate anchors may be used if approved by the Program Manager.

705-2.8 Controlled low-strength material (CLSM). Controlled low-strength materials shall conform to the requirements of Item P-153. All joints shall have elastomeric seals. Use of CLSM shall require approval from the Program Manager prior to installation or use.

705-2.9. Cleanout. The cleanout and lid surface fitting shall consist of an aircraft load rated cast iron frame with bolted lid and shall conform to requirements of ASTM A48. Cleanout shall include a minimum of 7 ½ inch square lid and minimum of 15 inch extreme top to extreme bottom depth fitting.

705-2.10. Underdrain end wall fittings. Metal fittings for underdrain end wall shall be stainless steel bars or mesh consisting of Type 304 stainless steel. Underdrain outfall structures shall conform to requirements provided in the plans.

705-2.11. Underdrain end wall corrugated concrete apron. The corrugated concrete apron at the downstream end of the underdrain end wall shall conform to requirements provided in the plans.

CONSTRUCTION METHODS

705-3.1 Equipment. All equipment required for the construction of pipe underdrains shall be on the project, in good working condition, and approved by the Program Manager before construction is permitted to start.

705-3.2 Excavation. The width of the pipe trench shall be sufficient to permit satisfactory jointing of the pipe and thorough tamping of the bedding material under and around the pipe, but shall not be less than the external diameter of the pipe plus 6 inches on each side of the pipe or as detailed in the drawings. The trench walls shall be approximately vertical.

Where rock, hardpan, or other unyielding material is encountered, it shall be removed below the foundation grade for a depth of at least 4 inches. The excavation below grade shall be backfilled with selected fine compressible material, such as silty clay or loam, and lightly compacted in layers not over 6 inches in uncompacted depth to form a uniform but yielding foundation.

Where a firm foundation is not encountered at the grade established, due to soft, spongy, or other unstable soil, the unstable soil shall be removed and replaced with approved granular material for the full trench width. The Program Manager shall determine the depth of removal necessary. The granular material shall be compacted to provide adequate support for the pipe.

Excavated material not required or acceptable for backfill shall be disposed of by the Contractor as directed by the Program Manager. The excavation shall not be carried below the required depth; if this occurs, the trench shall be backfilled at the Contractor's expense with material approved by the Program Manager and compacted to the density of the surrounding earth material.

Underdrain piping requiring excavation through a previously installed soil-cement subbase course shall only be done so after a method has been submitted and approved by the Program Manager for excavation through the soil cement without substantial damage to the surrounding area. The excavation through the soil cement subbase shall be accomplished in such a manner as to not damage the subbase. Any and all damage shall be repaired by the Contractor at his expense, in a manner suitable to the Engineer, at no additional cost to the Owner. The cost of excavation through the soil-cement subbase shall be included in the unit cost of the underdrain item.

The pipe bedding shall be constructed uniformly over the full length of the pipe barrel, as required on the plans. The maximum aggregate size shall be 1 inch for the bedding thickness. Bedding shall be loosely placed, uncompacted material under the middle third of the pipe prior to placement of the pipe. Spaces for the pipe bell shall be excavated accurately to size to clear the bell to allow the pipe barrel to support the entire weight of the pipe.

The Contractor shall do trench bracing, sheathing, or shoring necessary to perform and protect the excavation as required for safety and conformance to federal, state and local laws. Unless otherwise provided, the bracing, sheathing, or shoring shall be removed by the Contractor after the backfill has reached at least 12 inches over the top of the pipe. The sheathing or shoring shall be pulled as the granular backfill is placed and compacted to avoid any unfilled spaces between the trench wall and the backfill material. The cost of bracing, sheathing, or shoring, and the removal of same, shall be included in the unit price bid per foot for the pipe.

705-3.3 Laying and installing pipe.

a. PVC, or polyethylene pipe. PVC or polyethylene pipe shall be installed in accordance with the requirements of ASTM D2321. Perforations shall meet the requirements of AASHTO M252 or AASHTO M294 Class 2, unless otherwise indicated on the plans. The pipe shall be laid accurately to line and grade.

The Contractor's facilities for lowering the pipe into the trench shall be such that neither the pipe nor the trench will be damaged or disturbed. All pipe shall be laid in accordance with ASTM D 2321.

The Program Manager shall inspect all pipe before it is laid and reject any section that is damaged by handling or is defective to a degree which will materially affect the function and service of the pipe.

The laying of the pipe in the finished trench shall be started at the lowest point and laid upgrade. Holes in perforated pipe shall be placed down. The pipe shall be firmly and accurately set to line and grade so that

ISSUED FOR BID

the invert will be smooth and uniform. No sags or adverse grades will be allowed in any run of pipe. Pipe shall not be laid on frozen ground or in a wet trench.

Pipe which is not true in alignment, or which shows any settlement after laying, shall be taken up and re-laid at no cost to the Owner.

The pipe shall be laid with the separate sections jointed firmly together. Caps shall be installed on the upper ends of all underdrains pipes. Outfall ends of pipe, which do not terminate in a drainage structure, shall be equipped with an end wall as detailed on the drawings.

Unless otherwise shown on the plans, a bed of porous backfill material meeting the requirements of Section D-705-2.5 shall be spread in the bottom of the trench throughout the entire length under all perforated pipe underdrains at the depths and thicknesses indicated in the plans.

Underdrain outfalls shall be installed prior to, or at the same time, as longitudinal underdrains so that positive drainage will be maintained at all times. Areas of underdrain installation without positive outfalls will not be allowed.

b. All types of pipe. The upgrade end of pipelines, not terminating in a structure, shall be plugged or capped as approved by the Program Manager.

Unless otherwise shown on the plans, a 2-inch bed of granular backfill material shall be spread in the bottom of the trench throughout the entire length under all perforated pipe underdrains.

Pipe outlets for the underdrains shall be constructed when required or shown on the plans. The pipe shall be laid with tight-fitting joints. All connections to other drainage pipes or structures shall be made as detailed in the drawings and in a satisfactory manner. If connections are not made to other pipes or structures, the outlets shall be protected and constructed as shown on the plans.

e. Filter fabric. The filter fabric shall be installed in accordance with the manufacturer's recommendations, or in accordance with the AASHTO M288 Appendix, unless otherwise shown on the plans.

705-3.4 Mortar. The mortar shall be of the desired consistency for making connections to drainage pipes or to structures. Mortar that is not used within 45 minutes after water has been added shall be discarded. Re-tempering of mortar shall not be permitted.

705-3.5 Joints in concrete pipe. Not used.

705-3.6 Embedment and Backfill

a. Earth. All trenches and excavations shall be backfilled within a reasonable time after the pipes are installed, unless other protection of the pipe is directed. The embedment material shall be select material from excavation or borrow and shall be approved by the Program Manager. Material shall be placed outside of the granular material and filter fabric at the sides of the pipe. This material shall be a material, which can be readily compacted. It shall not contain stones 3 inches or larger in size, frozen lumps, chunks of highly plastic clay, or any other material that is objectionable to the Program Manager. The material shall be moistened or dried, as required to aid compaction. Placement of the embedment material shall not cause displacement of the pipe. Thorough compaction under the haunches and along the sides to the top of the pipe shall be obtained.

The embedment material shall be placed in loose layers not exceeding 6 inches in depth under and around the pipe. Backfill material over the pipe shall be placed in lifts not exceeding 8 inches. Successive

layers shall be added and thoroughly compacted by hand and pneumatic tampers, approved by the Program Manager, until the trench is completely filled and brought to the planned elevation. Embedment and backfilling shall be done to avoid damaging top or side of the pipe.

In embankments and other unpaved areas, the backfill shall be compacted per Item P-152 to the density required for embankments in unpaved areas. Under paved areas, the subgrade and any backfill shall be compacted per Item P-152 to the density required for embankments for paved areas.

b. Granular backfill. When granular backfill is required, placement in the trench and about the pipe shall be as shown on the plans. The granular backfill shall not contain an excessive amount of foreign matter, nor shall soil from the sides of the trench or from the soil excavated from the trench be allowed to filter into the granular backfill. When required by the Program Manager, a template shall be used to properly place and separate the two sizes of backfill. The backfill shall be placed in loose layers not exceeding 6 inches in depth. The granular backfill shall be compacted by hand and pneumatic tampers to the requirements as given for embankment. Backfilling shall be done to avoid damaging top or side pressure on the pipe. The granular backfill shall extend to the elevation of the trench or as shown on the plans.

When perforated pipe is specified, granular backfill material shall be placed along the full length of the pipe. The position of the granular material shall be as shown on the plans.

If porous backfill is placed in paved or adjacent to paved areas before grading or subgrade operations is completed, the backfill material shall be placed immediately after laying the pipe. The depth of the granular backfill shall be not less than 12 inches, measured from the top of the underdrain. During subsequent construction operations, a minimum depth of 12 inches of backfill shall be maintained over the underdrains. When the underdrains are to be completed, any unsuitable material shall be removed exposing the porous backfill. Porous backfill containing objectionable material shall be removed and replaced with suitable material. The cost of removing and replacing any unsuitable material shall be at the Contractor's expense.

If a granular subbase blanket course is used which extends several feet beyond the edge of paving to the outside edge of the underdrain trench, the granular backfill material over the underdrains shall be placed in the trench up to an elevation of 2 inches above the bottom surface of the granular subbase blanket course. Immediately prior to the placing of the granular subbase blanket course, the Contractor shall blade this excess trench backfill from the top of the trench onto the adjacent subgrade where it can be incorporated into the granular subbase blanket course. Any unsuitable material that remains over the underdrain trench shall be removed and replaced. The subbase material shall be placed to provide clean contact between the subbase material and the underdrain granular backfill material for the full width of the underdrain trench.

c. Controlled low-strength material (CLSM). Controlled low-strength material shall conform to the requirements of Item P-153. Use of CLSM shall require approval from Program Manager prior to use.

705-3.7 Flexible Pipe Ring Deflection. Not used.

705-3.8 Connections. When the plans call for connections to existing or proposed pipe or structures, these connections shall be watertight with mortar, in conformance with the connection details in the plans and made to obtain a smooth uniform flow line throughout the drainage system.

705-3.9 Cleaning and restoration of site. After the backfill is completed, the Contractor shall dispose of all surplus material, soil, and rubbish from the site. Surplus soil may be deposited in embankments, shoulders, or as directed by the Program Manager. Except for paved areas of the airport, the Contractor shall restore all disturbed areas to their original condition.

ISSUED FOR BID

705-3.10 Protection.

Underdrain piping shall be kept free of earth, granular fill, or any other construction material at all times. Open ends of pipe shall be closed with a temporary cap or plug so as to preclude the entry of storm water until work is continued.

During construction operations when various phases are involved, keep the underdrain clean of all dirt and debris and maintain positive drainage out of all parts of the underdrain system at all times. Any open trenches that flood due to rainfall shall be pumped out immediately. All costs associated with protection and drainage of the system shall be included in the cost of the underdrain.

METHOD OF MEASUREMENT

705-4.1 The length of pipe shall be the number of linear feet of perforated pipe underdrains in place, completed, and approved; measured along the centerline of the pipe from end or inside face of structure to the end or inside face of structure, whichever is applicable. The several classes, types, and sizes shall be measured separately. The cost of all fittings, porous backfill material, bedding material, excavation, backfill, protection, geotextile, pipe, and fittings shall be included in the footage as typical pipe sections and unit cost of the underdrain.

705-4.2 The length of pipe to be paid for shall be the number of linear feet of non-perforated outfall pipe in place, completed, and approved; measured along the centerline of the pipe from perforated pipe fitting to the end or inside face of structure at the outfall. All fittings, backfill, bedding material, excavation, protection, connections to existing drainage structures, pipe, and fittings shall be included in the cost of the underdrain outfall. The cost of the outlet, whether an end wall, or connection to an existing or new drainage structure or pipe, shall be included in the linear foot cost of the outfall pipe.

705-4.3 The quantity of underdrain cleanouts shall be on the basis of the contract unit price per cleanout, which price shall be full compensation for all labor, equipment, material, and incidentals necessary to satisfactorily construct each cleanout. The price for each cleanout will include the surface fitting and concrete block, steel reinforcing, non-perforated pipe, fittings, excavation, backfill, and protection during subsequent construction operations.

705-4.4 The quantity of underdrain connections to structure shall be on the basis of the contract unit price per each connection, which price shall be full compensation for all labor, equipment, material and incidentals necessary to satisfactorily construct each connection to structure. The price for each connection to structure will include the core into the structure, grout, grout collar, fabric, excavating, backfill, and protections during subsequent construction.

705-4.5 The quantity of underdrain endwalls shall be on the basis of the contract unit price per endwall, which price shall be full compensation for all labor, equipment, material and incidentals necessary to satisfactorily construct each endwall. The price for each endwall will include the concrete structure, rodent mesh, excavating, backfill, and protections during subsequent construction. The corrugated concrete apron at each underdrain endwall will be incidental to the endwall pay item.

BASIS OF PAYMENT

705-5.1 Payment will be made at the contract unit price per linear foot for pipe underdrains of the type, class, and size designated;

705-5.2 Pipe underdrains, Complete. Pipe underdrains, complete (including porous backfill and filter fabric) shall be made at the contract unit price per linear foot complete (including porous backfill and filter fabric).

705-5.3 Underdrain cleanout, Complete. Underdrain cleanouts shall be made at the contract unit price per each complete.

705-5.4 Underdrain connection to structure, Complete. Underdrain connection to structure, complete shall be made at the contract unit price per each complete.

705-5.5 Underdrain outfall structure, Complete. Underdrain outfall structure, complete be made at the contract unit price per each.

These prices shall be full compensation for furnishing all materials and for all preparation, excavation, and installation of these materials, connecting into existing or proposed structures or pipe, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item D-705-5.1	4-inch Perforated Underdrain Pipe, complete – per linear foot
Item D-705-5.2	Underdrain Cleanout – Concrete – per each

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM A760	Standard Specification for Corrugated Steel Pipe, Metallic Coated for Sewers and Drains
ASTM A762	Standard Specification for Corrugated Steel Pipe, Polymer Precoated for Sewers and Drains
ASTM C136	Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregates
ASTM C144	Standard Specification for Aggregate for Masonry Mortar
ASTM C150	Standard Specification for Portland Cement
ASTM C444	Standard Specification for Perforated Concrete Pipe
ASTM C654	Standard Specification for Porous Concrete Pipe
ASTM D2321	Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
ASTM D3262	Standard Specification for "Fiberglass" (Glass-Fiber Reinforced Thermosetting Resin) Sewer Pipe
ASTM D4161	Standard Specification for "Fiberglass" (Glass-Fiber Reinforced Thermosetting Resin) Pipe Joints Using Flexible Elastomeric Seals

ISSUED FOR BID

ASTM F477	Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
ASTM F758	Standard Specification for Smooth Wall Poly (Vinyl Chloride) (PVC) Plastic Underdrain Systems for Highway, Airport, and Similar Drainage
ASTM F794	Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe & Fittings Based on Controlled Inside Diameter
ASTM F949	Standard Specification for Poly (Vinyl Chloride) (PVC) Corrugated Sewer Pipe with a Smooth Interior and Fittings
ASTM F2562	Specification for Steel Reinforced Thermoplastic Ribbed Pipe and Fittings for Non-Pressure Drainage and Sewerage
American Association of State Highway and Transportation Officials (AASHTO)	
AASHTO M190	Standard Specification for Bituminous - Coated Corrugated Metal Culvert Pipe and Pipe Arches
AASHTO M196	Standard Specification for Corrugated Aluminum Pipe for Sewers and Drains
AASHTO M252	Standard Specification for Corrugated Polyethylene Drainage Pipe
AASHTO M288	Standard Specification for Geotextile Specification for Highway Applications
AASHTO M294	Standard Specification for Corrugated Polyethylene Pipe, 300- to 1500-mm (12- to 60-in.) Diameter
AASHTO M304	Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Wall Drain Pipe and Fittings Based on Controlled Inside Diameter
AASHTO MP20	Standard Specification for Steel-Reinforced Polyethylene (PE) Ribbed Pipe, 300- to 900-mm (12- to 36-in.) diameter
AASHTO	Standard Specifications for Highway Bridges

END OF ITEM D-705

ISSUED FOR BID

PAGE INTENTIONALLY BLANK

ISSUED FOR BID

ITEM D-751 STORM DRAIN MANHOLES, INLETS AND TRENCH DRAINS

DESCRIPTION

751-1.1 This item shall consist of construction of storm drain manholes, storm drain inlets, and trench drains in accordance with these specifications, at the specified locations and conforming to the lines, grades, and dimensions shown on the plans or required by the Program Manager.

MATERIALS

751-2.1 Brick. Not used.

751-2.2 Mortar. Mortar shall consist of one part Portland cement and two parts sand. The cement shall conform to the requirements of ASTM C150, Type I. The sand shall conform to the requirements of ASTM C144.

751-2.3 Concrete. Plain and reinforced concrete used in structures, connections of pipes with structures, and the support of structures or frames shall conform to the requirements of Item P-610.

751-2.4 Precast concrete pipe manhole rings. Not used.

751-2.5 Corrugated metal. Not used.

751-2.6 Frames, covers, and grates. The castings shall conform to one of the following requirements:

- a. ASTM A48, Class 35B: Gray iron castings
- b. ASTM A47: Malleable iron castings
- c. ASTM A27: Steel castings
- d. ASTM A283, Grade D: Structural steel for grates and frames
- e. ASTM A536, Grade 65-45-12: Ductile iron castings
- f. ASTM A897: Austempered ductile iron castings
- g. The trench drain frame and grate shall be capable of supporting a 200,000 pound proof load over a 9" X 9" contact area centered on the grate and with the grate supported on the two 23-7/8" long sides. The grate will be manufactured of ASTM A536 Ductile Iron with a minimum yield strength of 55,000 pounds per square inch. The grate weighs 193 pounds and is lettered 200 Kips and has an open area of 0.8 square feet per lineal foot. The frame for the trench grate will be in 2 foot sections with a masonry contact area of 254 square inches per foot and a bearing masonry contact area of 150 square inches. Each frame piece will weigh 68 pounds and be manufactured of ASTM A48 class 35 B gray iron. The frame will allow bolting of adjacent pieces with two 5/8 inch hex bolts on each end. The frame will also provide for anchoring the frame into the concrete. The grates will be bolted to the frame and the frame will provide for active debris chutes to allow debris entering into the threaded bolt holes to not become trapped within. The overall height of the frame will be 6-1/8".
- h. The drain inlet frame and grate shall be manufactured of ASTM A48 class 35B gray iron. The frame shall weigh 173 pounds and have an internal opening of 39-3/8" X 27-1/2" and the grate shall be in two pieces and weigh 418 pounds each. Each grate will provide an open area of 236 square inches for a total open area per set of 3.27 square feet. The grate shall have load supporting ribs 10-1/2" deep. The grates shall be fastened to the frame with 3/8-16 X 2 1/2 stainless steel flat head slotted

ISSUED FOR BID

screws. The frame shall have 12 anchors 3/8" diameter threaded into tapped holes of the frame for anchoring it into the concrete. The frame is intended to be wet set into the concrete.

- i. The drain manhole frame shall be manufactured of ASTM A48 Class 35 B gray iron and weigh 397 pounds and have an opening of 30 inches in diameter. The lid shall be manufactured of ASTM A536 ductile iron with a minimum yield strength of 55,000 pounds per square inch and lid shall weigh 279 pounds and be capable of supporting a proof load of 200,000 pound proof load over a 9" X 9" contact area centered on the lid. The lid shall have 4 one inch diameter lift holes and be fastened to the frame with two 1/2-13 X 3 stainless steel slotted flat head screws. The frame shall have a top and bottom flanges for locking into the concrete. The frame will also have 8 one inch anchor holes evenly spaced on a 37" diameter bolt circle for fastening to the structure.

All castings or structural steel units shall conform to the dimensions shown on the plans and shall be designed to support the loadings, aircraft gear configuration and/or direct loading as specified unless otherwise indicated in the plan set.

Each frame and cover or grate unit shall be provided with fastening members to prevent it from being dislodged by traffic, but which will allow easy removal for access to the structure.

All castings shall be thoroughly cleaned. After fabrication, structural steel units shall be galvanized to meet the requirements of ASTM A123.

751-2.7 Steps. The steps or ladder bars shall be gray or malleable cast iron or galvanized steel. The steps shall be the size, length, and shape shown on the plans and those steps that are not galvanized shall be given a coat of asphalt paint, when directed.

751-2.8 Precast inlet structures. Manufactured in accordance with and conforming to ASTM C913.

751-2.9 Reinforcing steel. Reinforcement for manholes or inlets shall conform to ASTM A 1064 for welded wire fabric and ASTM A615, A616, or A617, Grade 60, and epoxy coated for deformed bars.

CONSTRUCTION METHODS

751-3.1 Unclassified excavation.

a. The Contractor shall excavate for structures and footings to the lines and grades or elevations, shown on the plans, or as staked by the Program Manager. The excavation shall be of sufficient size to permit the placing of the full width and length of the structure or structure footings shown. The elevations of the bottoms of footings, as shown on the plans, shall be considered as approximate only; and the Program Manager may direct, in writing, changes in dimensions or elevations of footings necessary for a satisfactory foundation.

b. Boulders, logs, or any other objectionable material encountered in excavation shall be removed. All rock or other hard foundation material shall be cleaned of all loose material and cut to a firm surface either level, stepped, or serrated, as directed by the Program Manager. All seams or crevices shall be cleaned out and grouted. All loose and disintegrated rock and thin strata shall be removed. Where concrete will rest on a surface other than rock, the bottom of the excavation shall not be disturbed and excavation to final grade shall not be made until immediately before the concrete or reinforcing is placed.

c. The Contractor shall do all bracing, sheathing, or shoring necessary to implement and protect the excavation and the structure as required for safety or conformance to governing laws. The cost of bracing, sheathing, or shoring shall be included in the unit price bid for the structure.

ISSUED FOR BID

d. All bracing, sheathing, or shoring involved in the construction of this item shall be removed by the Contractor after the completion of the structure. Removal shall not disturb or damage finished structure. The cost of removal shall be included in the unit price bid for the structure.

e. After excavation is completed for each structure, the Contractor shall notify the Program Manager. No concrete or reinforcing steel shall be placed until the Program Manager has approved the depth of the excavation and the character of the foundation material.

751-3.2 Brick structures. Not used.

751-3.3 Concrete structures. Concrete structures which are to be cast-in-place within the project boundaries shall be built on prepared foundations, conforming to the dimensions and shape indicated on the plans. The construction shall conform to the requirements specified in Item P-610. Any reinforcement required shall be placed as indicated on the plans and shall be approved by the Program Manager before the concrete is placed.

751-3.4 Precast concrete structures. Precast concrete structures shall be furnished by a plant meeting National Precast Concrete Association Plant Certification Program or another Program Manager approved third party certification program.

Precast concrete structures shall conform to ASTM C478. Precast concrete structures shall be constructed on prepared or previously placed slab foundations conforming to the dimensions and locations and structural loading specifications shown on the plans. All precast concrete sections necessary to build a completed structure shall be furnished. The different sections shall fit together readily. Joints between precast concrete risers and tops shall be full-bedded in cement mortar and shall utilize a rubber gasket per ASTM C443. Concrete mortar shall be used to seal joints after the installation of the gasket material on the interior and exterior walls between all precast manhole sections. The top of the upper precast concrete section shall be suitably formed and dimensioned to receive the metal frame and cover or grate, or other cap, as required. Provision shall be made for any connections for lateral pipe, including drops and leads that may be installed in the structure. The flow lines shall be smooth, uniform, and cause minimum resistance to flow. The metal or metal encapsulated steps that are embedded or built into the side walls shall be aligned and placed in accordance to ASTM C478. When a metal ladder replaces the steps, it shall be securely fastened into position.

751-3.5 Corrugated metal structures. Not used.

751-3.6 Inlet and outlet pipes. Inlet and outlet pipes shall extend through the walls of the structures a sufficient distance beyond the outside surface to allow for connections. They shall be cut off flush with the wall on the inside surface of the structure, unless otherwise directed. For concrete or brick structures, mortar shall be placed around these pipes to form a tight, neat connection.

751-3.7 Placement and treatment of castings, frames, and fittings. All castings, frames, and fittings shall be placed in the positions indicated on the plans or as directed by the Program Manager, and shall be set true to line and elevation. If frames or fittings are to be set in concrete or cement mortar, all anchors or bolts shall be in place before the concrete or mortar is placed. The unit shall not be disturbed until the mortar or concrete has set.

After the frames or fittings have been set in final position, the concrete or mortar shall be allowed to harden for seven (7) days before the grates or covers are placed and fastened down.

751-3.8 Installation of steps. The steps shall be installed as indicated on the plans or as directed by the Program Manager. When the steps are to be set in concrete, they shall be placed and secured in position before the concrete is placed. When the steps are installed in brick masonry, they shall be placed as the masonry is being built. The steps shall not be disturbed or used until the concrete or mortar has hardened.

for at least seven (7) days. After seven (7) days, the steps shall be cleaned and painted, unless they have been galvanized.

When steps are required with precast concrete structures they shall meet the requirements of ASTM C478. The steps shall be cast into the side of the sections at the time the sections are manufactured or set in place after the structure is erected by drilling holes in the concrete and cementing the steps in place.

When steps are required with corrugated metal structures, they shall be welded into aligned position at a vertical spacing of 12 inches.

Instead of steps, prefabricated ladders may be installed. For brick or concrete structures, the ladder shall be held in place by grouting the supports in drilled holes. For metal structures, the ladder shall be secured by welding the top support to the structure and grouting the bottom support into drilled holes in the foundation or as directed by the Program Manager.

751-3.9 Backfilling.

a. After a structure has been completed, the area around it shall be backfilled with approved material, in horizontal layers not to exceed 8 inches in loose depth, and compacted to the density required in Item P-152 or P-219 as shown in the plans. Each layer shall be deposited evenly around the structure to approximately the same elevation. The top of the fill shall meet the elevation shown on the plans or as directed by the Program Manager. Backfill may also consist of P-153, controlled low strength material, at the discretion and with approval of the Program Manager.

b. Backfill shall not be placed against any structure until approved by the Program Manager. For concrete structures, approval shall not be given until the concrete has been in place seven (7) days, or until tests establish that the concrete has attained sufficient strength to withstand any pressure created by the backfill and placing methods.

c. Backfill shall not be measured for direct payment. Performance of this work shall be considered an obligation of the Contractor covered under the contract unit price for the structure involved.

751-3.10 Cleaning and restoration of site. After the backfill is completed, the Contractor shall dispose of all surplus material, dirt, and rubbish from the site. Surplus dirt may be deposited in embankments, shoulders, or as approved by the Program Manager. The Contractor shall restore all disturbed areas to their original condition. The Contractor shall remove all tools and equipment, leaving the entire site free, clear, and in good condition.

METHOD OF MEASUREMENT

751-4.1 Manholes, inlets, and trench drains shall be measured by the unit specified on the plans.

BASIS OF PAYMENT

751-5.1 The accepted quantities of storm drain manholes and storm drain inlets will be paid for at the contract unit price per each when completed and in place. Trench drains will be paid for at the contract unit price per linear foot when completed and in place. This price shall be full compensation for furnishing all materials and for all preparation, selective demolition, excavation, granular base, backfilling and placing of the materials; furnishing and installation of such connections to pipes and other structures as may be required to complete the item as shown on the plans; and for all labor equipment, dewatering, castings, concrete, steps, tools and incidentals necessary to complete the structure.

ISSUED FOR BID

Payment will be made under:

Item D-751-5.1	Storm Drain Manhole (5' Diameter, > 4' - 8' Depth)
Item D-751-5.2	Storm Drain Manhole (6' Diameter, > 4' - 8' Depth)
Item D-751-5.3	Storm Drain Inlet (4'x4', > 4' - 8' Depth)
Item D-751-5.4	Trench Drain (All Depths)

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM A27	Standard Specification for Steel Castings, Carbon, for General Application
ASTM A47	Standard Specification for Ferritic Malleable Iron Castings
ASTM A48	Standard Specification for Gray Iron Castings
ASTM A123	Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A283	Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates, Shapes, and Bars
ASTM A536	Standard Specification for Ductile Iron Castings
ASTM A897	Standard Specification for Austempered Ductile Iron Castings
ASTM C32	Standard Specification for Sewer and Manhole Brick (Made from Clay or Shale)
ASTM C144	Standard Specification for Aggregate for Masonry Mortar
ASTM C150	Standard Specification for Portland Cement
ASTM C443	Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
ASTM C478	Standard Specification for Precast Reinforced Concrete Manhole Sections
ASTM C913	Standard Specification for Precast Concrete Water and Wastewater Structures.

American Association of State Highway and Transportation Officials (AASHTO)

AASHTO M36	Standard Specification for Zinc Coated (Galvanized) Corrugated Iron or Steel Culverts and Underdrains Corrugated Steel Pipe, Metallic-Coated, for Sewers and Drains
------------	---

END OF ITEM D-751

ISSUED FOR BID

PAGE INTENTIONALLY BLANK

ISSUED FOR BID

**SECTION 03250:
BENTONITE WATERSTOP**

PART 1: GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract Documents, including General and Supplementary Conditions, and Division 1 General requirements, apply to the work of this section.

1.02 WORK SUMMARY

- A. Furnish and install expanding bentonite-based waterstop as specified herein, illustrated on project drawings, or as required to complete the work to comply with waterproofing warranty requirements.

1.03 QUALITY ASSURANCE

- A. Verification of Details: Contractor to notify the Architect immediately of any detail, note, or specification which does not comply with current manufacturer's installation requirements
- B. Adhesion: Bentonite waterstop is not a self-adhering product. Adhesive is required to secure bentonite waterstop. Mechanical fasteners can be used in conjunction with adhesive, but should not be used solely to secure the waterstop.
- C. Installation Instructions: Components and installation procedures shall be in accordance with current manufacturer's printed specifications and recommendations. Verify technical data submittals are the most current with manufacturer
- D. Expansion Joints: Bentonite waterstop is not designed, nor intended for waterproofing or sealing expansion joints. Responsibility of waterproofing expansion joints is of others.
- E. Concrete: Concrete shall be structural grade quality with a minimum 3000 psi tensile strength.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's product data, with complete general and specific installation instructions, recommendations, and limitations.
- B. NSF Standard 61 Certification: Submit Official NSF Listing for waterstop confirming that the products conforms to the requirements of NSF Standard 61 – Drinking Water System Components –Health Effects.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in factory sealed and labeled packaging. Sequence deliveries to avoid delays, while minimizing on-site storage. Handle and store following manufacturer's instructions, recommendations and material safety data sheets. Protect from construction operation related damage, as well as, damage from weather, excessive temperatures and prolonged sunlight. Remove damaged material from site and dispose of in accordance with applicable regulations.

PART 2 - PRODUCTS

2.01 MANUFACTURER

- A. Provide Waterstop-RX bentonite waterstop and Cetseal adhesive as manufactured by Colloid Environmental Technologies (or Equal)

2.02 MATERIALS

- A. Waterstop shall consist of sodium bentonite and butyl rubber compound formed into uniform coils.
- B. NSF Certified: Bentonite waterstop shall be certified by NSF International to conform to the requirements of NSF Standard 61 – Drinking Water System Components – Health Effects.

C. BENTONITE WATERSTOPS

1. WATESTOP-RX 101T: 1-1/4" x 1/2" x 20" trapezoidal rolls of flexible strip of bentonite and butyl rubber compound with a reinforcing poly scrim for use in concrete construction joints - not designed for expansion joints.

D. ADHEISIVE

1. CETSEAL: A multipurpose UV stable single component polyether moisture cure sealant / adhesive.

PART 3 – EXECUTION

- A. Comply with contract documents and manufacturer's product data, including product application and installation instructions.

3.01 SUBSTRATE INSPECTION AND CONDITIONS

- A. The installer shall examine conditions of substrates and other conditions under which this section work is to be performed and notify the contractor, in writing, of circumstances detrimental to the proper completion of the work. Do not proceed with work until unsatisfactory conditions are corrected and are acceptable for compliance with manufacturer's warranty requirements.
- B. Installation shall not proceed when work areas are flooded or wet to the extent that would cause bentonite waterstop to hydrate prior to concrete encapsulation.

3.02 SURFACE PREPARATION

- A. Remove dirt, debris, oil, grease, cement laitance, or other foreign matter which will impair or negatively affect the installation of the waterstop. Protect adjacent material surfaces from damage or contamination from during installation operations.

3.03 GENERAL INSTALLATION GUIDELINES

- A. Install bentonite waterstop in all applicable vertical and horizontal cast-in-place concrete construction joints; and around applicable penetrations and structural members. Place bentonite waterstop to allow for minimum 3" (75 mm) concrete coverage on all sides.
- B. Apply continuous bead of adhesive (typical bead diameter 3/16" (5 mm)) to dry, smooth concrete surface maintaining a minimum 3" (75 mm) depth within the concrete joint.
- C. Remove release paper from coil of bentonite waterstop. Firmly press the entire length of bentonite waterstop into the adhesive bead; resulting in the adhesive bead spreading to coat most of the bottom of the waterstop. Verify 3" (75 mm) minimum concrete coverage will be maintained over entire placement of waterstop. Place in maximum practical lengths to minimize coil end joints.
- D. Tightly butt coil ends together to form continuous waterstop. Do not overlap coil ends. Where required, cut coils with sharp knife or utility blade to fit coil ends together without overlapping.

- E. Following Steps 1-3, install waterstop around all applicable through wall pipes and mechanical penetrations; and around all applicable structural elements like metal H-Piles through the slab.
- F. Protect installed waterstop from prehydration prior to concrete placement and product encapsulation. Replace any waterstop material that exhibit significant expansion prior to concrete encapsulation.

3.04 CLEAN UP

- A. Clean areas where adjacent finished surfaces are soiled by work of this Section. Remove all tools, equipment and remaining product on-site. Dispose of section work debris and damaged product following all applicable regulations.

END OF SECTION

THIS PAGE LEFT BLANK INTENTIONALLY

**SECTION 03300:
CAST-IN-PLACE CONCRETE**

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
 - 1. Footings.
 - 2. Grade Beams.
 - 3. Retaining Walls.
 - 4. Slabs-on-grade.
 - 5. Suspended slabs.
 - 6. Equipment "Housekeeping" Pads.
 - 7. Fill for Steel Pan Stairs.
- B. Related Sections:
 - 1. Division 02 "Earthwork" for drainage fill under slabs-on-grade.
 - 2. Division 02 "Asphaltic Concrete Paving" for concrete pavement.
 - 3. Division 02 "Concrete Curbs, Gutters and Sidewalks" for decorative concrete walks.
 - 4. Division 03: "Architectural Precast Concrete", for precast concrete panels and trim.
 - 5. Division 07: "Sheet Waterproofing" for waterproofing between mud slab and Structural Slab on Grade

1.2 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Sustainability Submittals:
 - 1. Provide documentation indicating compliance with the requirements of the State of Tennessee Sustainable Design Guidelines (SDG).
- C. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
 - 1. Indicate amounts of mixing water to be withheld for later addition at Project site.
 - 2. Mix submittals must conform to chapter 5 of ACI 318 for selection and documentation of concrete proportions.

- D. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
- E. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer detailing fabrication, assembly, and support of formwork.
 - 1. Shoring and Re-shoring: Indicate proposed schedule and sequence of stripping formwork, shoring removal, and re-shoring installation and removal.
- F. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
 - 1. Location of construction joints is subject to approval of the Architect.
- G. Samples: For water stops and vapor retarder.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer, manufacturer and testing agency.
- B. Welding certificates.
- C. Material Certificates: For each of the following, signed by manufacturers:
 - 1. Cementitious materials.
 - 2. Admixtures.
 - 3. Form materials and form-release agents.
 - 4. Steel reinforcement and accessories.
 - 5. Water stops.
 - 6. Curing compounds.
 - 7. Floor and slab treatments.
 - 8. Bonding agents.
 - 9. Adhesives.
 - 10. Vapor retarders.
 - 11. Semi-rigid joint filler.
 - 12. Joint-filler strips.
 - 13. Repair materials.
- D. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
 - 1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.
- E. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.
- F. Field quality-control reports.
- G. Minutes of pre-installation conference.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.
- B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94 requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- C. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
 - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
 - 2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.
- D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.
- E. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code - Reinforcing Steel."
- F. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5 and Section 7.
 - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- G. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.
- H. Mockups: Cast concrete slab-on-grade and formed-surface panels to demonstrate typical joints, surface finish, texture, tolerances, floor treatments, and standard of workmanship.
 - 1. Build panel approximately 200 sq. ft. for slab-on-grade and 100 sq. ft. for formed surface in the location indicated or, if not indicated, as directed by Architect.
 - 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- I. Pre-installation Conference: Conduct conference at Project site.
 - 1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixtures.
 - c. Ready-mix concrete manufacturer.
 - d. Concrete subcontractor.
 - e. Special concrete finish subcontractor.

2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semi-rigid joint fillers, forms and form removal limitations, shoring and reshoring procedures, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.
- B. Water stops: Store water stops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
 1. Plywood, metal, or other approved panel materials.
 2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
 - a. High-density overlay, Class 1 or better.
 - b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
 - c. Structural 1, B-B or better; mill oiled and edge sealed.
 - d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.
- B. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.
- C. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.
- D. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- E. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
 1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
 2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.
 3. Furnish ties with integral water-barrier plates to walls indicated to receive damp-proofing or waterproofing.

2.2 STEEL REINFORCEMENT

- A. Recycled Content of Steel Products: Meet requirements of the State of Tennessee Sustainable Design Guidelines (SDG) for post-consumer and pre-consumer recycled content.

- B. Reinforcing Bars: ASTM A 615, Grade 60, deformed.
- C. Steel Bar Mats: ASTM A 184, fabricated from ASTM A 615, Grade 60, deformed bars, assembled with clips.
- D. Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets.

2.3 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: ASTM A 615, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.
- B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
 - 1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
 - 2. Laying wire mesh on the bottom of the slab and pulling it up during concrete placement will not be tolerated. Wire mesh must be supported on bars and chairs to keep it in position prior to and during concrete placement.
- C. Mechanical Bar Splices: Mechanical couplers capable of developing in tension or compression at least 125% of the yield strength of the rebar.
 - 1. Subject to compliance with requirements, provide products of one of the following manufacturers:
 - a. Erico International, Inc.
 - b. Dayton Superior Corp.
 - c. BarSplice Products, Inc.

2.4 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
 - 1. Portland Cement: ASTM C 150, Type I,. Supplement with the following:
 - a. Fly Ash: ASTM C 618, Class F.
- B. Normal-Weight Aggregates: ASTM C 33, coarse aggregate or better, graded. Provide aggregates from a single source.
 - 1. Maximum Coarse-Aggregate Size: Minimum of the following:
 - a. 1-1/2 inches nominal, maximum.
 - b. 1/5 of the narrowest dimension between formed surfaces.
 - c. Or, 3/4 of clear spacing between reinforcing bars.
 - 2. Course aggregate: Clean crushed limestone.
 - 3. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Water: ASTM C 94 and potable.

2.5 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260.
- B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 - 1. Water-Reducing Admixture: ASTM C 494, Type A.
 - 2. Retarding Admixture: ASTM C 494, Type B.
 - 3. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
 - 4. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.
 - 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494, Type G.
 - 6. Plasticizing and Retarding Admixture: ASTM C 1017, Type II.
- C. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C 494, Type C.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Axim Italcementi Group, Inc.; CATEXOL CN-CI.
 - b. BASF Construction Chemicals - Building Systems; Rheocrete CNI.
 - c. Grace Construction Products, W. R. Grace & Co.; DCI.
 - d. Sika Corporation; Sika CNI.
- D. Non-Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, non-set-accelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. BASF Construction Chemicals - Building Systems; Rheocrete 222+.
 - b. Grace Construction Products, W. R. Grace & Co.; DCI-S.
 - c. Sika Corporation; FerroGard 901.
- E. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black, non-fading, and resistant to lime and other alkalis.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. ChemMasters.
 - b. Davis Colors.
 - c. Dayton Superior Corporation.
 - d. Hoover Color Corporation.
 - e. Lambert Corporation.
 - f. QC Construction Products.
 - g. Rockwood Pigments NA, Inc.

- h. Scofield, L. M. Company.
 - i. Solomon Colors, Inc.
2. Color: As selected by Architect from manufacturer's full range.

2.6 BENTONITE SEAL

Waterstop shall consist of sodium bentonite and butyl rubber compound formed into uniform coils.

NSF Certified: Bentonite waterstop shall be certified by NSF International to conform to the requirements of NSF Standard 61 – Drinking Water System Components – Health Effects.

The design is based on WATERSTOP-RX 101: 1" x 3/4" x 16'8" rolls of a flexible strip of bentonite and butyl rubber compound for use in concrete construction joints and Cetseal adhesive as manufactured by Colloid Environmental Technologies Company (CETCO), 2870 Forbs Ave, Hoffman Estates, IL 60192, USA. Phone: (847) 851-1800; Fax: (847) 851-1899; Web-site: <http://www.cetco.com>.

2.7 VAPOR RETARDERS

- A. Sheet Vapor Retarder: ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.
1. Products: Subject to compliance with requirements, provide one of the following:
- a. Fortifiber Building Systems Group; Moistop Ultra 15.
 - b. Grace Construction Products, W. R. Grace & Co.; Florprufe 120.
 - c. Meadows, W. R., Inc.; Perminator 15 mil.
 - d. Raven Industries Inc.; Vapor Block 15.
 - e. Reef Industries, Inc.; Griffolyn 15 mil Green.
 - f. Stego Industries, LLC; Stego Wrap 15 mil Class A.

2.8 LIQUID FLOOR TREATMENTS

- A. VOC Content: Liquid floor treatments shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or siliconate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
- a. ChemMasters; Chemisil Plus.
 - b. Conspec by Dayton Superior; Intraseal.
 - c. Curecrete Distribution Inc.; Ashford Formula.
 - d. Dayton Superior Corporation; Day-Chem Sure Hard (J-17).
 - e. Euclid Chemical Company (The), an RPM company; Euco Diamond Hard.
 - f. L&M Construction Chemicals, Inc.; Seal Hard.
 - g. Meadows, W. R., Inc.; LIQUI-HARD.

- C. Penetrating Liquid Floor Treatments for Polished Concrete Finish: Clear, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; that penetrates, hardens, and is suitable for polished concrete surfaces.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Advanced Floor Products; Retro-Plate 99.
 - b. L&M Construction Chemicals, Inc.; FGS Hardener Plus.
 - c. QuestMark, a division of CentiMark Corporation; DiamondQuest Densifying Impregnator Application.

2.9 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Axim Italcementi Group, Inc.; CATExOL CimFilm.
 - b. BASF Construction Chemicals - Building Systems; Confilm.
 - c. ChemMasters; SprayFilm.
 - d. Conspec by Dayton Superior; Aquafilm.
 - e. Dayton Superior Corporation; Sure Film (J-74).
 - f. Euclid Chemical Company (The), an RPM company; Eucobar.
 - g. L&M Construction Chemicals, Inc.; E-CON.
 - h. Meadows, W. R., Inc.; EVAPRE.
 - i. Sika Corporation; SikaFilm.
 - j. Symons by Dayton Superior; Finishing Aid.
 - 2. VOC Content: Curing and sealing compounds shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, 18 to 25 percent solids, non-dissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. BASF Construction Chemicals - Building Systems; Kure-N-Seal W.
 - b. ChemMasters; Safe-Cure Clear.
 - c. Dayton Superior Corporation; Safe Cure and Seal (J-19).
 - d. Euclid Chemical Company (The), an RPM company; Diamond Clear VOX; Clearseal WB STD.

- e. Kaufman Products, Inc.; SureCure Emulsion.
 - f. Lambert Corporation; Glazecote Sealer-20.
 - g. L&M Construction Chemicals, Inc.; Dress & Seal WB.
 - h. Meadows, W. R., Inc.; Vocomp-20.
 - i. Symons by Dayton Superior; Cure & Seal 18 Percent E.
2. VOC Content: Curing and sealing compounds shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- F. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
- a. BASF Construction Chemicals - Building Systems; Kure-N-Seal 25 LV.
 - b. ChemMasters; Spray-Cure & Seal Plus.
 - c. Dayton Superior Corporation; Day-Chem Cure and Seal (J-22UV).
 - d. Euclid Chemical Company (The), an RPM company; Super Diamond Clear; LusterSeal 300.
 - e. Kaufman Products, Inc.; Sure Cure 25.
 - f. Lambert Corporation; UV Super Seal.
 - g. L&M Construction Chemicals, Inc.; Lumiseal Plus.
 - h. Meadows, W. R., Inc.; CS-309/30.
2. VOC Content: Curing and sealing compounds shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- G. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
- a. BASF Construction Chemicals - Building Systems; Kure 1315.
 - b. ChemMasters; Polyseal WB.
 - c. Conspec by Dayton Superior; Sealcure 1315 WB.
 - d. Euclid Chemical Company (The), an RPM company; Super Diamond Clear VOX; LusterSeal WB 300.
 - e. Kaufman Products, Inc.; Sure Cure 25 Emulsion.
 - f. Lambert Corporation; UV Safe Seal.
 - g. L&M Construction Chemicals, Inc.; Lumiseal WB Plus.
 - h. Meadows, W. R., Inc.; Vocomp-30.
 - i. Symons by Dayton Superior; Cure & Seal 31 Percent E.
2. VOC Content: Curing and sealing compounds shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.10 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

ISSUED FOR BID/CONSTRUCTION

03300
PAGE 9

- B. Semi-rigid Joint Filler: Two-component, semi-rigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 per ASTM D 2240.
- C. Bonding Agent: ASTM C 1059/C 1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- D. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:
 - 1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
- E. Reglets: Fabricate reglets of not less than 0.022-inch- thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.
- F. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

2.11 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
 - 4. Compressive Strength: Not less than 4000 psi at 28 days when tested according to ASTM C 109.
- B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
 - 4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109.
- C. Structural Repair Mortar: Polymer-Modified, Cementitious Patching Mortar. Packaged, dry mix complying with ASTM C 928, that contains a non-redispersible latex additive as either a dry powder or a separate liquid that is added during mixing.
 - 1. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Euclid Chemical Company (The); DuralTop Gel.
 - b. MBT Protection and Repair, Div. of BASF; Emaco R350 CI.
 - c. Sika Corporation; SikaTop 123 Plus.

- d. Sto Corp., Concrete Restoration Division; Sto Overhead Mortar with CI.

2.12 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Cementitious Materials: Use fly ash, and/or, pozzolan, as needed to reduce the total amount of portland cement, which would otherwise be used, by not more than 15 percent.
- C. Limit water-soluble, chloride-ion content in hardened concrete to 0.06 percent by weight of cement.
- D. Admixtures: Use admixtures according to manufacturer's written instructions.
1. Use water-reducing, high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
 4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.
- E. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

2.13 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Footings, grade beams, sidewalks, retaining walls, any concrete exposed to weather: Proportion normal-weight concrete mixture as follows:
1. Minimum Compressive Strength: 4500 psi at 28 days.
 2. Maximum Water-Cementitious Materials Ratio: 0.45.
 3. Slump Limit: 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.
 4. Air Content:
 - a. 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.
 - b. 6 percent, plus or minus 1.5 percent at point of delivery for 1-inch and 3/4-inch nominal maximum aggregate size.
- B. Slabs-on-Grade, mechanical housekeeping pads, and fill for metal stair pans: Proportion normal-weight concrete mixture as follows:
1. Minimum Compressive Strength: 4500 psi at 28 days.
 2. Minimum Cementitious Materials Content: 520 lb/cu. yd..
 3. Slump Limit: 4 inches, plus or minus 1 inch.
 4. Air Content: Do not allow air content of trowel-finished floors to exceed 2 percent.

2.14 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.15 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94 and ASTM C 1116, and furnish batch ticket information.
1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION**3.1 FORMWORK**

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:
1. Class A, 1/8 inch for smooth-formed finished surfaces.
 2. Class C, for other concrete surfaces.
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
1. Install keyways, reglets, recesses, and the like, for easy removal.
 2. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- H. Chamfer exterior corners and edges of permanently exposed concrete.
- I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

- L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
 - 2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
 - 3. Install dovetail anchor slots in concrete structures as indicated.

3.3 REMOVING AND RE-USING FORMS

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.
 - 1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 90 percent of its 28-day design compressive strength.
 - 2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 VAPOR RETARDERS

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.
 - 1. Lap joints 6 inches and seal with manufacturer's recommended tape.
- B. Bituminous Vapor Retarders: Place, protect, and repair bituminous vapor retarder according to manufacturer's written instructions.

3.5 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
 - 1. Weld reinforcing bars according to AWS D1.4, where indicated.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.6 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
 - 2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
 - 3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
 - 4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 - 5. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
 - 6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
 - 7. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

3.7 BENTONITE SEAL

- A. Bentonite Seal: Install with Cetseal in construction joints and at other joints indicated per manufacturer's written instructions to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed Bentonite seals during progress of the Work. Field fabricate joints in Bentonite seals according to manufacturer's written instructions.

3.8 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.
- C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
 1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
 1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 2. Maintain reinforcement in position on chairs during concrete placement.
 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 4. Slope surfaces uniformly to drains where required.
 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleed water appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
 1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen sub-grade or on sub-grade containing frozen materials.
 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- G. Hot-Weather Placement: Comply with ACI 301 and as follows:
 1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 2. Fog-spray forms, steel reinforcement, and sub-grade just before placing concrete. Keep sub-grade uniformly moist without standing water, soft spots, or dry areas.

3.9 FINISHING FORMED SURFACES

- A. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 - 1. Apply to concrete surfaces exposed to public view.
- B. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:
 - 1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
- C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.10 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, re-straightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in one direction.
 - 1. Apply scratch finish to surfaces to receive mortar setting beds for bonded cementitious floor finishes.
- C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and re-straighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
 - 1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
 - 2. Finish surfaces to the following tolerances, according to ASTM E 1155, for a randomly trafficked floor surface:
 - a. Specified overall values of flatness, F(F) 30; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 15; for suspended slabs.
 - 3. Finish and measure surface so gap at any point between concrete surface and an unlevelled, freestanding, 10-ft.- long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/8 inch.
- D. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.
 - 1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

3.11 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place

- construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
 - C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.
 - D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel finish concrete surfaces.

3.12 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
 - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.
4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.13 LIQUID FLOOR TREATMENTS

- A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.
 1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
 2. Do not apply to concrete that is less than three days' old.
 3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.
- B. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller according to manufacturer's written instructions.

3.14 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
 1. Defer joint filling until concrete has aged at least six months. Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.
- C. Install semi-rigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.15 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete. Limit cut depth to 3/4 inch. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
 2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 2. After concrete has cured at least 14 days, correct high areas by grinding.
 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
 4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
 5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
 7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.16 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
- B. Inspections:
 - 1. Steel reinforcement placement.
 - 2. Steel reinforcement welding.
 - 3. Headed bolts and studs.
 - 4. Verification of use of required design mixture.
 - 5. Concrete placement, including conveying and depositing.
 - 6. Curing procedures and maintenance of curing temperature.
 - 7. Verification of concrete strength before removal of shores and forms from beams and slabs.
- C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
 - 1. Testing Frequency:
 - a. Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.
 - b. Obtain at least one composite sample for each 5,000 square feet of surface area for slabs or walls.
 - c. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 - 2. Slump: ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 - 3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - 4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
 - 5. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - 6. Compression Test Specimens: ASTM C 31.
 - a. Cast and laboratory cure three sets of two standard cylinder specimens for each composite sample.
 - b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.
 - 7. Compressive-Strength Tests: ASTM C 39; test one set of two laboratory-cured specimens at 7 days, one set of two specimens at 28 days, holding the last set of two specimens in reserve.
 - a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
 - b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

8. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
 9. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
 10. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
 11. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
 12. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods as directed by Architect.
 13. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
 14. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.
- D. Measure floor and slab flatness and levelness according to ASTM E 1155 within 48 hours of finishing.

3.17 PROTECTION OF LIQUID FLOOR TREATMENTS

- A. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.

END OF SECTION

THIS PAGE LEFT BLANK INTENTIONALLY

SECTION 03700 - CONCRETE REHABILITATION**PART 1 - GENERAL****1.01 WORK IN OTHER SECTIONS**

- A. Preparation for painting

1.02 QUALITY ASSURANCE

- A. Manufacturing qualifications:
The manufacturer of the specified product shall have in existence, for a minimum of 10 years, a program of training, certifying, and technically supporting a nationally organized Approved Applicator Contractor Program with annual re-certification of its participants.
- B. Application Contractor qualifications:
Application Contractor shall be an Approved Application Contractor of the manufacturer of the specified product, who has completed a program of instruction in the use of the specified repair material, and will provide a notarized certification from the manufacturer attesting to their Approved Application Contractor status.
- C. Manufacturer's Field Representative
The Manufacturer of the Concrete Rehabilitation System will provide field representation working with the Approved Application Contractor during the material and technique selection process for specific types of repairs. The field representative will visit the project monthly for the duration of the rehabilitation process.
- D. Repair Certification:
The Manufacturer will provide a notarized certificate stating that the repair material meets the specified requirements and have available the manufacturer's current printed literature on the specified product.

1.03 GUARANTEE

- A. The Approved Application Contractor and the Manufacturer shall provide the Owner with a joint and several guarantees on the application and product covered in this specification.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver the specified product in original, unopened containers with the manufacturer's name, labels, product identification, and batch numbers affixed. Store, handle and condition the specified product as recommended by the manufacturer.

1.05 JOB CONDITIONS

- A. Environmental Conditions:
Do not apply material if it is raining or snowing or if they appear to be imminent.
- B. Protection:
Precautions should be taken to avoid damage to or contamination of any surface due to mixing and handling of the specified repair material.

PART 2 - PRODUCTS

As manufactured by Sika Corporation, Lyndhurst, New Jersey. The use of other than the specified product will be considered providing the contractor requests its use in writing to the Architect as provided in Section 01600. This request shall be accompanied by (a) a certificate of compliance from an approved independent testing laboratory that

the proposed substitute product meets or exceeds the specified performance criteria, tested in accordance with the specified test standards; and (b) documented proof that the proposed substitute product has a proven record of performance confirmed by actual field tests and five successful installations that the Architect can investigate.

2.01 BONDING BRIDGE

- A. Sika Armatex 110, an epoxy resin/portland cement adhesive bonding bridge between new portland cement mortar/concrete and hardened portland cement mortar/concrete and as the corrosion protection of reinforcing steel. The material shall not contain asbestos.

1. Performance Criteria

- a. Properties of the mixed epoxy resin/portland cement adhesive.

Pot life: 75-105 minutes

Contact Time: 24 hours

Color: concrete gray

2. Properties of the cured epoxy resin/portland cement adhesive.

- a. Compressive Strength (ASTM C-109)

1 day: 810 psi min.

7 day: 6,200 psi min.

28 days: 8,700 psi min.

- b. Splitting Tensile Strength (ASTM C-496)

28 days: 540 psi min.

- c. Flexural Strength (ASTM C-348)

1100 psi min.

- d. Bond Strength (ASTM C-882 modified) at 14 days.

0 hrs. open time: 2,500 psi min.

24 hrs. open time: 1700 psi min. The epoxy resin/portland cement adhesive shall not produce a vapor barrier.

3. Components

- a. Epoxy resin/portland cement adhesive:

1. Component "A" shall be an epoxy resin/water emulsion containing suitable viscosity control agents. It shall not contain butyl glycidyl ether.
2. Component "B" shall be primarily a water solution of a polyamine.
3. Component "C" shall be a blend of selected portland cement and sands.

2.02 REPAIR MORTAR/CONCRETE

- A. Sika Top 111 polymer-modified portland cement mortar/concrete. The polymer-modified portland cement mortar/cement shall be approved by the United States Department of Agriculture and shall not produce a vapor barrier. The material shall not contain asbestos, chlorides, nitrates, added gypsum, added lime, or high aluminum cements. The material shall be non-combustible, either before or after cure. The polymer-modified portland cement mortar shall be supplied in a factory proportioned unit. The polymer-modified portland cement mortar must be able to be finished with a power trowel. The polymer-modified portland cement mortar must be placeable from 1/2 in. to 1 in. in depth and extendable in greater depths.

1. Performance Criteria, Mortar

- a. Properties of the mixed polymer-modified portland cement mortar:

Working Time: 10-15 minutes

Finishing Time: 20-60 minutes

Color: concrete gray

Flow: 100-200%

- b. Properties of the cured polymer-modified portland cement mortar:

Compressive Strength (ASTM C-109 Modified)

4 hour: 250 psi min.

1 day: 2000 psi min.

28 day: 6400 psi min.

- c. Splitting Tensile Strength (ASTM C-496); at 28 days: 650 psi.

- d. Flexural Strength (Modulus of Rupture)(ASTM C-78) at 28 days: 1500 psi min.

- e. Rapid Freeze/Thaw Durability (ASTM C-666; Procedure A)

- f. Relative Durability Factor at 300 cycles: 90 min. Bond Strength (ASTM C-882 Modified) at 28 days: 2200 psi min.

- g. Thermal Compatibility (ASTM C-884 Modified): passes test min.

- h. Abrasion (Taber Abrader) at 7 days

- i. Weight Loss: 5.6 gm. max. (H-22 wheel; 1000 gm. load: 1000 cycles)

2. Performance Criteria, Concrete

- a. Properties of the polymer-modified portland and cement concrete*:

Compressive Strength (ASTM C-39)

4 hour: 250 psi min.

1 day: 2000 psi min.

28 day: 5200 psi min.

- b. Splitting Tensile Strength (ASTM C-496) at 28 days: 400 psi min.
 - c. Flexural Strength (Modulus of Rupture)(ASTM C-78) at 28 days: 1000 psi min.
Rapid Freeze/Thaw Durability (ASTM C-666; Procedure A)
 - d. Relative Durability Factor at 300 cycles: 90 min.
- * To prepare the polymer-modified portland cement concrete, the factory proportioned unit was extended with 42 lbs. of a minus 1/2 in. or 3/8 in. clean, well-graded, saturated surface dry aggregate, having low absorption and high density. Aggregate shall conform to ASTM C-33.

3. Components

a. Polymer-modified portland cement mortar:

- (1) Component A shall be a liquid polymer emulsion of an acrylic copolymer base and additives. This acrylic copolymer shall have the following properties:

pH: 4.5-6.5

Film Forming Temperature: 73F max.

Tear Strength: 950 psi min.

Elongation at Break: 500% min.

Particle Size: less than 0.1 micron

- (2) Component B shall be a blend of selected portland cements, specially graded aggregates, admixtures for controlling setting time, water reducers for workability, a corrosion inhibitor, and an organic accelerator.

- (3) The ratio of Component A to Component B shall be 1:7.2 by weight.

- b. Aggregate to extend the polymer-modified portland cement mortar shall be a minus 1/2 in. or 3/8 in. clean, well-graded, saturated surface dry material, having low absorption and high density. Aggregate must be approved by the Architect. Aggregate shall conform to ASTM C-33.

PART 3 - EXECUTION

3.01 GENERAL

- A. Adhere to all instructions, directions, recommendations, limitations and cautions contained in the manufacturers current printed literature. Finished work to match surface of existing adjacent areas.

3.02 SURFACE PREPARATION

- A. Mechanically prepare the surface. Areas to be repaired must be clean, sound and free of contaminates. All loose and deteriorated concrete shall be removed by mechanical means approved by the Architect. Saw cut perimeter 1/2" deep. Saw cuts in an irregular pattern following outline of deteriorated area, not parallel to building lines. Areas less than 3 inches square may be chisel cut around perimeter to a depth of 1/2". Chip

concrete substrate to obtain a surface profile no more than + 1/8" with a new fractured aggregate surface. Be sure the area to be repaired is not less than 1/2" in depth. If half of the diameter of the rebar is exposed, chip out behind the reinforcing steel, 1/2" minimum for mortar only and 3 times the largest aggregate size for extended mixes.

3.03 FORMS

- A. All forms shall retain repair material without leakage. Forms shall be lined or coated with release agent for easy removal. All form work shall be approved by the Owner.

3.04 EXISTING JOINTS

- A. Extend all existing control and expansion joints through any patch or overlay. Install new joints at locations shown and as detailed on plan drawings. Install joint filler and sealer as specified and detailed.

3.05 APPLICATION

A. BONDING BRIDGE

1. Mixing and Application

Mixing the epoxy resin: Shake contents of Components "A" and Component "B." Empty all of both components into a clean, dry mixing pail. Mix thoroughly for 30 seconds with a jiffy paddle on a low-speed (400-600 rpm) drill. Slowly add the entire contents of Component "C" while continuing to mix for 3 minutes until uniform with no lumps. Mix only that quantity that can be applied within its pot life.

2. Placement procedure

Apply to approved prepared surface with a stiff-bristle brush, broom or "hopper type" spray equipment.

a. For hand applications

Place fresh, plastic concrete/mortar while the bonding bridge adhesive is wet or dry, up to 24 hours.

b. For machine applications

Allow the bonding bridge adhesive to dry for 12 hours minimum.

3. Polymer-modified mortars/concretes

When the adhesive has dried to pre-saturate the substrate and scrub coat the repair material into the surface.

B. REPAIR MORTAR/CONCRETE

1. Mixing

a. Polymer-modified portland cement mortar

Mix manually or mechanically. Manually mix in a wheelbarrow or mortar box. Mechanically mix in appropriately sized mortar mixer or with a jiffy paddle and low speed (400-600 rpm) drill. Pour approximately 4/5 gal. Component A into the mixing container. Add Component B while continuing to mix. Mix to a uniform consistency for a maximum of three minutes. Add remaining Component A to mix if a more loose consistency is desired. If manual mixing takes more than three minutes mix small quantities. Should smaller quantities be needed, be sure the components are dosed in the correct ratio and that the Component B is uniformly pre-mixed before batching.

b. Polymer-modified portland cement concrete

Pour all, 1 gal., of Component A into the mixing container. Add Component B while continuing to mix. Add correct amount of the pre-approved coarse aggregate, 42 lb/unit maximum, and continue mixing to a uniform consistency. Mixing time should be 3 minute maximum.

2. Placement

- a. At the time of application, the substrate should be saturated surface dry with no standing water. Within 15 minutes of mixing pour the mortar/concrete into the prepared form. Work in a manner to avoid air entrapment. Vibrate the form, as required, to achieve flow and compaction. After the mortar/concrete has achieved its final set, remove any forms and trim or shape exposed mortar/concrete to the desired profile, if required.
- b. Where forming is not required work onto surface to provide a smooth finished surface over entire area requiring treatment. Feather to undamaged surface for uniform finished appearance of entire new and repaired area.
- c. Curing is not required under most conditions. However, if ambient conditions might cause premature surface drying - high winds, high temperatures, direct sunlight, low humidity, etc. - use a fine mist of water, wet burlap, or non-solvent, water- based curing compound, which has been pre-approved by the Architect.

3.06 CLEANING

- A. The uncured polymer-modified portland cement mortar can be cleaned from tools with water. The cured polymer-modified portland cement mortar can only be removed mechanically.
- B. Leave finished work and work area in a neat, clean condition without evidence of spillovers onto adjacent areas.

END OF SECTION

**SECTION 04100
MORTAR**

PART 1: GENERAL

1.01 Work Included:

- A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.
- B. This section includes mortar and grout for the following types of unit masonry:
 - 1. Brick Masonry

1.02 Related Work:

- A. Section 04200 - Unit Masonry

1.03 Quality Assurance:

- A. Obtain mortar ingredients of uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source and producer for each aggregate.

1.04 Submittals:

- A. Provide manufacturer's product data for cement materials and waterproofing admixtures for mortar.
 - 1. Submit daily logs demonstrating proper mix of mortar with waterproof admixtures.
- B. Provide samples showing full range of mortar colors available.

1.05 Delivery, Storage and Handling:

- A. Deliver materials to project in original, unopened containers and in undamaged condition.
- B. Protect glass block from damage, soiling and moisture.
- C. Store cementitious materials off the ground, under cover, and in a dry location.
- D. Store aggregates in a location where required characteristics can be maintained.

PART 2: PRODUCTS

2.01 Mortar and Grout Materials:

- A. Portland Cement shall conform to ASTM C 150, Type I except as follows:
- B. Cement shall be Type M or S.
- C. Hydrated Lime shall conform to ASTM C 207, Type S.
- D. Aggregate shall conform to ASTM C 144 and as follows:
 - 1. Use aggregate graded with 100 percent passing #16 sieve for joints less than 1/4".

- 2. For colored mortar provide aggregate in accordance with manufacturer's recommendations, in combination with other mortar materials, to produce mortar color required.
- E. Aggregate for grout shall conform to ASTM C 404.
- F. Water shall be clean and potable.
- G. Color: Custom color as selected by Architect.

2.02 Mortar and Grout Mixes:

- A. Do not use admixtures including air-entraining agents, accelerators, retarders, water repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
 - 1. Do not lower the freezing point of mortar by use of admixtures or anti-freeze agents.
 - 2. Do not use calcium chloride in mortar or grout.
 - 3. For mortar used in exterior installations, include waterproofing admixture in mortar mix according to manufacturer's instructions.
- B. Combine and thoroughly mix cementitious materials, water, and aggregates in a mechanical batch mixer to produce a stiff but workable consistency in accordance with manufacturer's instructions. Comply with referenced ASTM standards for mixing time and water content.
- C. Mortar for concrete unit masonry shall comply with ASTM C 270 proportion specification and as follows:
 - 1. Limit cementitious materials in mortar to portland cement-lime.
 - 2. Use Type M or S mortar for unit masonry construction.
 - 3. Mortar color shall be as selected by Architect from full range of available colors.
- D. Grout for use in construction of reinforced and non-reinforced unit masonry shall comply with ASTM C 476. Use grout of consistency indicated with a minimum compressive strength of 3000 psi:
 - 1. Use fine grout in spaces less than 2" in horizontal direction.
 - 2. Use course grout in spaces 2" or more in least horizontal dimension.

PART 3: EXECUTION

3.01 Cleaning:

- A. After mortar is thoroughly set and cured, remove large mortar particles with wood paddles and nonmetallic scrape hoes or chisels.
- B. Clean concrete masonry as required to achieve flush and true fit of applied finish as specified.

END OF SECTION

**SECTION 04200:
UNIT MASONRY****PART 1: GENERAL****1.01 Work Included:**

- A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.
- B. This section includes the following types of unit masonry and accessories:
 - 1. Brick
 - 2. Accessories

1.02 Related Work:

- A. Section 04100 - Mortar

1.03 Quality Assurance:

- A. Masonry units should be Memphis International Airport standard glazed brick as provided by ACME Brick. Brick will be owner supplied.

1.04 Submittals:

- A. Submit manufacturer's product data for each different masonry unit and accessory, including certifications that each product complies with specified requirements.
- B. Submit unit masonry samples in small scale form showing full extent of colors and textures available for each type of exposed masonry unit required.
- C. Prior to installation of masonry work, erect a sample wall panel to further verify selections made for color and textural characteristics. Construct panel to comply with the following requirements:
 - 1. Construct 6'-0" long by 4'-0" height mock-up in locations as directed by the Architect.
 - 2. Using materials indicated for final work, construct mock-ups for each type of unit masonry. Mock-up shall include face and back-up wythes as well as reinforcement, insulation, and accessories.
 - 3. Protect mock-ups from the elements with weather resistant membrane.
 - 4. Retain mock-ups in undisturbed condition during construction to represent completed masonry work for qualities of appearance, materials and construction.

1.05 Delivery, Storage and Handling:

- A. Masonry units are housed at storage facility on airport property off Swinnea Rd. Pickup and delivery of units are the responsibility of the contractor. Deliver masonry materials to project in undamaged condition.
- B. Store masonry units above ground, under cover, and in a dry location to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion, and other causes.

- C. Store masonry accessories including metal items to prevent deterioration by corrosion and accumulation of dirt.

1.06 Project Conditions:

- A. Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted:
 - 1. Protect base of walls from rain-splashed mud and mortar splatter by means of coverings spread on ground and over wall surface.
 - 2. Protect sills, ledges, and projections from mortar droppings.
 - 3. Remove immediately any grout, mortar, and soil that come in contact with such masonry.

PART 2: PRODUCTS

2.01 Brick:

- A. Masonry units should be Memphis International Airport standard glazed brick as provided by ACME Brick. Brick will be owner supplied.

2.02 Joint Reinforcement:

- A. Provide ladder type welded-wire prefabricated units with deformed continuous side rods and plain cross rods into straight lengths of not less than 10'-0", with prefabricated corner, and complying with the requirements indicated below:
 - 1. Wire finish shall be manufacturer's standard mill galvanized finish except as otherwise indicated.
 - 3. For masonry not exposed to exterior use zinc-coated galvanized steel wire complying with ASTM A 82 for uncoated wire, and ASTM C 641 for Class 1 zinc coating.
 - 4. Wire size shall be 0.1483" diameter.
 - 5. Space side rods center to center approximately two inches less than nominal width of walls and partitions to provide mortar coverage of not less than 5/8" on joint faces.
 - 6. Space cross rods not more than 16" apart.

2.03 Anchoring Devices:

- A. Provide adjustable anchors complying with the following requirements:
 - 1. Anchors shall comply with ASTM A153 and shall carry a Class B-2 coating.
 - 2 Metal Studs:
 - a. Hot dipped galvanized steel, Hohman & Barnard DW-10-X Byna-tie, seismic clip and continuous wire.
 - b. Provide manufacturer's standard closed cell neoprene gaskets manufactured to fit behind anchor plate and to prevent moisture from penetrating through screw holes to steel studs behind sheathing.

- B. Provide steel anchor bolts with hex nuts and flat washers complying with ASTM A 307, Grade A, hot-dip galvanized to comply with ASTM A 153, Class C, in sizes and configurations required.

2.04 Expansion Joint Material

- A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:
 - 1. Brick Applications - Rapid Soft Joint/Expansion Joint by Dur-O-Wal.
- B. Width of material to be as recommended by the manufacturer for the type and size of masonry in which the joint is to be installed.

2.05 Masonry Cleaners:

- A. Provide manufacturer's standard strength general purpose cleaner designed for new masonry surfaces. Cleaner shall be expressly approved by manufacturer for masonry units being cleaned.

PART 3: EXECUTION

3.01 Preparation:

- A. Wet surfaces of brick made from clay or shale which have ASTM C67 initial rates of absorption of more than 30 grams per 30 sq. in. per minute. Use wetting methods which allow each clay masonry unit to be nearly saturated but surface dry when laid.
- B. Cut masonry units with motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide continuous pattern and to fit adjoining construction. Use full-size units without cutting where possible.
- C. Build cavity and composite walls and other masonry construction to the full thickness shown. Build single-wythe walls to the actual thickness of the masonry units, using units of nominal thickness indicated.
- D. Build chases and recesses as shown or required for the work of other trades. Provide not less than 8 inches of masonry between chase or recess and jamb of openings, and between adjacent chases and recesses.
- E. Before placing reinforcing, remove loose rust, ice and other coatings.
- F. Leave openings for equipment to be installed before completion of masonry. After installation of equipment, complete masonry to match construction adjacent openings.

3.02 Installing Masonry Walls:

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint widths and for accurate locating of openings, movement-type joints, returns, and offsets. Avoid the use of less-than-half-size units at corners, jambs, and where possible at other locations.
- B. Lay up walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with other construction.
- C. Lay exposed masonry in running bond pattern with vertical joint in each course centered on units in courses above and below. Lay concealed masonry with all units in a wythe in running bond. Bond interlock each course of each wythe at corners. Do not use units with less than nominal 4 inch horizontal face dimensions at corners or jambs.

- D. When stopping and resuming work, Rack back $\frac{1}{2}$ unit length in each course. Do not tooth. Clean exposed surfaces of set masonry, wet units lightly as required, and remove loose masonry units and mortar prior to laying fresh masonry.
- E. As construction progresses, build-in items specified under this and other sections of the specifications. Fill in solidly with masonry around built-in items.
 - 1. Fill space between hollow metal frames and masonry solidly with mortar, unless otherwise indicated.
 - 2. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.

3.03 Cavity Walls:

- A. Keep cavity clean of mortar droppings and other materials during construction. Strike joints facing cavity flush.
- B. Tie exterior wythe to masonry back-up with continuous horizontal joint reinforcing, installed in mortar joints at not more than 16" o.c. vertically or horizontally. Maximum misalignment of bed joints from one wythe to the other shall not exceed 1 $\frac{1}{4}$ ". Ties shall have at least two $\frac{3}{16}$ " diameter pintle legs.
- C. Tie exterior wythe to metal stud back-up at not more than one tie for each two square feet of wall area, spaced not more than 24" on center horizontally.

3.04 Mortar Bedding and Joints:

- A. Lay walls with $\frac{3}{8}$ " joints, and maintain joint widths except for minor variations required to maintain bond alignment.
- B. Cut joints flush for masonry walls to be concealed or to be covered by other materials, unless otherwise indicated.
- C. Tool exposed joints slightly concave using a jointer larger than joint thickness, unless otherwise indicated.
- D. Remove masonry units disturbed after laying; clean and reset in fresh mortar. Do not pound corners or jambs to shift adjacent stretcher units which have been set in position. If adjustments are required, remove units, clean off mortar and reset in fresh mortar.

3.05 Horizontal Joint Reinforcement:

- A. Provide continuous horizontal joint reinforcement as indicated. Install longitudinal side rods in mortar for their entire length with a minimum cover of $\frac{5}{8}$ ". Lap reinforcing a minimum of 6".
- B. Cut or interrupt horizontal joint reinforcement at control and expansion joints, unless otherwise indicated.
- C. Reinforce all walls with continuous horizontal joint reinforcing unless specifically noted to be omitted.
- D. Provide continuity at corners and wall intersections by use of prefabricated "L" and "T" sections. Cut and bend reinforcement units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.
- E. Space continuous horizontal reinforcement as follows:
 - 1. For single-wythe walls, space reinforcement at 16" on center vertically, unless otherwise

indicated.

2. For parapets, space reinforcement at 8" on center vertically, unless otherwise indicated.

- F. Reinforce masonry openings greater than one foot wide, with horizontal joint reinforcement placed in two horizontal joints approximately 8" apart, immediately above the lintel and immediately below the sill. Extend reinforcement a minimum of 2'-0" beyond jambs of the opening except at control joints.

3.06 Control and Expansion Joints:

- A. Build-in non-metallic joint fillers where indicated.
- B. Build in horizontal pressure-relieving joints where indicated; construct joints by inserting non-metallic compressible joint filler of width required to permit installation of sealant and backer rod as shown on the drawings or specified herein.
 1. Locate horizontal pressure-relieving joints beneath shelf angles supporting masonry veneer and attached to structure behind masonry veneer.

3.07 Lintels:

- A. Provide steel lintels where shown or wherever openings of more than 1'-0" occur.
- B. Provide minimum bearing of 8" at each jamb, unless otherwise indicated.

3.08 Field Quality Control:

- A. Cold Weather Construction:
 1. Do not lay masonry units that are wet or frozen.
 2. Remove ice or snow formed on masonry bed by carefully applying heat until top surface is dry to the touch.
 3. Remove masonry damaged by freezing conditions.
 4. Perform the following construction procedures while masonry work is progressing. Temperature ranges indicated apply to air temperatures existing at time of installation except for grout. For grout, temperature ranges apply to anticipated minimum night temperatures. In heating mortar and grout materials, maintain mixing temperature selected within 10 degrees F.
 - a. 40 degrees F to 32 degrees F - Heat mixing water to produce mortar temperature between 40 degrees F and 120 degrees F. Follow normal masonry procedures for grout.
 - b. 32 degrees F to 25 degrees F - Heat mixing water and sand to produce mortar temperatures between 40 degrees F and 120 degrees F, maintain temperature of mortar on boards above freezing. Heat grout materials to 90 degrees F to produce in-place grout temperature of 70 degrees F at end of work day.
 - c. No masonry work permitted at temperatures below 32 degrees F.
 5. Protect completed masonry and masonry not being worked on in the following manner. Temperature ranges indicated apply to mean daily air temperatures except for grouted masonry. For grouted masonry, temperatures ranges apply to anticipated minimum night temperatures.
 - a. 40 degrees F to 32 degrees F - Protect masonry from rain or snow for at least 24 hours by covering with weather-resistive membrane.

- b. 32 degrees F to 25 degrees F - Completely cover masonry with weather-resistive membrane for at least 24 hours.
- c. 25 degrees F to 20 degrees F - Completely cover masonry with weather-resistive insulating blankets or similar protection for at least 24 hours, 48 hours for grouted masonry.
- d. 20 degrees F and below - Except as otherwise indicated, maintain masonry temperature above 32 degrees F for 24 hours using enclosures and supplementary heat, electric heating blankets, infrared lamps or other methods proven to be satisfactory. For grouted masonry maintain heated enclosure to 40 degrees F for 48 hours.

B. Hot-Weather Construction:

- 1. Comply with referenced masonry unit standard.

C. Construction Tolerances:

- 1. Variation from Plumb - For vertical lines and surfaces of columns, walls and arises do not exceed 1/4" in 10'-0", or 3/8" in a story height not to exceed 20'-0", nor 1/2" in 40'-0" or more. For external corners, expansion joints, control joints and other conspicuous lines, do not exceed 1/4" in any story or 20'-0" maximum, nor 1/2" in 40'-0" or more. For vertical alignment of head joints do not exceed plus or minus 1/4" in 10'-0".
- 2. Variation from Level - For bed joints and lines of exposed lintels, sills, parapets, horizontal grooves and other conspicuous lines, do not exceed 1/8" between adjacent floor elements in 10'-0" or 1/16" within width of a single unit.
- 3. Variation of Linear Building Line - For position shown in plan and related portion of columns, walls and partitions, do not exceed 1/2" in any bay or 20'-0", maximum, nor 3/4" in 40'-0" or more.
- 4. Variation in Cross-Sectional Dimension - For columns and walls do not exceed minus 1/4" nor plus 1/2".
- 5. Variation in Mortar Joint Thickness - Do not exceed bed joint thickness indicated by more than plus or minus 1/8", with a maximum thickness limited to 1/2". Do not exceed head joint thickness indicated by more than plus or minus 1/8".

3.09 Adjusting and Cleaning:

- A. Remove and replace masonry units that are loose, broken, or otherwise damaged. Provide new units to match adjoining units and install in fresh mortar or grout, pointed to eliminate evidence of replacement.
- B. During the tooling of joints, enlarge any voids or holes, except weepholes, and completely fill with mortar.
- C. Provide final protection and maintain conditions in a manner which ensures unit masonry is without damage and deterioration at time of Substantial Completion.

END OF SECTION

THIS PAGE LEFT BLANK INTENTIONALLY

**SECTION 05120:
STRUCTURAL STEEL**

PART 1 - GENERAL

1.01 SCOPE OF WORK:

- A. Furnishing of, and paying for, all labor, materials, services, appliances, and equipment necessary for the execution, installation, and completion of all work specified herein.
- B. Work Included:
 - 1. Fabrication and erection of all structural steel, as shown on drawings and/or specified herein, including but not necessarily limited to the following all structural steel rolled sections, such as beams, girders, columns, purlins, channels, angles, anchor plates, bearing plates, brackets, braces, loose lintels, shelf angles, anchor bolts, sleeves, bearing plates, inserts, and/or other items incidental to construction, or as normally required to complete the erection and support of all structural steel work specified herein.
 - 2. Loose lintels, shelf angles, anchor bolts, sleeves, bearing plates, inserts, wedge inserts, expansion joint plates, and other incidental items of structural and/or miscellaneous steel as required to be built into concrete or masonry must be provided as indicated on drawings or as specified. At the proper time, these will be furnished to the respective contractor, where applicable, including instructions or templates for installation within masonry and/or concrete construction.
 - 3. All miscellaneous steel members supporting penetrations of roof deck.
 - 4. All connections, erection fittings, and devices required to complete this work.
 - 5. Shop painting and field touch-up painting.
 - 6. All miscellaneous steel angles, beams, rods, and/or braces to be furnished and/or installed for support or bracing of door frames, operable walls, and as shown on the drawings.
 - 7. All other miscellaneous steel appearance items complete with brackets, etc. for complete installation.
- C. Work Furnished but Installed Under Other Sections:
 - a. Section 03300 - Cast in Concrete; anchorages cast in concrete.
 - b. Section 04200 – Unit Masonry Assemblies: anchorages cast in masonry

1.02 RELATED WORK SPECIFIED ELSEWHERE:

- A. Shop drawings, product data, and samples - General Conditions, Article 4, paragraph 4.12 and Section 01340 - Submittals of this Project Manual.
- B. Testing laboratory services - General Conditions, Article 7, paragraph 7.7 and Section 01 45 00 - Quality Control of this Project Manual.
- C. Cast-in-place concrete, including grouting of base plates and bearing plates - Section 03 3000 - Cast-In-Place Concrete of this Project Manual.
- D. Metal deck, including support framing for small openings - Section 05 3000 - Metal Floor and Roof Deck of this Project Manual.

- E. Metal fabrications - Section 05 5000 - Miscellaneous Metal Fabrications of this Project Manual.
- F. Metal stairs – Section 05 5100 – Metal Stairs of this Project Manual
- G. Finish painting – 09 9100 Exterior Painting and 09920 Interior Painting of this Project Manual.

1.03 RELATED DOCUMENTS:

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions, and DIVISION 1 - GENERAL REQUIREMENTS apply to the work of this section.
- B. Use this specification in conjunction with the General Notes and specific directives on the Contract Drawings.

1.04 REFERENCE STANDARDS:

Perform work in accordance with the AISC Specifications and Code of Standard Practice, except as modified herein.

- A. American Institute of Steel Construction (AISC):
 - 1. Manual of Steel Construction, thirteenth edition (2010) and Specifications for Structural Steel Buildings, AISC Specifications (2010) and AISC Code of Standard Practice for Steel Buildings and Bridges, 2010.
 - 2. Quality Criteria and Inspection Standards, third edition (1988).
 - 3. Specifications for Structural Joints Using ASTM A325 or A490 Bolts, 2004.
 - 4. AISC Quality Certification Program.
- B. American Welding Society (AWS):
 - 1. Structural Welding Code (AWS D1.1), including the "Standard Qualification Procedure," Section 5, Part B, "Procedure Qualification."
 - 2. Guide for the Non-destructive Inspection of Welds (ANSI/AWS B1.0 [80]).
 - 3. Guide to Standard for Qualification and Certification of Welding Inspectors (AWS - W1QC).
- C. Research Council on Structural Connections of Engineering Foundation:
Specifications for Structural Joints Using ASTM A325 or A490 Bolts, 2004.
- D. American Society for Testing and Materials (ASTM):
 - 1. ASTM A6-84 General Regulations for Delivery of Rolled Steel Plates, Shapes, Sheet Piling, and Bars for Structural Use.
 - 2. See materials specifications listed under Part 2 - Products of this section of the Project Manual.
- E. Steel Structures Painting Council (SSPC):
A Guide to the Shop Painting of Structural Steel, SSPC AISC.
- F. Industrial Fasteners Institute:

Handbook for Bolt, Nut, and Rivet Standards.

- G. American Society for Non-Destructive Testing (ASNT):
Recommended Practice, (SNT-TC-1A).
- H. No provision of any referenced standard specification, manual, or code (whether or not specifically incorporated by reference in the Contract Documents) will be effective to change the duties and responsibilities of the OWNER, CONTRACTOR, or ENGINEER, or any of their consultants, agents or employees from those set forth in the Contract Documents, nor will it be effective to assign the ENGINEER, or anyone of authority, to supervise or direct the furnishing or performance of the work or any duty or authority to undertake responsibility contrary to the provisions of these Contract Documents.

1.05 QUALIFICATIONS:

- A. Fabricator and erector must have completed a project of similar scope and must have adequate facilities, personnel, and equipment to meet production and quality requirements and to maintain proper job progress. Certification by the AISC Quality Certification Program will provide satisfactory evidence of compliance.
- B. Welding procedures, welders, welding operations, and tack welders must be qualified in accordance with the AWS Structural Welding Code, Section 5.

1.06 RESPONSIBILITY FOR DESIGN:

- A. Where connections are not shown on drawings, the connections must comply with the requirements of the AISC Specifications, paragraph 3.1.3. Where reactions and/or moments are shown on drawings, connections must be designed to accommodate these, subject to review and approval by the Engineer.
- B. Substitutions of member sizes due to non-availability of materials must be of equivalent strength and rigidity to that specified; must be compatible with the design and must be approved by the Engineer after being specifically called to his attention in writing.

1.07 SUBMITTALS:

- A. Submit shop drawings in accordance with Section 01340 - Submittals and the AISC Code, Division 4 clearly indicating profiles, sizes, spacing, and locations of structural members, connections, attachments, anchorages, framed openings larger than eighteen [18"] inches square, size and type of fasteners, cambers, and all other details required for the fabrication and erection of the structural steel.
- B. Submit descriptive data to illustrate the structural steel erection procedure, including the sequence of erection and temporary staying and bracing.
- C. Indicate welded connections using standard AWS welding symbols. Clearly indicate net weld lengths. Submit written description, as required, to illustrate each welding procedure to be performed.
- D. Submit descriptive data for field welding equipment including type, voltage, and amperage.
- E. Submit the following for proof of material compliance:
 - 1. Reports of ladle analysis for all steels.
 - 2. Reports of tensile properties and bend tests for steel shapes, bars, and plates.

3. Certified mill test reports required by applicable ASTM Material Specifications (AISC Code, Division 5). All high-strength steels exceeding 36,000 psi yield point (ASTM A36) must be identified in accordance with the Recommended Procedures for Identification of High-Strength Steels During Fabrication, as adopted by the AISC, (see AISC Code, Section 6.1, "Identification of Material").
4. Submit Certificates of Conformance for:
 - a. Structural steel tubing.
 - b. Shear studs in accordance with AWS Building Code, Article 4.27.
 - c. Filler material for welding.
5. Reports of mechanical properties of headed-stud type shear connectors.
6. Reports of mechanical tests for high-strength threaded fasteners.
- F. Submit manufacturer's literature describing each type of welding stud and arc shield.
- G. Submit inspection and test reports according to article 1.08 below.
- H. Certification of Quality Assurance Program (see 1.08 below).

1.08 QUALITY ASSURANCE:

- A. See Section 01 45 00 - Quality Control of this Project Manual; AISC Code, Section 8 and AISC Specification Section 1.26. Both the fabricator and the erector must maintain a quality assurance program to assure that all work is performed in accordance with these specifications and the AISC Code and Specifications. Certification under the AISC Quality Certification Program will suffice. The AISC Quality Criteria and Inspection Standards, third edition, 1988, will establish acceptable practice, unless otherwise provided by this specification.
- B. It is the responsibility of the Contractor to maintain control of the quality of the materials and workmanship and conformance to the project specifications.
- C. Fabrication/erection inspection and testing of weldments must be provided by the Contractor in accordance with AWS D1.1-83, Section 6. The fabrication/erection inspector(s) must be AWS certified welding inspector(s) in accordance with the provisions of AWS QCI, Standard for Qualifications and Certification of Welding Inspectors.
- D. Provide certification that welding inspectors, welders, welding operators, and tack welders performing the work have satisfactorily passed AWS qualification tests within the previous twelve [12] months prior to starting the work. If re-certification of welders is required, it will be the Contractor's responsibility to ensure compliance. Each welder working on the project must mark his identification symbol at each weldment completed, whether in the shop or field.
- E. The fabrication and erection of structural steel (per AWS D1.1, Section 6) will be subject to verification, testing, and inspection by the Owner or his representative, the Engineer, and/or the testing laboratory specified in Section 01 45 00 - Quality Control. Such verification inspections do not relieve the Contractor and his supplier of responsibility for conforming to the Contract Document requirements.
- F. The testing agency (see Section 01 45 00 - Quality Control) will inspect or test structural steel at the fabricating plant before shipment to the project as follows:

1. Base Material:
 - a. Verify chemical composition of all steel.
 - b. Verify mechanical properties of all steel (ASTM A370).
2. Fabrication:
 - a. Verify qualification of shop procedures for type of steel construction specified or elected by fabricator.
 - b. Inspect shop-fabricated structural steel members and assemblies for conformance with the requirements specified.
 - c. Test requirements for materials specified herein or incorporated in referenced documents may be waived provided certified copies of mill test or test reports from approved laboratories, performed on previously manufactured materials, are submitted and approved. Test reports must be accompanied by notarized certificates from the manufacturer certifying that the tested material was of the same type, quality, and manufacturer as that being supplied for this project. Tests must have been conducted no more than one [1] year prior to the date such materials are submitted for approval. Proper steels must be maintained throughout the fabricating process.
 - d. Inspection of shop welds must be in accordance with Sections 6 and 8.15 of the AWS Structural Welding Code and as follows:
 - I. Visual inspection of all shop welds in accordance with AWS D1.1, 6.5.
 - II. All full penetration welds shall be tested with non-destructive testing methods. The non-destructive testing rate for welds made by an individual welder is permitted to be reduced to 25% of the welds provided the weld inspection reject rate is 5% or less and a minimum of 10% of the total welds are tested. A representative sample of twenty-five percent of all full penetration welds and all questionable quality, full penetration welds must be non-destructive tested by one of the following as appropriate:
 - aa. Liquid penetrate inspection of the shop welds in accordance with AWS D1.1, 6.5 (ASTM E165).
 - bb. Magnetic particle inspection of the shop welds in accordance with AWS D1.1, 6.7.5 (ASTM E105).
 - cc. Radiographic inspection of the shop welds in accordance with AWS D1.1, Part C, Chapter 6, "Inspection" (ASTM E94 and E99).
 - dd. Ultrasonic inspection of the shop welds indicated in accordance with AWS D1.1, Part C, Chapter 6, "Inspection" (ASTM E164).
 - III. Stud welding inspection of shop welded studs must be in accordance with AWS D1.1, 4.26.
 - IV. Five percent (5%) of all fillet welds shall be tested by an approved non-destructive testing method.
 - e. Inspection of Shop Painting:

- I. Surface preparation prior to painting must be visually evaluated for degree of cleaning by comparison with SSPC pictorial standards.
 - II. Measurement of dry film thickness of each coat of shop-applied paint must be in accordance with ASTM D1005-72.
- G. Erection verification inspection and testing to be provided by the testing agency.
- 1. Verification of qualifications of field procedures and personnel.
 - 2. Inspection of erected structural steel work for conformance with the requirements specified.
 - 3. Inspection of field-assembled high-strength, bolted construction must be in accordance with AISC Specification for Structural Joints, Section 6, using ASTM A325 or A490 bolts.
 - 4. Inspection of field welds must be in accordance with AWS Structural Welding Code, Section 6, and paragraph 1.7.7.2D above.
 - 5. Perform non-destructive testing as appropriate for all field welds of questionable quality (or replace weld) and test ten [10%] percent of all full penetration field welds.
 - 6. The fabricator, erector, architects, and structural engineer of record shall receive copies of all inspection reports.
- H. The Contractor must correct deficiencies in structural steel work which inspections and laboratory test reports have indicated to be not in compliance with requirements. Perform additional tests, at Contractor's expense, as may be necessary to reconfirm any non-compliance of original work and as may be necessary to show compliance of corrected work.

1.09 PRODUCT HANDLING:

- A. Delivery of materials to be installed under other sections:
- 1. Anchor bolts and other anchorage devices which are embedded in cast-in-place concrete or masonry construction must be delivered to the project site in time to be installed before the start of cast-in-place concrete operations or masonry work.
 - 2. Provide setting drawings, templates, and directions for the installation of the anchor bolts and other devices.
- B. Storage of Materials:
- 1. Structural steel members which are stored at the project site must be above ground on platforms, skids, or other supports so they are kept out of the mud.
 - 2. Steel must be protected from corrosion.
 - 3. Other materials must be stored in a weather-tight and dry place until ready for use in the work.
 - 4. Packaged materials must be stored in their original, unbroken packages or containers.

PART 2 - PRODUCTS

2.01 MATERIALS AND COMPONENTS:

- A. Refer to AISC Specifications, Section 1.4, "Materials." See structural drawings and General Notes for

specific requirements, unless modified or specified hereafter.

- B. Structural steel must conform to ASTM standards as specified on drawings. See AISC Specifications, Section 1.4.1 for other grades of steel shown on the drawings.
- C. Bolts must conform to AISC Specifications, Section 1.4.4.
 - 1. Unfinished bolts must conform to ASTM A307.
 - 2. High-strength bolts must conform to ASTM A325, A490, or A449.
 - 3. Anchor bolts and nuts must conform to ASTM A36/A36M.
 - 4. High-strength anchor bolts must conform to ASTM 449.
- D. Filler metal and flux for welding must conform to AISC Specifications, Section 1.4.5.
 - 1. AWS A5.1, E70 or E80 unless otherwise approved. Electrodes must be compatible with the base material being welded. Manufacturer's certification must constitute evidence of conformance.
- E. Non-shrink grout for columns and other bearing plates must comply with Section 03300 - Cast-in-Place Concrete of this Project Manual.
- F. This contractor is to furnish male portion of all wedge inserts to be inserted within female section of inserts furnished under Section 03300 - Cast-in-Place Concrete for support of steel members specified herein. Furnish all shims as required for alignment for all members.
- G. Shop paint primer must conform to AISC Code, Section 6.5 and A Guide to Shop Painting of Structural Steel, AISC-SSPC.
 - 1. Dry interior where steel is embedded in concrete, encased in masonry, or protected by membrane or contact type fireproofing are to be left unpainted.
 - 2. Interiors permanently exposed to view, normally dry must conform to SSPC-PS 7.01-64T, "One-Coat Shop Paint System" (SSPC Paint 13).
 - 3. Exteriors permanently exposed to weather must conform to SSPC-PS 1.01 or 1.03-64T, "Oil Base Paint System" (SSPC Paint 14).
 - 4. The Volatile Organic Compounds (VOC) content of all Paint must conform to Tennessee Sustainability Guidelines
 - a. Finish Paint VOC limit is 50 g/L less water
 - b. Anti-corrosive and anti-rust paints applied to interior ferrous metal substrates VOC limit is 250 g/L less water
- H. Headed Stud-Type Shear Connectors: ASTM A-08 Grade 1015 or 1020, cold finished carbon steel with dimensions complying with AISC Specifications
- I. Other materials must conform to the applicable current specifications of the ASTM.

2.02 FABRICATION AND DELIVERY:

- A. Conform to AISC Code, Section 6 and AISC Specifications, Section 1.23.

ISSUED FOR BID/CONSTRUCTION

- B. Fabricate and assemble structural assemblies in the shop to the greatest extent possible. Fabricate items of structural steel in accordance with the approved shop drawings. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence which will expedite erection and minimize field handling of materials. Verify all dimensions prior to fabrication.
- C. Dimensional and straightness tolerances must conform to ASIC Code, Section 6.4.
- D. Provide openings in structural members for other building components as shown on drawings. Locate holes so as not to cause any appreciable reduction in strength of members and reinforce openings with steel plates and/or angles sized and welded in place to restore members to original strength as approved by the Engineer.
- E. All openings through steel floor and roof deck larger than eighteen [18"] inches square are to receive supplemental steel framing by this section of the work.
- F. Cut and mill column ends and bearing plates accurately to ensure full contact of bearing surfaces prior to welding.
- G. Camber horizontal members to accommodate dead load deflections as indicated on the Contract Drawings. See General Notes on structural drawings, AISC Specifications, Section 1.19 and AISC Code, paragraph 6.4.4.
- H. Clean, prepare, and shop prime structural steel members. Do not prime surfaces to be field-welded or to be bolted or in contact with concrete.
- I. Shop and field connections must be bolted, welded, or a combination of these as required to conform to AISC Specifications.
 - 1. Field Connections:
 - a. Bolted in accordance with AISC Specifications, except where welded connections are required or selected.
 - b. High-strength threaded fasteners must be used for bolted connections, except where standard threaded fasteners are permitted.
 - c. Welded connections must conform to AWS D1.1. Non-destructive testing will be required on ten [25%] percent of all full-penetration welds. Welding materials must be of the type required for materials being welded and conform to applicable AWS Specifications.
- J. Bearing Plates must be provided under beams, closures, and girders resting on footings, piers, and walls as shown on the drawings with anchorage devices. Bearing plates must either be attached or loose as required for erection.
- K. Metal Framing Appearance Items:
 - 1. Form members to manufacturer's standard shapes meeting design criteria.
 - 2. Cut right angle connections of framing components to fit squarely against abutting members as shown on the drawings. Weld or bolt as shown.
 - 3. Grind smooth all welds and holes cut in structural members exposed to view after fabricating.
 - 4. All items are to be square, straight, and true to detail in all respects.

5. Fabricate all items as shown on drawings and specified herein. All must present smooth surface for use and appearance.
- L. Shear Connectors: Prepare steel surfaces as recommended by Manufacturer of shear connectors. Weld shear connectors in field, spaced as shown on drawings, to beams and girders in composite construction. Use automatic end welding of headed stud shear connectors in accordance with manufacturer's printed instructions. Hand welding will not be allowed.

PART 3 - EXECUTION

3.01 INSPECTION:

- A. Examine areas and conditions under which structural steel work is to be installed and notify Contractor in writing of conditions detrimental to proper and timely completion of the work.
- B. Do not proceed with work until unsatisfactory conditions have been corrected in an acceptable matter.

3.02 ERECTION:

- A. Check elevations of concrete and masonry bearing surfaces and locations of anchor bolts and similar devices before erection work proceeds and report discrepancies to Contractor and Engineer.
- B. Do not proceed with erection until corrections have been made or until compensating adjustments to structural steel work have been agreed upon with the Designer.
- C. Erect structural steel in accordance with the drawings and as provided in AISC Code, Section 7 and AISC Specifications, Section 1.25, except as hereinafter specified.
- D. Field Assembly:
 1. Steel frames and/or members must be assembled accurately to the lines and elevations indicated and within the erection tolerances specified in AISC Code, Section 7.11.
 2. The various members forming parts of a complete frame or structure after being assembled must be aligned and adjusted accurately before being fastened.
 3. Fastening of splices of compression members must be done after the abutting surfaces have been brought completely into contact.
 4. Bearing surfaces and surfaces which will be in permanent contact must be cleaned before the members are assembled.
 5. Splices will be permitted only where indicated or approved in writing.
- E. Bearing plates for columns, beams, and similar structural members must be aligned with wedges or shims before grouting.
- F. Make adequate provisions for all erection loads and for sufficient temporary bracing to maintain structure safe, plumb, and in true alignment until completion of erection and installation of necessary permanent bracing.
- G. Do not field-cut or alter structural members without the written approval of the Engineer.
- H. Provide temporary shoring and bracing members and connections of sufficient strength to bear imposed loads. Remove temporary members and connections when permanent members are in place.

and final connections are made. Provide temporary guy lines to achieve proper alignment of structures as erection proceeds.

- I. Provide temporary planking and working platforms as necessary to complete work effectively.
- J. Furnish anchor bolts and other connectors required for securing structural steel to foundations and other in-place work. Furnish templates and other devices as necessary for pre-setting bolts and other anchors to accurate locations. Refer to Section 03300 - Cast-in-Place Concrete of this Project Manual for anchor bolt installation in concrete and for masonry installations.
- K. Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of baseplates and bearing plates. Set loose and attached baseplates and bearing plates for structural members on wedges or other adjusting devices.
- L. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims, but if protruding, cut off flush with edge of baseplate or bearing plate prior to packing with grout.
- M. On exposed, welded construction, remove erection bolts, fill holes with plug welds, and grind smooth at exposed surfaces.
- N. Comply with AISC Specifications for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds. Do not enlarge holes in members by burning or by use of drift pins, except in secondary bracing members. Ream holes which must be enlarged to admit bolts.
- O. Do not use gas cutting torches in field for correcting fabrication errors in structural framing. Cutting will be permitted only on secondary members which are not under stress, as acceptable to Engineer. Finish gas-cut sections equal to a sheared appearance when permitted.

3.03 PROTECTION:

- A. Do not use structural units for storage or working platforms until permanently secured into position.
- B. Ensure that construction loads do not exceed carrying capacity of structure.

3.04 FIELD PAINTING TOUCH-UP:

- A. After the erection of all structural and miscellaneous steel members, touch-up paint all abrasions and unpainted areas with the same paint used for the shop painting.
- B. All shelf angles and lintels which will have any part exposed to weather after completion of work will receive prior to erection one [1] finish paint coat by Section 09 9000 - Painting.

3.05 CLEAN-UP:

Remove all debris caused by the subcontract from the work site.

END OF SECTION

**SECTION 05500:
METAL FABRICATIONS**

PART 1 - GENERAL

1.1 SUMMARY

1.2 SECTION INCLUDES:

- A. Steel framing and supports for floor and ceiling mounted toilet partitions.
- B. Steel framing and supports for mechanical and electrical equipment.
- C. Steel framing and supports for applications where framing and supports are not specified in other Sections.
- D. Shelf angles.
- E. Metal ladders.
- F. Miscellaneous steel trim including steel edgings and loading-dock edge angles.
- G. Metal bollards.
- H. Loose bearing and leveling plates for applications where they are not specified in other Sections.
- I. Metal areaway gratings.
- J. Products furnished, but not installed, under this Section:
 - 1. Loose steel lintels.
 - 2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
 - 3. Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections.

1.3 RELATED SECTIONS:

- A. Division 03: Concrete, for installing anchor bolts, steel pipe sleeves, slotted-channel inserts, wedge-type inserts, and other items cast into concrete.
- B. Division 04: Unit Masonry, for installing loose lintels, anchor bolts, and other items built into unit masonry.
- C. Division 05: Structural Steel Framing; Metal Stairs; Decorative Metal Railings.
- D. Division 09: Painting, for exterior fabrications; High-Performance Architectural Coatings, for exterior fabrications.

1.4 PERFORMANCE REQUIREMENTS

- A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

1.5 ACTION SUBMITTALS

- A. Comply with requirements of applicable Division 01 Sections.

- B. Shop Drawings: Show fabrication and installation details for each required metal fabrication except loose lintels, bearing plates, shelf angles and edging angles.
 - 1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

1.6 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code - Steel."
- B. Provide certification that welders to be employed on the Work have satisfactorily passed AWS qualification tests. Certifications shall be current within last 12 months.
- C. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1, "Structural Welding Code - Steel."
 - 2. AWS D1.2, "Structural Welding Code - Aluminum."
 - 3. AWS D1.6, "Structural Welding Code - Stainless Steel."

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

1.8 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorages and steel weld plates and angles for casting into concrete. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.9 DELIVERY, STORAGE AND HANDLING

- A. Comply with requirements of applicable Division 01 Sections.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without pitting, seam marks, roller marks, rolled trade names, or blemishes.

2.2 FERROUS METALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36.
- B. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.
 - 1. Size of Channels: Minimum 1-5/8 by 1-5/8 inches, as indicated.
 - 2. Material: Galvanized steel, ASTM A 653, structural steel, Grade 33, with G90 coating; 0.108-inch nominal thickness.

- C. Steel Tubing: Cold formed, ASTM A500; or hot rolled, ASTM A501.
 - 1. For exterior installations or where so noted, use tubing with hot dip galvanized coating per ASTM A53.
- D. Steel Pipe: ASTM A53; weight as needed for structural loads, but not less than standard weight (schedule 40).
 - 1. Finish: Galvanized for exterior applications or where indicated.
- E. Steel Dowels and Rods: ASTM A36 stainless steel.
- F. Concrete Inserts: Anchors of type indicated below fabricated from corrosion resistant materials capable of sustaining without failure the load imposed within a safety factor of 4, as determined by testing per ASTM E488 by a qualified independent testing agency.
 - 1. Threaded or wedge type; galvanized ferrous castings, either ASTM A47 malleable iron or ASTM A27 cast steel.
 - 2. Provide bolts, washers and shims as needed; hot dip galvanized coating per ASTM A153.

2.3 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.
- C. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM F 593; with hex nuts, ASTM F 594; and, where indicated, flat washers; Alloy Group 1.
- D. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563; and, where indicated, flat washers.
 - 1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.
- E. Machine Screws: ASME B18.6.3.
- F. Lag Screws: ASME B18.2.1.
- G. Wood Screws: Flat head, ASME B18.6.1.
- H. Plain Washers: Round, ASME B18.22.1.
- I. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
- J. Post-Installed Anchors: [Torque-controlled expansion anchors].
 - 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.
 - 2. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.
- K. Toggle Bolts: Tumble-wing type, class and style as required; FS FF-B-588.

2.4 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.

- C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
- E. Non-shrink, Non-metallic Grout: Factory-packaged, non-staining, non-corrosive, non-gaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- F. The Volatile Organic Compounds (VOC) content of all Paint must conform to Tennessee Sustainability Guidelines
 - 1. Finish Paint VOC limit is 50 g/L less water
 - 2. Anti-corrosive and anti-rust paints applied to interior ferrous metal substrates VOC limit is 250 g/L less water

2.5 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
 - 1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches oc, unless otherwise indicated.

2.6 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
 - 1. Fabricate units from slotted channel framing where indicated.
 - 2. Furnish inserts for units installed after concrete is placed.
- C. Galvanize miscellaneous framing and supports where indicated.

2.7 SHELF ANGLES

- A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive 3/4-inch bolts, spaced not more than 6 inches from ends and 24 inches OC, unless otherwise indicated.
 - 1. Provide mitered and welded units at corners.
 - 2. Provide open joints in shelf angles at expansion and control joints. Make open joint approximately 2 inches larger than expansion or control joint.
- B. For cavity walls, provide vertical channel brackets to support angles from backup masonry and concrete.
- C. Galvanize shelf angles located in exterior walls.
- D. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.

2.8 METAL LADDERS

- A. General: Fabricate ladders for the locations shown, with dimensions, spacings, details and anchorages as indicated.
 - 1. Comply with ANSI A14.3 unless otherwise indicated.
 - 2. For elevator pit ladders, comply with ASME A17.1.
- B. Steel Ladders:
 - 1. Space side rails 18 inches apart unless otherwise indicated.
 - 2. Space side rails of elevator pit ladders 12 inches apart.
 - 3. Side rails: Continuous, 1/2-by-2-1/2-inch steel flat bars, with eased edges.
 - 4. Rungs: 3/4-inch- diameter steel bars.
 - 5. Fit rungs in centerline of side rails; plug-weld and grind smooth on outer rail faces.
 - 6. Provide nonslip surfaces on top of each rung by coating with abrasive material metallurgically bonded to rung.
 - a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) IKG Industries, a division of Harsco Corporation; Mebac.
 - 2) SlipNOT Metal Safety Flooring, a W. S. Molnar company; SlipNOT.
 - 7. Support each ladder at top and bottom and not more than 60 inches o.c. with welded or bolted steel brackets.
 - a. Size brackets to support design live and dead loads and to hold centerline of rungs clear of wall minimum 7 inches. Exception: ladders for elevator pits may have 4-1/2 inch clearance.

- b. Extend rails 42 inches above top rung, and return rails to wall or structure unless other secure handholds are provided. If adjacent structure does not extend above top rung, goose-neck the extended rails back to structure to provide secure ladder access.
- 8. Galvanize exterior ladders, including brackets and fasteners.
- 9. Shop prime interior ladders, brackets, and fasteners

2.9 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
 - 1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.
- C. Galvanize exterior miscellaneous steel trim.

2.10 METAL BOLLARDS

- A. Fabricate metal bollards from Schedule 80 steel pipe 1/4-inch wall thickness steel shapes, as indicated on Drawings.
- B. Cap bollards with 1/4-inch thick steel plate.
- C. Fabricate sleeves for bollard anchorage from steel pipe with 1/4-inch thick steel plate welded to bottom of sleeve. Makes sleeves not less than 8 inches deep and 3/4-inch large than OD of bollard.
- D. Prime bollards with primer specified in Division 09: High-Performance Paint Coatings.

2.11 LOOSE BEARING AND LEVELING PLATES

- A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.
- B. Galvanize plates.

2.12 LOOSE STEEL LINTELS

- A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Fabricate in single lengths for each opening unless otherwise indicated. Weld adjoining members together to form a single unit where indicated.
- B. Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span but not less than 8 inches solid bearing unless otherwise indicated.
- C. Galvanize loose steel lintels located in exterior walls.

2.13 STEEL WELD PLATES AND ANGLES

- A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.14 METAL GRATINGS

- A. Gratings: Welded or pressure-locked steel bar gratings conforming to "Standard Specifications for Metal Bar Grating and Metal Bar Grating Treads" published in ANSI/ NAAMM MBG 531 "Metal Bar Grating Manual".
 - 1. Grating Mark: W-7-4 or P-7-4; bearing bars 7/16 inch o/c and cross bars 4 inches OC.
 - 2. Bearing Bar Size: 1-1/2 inches by 3/16 inch.
 - 3. Traffic Surface: Plain.
 - 4. Finish: Hot-dip galvanized after fabrication.
- B. Fabricate cutouts in gratings for indicated penetrations. Arrange layout of cutouts to allow grating removal without disturbing items that penetrate the grating.
 - 1. Provide hinged access panels as indicated on Drawings.
- C. Edge band openings in grating that interrupt 4 or more bearing bars with bars of same material and size as bearing bars.
- D. Do not notch bearing bars at supports to maintain elevation.
- E. Provide hot-dip galvanized steel anchorage devices suitable for Project applications.

2.15 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal fabrications after assembly.
- C. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.16 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153 for steel and iron hardware and with ASTM A 123 for other steel and iron products.
 - 1. Iron and Steel Hardware: ASTM A153.
 - 2. Base Material and Fabrications: ASTM A123.
 - 3. Assembled Steel Products: ASTM A123.
- B. Apply finishes after welding is complete, but before assembly with mechanical fasteners
- C. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
- D. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.
- E. Surface Preparation for Priming: Remove scale, rust, dirt, and other loose materials that would impair paint bond before applying primer.
 - 1. Exterior Fabrications: SSPC-SP6, 'Commercial Blast Cleaning'.
 - 2. Interior Fabrications: SSPC-SP3, 'Power Tool Cleaning'.
 - 3. Remove oil, grease and similar contaminants in accordance with SSPC SP-1 'Solvent Cleaning'.
- F. Shop Priming - Method: Apply primer immediately after surface preparation. Comply with SSPC-PA1, 'Paint Application Specification No. 1' to provide uniform dry film thickness of 2.0 mils for each coat. Apply one shop coat to fabrications, except apply 2 coats of paint to surfaces inaccessible after assembly or erection.
 - 1. Use painting methods that result in full coverage of joints, corners, edges and exposed surfaces.
 - 2. Stripe paint corners, crevices, bolts, welds, and sharp edges.

- G. Stainless Steel: Polished finish.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Comply with requirements of applicable Division 01 Sections.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- C. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- D. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- E. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.
- F. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- G. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.
- H. Gratings: Attach with mechanical vandal-resistant anchors.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.
- B. Anchor supports for operable partitions securely to and rigidly brace from building structure.

3.3 INSTALLING PIPE BOLLARDS

- A. Cast pipe bollards into concrete or set in pipe sleeves. Plumb bollards in all directions.
 - 1. Sleeve Installation: Fill annular space between bollard and sleeve solid with grout.
- B. Fill bollards solidly with concrete per requirements of Division 03: Cast-in-Place Concrete.

3.4 INSTALLING BEARING AND LEVELING PLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.

- B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.
 - 1. Use non-shrink grout, either metallic or nonmetallic, in concealed locations where not exposed to moisture; use non-shrink, nonmetallic grout in exposed locations unless otherwise indicated.
 - 2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.5 INSTALLATION – SUPPORTS FOR OVERHEAD DOORS AND OPERABLE PARTITIONS.

- A. Provide temporary bracing or supports needed for erection loads and stability until permanent supports and connections are completed.
- B. Anchor support framing to existing building structure in manner to safely transfer loads from operable partition components to existing structure, to provide stability, and to prevent vibration of assembly during partition operation.
- C. Install framing to form rigid, stable assemblies.
- D. Provide permanent connections that will not loosen or need adjustment during normal use.

3.6 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
- B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 09 91 00 Painting and/or Section 09 96 00 High Performance Coatings.
- C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780.

END OF SECTION

THIS PAGE LEFT BLANK INTENTIONALLY

ITEM 055213 PIPE HANDRAIL**DESCRIPTION****1.1 SUMMARY****A. Section includes:**

1. Steel pipe and tube railings.

1.2 PERFORMANCE REQUIREMENTS**A. Structural Performance:** Provide railings capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:**1. Handrails:**

- a. Uniform load of 50 lbf/ ft. applied in any direction.
- b. Concentrated load of 200 lbf applied in any direction.
- c. Uniform and concentrated loads need not be assumed to act concurrently.

2. Top Rails of Guards:

- a. Uniform load of 50 lbf/ ft. applied in any direction.
- b. Concentrated load of 200 lbf applied in any direction.
- c. Uniform and concentrated loads need not be assumed to act concurrently.

3. Infill of Guards:

- a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft.
- b. Infill load and other loads need not be assumed to act concurrently.

B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.**1.3 SUBMITTALS****A. Shop Drawings:** Include plans, elevations, sections, details, and attachments to other work.**ISSUED FOR BID**

PART 2 - PRODUCTS**2.1 METALS**

- A. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails, unless otherwise indicated.
- B. Steel and Iron:
 - 1. Pipe: ASTM A 53/A 53M, Type F or Type S, Grade A, Extra Strong (Schedule 80), unless another grade and weight are required by structural loads.
 - 2. Plates, Shapes, and Bars: ASTM A 36/A 36M.
 - 3. Castings: Either gray or malleable iron, unless otherwise indicated.
 - a. Gray Iron: ASTM A 48/A 48M, Class 30, unless another class is indicated or required by structural loads.
 - b. Malleable Iron: ASTM A 47/A 47M.

2.2 MISCELLANEOUS MATERIALS

- A. Fasteners: Plated steel concealed fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating.
- B. Zinc-Rich Primer: Complying with SSPC-Paint 20 or SSPC-Paint 29 and compatible with topcoat.
- C. Grout and Anchoring Cement: Factory-packaged, nonshrink, nonmetallic grout complying with ASTM C 1107; or water-resistant, nonshrink anchoring cement; recommended by manufacturer for exterior use.

2.3 FABRICATION

- A. General: Fabricate railings to comply with design, dimensions, and details indicated, but not less than that required to support structural loads.
- B. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
- C. Close exposed ends of railing members with prefabricated end fittings.

2.4 FINISHES

- A. Shop-Primed Steel Finish: Prepare to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning" and apply zinc-rich primer to comply with SSPC-PA 1.

ISSUED FOR BID

- B. All handrail surfaces to be hot dip galvanized per ASTM A123. All exposed handrail surfaces to be covered by a high build epoxy primer (4 mil thick) and then covered by two (2) coats of high build aliphatic acrylic polyurethane (4 mil thick each). Total paint dry film thickness of 8 mils over galvanizing. Paint color to be dark bronze as approved by the Program Manager.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation.
 - 1. Set posts plumb within a tolerance of 1/16 inch in 3 feet .
 - 2. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet .
- B. Anchor posts in concrete by inserting into preset steel pipe sleeves and grouting annular space.
- C. Anchor railing ends to concrete and masonry with round flanges connected to railing ends and anchored to wall construction with anchors and bolts.
- D. Adjusting and Cleaning: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting.
- E. Refer to Item P-610 for measurement and payment of pipe handrail.

END OF SECTION 055213

ISSUED FOR BID

THIS PAGE LEFT INTENTIONALLY BLANK

ISSUED FOR BID

**SECTION 06100:
ROUGH CARPENTRY**

PART 1: GENERAL

1.01 Work Included:

- A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.
- B. Types of work in this Section include rough carpentry for:
 - 1. Wood nailers, blocking and bracing.

1.02 Related Work:

- A. Section 06400 – Architectural Woodwork

PART 2: PRODUCTS

2.01 Lumber:

- A. Lumber standards to comply with PS 20 "American Softwood Lumber Standard".
 - 1. Provide dressed lumber, S4S, 19 percent maximum moisture content - No. 2 or better.
- B. Provide dressed lumber, S4S, unless otherwise indicated.
 - 1. Construction grade SYP for short lengths.
 - 2. Construction grade western wood species, fir, pine, or cedar for long lengths.
- C. Provide wood for support or attachment of other work including cant strips, bucks, nailers, blocking, furring, grounds, stripping and similar members.

2.02 Anchors and Fasteners:

- A. Provide size, type, material and finish as indicated and as recommended by applicable standards, complying with applicable Federal Specifications for nails, staples, screws, bolts, nuts, washers and anchoring devices. Provide metal hangers and framing anchors of the size and type recommended by the manufacturer for each use including recommended nails.

2.03 Wood Treatment:

- A. Where lumber or plywood is indicated as "Treated", or is specified herein to be treated, comply with applicable requirements of AWPB Standards C2 (Lumber) and C9 (Plywood) and of AWPB Standards listed below. Mark each treated item with the AWPB Quality Mark Requirements.
 - 1. Pressure-treat above-ground items with water-borne preservatives to comply with AWPB LP-2. After treatment, kiln-dry.
 - a. Wood cants, nailers, curbs, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers and waterproofing.

2. Complete fabrication of treated items prior to treatment, where possible. If cut after treatment, coat cut surfaces with heavy brush coat of same chemical used for treatment and to comply with AWP A M4. Inspect each piece of lumber or plywood after drying and discard damaged or defective pieces.
- B. All wood blocking, nailers, etc. shall be treated.

PART 3: EXECUTION

3.01 Installation:

- A. Discard units of material with defects which might impair quality of work, and units which are too small to use in fabricating work with minimum joints or optimum joint arrangement.
- B. Set carpentry work to required levels and lines, with members plumb and true and cut and fitted.
- C. Securely attach carpentry work to substrate by anchoring and fastening as shown and as required by recognized standards.
- D. Provide nailers, blocking and bracing wherever required for screeding or attachment of other work. Form to shapes as shown and cut as required for true line and level of work to be attached. Coordinate location with other work involved.

END OF SECTION

**SECTION 06160:
SHEATHING****PART 1 - GENERAL****1.1 SUMMARY**

- A. This Section includes the following:
 - 1. Wall sheathing.
 - 2. Flexible flashing at openings in sheathing.

1.2 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. Include data for wood-preserved treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements.
- B. Research/Evaluation Reports: For the following:
 - 1. Preservative-treated plywood.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Stack plywood and other panels flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS**1.4 WOOD PANEL PRODUCTS, GENERAL**

- A. Plywood: Either DOC PS 1 or DOC PS 2, unless otherwise indicated.

1.5 PRESERVATIVE-TREATED PLYWOOD

- A. Preservative Treatment by Pressure Process: AWPAC9.
- B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.
- C. Application: Treat items indicated on Drawings and plywood in contact with masonry or concrete.

1.6 FASTENERS

- A. General: Provide fasteners of size and type indicated.
 - 1. For wall sheathing panels, provide fasteners with corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.

1.7 MISCELLANEOUS MATERIALS

- A. Flexible Flashing: Self-adhesive, rubberized-asphalt compound, bonded to a high-density, polyethylene film to produce an overall thickness of not less than **0.025 inch**.

PART 3 - EXECUTION**1.8 INSTALLATION, GENERAL**

- A. Securely attach to substrate by fastening as indicated, complying with the following:
1. NES NER-272 for power-driven fasteners.
 2. Table 2306.1, "Fastening Schedule," in SBCCI's "Standard Building Code."
- B. Coordinate sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that exclude exterior moisture.
- C. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

1.9 PLYWOOD SHEATHING INSTALLATION

- A. Fastening Methods: Fasten sheathing as indicated below and per approved shop drawings:
1. Wall Sheathing:
 - a. Screw to cold-formed metal framing.
- B. Apply flexible flashing where indicated to comply with manufacturers written instructions.
1. Lap seams and junctures with other materials at least 4 inches, except that at flashing flanges of other construction, laps need not exceed flange width.
 2. Lap flashing over weather-resistant building paper at bottom and sides of openings.
 3. Lap weather-resistant building paper over flashing at heads of openings.
 4. After flashing has been applied, roll surfaces with a hard rubber or metal roller.

END OF SECTION

SECTION 07 14 16
COLD FLUID-APPLIED WATERPROOFING

PART 1: GENERAL

1.1 SUMMARY

A. Section Includes:

1. Single component asphalt emulsion waterproofing.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review waterproofing requirements including, but not limited to, the following:
 - a. Surface preparation specified in other Sections.
 - b. Minimum curing period.
 - c. Forecasted weather conditions.
 - d. Special details and sheet flashings.
 - e. Repairs.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, and tested physical and performance properties of waterproofing.
2. Include manufacturer's written instructions for evaluating, preparing, and treating substrate.

B. Shop Drawings:

1. Show locations and extent of waterproofing.
2. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.

C. Samples: For each exposed product and for each color and texture specified, including the following products:

1. Flashing sheet, 8 by 8 inches.
2. Membrane-reinforcing fabric, 8 by 8 inches.
3. Drainage panel, 4 by 4 inches.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Field quality-control reports.
- C. Sample Warranties: For special warranties.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by waterproofing manufacturer.
- B. Mockups: Build mockups to verify selections made under Sample submittals and to set quality standards for installation.
 - 1. Build mockup for each typical waterproofing installation including accessories to demonstrate surface preparation, crack and joint treatments, inside and outside corner treatments, and protection.
 - a. Size: 100 sq. ft. in area .
 - b. Description: Each type of installation.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 FIELD CONDITIONS

- A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended in writing by waterproofing manufacturer.
 - 1. Do not apply waterproofing to a damp or wet substrate, when relative humidity exceeds 85 percent, or when temperatures are less than 5 deg F above dew point.
 - 2. Do not apply waterproofing in snow, rain, fog or mist, or when such weather conditions are imminent during application and curing period.
- B. Maintain adequate ventilation during application and curing of waterproofing materials.

1.7 WARRANTY

- A. Manufacturer's Special Warranty: Manufacturer agrees to repair or replace waterproofing that fails in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2: PRODUCTS**2.1 MATERIALS, GENERAL**

- A. Source Limitations for Waterproofing System: Obtain waterproofing materials, drainage and protection course, from single source from single manufacturer.

2.2 SINGLE-COMPONENT ASPHALT EMULSION WATERPROOFING

- A. Single-Component, Asphalt Emulsion Waterproofing: ASTM C 836.
 - 1. Products: Subject to compliance with requirements, provide the following:
 - a. Tremco Incorporated; Tremproof 260.
 - b. Other approved products.

2.3 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials recommended in writing by waterproofing manufacturer for intended use and compatible with one another and with waterproofing.
 - 1. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.
- B. Joint Sealant: Single-component polyurethane sealant, compatible with waterproofing.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Tremco; Dymonic 100.

2.4 DRAINAGE AND PROTECTION COURSE

- A. Multi-Composite Drainage and Protection Board: Two-layer drainage mat with polystyrene core with nonwoven polypropylene filter fabric.
 - 1. Basis of Design Product: Subject to compliance with requirements, provide Tremco; TREMDrain TotalDrain..

PART 3: EXECUTION**3.1 EXAMINATION**

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
 - 1. Verify that concrete has cured and aged for minimum time period recommended in writing by waterproofing manufacturer.

2. Verify that substrate is visibly dry and within the moisture limits recommended in writing by manufacturer. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.
- B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.
- C. Close off deck drains and other deck penetrations to prevent spillage and migration of waterproofing fluids.
- D. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, acid residues, and other penetrating contaminants or film-forming coatings from concrete.
1. Abrasive blast clean concrete surfaces uniformly to expose top surface of fine aggregate according to ASTM D 4259 with a self-contained, recirculating, blast-cleaning apparatus. Remove material to provide a sound surface free of laitance, glaze, efflorescence, curing compounds, concrete hardeners, or form-release agents. Remove remaining loose material and clean surfaces according to ASTM D 4258.
- E. Remove fins, ridges, and other projections, and fill honeycomb, aggregate pockets, holes, and other voids.

3.3 PREPARATION AT TERMINATIONS, PENETRATIONS, AND CORNERS

- A. Prepare surfaces at terminations and penetrations through waterproofing and at expansion joints, drains, sleeves, and corners according to waterproofing manufacturer's written instructions and to recommendations in ASTM C 898/C 898M and ASTM C 1471.
- B. Apply waterproofing in two separate applications, and embed a joint reinforcing strip in the first preparation coat when recommended by waterproofing manufacturer.

3.4 JOINT AND CRACK TREATMENT

- A. Prepare, treat, rout, and fill joints and cracks in substrate according to waterproofing manufacturer's written instructions and to recommendations in ASTM C 898/C 898M and ASTM C 1471. Before coating surfaces, remove dust and dirt from joints and cracks according to ASTM D 4258.
1. Comply with ASTM C 1193 for joint-sealant installation.

3.5 WATERPROOFING APPLICATION

- A. Apply waterproofing according to manufacturer's written instructions and to recommendations in ASTM C 898/C 898M and ASTM C 1471.
- B. Start installing waterproofing in presence of manufacturer's technical representative.
- C. Apply primer over prepared substrate unless otherwise instructed in writing by waterproofing manufacturer.
- D. Unreinforced Waterproofing Applications: Mix materials and apply waterproofing by spray, roller, notched squeegee, trowel, or other application method suitable to slope of substrate.
 - 1. Apply one or more coats of waterproofing to obtain a seamless membrane free of entrapped gases and pinholes, with a dry film thickness of 60 mils.
 - 2. Apply waterproofing to prepared wall terminations and vertical surfaces.
 - 3. Verify manufacturer's recommended wet film thickness of waterproofing every 100 sq. ft..
- E. Cure waterproofing, taking care to prevent contamination and damage during application and curing.
- F. Install drainage and protection course according to manufacturer's written instructions.

3.6 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a site representative qualified by waterproofing membrane manufacturer to inspect substrate conditions, surface preparation, membrane application, flashings, protection, and drainage components and to furnish daily reports to Architect.
- B. If test results or inspections show waterproofing does not comply with requirements, remove and replace or repair the waterproofing as recommended in writing by manufacturer, and make further repairs after retesting and inspecting until waterproofing installation passes.
- C. Prepare test and inspection reports.

3.7 PROTECTION

- A. Protect waterproofing from damage and wear during remainder of construction period.
- B. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.
- C. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

END OF SECTION

SECTION 07 16 16
CRYSTALLINE WATERPROOFING

PART 1: GENERAL

1.1 SUMMARY

- A. Section includes crystalline waterproofing for repairs to tunnel walls and elevator pits.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, and installation instructions.

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Applicator.
- B. Product Certificates: For each type of waterproofing, patching, and plugging material.
- C. Product Test Reports: For each product formulation, for tests performed by manufacturer and witnessed by a qualified testing agency.
- D. Field quality-control reports.

1.4 QUALITY ASSURANCE

- A. Applicator Qualifications: A firm experienced in applying crystalline waterproofing similar in material, design, and extent to that indicated for this Project, whose work has resulted in applications with a record of successful in-service performance, and that employs workers trained and approved by manufacturer.

1.5 FIELD CONDITIONS

- A. Weather Limitations: Proceed with application only when existing and forecasted weather conditions permit crystalline waterproofing to be performed according to manufacturer's written instructions.
- B. Proceed with waterproofing work only after pipe sleeves, vents, curbs, inserts, drains, and other projections through the substrate to be waterproofed have been completed. Proceed only after substrate defects, including honeycombs, voids, and cracks, have been repaired to provide a sound substrate free of forming materials, including reveal inserts.

- C. Ambient Conditions: Proceed with waterproofing work only if temperature is maintained at 40 deg F or above during work and cure period, and space is well ventilated and kept free of water.

PART 2: PRODUCTS

2.1 WATERPROOFING MATERIALS

- A. Crystalline Waterproofing: Prepackaged, gray-colored proprietary blend of portland cement, specially treated sand, and active chemicals that, when mixed with water and applied, penetrates into concrete and concrete unit masonry and reacts chemically with the byproducts of cement hydration in the presence of water to develop crystalline growth within substrate capillaries to produce an impervious, dense, waterproof substrate; with properties complying with or exceeding the criteria specified below.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Xypex Chemical Corporation; Xypex Concentrate as basis of design.
 - b. AQUAFIN, Inc.; AQUAFIN-1C.
 - c. BASF Building Systems; Masterseal 500.
 - d. Conproco Corporation; Conpro Super Seal.
 - e. Tremco Incorporated, an RPM company; Permaquik Crystalline Waterproofing.
 - f. Or approved equal.
 - 2. Water Permeability: Maximum zero for water at 30 feet when tested according to COE CRD-C 48.
 - 3. Compressive Strength: Minimum 4000 psi at 28 days when tested according to ASTM C 109/C 109M.

2.2 ACCESSORY MATERIALS

- A. Patching Compound: Factory-premixed cementitious repair mortar, crack filler, or sealant recommended by waterproofing manufacturer for filling and patching tie holes, honeycombs, reveals, and other imperfections; and compatible with substrate and other materials indicated.
- B. Plugging Compound: Factory-premixed cementitious compound with hydrophobic properties and recommended by waterproofing manufacturer; resistant to water and moisture but vapor permeable for all standard applications (vertical, overhead, and horizontal surfaces not exposed to vehicular traffic); and compatible with substrate and other materials indicated.
- C. Water: Potable.

2.3 MIXES

- A. Crystalline Waterproofing: Add prepackaged dry ingredients to water according to manufacturer's written instructions. Mix together with mechanical mixer or by hand to required consistency.

PART 3: EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for suitable conditions where waterproofing is to be applied.
- B. Proceed with application only after unsatisfactory conditions have been corrected.
- C. Notify Architect in writing of active leaks or defects that would affect system performance.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions.
- B. Protect other work from damage caused by cleaning, preparation, and application of waterproofing. Provide temporary enclosure to confine spraying operation and to ensure adequate ambient temperatures and ventilation conditions for application.
- C. Do not allow waterproofing, patching, and plugging materials to enter reveals or annular spaces intended for resilient sealants or gaskets, such as joint spaces between pipes and pipe sleeves.
- D. Stop active water leaks with plugging compound.
- E. Repair damaged or unsatisfactory substrate with patching compound.
- F. Surface Preparation: Remove efflorescence, chalk, dust, dirt, mortar spatter, grease, oils, paint, curing compounds, and form-release agents to ensure that waterproofing bonds to surfaces.
 - 1. Clean concrete surfaces according to ASTM D 4258.
 - a. Scratch- and Float-Finished Concrete: Etch with 10 percent muriatic acid solution according to ASTM D 4260.
 - b. Smooth-Formed and Trowel-Finished Concrete: Prepare by mechanical abrading or abrasive-blast cleaning according to ASTM D 4259.
 - 2. Clean concrete unit masonry surfaces according to ASTM D 4261.
 - a. Medium- and Normal-Weight Concrete Unit Masonry: Sandblast or bushhammer to a depth of 1/16 inch.

3. Concrete Joints: Clean reveals.

3.3 APPLICATION

- A. General: Comply with waterproofing manufacturer's written instructions for application and curing.
 1. Saturate surface with water for several hours and maintain damp condition until applying waterproofing. Remove standing water.
 2. Apply waterproofing to surfaces, and extend waterproofing onto adjacent surfaces as follows:
 - a. Onto columns integral with treated walls.
 - b. Onto interior nontreated walls intersecting exterior treated walls, for a distance of 24 inches for cast-in-place concrete and 48 inches for masonry.
 - c. Onto exterior walls and onto both exterior and interior columns, for a height of 12 inches, where floors, but not walls, are treated.
 - d. Onto every substrate in areas indicated for treatment, including pits and similar offsets and features.
 3. Number of Coats: Number required for specified water permeability.
 4. Application Method: Apply to ensure that each coat fills voids and is in full contact with substrate or previous coat.
 5. Dampen surface between coats.
- B. Final Coat Finish: Smooth.
- C. Curing: Moist-cure waterproofing for three days immediately after final coat has set, followed by air drying, unless otherwise recommended in writing by manufacturer.

3.4 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect completed application of waterproofing.
- B. Prepare test and inspection reports.

END OF SECTION

**SECTION 07200:
INSULATION**

PART 1: GENERAL

1.01 Work Included:

- A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.
- B. Types of insulation specified in this section include the following:
 - 1. Thermal batt insulation.
 - 2. Sound attenuation batt insulation.

1.02 Submittals:

- A. Submit manufacturer's technical data and installation instructions for each type of insulation specified.

PART 2: PRODUCTS

2.01 Acceptable Manufacturers:

- A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:
 - 1. Dow Corporation
 - 2. Johns - Manville Corporation
 - 3. Owens Corning

2.02 Thermal Batt Insulation:

- A. Fiberglass, flexible batts produced from inorganic fibers. Batt insulation with kraft paper vapor retarder membrane face, for use in concealed spaces, shall comply with ASTM C 665, Type II, Class C.
 - 1. R-11, 3 " x stud spacing at studs smaller than 6".
 - 2. R-19, 6" x stud spacing at studs 6" or larger.
- B. Provide mineral wool batts at fire rated exterior walls as indicated on drawings.

2.03 Sound Attenuation Batt Insulation:

- A. Mineral wool, flexible batts bonded and formed from inorganic fibers derived from basalt. Batt insulation shall comply with ASTM C 665, Type I and ASTM E 136.
 - 1. 2.5 pcf nominal density.
 - 2. 3-1/2" x stud spacing except as follows:

- a. 6" x stud spacing for use in auditorium walls, above ceilings, and other locations indicated on drawings.
- 3. Surface burning characteristics shall be as follows when tested in accordance with ASTM E 84.
 - a. Flame Spread - 5
 - b. Smoke Developed - 0

PART 3: EXECUTION

3.01 Preparation:

- A. Clean substrates of substances harmful to insulations or vapor retarders, including removal of projections which might puncture vapor retarders.

3.02 Installation:

- A. Comply with manufacturer's instructions for particular conditions of installation in each case. If printed instructions are not available or do not apply to project conditions, consult manufacturer's technical representative for specific recommendations before proceeding with work.
- B. Extend insulation full thickness as shown over entire area to be insulated. Cut and fit tightly around obstructions, and fill voids with insulation.
- C. Apply a single layer of insulation of required thickness, unless otherwise shown or required to make up total thickness.
- D. Blanket/Batt Insulation:
 - 1. Set vapor retarder faced units with vapor retarder to warm side of construction, except as otherwise indicated. Do not obstruct ventilation spaces, except for firestopping.

3.03 Protection:

- A. Protect installed insulation and vapor retarders from harmful weather exposures and from possible physical abuses, where possible by non-delayed installation of concealing work or, where that is not possible, by temporary covering or enclosure.

END OF SECTION

SECTION 07 24 19 EXTERIOR INSULATION AND FINISH SYSTEM CLASS PB

PART I GENERAL

1.1 SUMMARY

A. This document is to be used in preparing specifications for projects utilizing the Dryvit Outsulation Plus MD System. For complete product description and usage refer to:

1. Dryvit Outsulation Plus MD System Data Sheet, [DS445](#)
2. Dryvit Outsulation Plus MD System Application Instructions, [DS218](#)
3. Dryvit Outsulation Plus MD System Installation Details, [DS110](#)

B. Related Sections

1. Unit Masonry – Section 04 20 00
2. Concrete – Sections 03 00 00
3. Cold-Formed Metal Framing – Section 05 40 00
4. Joint Protection – Section 07 90 00
5. Flashing – Section 07 60 00
6. Water-Resistive Barriers – Section 07 25 00
7. Vapor Retarders – 07 26 13
8. Air Barriers – 07 27 26

1.2 REFERENCES

A. Section Includes

1. ASTM B 117 (Federal Test Standard 141A Method 6061) Standard Practice for Operating Salt Spray (Fog) Apparatus
2. ASTM C 150 Standard Specification for Portland Cement
3. ASTM C 297 Standard Test Method for Flatwise Tensile Strength of Sandwich Constructions
4. ASTM C 1063 Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster
5. ASTM C 1177 Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing
6. ASTM C 1396 (formerly C 79) Standard Specification for Gypsum Board
7. ASTM D 968 (Federal Test Standard 141A Method 6191) Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive
8. ASTM D 1784 Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
9. ASTM D 1970 Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
10. ASTM D 2247 (Federal Test Standard 141A Method 6201) Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity
11. ASTM D 2898 Standard Test Method for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing
12. ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
13. ASTM D 4060 Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser
14. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials
15. ASTM E 96 Standard Test Methods for Water Vapor Transmission of Materials
16. ASTM E 119 Standard Method for Fire Tests of Building Construction and Materials
17. ASTM E 283 Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Differences Across the Specimen
18. ASTM E 330 Test Method for Structural Performance of Exterior Windows, Doors and Curtain Walls by Uniform Static Air Pressure Difference

19. ASTM E 331 Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain Walls by Uniform Static Air Pressure Difference
20. ASTM E 2098 Test Method for Determining the Tensile Breaking Strength of Glass Fiber Reinforcing Mesh for use in Class PB Exterior Insulation and Finish Systems (EIFS), after Exposure to Sodium Hydroxide Solution
21. ASTM E 2134 Test Method for Evaluating the Tensile-Adhesion Performance of Exterior Insulation and Finish Systems (EIFS)
22. ASTM E 2178 Standard Test Method for Air Permeance of Building Materials
23. ASTM E 2273 Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish Systems (EIFS) Clad Wall Assemblies
24. ASTM E 2357 Standard Test Method for Determining Air Leakage of Air Barrier Assemblies
25. ASTM E 2430 Standard Specification for Expanded Polystyrene (EPS) Thermal Insulation Boards for use in Exterior Insulation and Finish Systems (EIFS)
26. ASTM E 2485 (formerly EIMA Std. 101.01) Standard Test Method for Freeze-Thaw Resistance of Exterior Insulation and Finish Systems (EIFS) and Water-Resistive Barrier Coatings
27. ASTM E 2486 (formerly EIMA Std. 101.86) Standard Test Method for Impact Resistance of Class PB and PI Exterior Insulation and Finish Systems (EIFS)
28. ASTM E 2568 Standard Specification for PB Exterior Insulation and Finish Systems
29. ASTM E 2570 Standard Test Method for Evaluating Water-Resistive Barrier (WRB) Coatings Used Under Exterior Insulation and Finish Systems (EIFS) or EIFS with Drainage
30. ASTM G 155 (Federal Test Standard 141A Method 6151) Standard Practice for Operating- Xenon Arc Light Apparatus for Exposure of Nonmetallic Materials
31. Mil Std E5272 Environmental Testing
32. Mil Std 810B Environmental Test Methods
33. NFPA 268 Standard Test Method for Determining Ignitability of Exterior Wall Assemblies Using a Radiant Heat Energy Source.
34. NFPA 285 Standard Method of Test for the Evaluation of Flammability Characteristics of Exterior Non-Load- Bearing Wall Assemblies Containing Combustible Components Using the Intermediate-Scale, Multistory Test Apparatus
35. ANSI FM 4880 Evaluating Insulated Wall or Wall and Roof/Ceiling Assemblies; Plastic Interior Finish Materials; Plastic Exterior Building Panels; Wall/Ceiling Coating Systems; Interior or Exterior Finish Systems

1.3 DEFINITIONS

- A. Base Coat: Material used to encapsulate one or more layers of reinforcing mesh fully embedded that is applied to the outside surface of the EPS.
- B. Building Expansion Joint: A joint through the entire building structure designed to accommodate structural movement.
- C. Contractor: The contractor that installs the Outsulation Plus MD System to the substrate.
- D. Dryvit: Dryvit Systems, Inc., the manufacturer of the Outsulation Plus MD System, a Rhode Island corporation.
- E. Expansion Joint: A structural discontinuity in the Outsulation Plus MD System.
- F. Finish: An acrylic-based coating, available in a variety of textures and colors that is applied over the base coat.
- G. Insulation Board: Expanded polystyrene (EPS) insulation board, which is affixed to the substrate and creates a layer of continuous insulation.
- H. Panel Erector: The contractor who installs the panelized Outsulation Plus MD System.
- I. Panel Fabricator: The contractor who fabricates the panelized Outsulation Plus MD System.
- J. Reinforcing Mesh: Glass fiber mesh(es) used to reinforce the base coat and to provide impact resistance.
- K. Sheathing: A substrate in sheet form.
- L. Substrate: The material to which the Outsulation Plus MD System is affixed.
- M. Substrate System: The total wall assembly including the attached substrate to which the Outsulation Plus MD System is affixed.

1.4 SYSTEM DESCRIPTION

- A. General: The Dryvit Outsulation Plus MD System is an Exterior Insulation and Finish System (EIFS), Class PB, consisting of an air/water-resistive barrier, an adhesive, expanded polystyrene insulation board, base coat, reinforcing mesh(es) and finish.
- B. Methods of Installation:
1. Field Applied: The Outsulation Plus MD System is applied to the substrate system in place.
 2. Panelized: The Outsulation Plus MD System is shop-applied to the prefabricated wall panels.
- C. Design Requirements:
1. Acceptable substrates for the Outsulation Plus MD System shall be:
 - a. Exterior sheathing having a water-resistant core with fiberglass mat facers meeting ASTM C 1177.
 2. Deflection of the substrate systems shall not exceed 1/240 times the span.
 3. The substrate shall be flat within 1/4 in (6.4 mm) in a 4 ft (1.2 m) radius.
 4. The slope of inclined surfaces shall not be less than 6:12 (27°) and the length shall not exceed 12 in (305 mm).
 5. All areas requiring an impact resistance classification higher than "standard", as defined by ASTM E 2486 (formerly EIMA Standard 101.86), shall be as detailed in the drawings and described in the contract documents. Refer to Section 1.04.D.1.d of this specification.
 6. Expansion Joints:
 - a. Design and location of expansion joints in the Outsulation Plus MD System is the responsibility of the project designer and shall be noted on the project drawings. As a minimum, expansion joints shall be placed at the following locations:
 - 1) Where expansion joints occur in the substrate system
 - 2) Where building expansion joints occur
 - 3) At floor lines in wood frame construction
 - 4) At floor lines of non-wood framed buildings where significant movement is expected
 - 5) Where the Outsulation Plus MD System abuts dissimilar materials
 - 6) Where the substrate type changes
 - 7) Where prefabricated panels abut one another
 - 8) In continuous elevations at intervals not exceeding 75 ft (23 m)
 - 9) Where significant structural movement occurs, such as changes in roof line, building shape or structural system
 7. Terminations:
 - a. Prior to applying the Dryvit Outsulation Plus MD System, wall openings shall be treated with Dryvit AquaFlash System or Flashing Tape. Refer to Dryvit Outsulation Plus MD Installation Details, [DS110](#).
 - b. The Outsulation Plus MD System shall be held back from adjoining materials around openings and penetrations such as windows, doors, and mechanical equipment a minimum of 3/4 in (19 mm) for sealant application. See Dryvit's Outsulation Plus MD System Installation Details, [DS110](#).
 - c. The system shall be terminated a minimum of 8 in (203 mm) above finished grade.
 - d. Sealants
 - 1) Shall be manufactured and supplied by others.
 - 2) Shall be compatible with the Outsulation Plus MD System materials. Refer to current Dryvit Publication [DS153](#) for listing of sealants tested by sealant manufacturer for compatibility.
 - 3) The sealant backer rod shall be closed cell.
 8. Vapor Retarders: The use and location of vapor retarders within a wall assembly is the responsibility of the project designer and shall comply with local building code requirements. The type and location shall be noted on the project drawings and specifications. Vapor retarders may be inappropriate in certain climates and can result in condensation within the wall assembly. Refer to Dryvit Publication DS159 for additional information.
 9. Dark Colors: The use of dark colors must be considered in relation to wall surface temperature as a

function of local climatic conditions. Use of dark colors in high temperature climates can affect the performance of the system.

10. Flashing: Shall be provided at all roof-wall intersections, windows, doors, chimneys, decks, balconies and other areas as necessary to prevent water from entering behind the Outsulation Plus MD System.
11. Site Coated EPS Shapes and Starter Boards: Shall be coated on site utilizing the same materials (EPS, base material mixture, reinforcing mesh, and finish) as specified for the project.
12. Pre Base Coated EPS Shapes and Starter Boards: Shall be supplied by Acrocore or other approved shape manufacturer.

D. Performance Requirements:

1. The Outsulation Plus MD System shall have been tested as follows:
 - a. Air/Water-Resistive Barrier Coating

TEST	TEST METHOD	CRITERIA	RESULTS
Tensile Bond	ASTM C 297/E 2134*	Minimum 15 psi (104 kPa)	Substrate: Minimum 19 psi (131 kPa) (Backstop NT) Minimum 24.1 psi (166 kPa) (Backstop DMS) Flashing: Minimum 431 psi (2970 kPa) (Backstop NT) Minimum 140 psi (967 kPa) (Backstop DMS)
Freeze-thaw	ASTM E 2485 Method B*	No deleterious effects after 10 cycles	Passed - No deleterious effects after 10 cycles
Water Resistance	ASTM D 2247*	No deleterious effects after 14 days exposure ¹	No deleterious effects after 14 days exposure
Water Vapor Transmission	ASTM E 96 Proc. B*	Vapor Permeable	Vapor Permeable Backstop DMS: 30 Perms
Air Leakage	ASTM E 283	No ICC or ANSI/EIMA Criteria	0.002 cfm/ft ² (0.01 l/sec/m ²) (Backstop NT)
Air Permeance	ASTM E 2178	No ICC or ANSI/EIMA Criteria	1.2x10 ⁻⁴ cfm/ft ² @ 1.6 psf (0.0006 l/s/m ² @ 75 Pa) (Backstop NT)
Air Barrier Assembly	ASTM E 2357	No ICC or ANSI/EIMA Criteria	<0.001 cfm/ft ² @ 6.24 psf (0.05 l/sec m ² @300 Pa) (Backstop NT)
Nail Sealability	ASTM D 1970	No ICC or ANSI/EIMA Criteria	Passed ABAA Criteria
Structural Performance	ASTM E 1233 Proc. A*	Minimum 10 positive cycles at 1/240 deflection; No cracking in field, at joints or interface with flashing	Passed
Racking	ASTM E 72*	No cracking in field, at joints or interface with flashing at net deflection of 1/8 in (3.2 mm)	Passed
Restrained Environmental	ICC-ES Procedure*	5 cycles; No cracking in field, at joints or interface with flashing	Passed
Water Penetration	ASTM E 331*	No water penetration beyond the inner-most plane of the wall after 15 minutes at 2.86 psf (137 Pa)	Passed

Weathering UV Exposure	ASTM D 2898 Method B*	210 hours of exposure	Passed
Accelerated Aging	ICC-ES Procedure*	25 cycles of wetting and drying	Passed
Hydrostatic Pressure Test	AATCC 127*	ICC: 21.6 in (549 mm) water column for 5 hours	Passed
Surface Burning Characteristics	ASTM E 84	Flame Spread < 25 Smoke Developed < 450	Passed
* ASTM E 2570 Standard Test Method for Evaluating Water-Resistive Barrier (WRB) Coatings Used Under Exterior Insulation and Finish Systems (EIFS) or EIFS with Drainage, also referred to as AC212 – Acceptance Criteria for Water-Resistive Coatings Used as Water-Resistive Barriers over Exterior Sheathing 1. No cracking, checking, rusting, crazing, erosion, blistering, peeling, or delamination when viewed under 5x magnification			

b. Durability

TEST	TEST METHOD	CRITERIA	RESULTS
Abrasion Resistance	ASTM D 968	No deleterious effects after 528 quarts (500 liters)	No deleterious effects after 1056 quarts (1000 liters)
Accelerated Weathering	ASTM G 155 Cycle 1*	No deleterious effects after 2000 hours	No deleterious effects after 5000 hours
	ASTM G 154 Cycle 1* (QUV)		No deleterious effects after 5000 hours
Freeze-Thaw	ASTM E 2485 Method A*	No deleterious effects after 60 cycles	Passed - No deleterious effects after 90 cycles
	ASTM C 67 modified	No deleterious effects after 60 cycles	Passed - No deleterious effects after 60 cycles
	ASTM E 2485 Method B*	No deleterious effects after 10 cycles	Passed - No deleterious effects after 10 cycles
Mildew Resistance	ASTM D 3273	No growth during 28 day exposure period	No growth during 60 day exposure period
Water Resistance	ASTM D 2247*	No deleterious effects after 14 days exposure	No deleterious effects after 42 days exposure
Taber Abrasion	ASTM D 4060	N/A	Passed 1000 cycles
Salt Spray Resistance	ASTM B 117*	No deleterious effects after 300 hours exposure	No deleterious effects after 1000 hours exposure
Water Penetration	ASTM E 331*	No water penetration beyond the inner-most plane of the wall 2 hours at 6.24 psf (299 Pa)	Passed
Water Vapor Transmission	ASTM E 96 Procedure B*	Vapor permeable	EPS 5 perm-inch Base Coat ¹ 40 Perms Finish ² 40 Perms
Drainage Efficiency	ASTM E 2273	Minimum Drainage Efficiency of 90%	Passed
* ASTM E 2568 Standard Specification for PB Exterior Insulation and Finish Systems. 1. Base Coat perm value based on Dryvit Genesis® 2. Finish perm value based on Dryvit Quarzputz			

c. Structural

TEST	TEST METHOD	CRITERIA	RESULTS
Tensile Bond	ASTM C 297/E 2134*	Minimum 15 psi (104 kPa) – substrate or insulation failure	Minimum 31 psi (213.6 kPa)
Transverse Wind Load	ASTM E 330*	Withstand positive and negative wind loads as specified by the building code	Minimum 90 psf (4.3 kPa) ¹ 16 in o.c. framing, 1/2 in sheathing screw attached at 8 in (203 mm) o.c.
* ASTM E 2568 Standard Specification for PB Exterior Insulation and Finish Systems. 1. All Dryvit components remain intact – for higher wind loads contact Dryvit Systems, Inc.			

d. Impact Resistance: In accordance with ASTM E 2486* (formerly EIMA Standard 101.86):

Reinforcing Mesh ¹ /Weight oz/yd ² (g/m ²)	Minimum Tensile Strengths	EIMA Impact Classification	EIMA Impact Range in-lbs (Joules)		Impact Test Results in-lbs (Joules)	
Standard - 4.3 (146)	150 lbs/in (27 g/cm)	Standard	25-49	(3-6)	36	(4)
Standard Plus - 6 (203)	200 lbs/in (36 g/cm)	Medium	50-89	(6-10)	56	(6)
Intermediate™ - 12 (407)	300 lbs/in (54 g/cm)	High	90-150	(10-17)	108	(12)
Panzer® 15 ² - 15 (509)	400 lbs/in (71 g/cm)	Ultra High	>150	(>17)	162	(18)
Panzer 20 ² - 20.5 (695)	550 lbs/in (98 g/cm)	Ultra High	>150	(>17)	352	(40)
Detail Mesh® Short Rolls - 4.3 (146)	150 lbs/in (27 g/cm)	n/a	n/a	n/a	n/a	n/a
Corner Mesh™ - 7.2 (244)	274 lbs/in (49 g/cm)	n/a	n/a	n/a	n/a	n/a
* ASTM E 2568 Standard Specification for PB Exterior Insulation and Finish Systems. 1. It shall be colored blue and bear the Dryvit logo for product identification 2. Shall be used in conjunction with Standard Mesh (recommended for areas exposed to high traffic)						

TEST	TEST METHOD	CRITERIA	RESULTS
Fire Resistance	ASTM E 119	No effect on the fire resistance of a rated wall assembly	Passed 1 hour non-load bearing Passed 2-hour load bearing over wood framing
Ignitability	NFPA 268*	No ignition at 12.5 kw/m ² at 20 minutes	Passed
Intermediate Multi-Story Fire Test	NFPA 285* (UBC 26-9)	1. Resist flame propagation over the exterior surface 2. Resist vertical spread of flame within combustible core/component of panel from one story to the next 3. Resist vertical spread of flame over the interior surface from one story to the next 4. Resist lateral spread of flame from the compartment of fire origin to adjacent spaces	Passed over steel framing and wood framing
Full Scale Multi-Story ¹ (corner test)	ANSI FM 4880	Resist flame propagation over the exterior surface	Passed; No height restrictions*
* ASTM E 2568 Standard Specification for PB Exterior Insulation and Finish Systems. 1. Dryvit FM Products must be specified			

2. The Outsulation Plus MD components shall be tested for:

a. Fire

TEST	TEST METHOD	CRITERIA	RESULTS
Surface Burning Characteristics	ASTM E 84*	All components shall have a: Flame Spread < 25 Smoke Developed < 450	Passed
* ASTM E 2568 Standard Specification for PB Exterior Insulation and Finish Systems.			

b. Durability

TEST	TEST METHOD	CRITERIA	RESULTS
Reinforcing Mesh Alkali Resistance of Reinforcing Mesh	ASTM E 2098*	120 pli (> 21dN/cm) retained tensile strength after exposure	Passed
EPS (Physical Properties) Density	ASTM C 303, D 1622	0.95-1.25 lb/ft ³ (15.2-20.0 kg/m ³)	Passed
Thermal Resistance	ASTM C 177, C 518	4.0 @ 40 °F (4.4 °C) 3.6 @ 75 °F (23.9 °C)	Passed Passed
Water Absorption	ASTM C 272	2.5 % max. by volume	Passed
Oxygen Index	ASTM D 2863	24% min. by volume	Passed
Compressive Strength	ASTM D 1621 Proc. A	10 psi (69 kPa) min.	Passed
Flexural Strength	ASTM C 203	25 psi (172 kPa) min.	Passed
Flame Spread	ASTM E 84*	25 max.	Passed
Smoke Developed	ASTM E 84*	450 max.	Passed

1.5 SUBMITTALS

- A. Product Data: The contractor shall submit to the owner/architect the manufacturer's product data sheets describing products, which will be used on this project.
- B. Shop Drawings for Panelized Construction: The panel fabricator shall prepare and submit to the owner/architect complete drawings showing: wall layout, connections, details, expansion joints, and installation sequence.
- C. Samples: The contractor shall submit to the owner/architect two (2) samples of the Outsulation Plus MD System for each finish, texture and color to be used on the project. The same tools and techniques proposed for the actual installation shall be used. Samples shall be of sufficient size to accurately represent each color and texture being utilized on the project.
- D. Test Reports: When requested, the contractor shall submit to the owner/architect copies of selected test reports verifying the performance of the Outsulation Plus MD System.
- E. Environmental Product Declaration: When requested, the contractor shall submit to the owner/architect copies of the Environmental Product Declaration (EPD) describing the estimated environmental impacts of the Outsulation Plus MD System.

1.6 QUALITY ASSURANCE**A. Qualifications**

- 1. System Manufacturer: Shall be Dryvit Systems, Inc. All materials shall be manufactured or sold by Dryvit and shall be purchased from Dryvit or its authorized distributors.
 - a. Materials shall be manufactured at a facility covered by a current ISO 9001:2008 and ISO 14001:2004 certification. Certification of the facility shall be done by a registrar accredited by the American National Standards Institute, Registrar Accreditation Board (ANSI-RAB).
- 2. Contractor: Shall be knowledgeable in the proper installation of the Dryvit Outsulation Plus MD System and shall be experienced and competent in the installation of Exterior Insulation and Finish Systems. Additionally, the contractor shall possess a current Outsulation Plus MD System Trained Contractor Certificate* issued by Dryvit Systems, Inc.
- 3. Insulation Board Manufacturer: Shall be listed by Dryvit Systems, Inc., shall be capable of producing the Expanded Polystyrene (EPS) in accordance with the current Dryvit Specification for Insulation Board, [DS131](#), and shall subscribe to the Dryvit Third Party Certification and Quality Assurance Program.
- 4. Panel Fabricator: Shall be a contractor experienced and competent in the fabrication of architectural wall panels and shall possess a current Outsulation Plus MD System Trained Contractor Certificate* issued by Dryvit Systems, Inc.
- 5. Panel Erector: Shall be experienced and competent in the installation of architectural wall panel systems and shall be:
 - a. The panel fabricator or
 - b. An erector approved by the panel fabricator or
 - c. An erector under the direct supervision of the panel fabricator
- 6. Machine Coated Dryvit EPS Shapes and Starter Boards: Shall be supplied by [Acrocore](#) or other manufacturer that subscribes to the Dryvit third party certification and quality assurance program.

B. Regulatory Requirements:

- 1. The EPS shall be separated from the interior of the building by a minimum 15-minute thermal barrier.
- 2. The use and maximum thickness of EPS shall be in accordance with the applicable building code(s).

C. Certification

- 1. The Outsulation Plus MD System shall be recognized for the intended use by the applicable building code(s).

D. Mock-Up

- 1. The contractor shall, before the project commences, provide the owner/architect with a mock-up for approval.
- 2. The mock-up shall be of suitable size as required to accurately represent the products being installed, as well as each color and texture to be utilized on the project.
- 3. The mock-up shall be prepared with the same products, tools, equipment and techniques required for the actual applications. The finish used shall be from the same batch that is being used on the

project.

4. The approved mock-up shall be available and maintained at the jobsite.
5. For panelized construction, the mock-up shall be available and maintained at the panel fabrication location.

1.7 DELIVERY, STORAGE AND HANDLING

- A. All Dryvit materials shall be delivered to the job site in the original, unopened packages with labels intact.
- B. Upon arrival, materials shall be inspected for physical damage, freezing or overheating.

Questionable materials shall not be used.

1. Materials shall be stored at the job site, and at all times, in a cool, dry location, out of direct sunlight, protected from weather and other sources of damage. Minimum storage temperature shall be as follows:
 - a. DPR, PMR™, HDP™, Weatherlastic® and E™ Finishes, Color Prime™, Primus®, Genesis® and NCB™, 40 °F (4 °C).
 - b. For other products, refer to specific product data sheets.
2. Maximum storage temperature shall not exceed 100 °F (38 °C). **NOTE: Minimize exposure of materials to temperatures over 90 °F (32 °C). Finishes exposed to temperatures over 110 °F (43 °C) for even short periods may exhibit skinning, increased viscosity and should be inspected prior to use.**
- C. Protect all products from inclement weather and direct sunlight.

1.8 PROJECT CONDITIONS

- A. Environmental Requirements

1. Application of wet materials shall not take place during inclement weather unless appropriate protection is provided. Protect materials from inclement weather until they are completely dry.
2. At the time of Dryvit product application, the air and wall surface temperatures shall be from 40 °F (4 °C) minimum to 100 °F (38 °C) maximum for the following products:
 - a. DPR, PMR, HDP, Weatherlastic and E Finishes, Color Prime, Primus, Genesis and NCB.
 - b. For other products, refer to specific product data sheets.
3. These temperatures shall be maintained with adequate air ventilation and circulation for a minimum of 24 hours (48 hours for Weatherlastic Finishes, Ameristone, TerraNeo and Limestone) thereafter, or until the products are completely dry. Refer to published product data sheets for more specific information.

- B. Existing Conditions: The contractor shall have access to electric power, clean water and a clean work area at the location where the Dryvit materials are to be applied.

1.9 SEQUENCING AND SCHEDULING

- A. Installation of the Outsulation Plus MD System shall be coordinated with other construction trades.
- B. Sufficient manpower and equipment shall be employed to ensure a continuous operation, free of cold joints, scaffold lines, texture variations, etc.

1.10 WARRANTY

- A. Dryvit Systems, Inc. shall provide a written moisture drainage and limited materials warranty against defective material upon written request. Dryvit shall make no other warranties, expressed or implied. Dryvit does not warrant workmanship. Full details are available from Dryvit Systems, Inc.
- B. The applicator shall warrant workmanship separately. Dryvit shall not be responsible for workmanship associated with installation of the Outsulation Plus MD System.

1.11 DESIGN RESPONSIBILITY

- A. It is the responsibility of both the specifier and the purchaser to determine if a product is suitable for its intended use. The designer selected by the purchaser shall be responsible for all decisions pertaining to design, detail, structural capability, attachment details, shop drawings and the like. Dryvit has prepared guidelines in the form of specifications, installation details, and product data sheets to

facilitate the design process only. Dryvit is not liable for any errors or omissions in design, detail, structural capability, attachment details, shop drawings, or the like, whether based upon the information prepared by Dryvit or otherwise, or for any changes which purchasers, specifiers, designers, or their appointed representatives may make to Dryvit's published comments.

1.12 MAINTENANCE

- A. Maintenance and repair shall follow the procedures noted in the Dryvit Outsulation Plus MD System Application Instructions, [DS218](#).
- B. All Dryvit products are designed to require minimal maintenance. However, as with all building products, depending on location, some cleaning may be required. See Dryvit publication [DS152](#) on Cleaning and Recoating.
- C. Sealants and Flashings shall be inspected on a regular basis and repairs made as necessary.

PART II PRODUCTS

2.1 MANUFACTURER

- A. All components of the Outsulation Plus MD System shall be supplied or obtained from Dryvit or its authorized distributors. Substitutions or additions of materials other than specified will void the warranty.

2.2 MATERIALS

- A. Portland Cement: Shall be Type I or II, meeting ASTM C 150, white or gray in color, fresh and free of lumps.
- B. Water: Shall be clean and free of foreign matter.

2.3 COMPONENTS

- A. Air/Water-Resistive Barrier Components:
 - 1. Dryvit Backstop NT: A vapor permeable, flexible, polymer-based noncementitious water-resistive and air barrier coating available in Texture, Smooth, and Spray. See [DS180](#) and [DS181](#).
 - 2. Dryvit Backstop NT-VB: A Class 1 vapor retarder, available in trowel and spray versions. When specified, consider having a WVT analysis performed. See [DS830](#) and [DS831](#).
 - 3. Dryvit Grid Tape™: An open weave fiberglass mesh tape with pressure sensitive adhesive available in rolls 4 in (102 mm) wide by 100 yds (91 m) long.
 - 4. Dryvit Backstop DMS: A sprayable single step water-resistive membrane/air barrier and adhesive.

NOTE: Backstop DMS is not approved for use over wood based substrates.

- B. Flashing Materials: Used to protect substrate edges at terminations.
 - 1. Liquid Applied: An extremely flexible water-based polymer material, ready for use.
 - a. Shall be AquaFlash and AquaFlash Mesh
 - 2. Sheet Type:
 - a. Shall be Flashing Tape and Surface Conditioner
 - 1) Dryvit Flashing Tape™: A high density polyethylene film backed with a rubberized asphalt adhesive available in rolls 4 in (102 mm), 6 in (152 mm) and 9 in (229 mm) wide by 75 ft (23 m) long.
 - 2) Dryvit Flashing Tape Surface Conditioner™: A water-based surface conditioner and adhesion promoter for the Dryvit Flashing Tape.
- C. Dryvit AP Adhesive™: A moisture cure, urethane-based adhesive used to adhere the Dryvit Drainage Strip™ and Drainage Track. Drainage Track: UV treated PVC "J" channel perforated with weep holes, complying with ASTM D 1784 and ASTM C 1063. **Drainage track usage is limited to the base of the system at finished grade level when installing system in noncombustible construction. All other horizontal terminations shall utilize the Dryvit Drainage Strip as shown in Outsulation Plus MD Installation Details, [DS110](#).** Shall be one of the following:
 - 1. Starter Trac STWP – without drip edge by Plastic Components, Inc.
 - 2. Starter Trac STDE – with drip edge by Plastic Components, Inc.
 - 3. Universal Starter Track by Wind-lock Corporation
 - 4. Sloped Starter Strip with Drip by Vinyl Corp.

- D. Dryvit Drainage Strip: A corrugated plastic sheet material, which provides drainage.
- E. Adhesives: Used to adhere the EPS to the air/water-resistive barrier, shall be compatible with the water-resistive barrier and the EPS.
 - 1. Cementitious: A liquid polymer-based material, which is field mixed with Portland cement.
 - a. Shall be Primus, Genesis or Genesis® FM
 - 2. Ready mixed: A dry blend cementitious, copolymer-based product, field mixed with water.
 - a. Shall be Primus® DM, Genesis® DM, Genesis® DMS, Rapidry DM 35-50 or Rapidry DM 50-75
- F. Insulation Board: Expanded Polystyrene meeting Dryvit Specification for Insulation Board, [DS131](#).
 - 1. Thickness of insulation board shall be minimum 1 in (25 mm).
 - 2. The insulation board shall be manufactured by a board supplier listed by Dryvit Systems, Inc.
- G. Machine Coated Dryvit EPS Shapes and Starter Boards: Shall be supplied by [Acrocore](#) or other approved manufacturer that subscribes to the Dryvit third party certification and quality assurance program.
- H. Base Coat: Shall be compatible with the EPS insulation board and reinforcing mesh(es).
 - 1. Cementitious: A liquid polymer-based material, which is field mixed with Portland cement.
 - a. Shall be Primus, Genesis or Genesis FM
 - 2. Noncementitious: A factory-mixed, fully formulated, water-based product.
 - a. Shall be NCB
 - 3. Ready mixed: A dry blend cementitious, copolymer-based product, field mixed with water.
 - a. Shall be Primus DM, Genesis DM, Genesis DMS, Rapidry DM 35-50 or Rapidry DM 50-75.
- I. Reinforcing Mesh: A balanced, open weave, glass fiber fabric treated for compatibility with other system materials. **NOTE: Reinforcing meshes are classified by impact resistance and specified by weight and tensile strength as listed in Section 1.04.D.1.d.**
 - 1. Shall be Standard, Standard Plus, Intermediate, Panzer 15, Panzer 20, Detail and Corner Mesh
 - 2. Shall be colored blue for product identification bearing the Dryvit logo.
- J. Finish: Shall be the type, color and texture as selected by the architect/owner and shall be one or more of the following:
 - 1. **E**: Water-based, lightweight acrylic coating with integral color and texture and formulated with DPR chemistry:
 - a. Sandpebble® Fine **E**

PART III EXECUTION

3.1 EXAMINATION

- A. Prior to installation of the Outsulation Plus MD System, the contractor shall verify that the substrate:
 - 1. Is of a type listed in Section 1.04.C.1.
 - 2. Is flat within 1/4 in (6.4 mm) in a 4 ft (1.2 m) radius.
 - 3. Is sound, dry, connections are tight; has no surface voids, projections, or other conditions that may interfere with the Outsulation Plus MD System installation or performance.
- B. Prior to installation of the Outsulation Plus MD System, the architect or general contractor shall insure that all needed flashings and other waterproofing details have been completed, if such completion is required prior to the Outsulation Plus MD application. Additionally, the Contractor shall ensure that:
 - 1. Metal roof flashing has been installed in accordance with the manufacturer's requirements, Asphalt Roofing Manufacturers Association (ARMA) Standards and Dryvit Outsulation Plus MD Installation Details, [DS110](#), or as otherwise necessary to maintain a watertight envelope.
 - 2. Openings are flashed in accordance with the Outsulation Plus MD System Installation Details, [DS110](#), or as otherwise necessary to prevent water penetration.
 - 3. Chimneys, balconies and decks have been properly flashed.
 - 4. Windows, doors, etc. are installed and flashed per manufacturer's requirements and the Outsulation Plus MD System Installation Details, [DS110](#).
- C. Prior to the installation of the Outsulation Plus MD System, the contractor shall notify the general contractor, and/or architect, and/or owner of all discrepancies.

3.2 PREPARATION

- A. The Outsulation Plus MD materials shall be protected by permanent or temporary means from inclement weather and other sources of damage prior to, during, and following application until completely dry.
- B. Protect adjoining work and property during Outsulation Plus MD installation.
- C. The substrate shall be prepared as to be free of foreign materials, such as oil, dust, dirt, form-release agents, efflorescence, paint, wax, water repellants, moisture, frost, and any other condition that may inhibit adhesion.

3.3 INSTALLATION

- A. The system shall be installed in accordance with the Dryvit Outsulation Plus MD System Application Instructions, [DS218](#).
- B. The overall minimum base coat thickness shall be sufficient to fully embed the mesh. The recommended method is to apply the base coat in two (2) passes.
- C. Sealant shall not be applied directly to textured finishes or base coat surfaces. Dryvit Outsulation Plus MD System surfaces in contact with sealant shall be coated with Demandit Smooth or Color Prime.
- D. High impact meshes shall be installed as specified at ground level, high traffic areas and other areas exposed to or susceptible to impact damage.
- E. The installation of Machine Coated Dryvit EPS Shapes and Starter Boards shall be in accordance with Dryvit Publication [DS854](#).

3.4 FIELD QUALITY CONTROL

- A. The contractor shall be responsible for the proper storage and application of the Outsulation Plus MD materials.
- B. Dryvit assumes no responsibility for on-site inspections or application of its products.
- C. If required, the contractor shall certify in writing the quality of work performed relative to the substrate system, details, installation procedures, workmanship and as to the specific products used.
- D. If required, the EPS supplier shall certify in writing that the EPS meets Dryvit's specifications.
- E. If required, the sealant contractor shall certify in writing that the sealant application is in accordance with the sealant manufacturer's and Dryvit's recommendations.

3.5 CLEANING

- A. All excess Outsulation Plus MD System materials shall be removed from the job site by the contractor in accordance with contract provisions and as required by applicable law.
- B. All surrounding areas, where the Dryvit Outsulation Plus MD System has been applied, shall be left free of debris and foreign substances resulting from the contractor's work.

3.6 PROTECTION

- A. The Outsulation Plus MD System shall be protected from inclement weather and other sources of damage until dry and permanent protection in the form of flashings, sealants, etc. are installed.

END OF SECTION

THIS PAGE LEFT BLANK INTENTIONALLY

SECTION 07 27 26**FLUID-APPLIED MEMBRANE AIR BARRIERS****PART 1: GENERAL****1.1 SUMMARY**

- A. Section includes fluid-applied, vapor-barrier membrane air barriers at masonry walls.

1.2 DEFINITIONS

- A. Air-Barrier Material: A primary element that provides a continuous barrier to the movement of air.
- B. Air-Barrier Accessory: A transitional component of the air barrier that provides continuity.
- C. Air-Barrier Assembly: The collection of air-barrier materials and accessory materials applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include manufacturer's written instructions for evaluating, preparing, and treating substrate; technical data; and tested physical and performance properties of products.
- B. Shop Drawings: For air-barrier assemblies.
 - 1. Show locations and extent of air barrier. Include details for substrate joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
 - 2. Include details of interfaces with other materials that form part of air barrier.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: From air-barrier manufacturer, certifying compatibility of air barriers and accessory materials with Project materials that connect to or that come in contact with the barrier.

- C. Product Test Reports: For each air-barrier assembly, for tests performed by a qualified testing agency.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Remove and replace liquid materials that cannot be applied within their stated shelf life.
- B. Protect stored materials from direct sunlight.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended by air-barrier manufacturer.
 - 1. Protect substrates from environmental conditions that affect air-barrier performance.
 - 2. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.

PART 2: PRODUCTS

2.1 MATERIALS, GENERAL

- A. Source Limitations: Obtain primary air-barrier materials and air-barrier accessories from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. General: Air barrier shall be capable of performing as a continuous vapor-air barrier. Air-barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.
- B. Air-Barrier Assembly Air Leakage: Maximum 0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft., when tested according to ASTM E 283.

2.3 VAPORBARRIER MEMBRANE AIR BARRIER

- A. Fluid-Applied, Vapor-Barrier Membrane Air Barrier: Elastomeric, modified bituminous or synthetic polymer membrane.
 - a. Products: Subject to compliance with requirements, provide one of the following: Elastomeric, Modified Bituminous Membrane:
 - 1) Carlisle Coatings & Waterproofing Inc.; Barriseal R or Barriseal S.
 - 2) Epro Services, Inc.; Ecoflex-R or Ecoflex-S.
 - 3) Henry Company; Air-Bloc 06 QS or Air-Bloc 06 WB.
 - 4) Meadows, W. R., Inc.; Air-Shield LM.
 - 5) Tremco Incorporated, an RPM company; ExoAir 120SP/R.
 - b. Synthetic Polymer Membrane:
 - 1) Grace, W. R., & Co. - Conn.; Perm-A-Barrier Liquid.
 - 2) Henry Company; Air-Bloc 32MR.
 - 3) Rubber Polymer Corporation, Inc.; Rub-R-Wall Airtight.
- 2. Physical and Performance Properties:
 - a. Air Permeance: Maximum 0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. pressure difference; ASTM E 2178.
 - b. Vapor Permeance: Maximum 0.1 perm; ASTM E 96/E 96M Desiccant Method.
 - c. Ultimate Elongation: Minimum 500 percent; ASTM D 412, Die C.

2.4 ACCESSORY MATERIALS

- A. General: Accessory materials recommended by air-barrier manufacturer to produce a complete air-barrier assembly and compatible with primary air-barrier material.
- B. Primer: Liquid primer recommended for substrate by air-barrier material manufacturer.
- C. Counterflashing Strip: Modified bituminous, 40-mil- thick, self-adhering sheet consisting of 32 mils of rubberized asphalt laminated to an 8-mil- thick, cross-laminated polyethylene film with release liner backing.
- D. Butyl Strip: Vapor retarding, 30 to 40 mils thick, self-adhering; polyethylene-film-reinforced top surface laminated to layer of butyl adhesive with release liner backing.
- E. Modified Bituminous Strip: Vapor retarding, 40 mils thick, smooth surfaced, self-adhering; consisting of 36 mils of rubberized asphalt laminated to a 4-mil- thick polyethylene film with release liner backing.
- F. Joint Reinforcing Strip: Air-barrier manufacturer's glass-fiber-mesh tape.
- G. Substrate-Patching Membrane: Manufacturer's standard trowel-grade substrate filler.

- H. Adhesive and Tape: Air-barrier manufacturer's standard adhesive and pressure-sensitive adhesive tape.
- I. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, 0.0187 inch thick, and Series 300 stainless-steel fasteners.
- J. Sprayed Polyurethane Foam Sealant: One- or two-component, foamed-in-place, polyurethane foam sealant, 1.5- to 2.0-lb/cu. ft density; flame-spread index of 75 or less according to ASTM E 162; with primer and noncorrosive substrate cleaner recommended by foam sealant manufacturer.
- K. Modified Bituminous Transition Strip: Vapor retarding, 40 mils thick, smooth surfaced, self-adhering; consisting of 36 mils of rubberized asphalt laminated to a 4-mil- thick polyethylene film with release liner backing.
- L. Joint Sealant: ASTM C 920, single-component, neutral-curing silicone; Class 100/50 (low modulus), Grade NS, Use NT related to exposure, and, as applicable to joint substrates indicated, Use O. Comply with Section 079200 "Joint Sealants."
- M. Termination Mastic: Air-barrier manufacturer's standard cold fluid-applied elastomeric liquid; trowel grade.

PART 3: EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
 - 1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
 - 2. Verify that concrete has cured and aged for minimum time period recommended by air-barrier manufacturer.
 - 3. Verify that concrete is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
 - 4. Verify that masonry joints are flush and completely filled with mortar.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

- A. Clean, prepare, treat, and seal substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air-barrier application.
- B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.
- C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

- D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching membrane.
- E. Remove excess mortar from masonry ties, shelf angles, and other obstructions.
- F. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.
- G. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.

3.3 JOINT TREATMENT

- A. Concrete and Masonry: Prepare, treat, rout, and fill joints and cracks in substrate according to ASTM C 1193 and air-barrier manufacturer's written instructions. Remove dust and dirt from joints and cracks complying with ASTM D 4258 before coating surfaces.
 - 1. Prime substrate and apply a single thickness of air-barrier manufacturer's recommended preparation coat extending a minimum of 3 inches along each side of joints and cracks. Apply a double thickness of fluid air-barrier material and embed a joint reinforcing strip in preparation coat.
- B. Gypsum Sheathing: Fill joints greater than 1/4 inch with sealant according to ASTM C 1193 and air-barrier manufacturer's written instructions. Apply first layer of fluid air-barrier material at joints. Tape joints with joint reinforcing strip after first layer is dry. Apply a second layer of fluid air-barrier material over joint reinforcing strip.

3.4 TRANSITION STRIP INSTALLATION

- A. General: Install strips, transition strips, and accessory materials according to air-barrier manufacturer's written instructions to form a seal with adjacent construction and maintain a continuous air barrier.
 - 1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
 - 2. Install butyl or modified bituminous strip on roofing membrane or base flashing so that a minimum of 3 inches of coverage is achieved over each substrate.
- B. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by fluid air-barrier material on same day. Reprime areas exposed for more than 24 hours.
 - 1. Prime glass-fiber-surfaced gypsum sheathing with number of prime coats needed to achieve required bond, with adequate drying time between coats.
- C. Connect and seal exterior wall air-barrier material continuously to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and

window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.

- D. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.
- E. Apply joint sealants forming part of air-barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- F. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply modified bituminous transition strip so that a minimum of 3 inches of coverage is achieved over each substrate. Maintain 3 inches of full contact over firm bearing to perimeter frames with not less than 1 inch of full contact.
 - 1. Modified Bituminous Transition Strip: Roll firmly to enhance adhesion.
 - 2. Adhesive-Coated Transition Strip: Roll firmly to enhance adhesion.
 - 3. Elastomeric Flashing Sheet: Apply adhesive to wall, frame, and flashing sheet. Install flashing sheet and termination bars, fastened at 6 inches o.c. Apply lap sealant over exposed edges and on cavity side of flashing sheet.
 - 4. Preformed Silicone-Sealant Extrusion: Set in full bed of silicone sealant applied to walls, frame, and air-barrier material.
- G. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air-barrier material with foam sealant.
- H. Seal strips and transition strips around masonry reinforcing or ties and penetrations with termination mastic.
- I. Seal top of through-wall flashings to air barrier with an additional 6-inch- wide, modified bituminous or counterflashing strip.
- J. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.
- K. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches beyond repaired areas in strip direction.

3.5 FLUID AIR-BARRIER MEMBRANE INSTALLATION

- A. General: Apply fluid air-barrier material to form a seal with strips and transition strips and to achieve a continuous air barrier according to air-barrier manufacturer's written instructions. Apply fluid air-barrier material within manufacturer's recommended application temperature ranges.
 - 1. Apply primer to substrates at required rate and allow it to dry.
 - 2. Limit priming to areas that will be covered by fluid air-barrier material on same day. Reprime areas exposed for more than 24 hours.

3. Prime glass-fiber-surfaced gypsum sheathing with number of prime coats needed to achieve required bond, with adequate drying time between coats.
- B. Membrane Air Barriers: Apply a continuous unbroken air-barrier membrane to substrates according to the following thickness. Apply air-barrier membrane in full contact around protrusions such as masonry ties.
 1. Vapor-Barrier Membrane Air Barrier: Total dry film thickness as recommended in writing by manufacturer to meet performance requirements, but not less than 40-mil dry film thickness, applied in one or more equal coats.
- C. Apply strip and transition strip a minimum of 1 inch onto cured air-barrier material or strip and transition strip over cured air-barrier material overlapping 3 inches onto each surface according to air-barrier manufacturer's written instructions.
- D. Do not cover air barrier until it has been tested and inspected by Owner's testing agency.
- E. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

3.6 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Inspections: Air-barrier materials, accessories, and installation are subject to inspection for compliance with requirements. Inspections may include the following:
 1. Continuity of air-barrier system has been achieved throughout the building envelope with no gaps or holes.
 2. Continuous structural support of air-barrier system has been provided.
 3. Masonry and concrete surfaces are smooth, clean, and free of cavities, protrusions, and mortar droppings.
 4. Site conditions for application temperature and dryness of substrates have been maintained.
 5. Maximum exposure time of materials to UV deterioration has not been exceeded.
 6. Surfaces have been primed, if applicable.
 7. Laps in strips and transition strips have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fishmouths.
 8. Termination mastic has been applied on cut edges.
 9. Strips and transition strips have been firmly adhered to substrate.
 10. Compatible materials have been used.
 11. Transitions at changes in direction and structural support at gaps have been provided.
 12. Connections between assemblies (air-barrier and sealants) have complied with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
 13. All penetrations have been sealed.

- C. Tests: As determined by Owner's testing agency.
- D. Air barriers will be considered defective if they do not pass tests and inspections.
 - 1. Apply additional air-barrier material, according to manufacturer's written instructions, where inspection results indicate insufficient thickness.
 - 2. Remove and replace deficient air-barrier components for retesting as specified above.
- E. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.

3.7 CLEANING AND PROTECTION

- A. Protect air-barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.
 - 1. Protect air barrier from exposure to UV light and harmful weather exposure as required by manufacturer. If exposed to these conditions for more than 60 days, remove and replace air barrier or install additional, full-thickness, air-barrier application after repairing and preparing the overexposed membrane according to air-barrier manufacturer's written instructions.
 - 2. Protect air barrier from contact with incompatible materials and sealants not approved by air-barrier manufacturer.
- B. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended by manufacturer of affected construction.
- C. Remove masking materials after installation.

END OF SECTION

**SECTION 07600:
FLASHING AND SHEET METAL**

PART 1: GENERAL

1.01 Work Included:

- A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.
- B. Types of work specified in this section include the following:
 - 1. Metal Flashing
 - 2. Metal Accessories

1.03 Submittals:

- A. Submit shop drawings showing layout, profiles, joining, and anchoring of fabricated work, including flashing, counter-flashing, trim/fascia units, gutters and downspouts.

PART 2: PRODUCTS

2.01 Materials:

- A. Sheet metal flashing shall be 24 gauge, prefinished material except as otherwise indicated.
- B. Gutters and downspouts shall be size and shape as shown on the drawings. Shape downspouts to conform to wall profile as required.
 - 1. Metal straps for attaching downspouts to walls shall be 22 gauge, prefinished material. Straps shall be 2" wide, shaped to match downspouts, and of sufficient length to extend 4" on each side of downspout. (Gutter and downspout color shall be selected by Architect from Manufacturer's full range of standard colors).
- C. Metal accessories such as sheet metal clips, straps, anchoring devices and similar accessory units as required for installation of work, shall be matching or compatible with material being installed, non-corrosive, size and gauge required for performance.
- D. Bituminous Coating - Solvent type bituminous mastic, nominally free of sulfur, compounded for 15 mil dry film thickness per coat, complying with FS TT-C-494.
- E. Mastic Sealant - Polyisobutylene, non-hardening, non-skinning, non-drying, non-migrating sealant.
- F. Elastomeric Sealant - Type recommended by manufacturer of metal and fabricator of components being sealed, complying with FS TT-S-0027, FS TT-S-00230, and FS TT-S-001543.
- G. Epoxy Seam Sealer - 2-part non-corrosive metal seam cementing compound, recommended by metal manufacturer for exterior/interior non-moving joints including riveted joints.
- H. Adhesives - Type recommended by flashing manufacturer for waterproof/weather-resistant seaming and adhesive application of flashing metal.
- I. Roofing Cement - Asphaltic type, complying with ASTM D 2822.

- J. Fasteners - Same metal as flashing metal, or other non-corrosive metal as recommended by flashing manufacturer. Match finish of exposed heads with material being fastened.

2.02 Fabrication:

- A. Shop fabricate work to greatest extent possible, complying with details shown, and with applicable requirements of SMACNA "Architectural Sheet Metal Manual" and other recognized industry practices. Fabricate for waterproof and weather-resistant performance, sufficient to permanently prevent leakage, damage, or deterioration of the work.
- B. Form work to fit substrates complying with material manufacturer instructions and recommendations for forming. Form exposed sheet metal work without excessive oil-canning, buckling, or tool marks. Ensure formed work is true to line and levels indicated, with exposed edges folded back to form hems.
- C. Fabricate non-moving seams in sheet metal with flat-lock seams.
 - 1. Form aluminum seams with epoxy seam sealer. Rivet joints for additional strength where required.
 - 2. For metals other than aluminum, tin edges to be seamed, form seams, and solder.
- D. Where lapped or bayonet-type expansion provisions in work cannot be used, or would not be sufficiently water/weatherproof, form expansion joints of intermeshing hooked flanges, not less than 1" deep, filled with mastic sealant concealed within joints.
- E. Where movable, non-expansion type joints are indicated or required for proper performance of work, form metal in accordance with SMACNA standards to provide for proper installation of elastomeric sealant.
- F. Provide for separation of metal from non-compatible metal or corrosive substrates by coating concealed surfaces at locations of contact, with bituminous coating or other permanent separation as recommended by manufacturer and/or fabricator.
- G. Finish shall be full strength 70% Kynar 500 coating, baked on 15 minutes at 450 degrees F to a dry film thickness of 1.0 mil. Color shall be as selected by Architect.

PART 3: EXECUTION

3.01 Installation:

- A. Comply with manufacturer's installation instructions and recommendations, and with SMACNA "Architectural Sheet Metal Manual". Set work true to line and level. Anchor securely in place, providing for thermal expansion of metal units, concealing fasteners where possible. Install work with laps, joints and seams which will be permanently watertight and weatherproof
- B. Provide continuous hold down clips at all parapet cap flashing, drip edges, and other metal flashing as required to secure exposed edges of flashing. Install per SMACNA requirements.
- C. Bed flanges of work in a thick coat of bituminous roofing cement where required for waterproof performance.
- D. Install downspouts straight and plumb, in 10'-0" minimum sections, at locations shown on the drawings. Provide metal straps at top and bottom of each downspout section, and at 4'-0" o.c. maximum. Position

gutters to provide positive drainage. Provide for watertight expansion at intervals not to exceed SMACNA requirements.

3.02 Cleaning and Protection:

- A. Clean exposed metal surfaces, removing substances which might cause corrosion of metal or deterioration of finishes.
- B. Installer shall advise Contractor of required procedures for protection of flashing and sheet metal work during construction, to ensure that work will be without damage or deterioration at time of substantial completion.

END OF SECTION

THIS PAGE LEFT BLANK INTENTIONALLY.

**SECTION 07900:
JOINT SEALERS**

PART 1: GENERAL

1.01 Work Included:

- A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.
- B. Extent of each form and type of joint sealer as indicated on the drawings, specified herein, or reasonably implied by trade industry standards of construction.

1.02 System Description:

- A. Provide joint sealers that have been produced and installed to establish and maintain continuous watertight, airtight, and acoustical seals as applicable.

1.03 Quality Assurance:

- A. Obtain joint sealer materials from a single manufacturer for each different product required.
 - 1. Exterior sealant shall comply with F.S. TT-S-00230C.
 - 2. Interior caulking shall comply with F.S. TT-S-001657.

1.04 Submittals:

- A. Submit manufacturer's standard bead samples consisting of strips of actual products showing full range of colors available, for each product exposed to view.

1.05 Delivery, Storage and Handling:

- A. Store and handle materials to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.06 Project Conditions:

- A. Do not proceed with installation of joint sealers under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealer manufacturer or below 40 deg. F (4.4 deg. C).
 - 2. When joint substrates are wet due to rain, frost, condensation or other causes.
 - 3. When joint widths are less than allowed by joint sealer manufacturer for application indicated.
 - 4. Acoustical sealant shall not be begin until building is enclosed, with permanent heating and cooling equipment in operation, and building temperatures maintained above 55 deg. F. Adequate ventilation shall be provided to remove excess moisture.

PART 2: PRODUCTS**2.01 General Requirements:**

- A. Provide joint sealers, joint fillers and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by testing and field experience.
- B. Provide color of exposed joint sealers as selected by the Architect from Manufacturer's full range of standard colors.

2.02 Elastomeric Joint Sealants:

- A. Acceptable products subject to compliance with requirements, include the following:
 - 1. Bostik Construction Products - Chem-Calk 100.
 - 2. Pecora Corporation - Synthacalk GC-9.
 - 3. Sonneborn Building Products.
- B. Acceptable products for use at (FRP) Fiber Reinforced Plastic: subject to compliance with requirements, include the following:
 - 1. Mameco Corporation – Vulkem 116
 - 2. Sonneborn Building Products – NP1
- C. One Part Polysulfied Sealant; Type S; Grade NS; Class 12 ½; Uses T, M, G, A and as applicable to joint substrates indicated, O.

2.03 Latex Joint Sealants:

- A. Acceptable products subject to compliance with requirements, include the following:
 - 1. Bostik Construction Products - Chem-Calk 600.
 - 2. Pecora Corporation - AC-20.
 - 3. Sonneborn Building Products - Sonolac.
- B. Acrylic Emulsion Sealant of one part, nonsag, acrylic, mildew resistant, acrylic emulsion sealant complying with ASTM C 834, formulated to be paintable and recommended for exposed applications on interior and on protected exterior exposures involving joint movement of not more than 7.5%.

2.04 Acoustical Sealants:

- A. Acoustical sealants shall be United States Gypsum Company - SheetRock® Acoustical Sealant, or equal.
- B. Acoustical sealant products shall meet the following requirements:
 - 1. Sound test in accordance with ASTM E 90.

2. Surface burning characteristics when tested in accordance with ASTM E 84.
 - a. Flame Spread - 0
 - b. Smoke - 0
3. Comply with ASTM C 919 and ASTM C 834.

2.05 Joint Sealant Backing:

- A. Provide sealant backing of material and type which are non-staining; are compatible with joint substrates, sealants, primers and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Plastic foam joint fillers shall be preformed, compressible, resilient, non-waxing, non-extruding strips of plastic foam of material indicated below, subject to approval of sealant manufacturer.. Size, shape and density shall provide ability to control sealant depth and otherwise contribute to producing optimum sealant performance.
 1. Flexible, open cell polyurethane foam.
 2. Non-gassing, closed cell polyethylene foam.

2.06 Bond-Breaker Tape:

- A. Polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing bond between sealant and joint filler or other materials at back (3rd) surface of joint. Provide self-adhesive tape where applicable.

2.07 Primer:

- A. Provide type recommended by joint sealer manufacturer where required for adhesion of sealant to joint substrates indicated.

2.08 Cleaners:

- A. Cleaners for nonporous surfaces shall be non-staining, chemical cleaner of type acceptable to manufacturer of sealant and sealant backing materials which are not harmful to substrates and adjacent nonporous materials.

PART 3: EXECUTION

3.01 Preparation:

- A. Clean out joints immediately before installing joint sealers to comply with recommendations of joint sealer manufacturers and the following requirements:
 1. Remove all foreign material from joint substrates which could interfere with adhesion of joint sealer, including dust, paints, except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer; oil, grease, waterproofing, water repellents, water, surface dirt and frost.

2. Clean concrete, masonry, unglazed surface of ceramic tile and similar porous joint substrate surfaces, by brushing, grinding, blast cleaning, mechanical abrading, acid washing or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealers. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
 3. Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile and other non-porous surfaces by chemical cleaners or other means which are not harmful to substrates or leave residues capable of interfering with adhesion of joint sealers.
- B. Prime joint substrates where indicated or where recommended by joint sealer manufacturer based on pre-construction joint sealer manufacturer based on pre-construction joint sealer-substrate tests or prior experience. Apply primer to comply with joint sealer manufacturer's recommendations. Confine primers to areas of joint sealer bond, do not allow spillage or migration onto adjoining surfaces.

3.02 Joint Sealant Installation:

- A. Comply with joint sealer manufacturer's printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.
- B. Elastomeric sealant installation shall comply with requirements of ASTM C 962 for use of joint sealants as applicable to materials, applications and conditions indicated.
- C. Latex sealant installation shall comply with requirements of ASTM C 790 for use of latex sealants as applicable to materials, applications and conditions indicated.
- D. Install sealant backings to comply with the following requirements:
 1. Install joint-fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths which allow optimum sealant movement capability.
 - a. Do not leave gaps between ends of joint-fillers.
 - b. Do not stretch, twist, puncture or tear joint-fillers.
 - c. Remove absorbent joint fillers which have become wet prior to sealant application and replace with dry material.
 2. Install bond breaker tape between sealants and joint fillers, compression seals or back of joints where required to prevent third side adhesion of sealant to back of joint.
- E. Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration and providing uniform, cross-sectional shapes and depths relative to joint widths which allow optimum sealant movement capability.
- F. Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents which discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

- G. Install sealant, including forming, packing, and other accessory materials to fill openings around electrical and plumbing services penetrating walls to provide fire-stops with fire resistance ratings indicated for wall assembly in which penetration occurs. Comply with installation requirements established by testing and inspecting agent.
- 3.03 Adjust and Clean:
- A. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealers and of products in which joints occur.
- 3.04 Protection:
- A. Protect joint sealers during and after curing period from contact with contaminating substance or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of substantial completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealers immediately and reseal joints with new materials to product joint sealer installations with required areas indistinguishable from original work.

END OF SECTION

THIS PAGE LEFT BLANK INTENTIONALLY.

**SECTION 08100:
METAL DOOR FRAMES**

PART 1: GENERAL

1.01 Work Included:

- A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.
- B. Extent of standard metal doors and frames is indicated and scheduled on drawings.

1.02 Quality Assurance:

- A. Provide doors and frames complying with Steel Door Institute recommended specification SDI-100 - "Standard Steel Doors and Frames", and as herein specified.
- B. Where fire-rated door assemblies are indicated or required, provide fire-rated door and frame assemblies that comply with NFPA 80 "Standard for Fire Doors and Windows", and have been tested, listed, and labeled in accordance with ASTM E 152 "Standard Methods of Fire Tests of Door Assemblies" by a nationally recognized independent testing and inspection agency acceptable to authorities having jurisdiction.

1.03 Submittals:

- A. Submit shop drawings for fabrication and installation of metal doors and frames. Include details of each frame type, elevations of door design types, conditions at openings, details of construction, location and installation requirements of finish hardware and reinforcements, and details of joints and connections. Show anchorage and accessory items.
 - 1. Provide schedule of doors and frames using same reference numbers for details and openings as those on contract drawings. Failure to do so will result in rejection of submittal.
 - 2. Indicate coordination of glazing frames and stops with glass and glazing requirements.
- B. For door assemblies required to be fire-rated, submit manufacturer's certification that each door and frame assembly has been constructed to conform to design, materials and construction equivalent to requirements for labeled construction.

1.04 Delivery, Storage and Handling:

- A. Deliver hollow metal work cartoned or crated to provide protection during transit and job storage. Provide additional sealed plastic wrapping for factory finished doors.
- B. Inspect hollow metal work upon delivery for damage. Minor damages may be repaired provided refinished items are equal in all respects to new work and acceptable to Architect; otherwise, remove and replace damaged items as directed.
- C. Store doors and frames at building site under cover. Place units on minimum 4" high wood blocking. Avoid use of non-vented plastic or canvas shelters which could create humidity chamber. If cardboard wrapper on door becomes wet, remove carton immediately. Provide 1/4" spaces between stacked doors to promote air circulation.

PART 2: PRODUCTS**2.01 Acceptable Manufacturers:**

- A. Subject to compliance with requirements, manufacturers offering steel doors and frames which may be incorporated in the work include the following:
 - 1. Steelcraft Division; American Standard Company

2.02 Metals:

- A. Hot-Rolled Steel Sheets and Strips - Commercial quality carbon steel, pickled and oiled, complying with ASTM A 569 and ASTM A 568.
- B. Cold-Rolled Steel Sheets - Commercial quality carbon steel, complying with ASTM A 366 and ASTM A 568.
- C. Galvanized Steel Sheets - Zinc coated carbon steel sheets of commercial quality, complying with ASTM A 525 and ASTM A 526, with G60 zinc coating, mill phosphatized.
- D. Supports and Anchors - Fabricate of not less than 18 gauge galvanized sheet steel.
- E. Inserts, Bolts and Fasteners - Manufacturer's standard units, except hot-dip galvanize items to be built into exterior walls, complying with ASTM A 153, Class C or D as applicable.

2.03 Metal Frames:

- A. Provide metal frames for doors, lights, and other openings; of types and styles as shown on drawings and schedules. Conceal fastenings, unless otherwise indicated. Fabricate frames of minimum 16 gauge cold-rolled furniture steel unless indicated otherwise. Fabricate exterior frames and frames for rated doors of minimum 14 gauge Cold-rolled Furniture Steel.
 - 1. Fabricate frames with mitered corners, welded construction for exterior and interior applications.
 - 2. All openings having an STC 45 rating to have frames fully grouted solid.

2.04 Fabrication:

- A. Fabricate steel frame units to be rigid, neat in appearance, and free from defects, warp or buckle. Wherever practicable, fit and assemble units in manufacturer's plant.
- B. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at project site. Comply with SDI-100 requirements as follows:
 - 1. Interior Doors Frames - SDI-100, Grade II, heavy-duty, Model 1, minimum 16 gauge faces.
 - 2. Rated Doors - 14 Gauge, hot dipped galvanized at exterior locations; interior locations subject to high humidity.
- C. Fabricate exposed faces of doors and panels, including stiles and rails of non-flush units, from only cold-rolled steel.
- D. Fabricate frames, concealed stiffeners, reinforcement, edge channels, louvers and moldings from either cold-rolled or hot-rolled steel.

- E. Fabricate exterior doors, panels, and frames from galvanized sheet steel. Close top and bottom edges of exterior doors as integral part of door construction or by addition of minimum 16-gauge inverted steel channels.
- F. Prepare doors and frames to receive mortised and concealed finish hardware in accordance with final Finish Hardware Schedule and templates provided by hardware supplier. Comply with applicable requirements of ANSI A115 series specifications for door and frame preparation for hardware.
- G. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied finish hardware may be done at project site.
- H. Locate finish hardware as indicated on final shop drawings or, if not indicated, in accordance with "Recommended Locations for Builder's Hardware", published by Door and Hardware Institute.
- I. Shop Painting:
 - 1. Clean, treat, and paint exposed surfaces of steel door and frame units, including galvanized surfaces.
 - 2. Clean steel surfaces of mill scale, rust, oil, grease, dirt, and other foreign materials before application of paint.
 - 3. Apply shop coat of prime paint of even consistency to provide a uniformly finished surface ready to receive finish paint.

PART 3: EXECUTION

3.01 Installation:

- A. Install standard metal doors, frames, and accessories in accordance with final shop drawings, manufacturer's instructions, and as herein specified.
- B. Frame placement shall comply with provisions of SDI-105 "Recommended Erection Instructions For Steel Frames", unless otherwise indicated.
 - 1. Place frames prior to finishing of enclosing walls and ceilings. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders leaving surfaces smooth and undamaged.
 - 2. Provide three anchors per jamb at hinge and strike levels.
 - 3. Install fire-rated frames in accordance with NFPA 80.
- C. Door placement shall comply as follows:
 - 1. Fit hollow metal doors accurately in frames, within clearances specified in SDI-100.
 - 2. Place fire-rated doors with clearances as specified in NFPA 80.

3.02 Adjust and Clean:

- A. Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer.
- B. Immediately prior to final inspection, remove protective plastic wrappings from prefinished doors.

- C. Check and readjust operating finish hardware items, leaving steel doors and frames undamaged and in complete and proper operating conditions.

END OF SECTION

**SECTION 08400:
ALUMINUM STOREFRONTS**

PART 1: GENERAL

1.01 Work Included:

- A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.
- B. Extent of aluminum frames and storefronts is indicated on drawings and include the following:
 - 1. Aluminum storefront framing system for windows.

1.02 Related Work:

- A. Section 08800 - Glass and Glazing

1.03 Quality Assurance:

- A. Installer shall be a company specializing in installation of aluminum frame systems for a minimum of 3 years.

1.04 Submittals:

- A. Submit shop drawings for fabrication and installation of aluminum framing systems, including elevations, details of typical members, hardware mounting heights, anchors, reinforcement, expansion provisions, and glazing.

PART 2: PRODUCTS

2.01 Acceptable Manufacturers:

- A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:
 - 1. Kawneer Company, Inc.
 - 2. EFCO Corporation
 - 3. U.S. Aluminum

2.02 Materials:

- B. Aluminum frames for exterior applications shall be manufacturer's standard 2" x 6" aluminum frame flush front system suitable for 1" insulated glazing.
- C. Aluminum framing members shall be extruded aluminum 6063 alloy, T5 temper.
- D. Fasteners shall be aluminum, non-magnetic stainless steel, or other materials warranted by manufacturer to be noncorrosive and compatible with aluminum components.

2.03 Fabrication:

- A. Required sizes for aluminum frames, storefronts and doors are indicated on drawings. Variable dimensions are indicated, with overall dimensions required to achieve design conformance.
- B. To greatest extent possible, complete fabrication, assembly, finishing, hardware application, and other work before shipment to project site.
 - 1. Disassemble components only as necessary for shipment and installation.
- C. Fabricate contacting members with hairline fit, maintaining accurate relationship of planes and angles.
- D. Welding shall comply with AWS recommendations to avoid discoloration. Grind exposed welds smooth and restore finish.
- E. Install reinforcing as necessary for performance requirements. Separate dissimilar metals with bituminous paint or other separator which will prevent corrosion.
- F. Conceal anchors and fasteners wherever possible.
- G. Install 2" x 2" aluminum protection bar on inside face of storefront @ approx. 34" a.f.f. to match existing airport standard

2.04 Finishes:

- A. Comply with NAAMM "Metal Finishes Manual" for recommendations related to designations and application of finishes.
- B. Protect mechanical finishes from damage by application of strippable, temporary protective covering prior to shipment.
- C. Noticeable variations in finish for a single framing member is not acceptable. Variations in appearance of abutting or adjacent frames is not acceptable within ½ of the range of approved samples.
- D. Provide factory applied organic coating tested and certified by the manufacturer.
 - 1. Class I Color Anodized Finish - Nonspecular as fabricated mechanical finish; chemical etch, medium matte; 0.7 mill minimum thick integrally or electrolytically deposited colored anodic coating.
 - 2. Color shall be Dark Bronze to match existing airport standard.

PART 3: EXECUTION**3.01 Preparation:**

- A. Take field measurements prior to preparation of shop drawings and fabrication to ensure proper fitting of work.

3.02 Installation:

- A. Comply with manufacturer's recommendations and instructions for installation of aluminum entrances and storefronts.

- B. Set units plumb, level, and true to line, without warp or rack of framing members, doors, or panels, and anchor securely in place. Use materials as recommended by manufacturer to separate aluminum and other metal surfaces from sources of corrosion.
- C. Set aluminum framing members in bed of sealant, providing joint fillers or gaskets as required to provide weather tight construction.
- D. Refer to Section 08800 - Glass and Glazing for installation of glass into doors and framing which are not pre-glazed by storefront manufacturer.

3.03 Adjust and Clean:

- A. Adjust operating hardware to function properly, without binding, and to provide tight fit at contact points and weather-stripping.
- B. Clean completed system after erection and installation of glazing. Remove excess sealants, dirt, and other substances from aluminum surfaces.

END OF SECTION

THIS PAGE LEFT BLANK INTENTIONALLY.

**SECTION 08800:
GLASS AND GLAZING**

PART 1: GENERAL

1.01 Work Included:

- A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.
- B. Extent of glass and glazing is indicated on drawings and includes the following applications:
 - 1. Fixed aluminum window frames and glazing.

1.02 Related Work

- A. Section 08400 – Aluminum Storefronts

1.03 System Description:

- A. Provide glass that has been produced and installed to withstand normal temperature changes, wind loading, and impact loading as applicable, without failure. This includes breakage of glass, failure of sealants or gaskets to remain watertight and airtight, deterioration of glazing materials, and any other defects.

1.04 Quality Assurance:

- A. Comply with recommendations of Flat Glass Marketing Association (FGMA) "Glazing Manual" and "Sealant Manual" unless more stringent requirements are specified.
- B. Primary glass products shall comply with FS DD-G-451.
- C. Safety glass shall comply with ANSI Z97.1, and testing requirements of 16 CFR Part 1201 for category II materials.
- D. Fire rated wire glass shall be identical to those tested per ASTM E 163 and are labeled and listed by UL or other testing and inspecting agency acceptable to authorities having jurisdiction.
- E. Insulating glass products shall comply with ASTM E 774 for Class A requirements.
- F. Materials shall be provided by a single source for each type of glass and glazing product.

1.05 Submittals:

- A. Submit manufacturer's technical data for each glass and glazing material required, including installation and maintenance instructions.

1.06 Delivery, Storage and Handling:

- A. Provide protection as required to prevent edge damage to glass, and damage to glass from effects of moisture including condensation, temperature changes, direct exposure to sunlight, and other detrimental causes.

1.07 Project Conditions:

- A. Do not proceed with glazing when ambient and substrate temperature conditions are outside the limits permitted by glass manufacturer or when joint substrates are wet due to rain, frost, condensation, or other moisture.
- B. Install sealants only when temperatures are within manufacturer's recommended temperature range.

PART 2: PRODUCTS

2.01 Acceptable Manufacturers:

- A. Subject to compliance with requirements, manufacturers offering glass and glazing products which may be incorporated in the work include the following:
 - 1. AFG Industries, Inc.
 - 2. Guardian Industries Corporation
 - 3. PPG Industries, Inc.

2.02 Materials:

- A. Sealed Insulated Glass - Provide preassembled units consisting of organically sealed panes of glass enclosing a hermetically sealed dehydrated air space, complying with the following requirements:
 - 1. Glass for storefront shall be uncoated, insulated, exterior pane, grey tempered glass to match existing airport standard
 - 2. Thickness of each Tempered Glass Pane - 1/4"
 - 3. Air Space Thickness - 1/2"
 - 4. Total Insulated Glass Thickness - 1"
 - 5. Sealing System - Manufacturer's standard.
 - 6. Spacer Material - Manufacturer's standard metal (color:black).
 - 7. Desiccant - Manufacturer's standard material.
 - 8. Corner Design - Manufacturer's standard.
- F. Glazing Sealants:
 - 1. Comply with recommendations of sealant and glass manufacturers for selection of glazing sealants which have proven compatibility and performance characteristics suitable for surfaces, conditions, and applications.
 - 2. Provide color of exposed sealants as selected by Architect from manufacturer's standard colors.
 - 3. Silicone Glazing Sealant - Single component elastomeric silicone sealant complying with FS TT-S-001543, and ASTM C 920. Class A, nonsag, Type S, Grade NS, Class 25, Use G and as applicable Uses A and O.

4. Preformed butyl-polyisobutylene glazing tape complying with AAMA 807.1.
- G. Miscellaneous Glazing Materials:
1. Cleaners, primers, and sealers as recommended by sealant or gasket manufacturer.
 2. Setting Blocks - Neoprene, EPDM, or silicone blocks as required for compatibility with glazing sealants, 80 to 90 Shore A durometer hardness.
 3. Spacers - Neoprene, EPDM, silicone blocks, or continuous extrusions as required for compatibility with glazing sealant. Provide size, shape, and hardness recommended by glass and sealant manufacturers for required application.
 4. Edge Blocks - Neoprene, EPDM, or silicone blocks as required for compatibility with glazing sealant. Provide size and hardness required to limit lateral movement of glass.

PART 3: EXECUTION

3.01 Inspection:

- A. Inspect framing for compliance with installation tolerances including size, squareness, and offsets at corners. Also inspect for presence and functioning of weep system, existence of minimum required face or edge clearances, and effective sealing of joinery. Do not proceed with glazing until unsatisfactory conditions have been corrected.

3.02 Preparation:

- A. Immediately prior to glazing, clean channels and other framing members to receive glass. Remove coatings which are not firmly bonded to substrates and as may be detrimental to glass.

3.03 Installation:

- A. Comply with manufacturer' installation recommendations and instructions for glass, sealants, gaskets and other glazing materials, except where more stringent requirements exist.
- B. Protect glass, including edges, from damage during handling and installation:
 1. Use a rolling block in rotating glass units to prevent damage to corners.
 2. Do not impact glass with construction materials or equipment.
 3. Use suction cups to shift glass units within openings.
 - a. Do not raise or drift glass with a pry bar.

3.04 Protection and Cleaning:

- A. Protect exterior glass from breakage immediately upon installation by use of crossed streamers attached to framing and held away from glass. Do not apply markers to surfaces of glass. Remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove immediately by method recommended by glass manufacturer.

- C. Remove and replace glass which is broken, chipped, cracked, abraded or damaged in other ways during construction period, including natural causes, accidents and vandalism.
- D. Clean glass, in accordance with manufacturer's recommendations, on both faces not more than 4 days prior to date scheduled for substantial completion inspection.

END OF SECTION

**SECTION 09100:
METAL SUPPORT SYSTEMS**

PART 1: GENERAL

1.01 Work Included:

- A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.

1.02 Related Work:

- A. Section 05400 – Cold Formed Metal Framing
- B. Section 07900 - Joint Sealers
- C. Section 09250 - Gypsum Wallboard

1.03 System Description:

- A. This section covers steel stud wall systems, wall furring, fasteners and accessories for the screw attachment of gypsum board.

1.04 Quality Assurance:

- A. Thickness of steel is specified in decimals of an inch and is the minimum uncoated steel thickness.
- B. “Bottom of Deck” refers to the underside of structure overhead and may be either the underside of the floor or roof construction.
- C. Where fire rated construction is required for walls, columns, beams, and floor-ceiling assemblies, the construction shall be identical to that used in fire rating test assemblies.

1.05 Submittals:

- A. Provide manufacturer's technical data and typical installation instructions as follows:
 - 1. Typical metal framing including details around openings and corner details.
 - a. Studs, tracks, and furring channels.
 - 2. Clips, hangers and accessories.
 - 3. Anchors, fasteners, and screws.
 - 4. Fire rating test designation for each fire rating required for each assembly.

1.06 Delivery, Storage and Handling:

- A. Deliver and provide storage for products In accordance with the requirements of ASTM C 754.

PART 2: PRODUCTS

2.01 General Requirements:

- A. Protect steel studs, tracks, and rigid furring channels with not less than G 60 galvanizing per ASTM A 525.

2.02 Steel Studs and Tracks:

- A. Use ASTM A 525 steel and comply with the requirements of ASTM C 645.
 - 1. Studs shall be 20 gauge, unless otherwise indicated.
 - 2. Studs shall be in one piece.
 - 3. Tracks shall be same gauge and thickness as studs.
- B. Provide not less than two cutouts in web of each stud, approximately 12 inches from each end, and intermediate cutouts on approximately 24-inch centers.
- C. Refer to drawings for stud sizes and locations.

2.03 Furring Channels:

- A. Furring channels shall be comply with ASTM C 645, and as follows:
 - 1. ½" resilient, hat shaped channels.
 - 2. 7/8" rigid, 'Z' shaped channels.
 - 3. 7/8" resilient, hat shaped channels

2.04 Clips and Hangers:

- A. Clips and hangers shall comply with the requirements of ASTM C 754, except as otherwise specified.
- B. Clips shall conform to ASTM C 841, paragraph 6.11, manufacturers standard items. Clips used in lieu of tie wire shall have holding power equivalent to that provided by the tie wire for the specific application.
- C. Concrete ceiling hanger inserts shall be manufacturer's standard galvanized steel items, designed to support twice the hanger loads imposed and the type of hanger used.
- D. Hanger wire shall be galvanized steel conforming to ASTM A 641, and shall be soft temper with Class 1 coating. Wire gauge shall conform to the requirements of ASTM C 754 or ASTM C 841 as applicable to the installation.

2.05 Anchors and Fasteners:

- A. Anchors and fasteners shall comply with the requirements of ASTM C 754, except as otherwise specified.

- B. Fasteners for steel studs thicker than 20 gauge shall be steel drill screws of size and type recommended by the manufacturer of the material being fastened.
- C. Power Actuated Fasteners shall comply to FS FF-P-395; length and class as required to resist twice the imposed loads; style suitable for type of hanger or bracket used:
 - 1. Eye Pin - Type I, Class 4, Style EP.
 - 2. Threaded Stud - Style SC for concrete; Style SS for steel.
 - 3. Drive Pin - Style PC for concrete, Style PS for steel.
 - 4. For applications not specified, use type and size as recommended by the manufacturer of the material being fastened.

PART 3: EXECUTION

3.01 Installing Studs:

- A. Install studs in accordance with ASTM C 754, except as otherwise shown or specified.
- B. Space studs not more than 16 inches on center.
- C. When studs are to be extended to underside of structure overhead, cut studs 1/4 inch to 3/8 inch less than distance from floor to underside of structure overhead.
- D. Where studs are shown to terminate above suspended ceilings, provide bracing or extend studs to underside of structure overhead.
- E. Extend studs to underside of structure overhead for fire partitions, smoke partitions, and shafts.
- F. Form control joints with double studs spaced 1/2 inch apart.
- G. Fastening Studs:
 - 1. Fasten studs to adjacent track flange, at intersections, corners, and jambs, with two screws through each end of each stud and track flange, or by use of metal lock fastener tool.
 - 2. Do not fasten studs to top track when studs extend to underside of structure overhead.
- H. Chase Wall Partitions:
 - 1. Locate cross braces for chase wall partitions to permit the installation of pipes, conduits, carriers and similar items.
 - 2. Studs or tracks used as cross bracing shall be not less than 2 1/2 inches wide.
- I. Openings:
 - 1. Frame jambs of openings in stud partitions and furring with two 20 gauge steel studs placed back to back or as shown.
 - 2. Fasten back to back studs together with 3/8 inch long, Type S, panhead screws at not less than two feet on center, staggered along webs.

3. Studs fastened flange to flange shall have splice plates on both sides, screwed to each stud with two screws in each stud. Splice plates shall be approximately two inches by three inches, located at 24 inches on center between tracks.

3.02 Installing Furring Channels:

Space furring channels per manufacturer's recommendations for applicable conditions, but not more than 24" on center.

3.03 Installing Supports:

- A. Provide for attachment and support of handrail brackets, wall-hung casework, access panel frames, fire extinguisher cabinets, toilet partitions, urinal screens, wall guards, toilet accessories, plumbing fixtures, recessed type plumbing fixture accessories, electrical outlets, other items supported by stud construction, and additionally as shown on the drawings. Coordinate stud support locations with surrounding construction to avoid conflict with trades not yet accomplished.
- B. Provide additional studs where required. Install metal backing plates, or special metal shapes as required, and securely fasten to metal studs.

3.04 Field Quality Control:

- A. Fastening surface for application of subsequent materials shall not vary more than 1/8 inch from the layout line.
- B. Plumb and align vertical members within 1/8 inch.
- C. Level or align ceilings within 1/8 inch.

END OF SECTION

**SECTION 09250:
GYPSUM WALLBOARD**

PART 1: GENERAL

1.01 Work Included:

- A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.
- B. Types of work specified in this section include the following:
 - 1. Regular Gypsum Drywall
 - 2. Fire-Code Gypsum Drywall
 - 3. Moisture Resistant Gypsum Drywall
 - 4. Drywall Suspension System

1.02 Related Work:

- A. Section 09100 - Metal Support Systems
- B. Section 09500 - Acoustical Ceilings

1.03 Quality Assurance:

- A. Where gypsum drywall systems with fire resistance ratings are indicated, provide materials and installations which are identical with those of applicable assemblies tested per ASTM E 119 by fire testing laboratories acceptable to authorities having jurisdiction.
 - 1. Provide fire-resistance rated assemblies identical to those indicated by reference as follows:
 - a. File numbers in Gypsum Association "Fire Resistance Design Manual".
 - b. Design designations in UL "Fire Resistance Directory".
 - c. Listing of other testing agencies acceptable to authorities having jurisdiction.
- B. Refer to "Gypsum Board Terminology Standard", GA-505 by Gypsum Association, for terms relating to gypsum products not otherwise defined within this section.
- C. Obtain gypsum board products from a single manufacturer, or from manufacturers recommended by the prime manufacturer of gypsum board products.

1.04 Submittals:

- A. Submit manufacturer's product data and installation instructions for each gypsum drywall component.

1.05 Delivery, Storage and Handling:

- A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.

- B. Store materials inside, under cover, and in a manner to keep them dry and protected from weather, direct sunlight, surface contamination, corrosion and damage from construction traffic and other causes. Neatly stack gypsum boards flat to prevent sagging.
- C. Handle gypsum boards to prevent damage to edges, ends or surfaces. Protect metal corner beads and trim from being bent or damaged.

1.06 Project Conditions:

- A. Comply with requirements of referenced gypsum board application standards, and recommendations of gypsum board manufacturer, for environmental conditions before, during and after application of gypsum board.
- B. When ambient outdoor temperatures are below 55 deg F (13 deg C) maintain continuous, uniform, comfortable building working temperatures of not less than 55 deg F (13 deg C) for a minimum period of 48 hours prior to, during, and following application of gypsum board and joint treatment materials or bonding of adhesives.
- C. Ventilate building spaces as required to remove water in excess of that required for drying of joint treatment material, prior to its application. Avoid drafts during dry, hot weather to prevent too rapid drying.

PART 2: PRODUCTS

2.01 Acceptable Manufacturers:

- A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:
 - 1. Gypsum Board and Related Products:
 - a. American Gypsum Company
 - b. Georgia-Pacific Corporation
 - c. United States Gypsum Company

2.02 Gypsum Board:

- A. Gypsum board shall conform to ASTM C 36 and as indicated below:
 - 1. Regular wallboard, unless otherwise indicated.
 - 2. Type 'X' wallboard for fire-resistant rated assemblies and where indicated.
 - 3. Moisture resistant wallboard for use in toilet rooms, janitor closets, mechanical rooms, and other wet installations.
 - 4. Edges - Tapered.
 - 5. Thickness - 5/8", unless otherwise indicated.
- B. Gypsum board products shall be provided in maximum lengths available to minimize end-to-end butt joints.

2.03 Suspension System:

- A. Provide commercial quality, cold rolled steel, hot dipped galvanized finish, drywall suspension system conforming with the requirements of ASTM C 635.

1. Suspension members shall be fire rated, heavy duty classification, 1-1/2" high, with 1-1/2" wide knurled face.
 - a. Main tees shall be 144" long with integral reversible splice.
 - b. Cross tees shall be 48" long with quick release ends to provide positive locking and removability without the need for tools.
 - c. Accessory cross tees as required.

2.04 Trim Accessories:

- A. Provide manufacturer's standard drywall trim accessories as follows:
1. Trim materials shall be formed of galvanized steel, unless otherwise indicated.
 - a. Knurled and perforated, or expanded flanges for nailing or stapling.
 - b. Beaded for concealment of flanges in joint compound.
 2. Corner beads and casing beads.
 3. Edge trim beads - 'L' type, 'U' type and special 'L-kerf' type.
 4. One piece control joints.
 5. Transition clips and splice clips for suspension system.

2.05 Joint Treatment Materials:

- A. Provide joint treatment materials as recommended by the manufacturer for applicable installations, and conforming to ASTM C 475.
1. Perforated joint tape.
 2. Joint compound.

2.06 Miscellaneous Materials:

- A. Provide auxiliary materials as recommended by the manufacturer for applicable conditions:
1. Adhesive or joint compound specifically recommended for laminating gypsum board.

2.07 Anchors and Fasteners:

- A. Provide anchors, fasteners, and screws in accordance with manufacturer's instructions for applicable installations.

PART 3: EXECUTION

3.01 Drywall Suspension System:

- A. Install drywall suspension system in accordance with ASTM C 636, Cisca installation standards, and manufacturer's recommendations.
 - 1. Hanger wires are required within 12" on both sides of a splice clip.
 - 2. Minimum 1 hanger wire is required within 12" of a transition clip.
 - 3. Do not support wires from mechanical and/or electrical equipment occurring above ceiling.
- B. Install main tees a maximum of 48" on center and supported by hanger wires spaced a maximum 48" on center.
- C. Space cross tees per manufacturer's recommendations.
- D. Coordinate with acoustical ceiling installer for suspension of acoustical ceiling from drywall suspended ceiling at locations indicated on plans.
 - 1. Provide bracing of the drywall suspension system and additional hanger wires as may be required to ensure stability and structural performance during and after drywall attachment.

3.02 Gypsum Board Installation:

- A. Installations shall conform to "Gypsum Board Application and Finishing Standards", ASTM C 840 and GA 216.
- B. Locate exposed end-butt joints as far from center of walls and ceilings as possible, and stagger not less than 1'-0" in alternate courses of board.
- C. Install wall boards vertically to avoid end-butt joints wherever possible. At high walls, install boards horizontally with end joints staggered over studs.
- D. Install exposed gypsum board with face side out. Do not install imperfect, damaged or damp boards. Butt boards together for a light contact at edges and ends with not more than 1/16" open space between boards. Do not force into place.
- E. Locate either edge or end joints over supports, except in horizontal applications or where intermediate supports or gypsum board back-blocking is provided behind end joints. Position boards so that like edges abut, tapered edges against tapered edges and mill-cut or field-cut ends against mill-cut or field cut ends. Do not place tapered edges against cut edges or ends. Stagger vertical joints over different studs on opposite sides of partitions.
- F. Attach gypsum board to supplementary framing and blocking provided for additional support at openings and cutouts.
- G. Form control joints and expansion joints with space between edges of boards, prepared to receive trim accessories.
- H. Isolate perimeter of non-load-bearing drywall partitions at structural abutments. Provide 1/4" to 1/2" space and trim edge with J-type semi-finishing edge trim. Seal joints with acoustical sealant.

- I. Where sound-rated drywall work is indicated (STC rated), including double-layer work, and work on resilient furring, seal the work at perimeters, control and expansion joints, openings and penetrations, with a continuous bead of acoustical sealant including a bead at both faces of partitions. Comply with ASTM C 919 and manufacturer's recommendations for location of beads, and close off sound-flanking paths around or through the work, including sealing of partitions above acoustical ceilings.
- J. Space fasteners in gypsum boards in accordance with referenced standards and manufacturer's recommendations, except as otherwise indicated.

3.03 Trim Accessory Installation:

- A. Where feasible, use the same fasteners to anchor trim accessory flanges as required to fasten gypsum board to the supports. Otherwise, fasten flanges by nailing or stapling in accordance with manufacturer's instructions.
- B. Install metal corner beads at external corners of drywall work.
- C. Install metal edge trim whenever edge of gypsum board would otherwise be exposed or semi-exposed. Provide type with face flange to receive joint compound except where semi-finishing type is indicated.
 - 1. Install 'L' type trim where work is tightly abutted to other work.
 - 2. Install 'U' type trim where edge is exposed, revealed, gasketed, or sealant filled including expansion joints.
 - 3. Install special kerf type trim where other work is kerfed to receive long leg of 'L' type trim.

3.04 Finishing:

- A. Apply treatment at gypsum board joints (both directions), flanges of trim accessories, penetrations, fastener heads, surface defects and elsewhere as required to prepare work for decoration.
 - 1. Apply joint tape at joints between gypsum boards, except where trim accessories are indicated.
 - 2. Apply joint compound in 3 coats (not including pre-fill of openings), and sand between last 2 coats and after last coat.
- B. Omit third coat and sanding on concealed drywall work which is indicated for drywall finishing or which requires finishing to achieve fire-resistance rating, sound rating, or to act as air or smoke barrier.

3.05 Protection:

- A. Provide final protection and maintain conditions, in a manner suitable to Installer, which ensures gypsum drywall work being without damage or deterioration at time of substantial completion.

END OF SECTION

THIS PAGE LEFT BLANK INTENTIONALLY.

**SECTION 09441
EPOXY TERRAZZO**

PART 1: GENERAL

1.01 A. WORK IN OTHER SECTIONS

Concrete slab and finishing thereof.

1.02 SAMPLES

Make samples of terrazzo pattern selected and submit for approval of color in accordance with division 1. Prepare additional samples required until approved.

1.03 VENTILATION

Provide adequate power ventilation during installation and curing to prevent objectionable build up of fumes and odors.

PART 2: MATERIALS

2.01 EPOXY FLOOR SYSTEM

Matrix, decorative binder mix, aggregate, primer coat and sealer conforming to National Terrazzo and Mosaic Association, Inc.. Tuff-Lite Epoxy Terrazzo Floor Matrix as manufactured by H.B. Fuller Company, St. Paul, Minnesota or approved.

2.02 PRIMER

Epoxy resin, with additives to assure deep penetration into pores of base and provide permanent bond between floor and base.

2.03 MATRIX

Thermo-setting epoxy resin with proper amounts of suitable catalyst to provide permanent monolithic bond to aggregate and base material. 100% non-volatile.

2.04 DECORATIVE BINDER MIX

Accurately predetermined quantities of mineral fillers, for uniform, non-staining and non-fading color.

2.05 AGGREGATE

Assorted color marble chips, approved by manufacturer. ASTM C241 with Ha-10 minimum, 24 hour absorption not to exceed 0.75%. Color as selected by Architect.

2.06 SEALER

Slip resistant sealer recommended by manufacturer, Ph factor between 7 and 10: Vestal Products Co., St. Louis, MO; Hillyard Manufacturing Co., St. Joseph, MO or Multi-Clean Co, Minneapolis, MN.

2.07 DIVISION STRIPS

Heavy top, angle with lug, as manufactured by the American Terrazzo Strip Co. Top 1/4" wide by 1/4" deep zinc. Minimum length of strip equal to the corresponding panel dimension.

ISSUED FOR BID/CONSTRUCTION

09441
PAGE 1

2.08 EXPANSION STRIPS

Double expansion strip, Type X, as manufactured by the American Terrazzo Strip. Co. Outside strips 1/4" x 1/16" zinc. Enclosed strip 1/8" thick white neoprene. Minimum length of strip equal to the corresponding panel dimension.

2.09 CLEANER

Ph factor between 7 and 10. Free from crystallizing salts or water soluble alkaline salts. Biodegradable and phosphate free.

PART 3: INSTALLATION

3.01 PREPARATION

Thoroughly clean slab of all material and correct any imperfections which will effect installation. Take extra precaution to remove all traces of wax, finish or sealer from existing surfaces. Lightly grind existing surface. The start of installation of materials indicates acceptance of sub-surface.

3.02 CLEANING

Etch slab with dilute muratic acid solution, wash down with water and permit to dry thoroughly.

3.03 DIVISION STRIPS

Install strips with all corners true and square and all intersections in exact alignment, using adhesive and locking devices below the finish surface to maintain alignment. Place strips in pattern and spacing shown on drawings with expansion strips as designated or required. Install strips between terrazzo and other floor finishes.

3.04 PRIMER

Apply primer in thin, uniform coat in accordance with manufacturer's instructions.

3.05 BINDER MIX

Prepare and apply binder mix in accordance with manufacturer's instructions. Flush with divider strips, minimum 1/4" finished thickness.

3.06 GRINDING

Grind by wet process using terrazzo grinding equipment. Grind smooth, even true planes, free from pin holes, high spots or depressions.

3.07 GROUTING

Cleanse floor with clean water and rinse thoroughly. Remove excess rinse water by wet vacuum. Grout as required using epoxy resin to fill all voids completely. Regrind as necessary.

3.08 FINISHING

Clean thoroughly with neutral cleaner. Apply sealer in accordance with manufacturer's instructions.

3.09 PROTECTION

After completion of terrazzo work protect floor with reinforced Kraft paper or other means until final

acceptance of building. Repair any damage to floor.

END OF SECTION

THIS PAGE LEFT BLANK INTENTIONALLY.

**SECTION 09500:
ACOUSTICAL CEILINGS**

PART 1: GENERAL

1.01 Work Included:

- A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.
- B. Extent of each type of acoustical ceiling is shown on the drawings.
- C. Types of acoustical ceiling products specified in this section are indicated on construction drawings.

1.02 Quality Assurance:

- A. Provide acoustical ceiling components that are identical to those tested for the following fire performance characteristics, according to ASTM test method indicated, by UL or other testing and inspecting agency acceptable to authorities having jurisdiction. Identify acoustical ceiling components with appropriate marking of applicable testing and inspecting agency.
 - 1. Surface burning characteristics tested per ASTM E 84.
 - a. Flame Spread - 25 or less.
 - b. Smoke Developed - 50 or less.
- B. Coordinate layout and installation of acoustical ceiling panels and suspension system components with other work supported by, or penetrating through ceilings, which may include partitions, HVAC equipment, fire suppression system components, and light fixtures.

1.03 Submittals:

- A. Submit manufacturer's product data for each type of acoustical ceiling panel and suspension system required.
- B. Submit certificates from manufacturers of acoustical ceiling panels and suspension systems attesting that their products comply with specification requirements.

1.04 Delivery, Storage and Handling:

- A. Deliver acoustical ceiling panels to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination or other detriments.
- B. Before installing acoustical ceiling units, permit them to reach room temperature and a stabilized moisture content.
- C. Handle acoustical ceiling units carefully to avoid chipping edges or damaging units in any way.

1.05 Project Conditions:

- A. Do not install interior acoustical ceilings until space is enclosed and weatherproof, wet-work in space is completed and dry, work above ceilings is complete, and ambient conditions of temperature and humidity will be continuously maintained at values near those indicated for final occupancy.

PART 2: PRODUCTS

2.01 Acceptable Manufacturers:

- A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:
 - 1. Acoustical ceiling panels and metal suspension systems:
 - a. Armstrong

2.02 Acoustical Ceiling Panels:

- A. Ceiling panels shall match existing building standard as follows:
 - 1. Cortega Second Look 2765

2.03 Metal Suspension Systems:

- A. Provide metal suspension systems of type, structural classification and finish indicated which comply with applicable ASTM C 635 requirements.
 - 1. Prelude XL 15/16" Exposed Tee
- B. Provide manufacturer's standard factory applied finish for type of system indicated, color as selected by Owner from manufacturer's full range of standard colors.
- C. Attachment devices shall be sized for 5 times design load indicated in ASTM C 635, Table 1, direct hung.
- D. Hanger wire shall be galvanized carbon steel wire, conforming to ASTM A 641, soft temper, pre-stretched, Class 1 coating, minimum 12 gauge additionally sized so that stress at 3x hanger design load (ASTM C 635, Table 1, Direct Hung), will be less than yield stress of wire.
- E. Universal Hold-Down Clips to be placed around tile as follows: every 4' side shall have (2) clips placed at the "third" points according to manufacturer's recommendations. In addition, every 2' side shall have (1) clip placed in the middle.
 - 1. Armstrong part number "UHDC".
- F. Provide "shadow molding" around entire perimeter where grid meets wall or automatic door header.

PART 3: EXECUTION

3.01 Preparation:

- A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid use of less-than-half width units at borders, and comply with reflected ceiling plans wherever possible.

3.02 Installation:

- A. Install materials in accordance with manufacturer's printed instructions, and to comply with governing regulations, fire-resistance rating requirements as indicated, and Cisca standards applicable to work.
 - B. Arrange acoustical units and orient directionally-patterned units (if any) in manner shown by reflected ceiling plans.
 - C. Install suspension systems to comply with ASTM C 636, with hangers supported from building structural members. Locate hangers not less than 6" from each end and spaced 4'-0" along each carrying channel or direct-hung runner, unless otherwise indicated, leveling to tolerance of 1/8" in 12'-0".
 - 1. Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eye-screws, or other devices which are secure and appropriate for substrate, and which will not deteriorate or fail with age or elevated temperatures.
 - a. Install hangers and manufacturer's recommended clips for suspension from overhead drywall suspension system in locations indicated on plans.
 - 2. Install hangers free from contact with insulation or other objects within ceiling plenum which are not part of supporting structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal force by bracing, counter splaying or other equally effective means.
 - 3. Suspended ceiling light fixtures shall be supported at each corner.
 - D. Install edge moldings of type indicated at perimeter of acoustical ceiling area and at locations where necessary to conceal edges of acoustical units.
 - 1. Screw attach moldings to substrate at intervals not over 16" o.c. and not more than 3" from ends, leaving ceiling suspension system within tolerance of 1/8" in 12'-0". Miter corners accurately and connect securely.
 - E. Install acoustical panels in coordination with suspension system, with edges concealed by support of suspension members. Scribe and cut panels to fit accurately at borders and at penetrations.
- 3.03 Adjust and Clean:
- A. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members; comply with manufacturer's instructions for cleaning and touch-up of minor finish damage. Remove and replace work which cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.
- 3.04 Extra Materials:
- A. Furnish to the Owner, extra materials described below, matching products installed, packaged with protective covering for storage and identified with appropriate labels.
 - 1. Acoustical Ceiling Panels - Furnish quantity equal to 2.0% of amount installed.

END OF SECTION

THIS PAGE LEFT BLANK INTENTIONALLY.

**SECTION 09900:
PAINTING**

PART 1: GENERAL

1.01 Work Included:

- A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the Drawings, or reasonably implied to complete the construction.
- B. Extent of painting work is indicated on drawings, and as herein specified.

1.02 Related Work:

- A. Shop priming of ferrous metal items is included under various sections for structural steel, metal fabrications, and hollow metal frames.
- B. Shop priming of fabricated components is included under various sections for architectural woodwork, mechanical equipment, and electrical accessories.

1.03 System Description:

- A. "Paint" as used herein means all coating system materials including primers, emulsions, enamels, stains, sealers, fillers, and other applied materials whether used as a prime, intermediate, or finish coat.

1.04 Quality Assurance:

- A. Provide primers and other undercoat paint produced by same manufacturer as finish coats. Use only thinners approved by paint manufacturer, and use only within recommended limits.
- B. Review other sections of these specifications in which prime paints are to be provided to ensure compatibility of total coatings system for various substrates. Upon request from other trades, furnish information or characteristics of finish materials provided for use, to ensure compatible prime coats are used.
- C. Do not paint over any code required labels, such as Underwriters Laboratories and Factory Mutual, or any equipment identification, performance rating, name, or nomenclature plates.

1.05 Submittals:

- A. Submit manufacturer's technical information including paint label analysis and application instructions for each material proposed for use, as well as color, texture, and finish charts.
- B. Prior to beginning work, Architect will select colors, textures, and finishes for surfaces to be painted. Submit samples for Architect's review, including a description of material and application for each coat of each sample.
 - 1. Provide two 4 inch square samples for each type of filler, prime, finish coat, and color as applicable.

1.06 Delivery, Storage and Handling:

- A. Deliver materials to job site in new, original, unopened packages and containers bearing following information:
 - 1. Manufacturer's name, stock number, and date of manufacture.

2. Material, color name and number, and Federal Specification Number as applicable.
 3. Contents by volume, for major pigment and vehicle constituents.
 4. Thinning and application instructions.
- B. Store materials in tightly covered containers. Maintain containers in a clean condition, free of foreign materials and residue. Maintain storage area in orderly condition and remove oily rags and waste daily. Protect storage area from freezing.
1. Take all precautions to ensure that workmen and work areas are adequately protected from fire hazards and health hazards resulting from handling, mixing and application of paints.
- 1.07 Project Conditions:
- A. Apply water-base paints only when temperature of surfaces to be painted and surrounding air temperatures are between 50 deg F (10 deg C) and 90 deg F (32 deg C), unless otherwise permitted by paint manufacturer's printed instructions.
 - B. Apply solvent-thinned paints only when temperature of surfaces to be painted and surrounding air temperatures are between 45 deg F (7 deg C) and 95 deg F (35 deg C), unless otherwise permitted by paint manufacturer's printed instructions.
 - C. Do not apply paint in snow, rain, fog or mist; or when relative humidity exceeds 85%; or to damp or wet surfaces; unless otherwise permitted by paint manufacturer's printed instructions.
 1. Painting may be continued during inclement weather if areas and surfaces to be painted are enclosed and heated within temperature limits specified by paint manufacturer during application and drying periods.
 2. Do not apply finish in areas where dust is being generated.
 - D. In warm weather, apply concrete stain in early morning when concrete is coolest.

PART 2: PRODUCTS

2.01 Acceptable Manufacturers:

- A. Follow MSCAA Design Guide – Construction Standards

2.02 Materials:

- A. Provide best quality grade of various types of coatings as regularly manufactured by acceptable paint materials manufacturers. Materials not displaying manufacturer's identification as a standard, best-grade product will not be acceptable.
 1. Proprietary names used to designate colors or materials are not intended to imply that products of other manufacturers are excluded.
 2. Federal Specifications establish minimum acceptable quality for paint materials. Provide written certification from paint manufacturer that materials provided meet or exceed these minimums.
 3. Manufacturer's products which comply with coating qualitative requirements of applicable Federal Specifications, yet differ in quantitative requirements, may be considered for use when

- acceptable to Architect. Furnish material data and manufacturer's certificate of performance for any proposed substitutions.
- B. Color pigments shall be pure and non-fading, applicable to materials to be covered.

PART 3: EXECUTION

3.01 Inspection:

- A. Applicator must examine areas and conditions under which painting work is to be applied and notify Contractor in writing of conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Applicator.
- B. Starting of painting work will be construed as Applicator's acceptance of surfaces and conditions within any particular area.
- C. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to formation of a durable paint film.

3.02 Preparation:

- A. Perform preparation and cleaning procedures in accordance with paint manufacturer's instructions and as herein specified, for each particular substrate condition.
1. Provide barrier coats over incompatible primers or remove and reprime as required. Notify Architect in writing of any anticipated problems in using the specified coating systems with substrates primed by others.
 2. Remove hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items not to be finish-painted, or provide surface-applied protection prior to surface preparation and painting operations. Following completion of painting of each space or area, reinstall removed items.
 3. Clean surfaces to be painted before applying paint or surface treatments. Remove oil and grease prior to mechanical cleaning. Schedule cleaning and painting so that contaminants from cleaning process will not fall onto wet, newly-painted surfaces.
- B. Ferrous Metals - Clean ferrous surfaces, which are not galvanized or shop-coated, of oil, grease, dirt, loose mill scale and other foreign substances by solvent or mechanical cleaning.
1. Touch-up shop applied prime coats wherever damaged or bare, as required by other sections of these specifications.
 2. Clean and touch-up with same type shop primer.
- C. Galvanized Surfaces - Clean free of oil and surface contaminants with non-petroleum based solvent.
- D. Wood - Clean wood surfaces of dirt, oil, or other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sandpaper smooth those finished surfaces exposed to view, and dust off. Scrape and clean small, dry, seasoned knots and apply a thin coat of white shellac or other recommended knot sealer, before application of priming coat. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood-filler. Sandpaper smooth when dried.

1. Prime, stain, or seal wood required to be job-painted immediately upon delivery to job. Prime edges, ends, faces, undersides, and backsides of such wood, including cabinets, counters, cases, paneling.
 2. When transparent finish is required, use spar varnish for backpriming.
 3. Backprime paneling on interior partitions only where masonry, plaster, or other wet wall construction occurs on backside.
 4. Seal tops, bottoms, and cut-outs of unprimed wood doors with a heavy coat of varnish or equivalent sealer immediately upon delivery to job.
- E. Concrete - Prepare cementitious surfaces of concrete, concrete block, and cement plaster by removing efflorescence, chalk, dust, dirt, grease, oils, and by roughening as required to remove glaze.
1. Determine alkalinity and moisture content of surfaces to be painted by performing appropriate tests. If surfaces are found to be sufficiently alkaline to cause blistering and burning of finish paint, correct this condition before application of paint. Do not paint over surfaces where moisture content exceeds that permitted in manufacturer's printed directions.
 2. Clean concrete floor surfaces scheduled to be painted with a commercial solution of muriatic acid, or other etching cleaner. Flush floor with clean water to neutralize acid, and allow to dry before painting.
- F. Paints:
1. Mix and prepare painting materials in accordance with manufacturer's directions.
 2. Maintain containers used in mixing and application of paint in a clean condition, free of foreign materials and residue.
 3. Stir materials before application to produce a mixture of uniform density, and stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.
- 3.03 Surfaces to be Painted:
- A. Paint all exposed surfaces except where specifically noted as a surface not to be painted. Where items or surfaces are not specifically mentioned, paint the same as similar adjacent materials or areas. If color or finish is not designated, Architect will make selections from full range of manufacturer's colors or finishes.
1. Pre-Finished Items - Unless otherwise indicated, do not include painting when factory-finishing or installer finishing is specified for items.
 2. Concealed Surfaces - Unless otherwise indicated, painting is not required for concealed walls or ceilings, inaccessible areas, foundation spaces, furred areas, utility tunnels, pipe spaces, duct shafts and elevator shafts.
 3. Finished Metal Surfaces - Unless otherwise indicated, metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, bronze and similar finished materials will not require finish painting.
 4. Operating Parts - Unless otherwise indicated, moving parts of operating units, mechanical and electrical parts such as valve and damper operators, linkages, sinkages, sensing devices, motor and fan shafts will not require finish painting.

3.04 Application:

- A. Apply paint in accordance with manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.
1. Omit first coat (primer) on metal surfaces which have been shop-primed and touch-up painted, unless otherwise indicated.
 2. Provide finish coats which are compatible with prime paints used.
 3. Apply additional coats when undercoats, stains or other conditions show through final coat of paint, until paint film is of uniform finish, color and appearance. Give special attention to ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
 4. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Paint surfaces behind permanently fixed equipment or furniture with prime coat only before final installation of equipment.
 5. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, non-specular black paint.
 6. Paint back sides of access panels, and removable or hinged covers to match exposed surfaces.
 7. Finish exterior doors on tops, bottoms and side edges same as exterior faces, unless otherwise indicated.
 8. Sand lightly between each succeeding enamel or varnish coat.
- B. Prime Coat - Apply prime coat of material which is required to be painted or finished, and which has not been prime coated by others.
1. Recoat primed and sealed surfaces where there is evidence of suction spots or unsealed areas in first coat, to assure a finish coat with no burn-through or other defects due to insufficient sealing.
- C. First Coat - Apply first-coat material to surfaces that have been cleaned, pretreated or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
1. Allow sufficient time between successive coatings to permit proper drying. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.
- D. Minimum Coating Thickness - Apply materials at not less than manufacturer's recommended spreading rate, to establish a total dry film thickness as recommended by coating manufacturer.
- E. Mechanical and Electrical Work - Painting of mechanical and electrical work is limited to those items exposed in occupied spaces and includes, but is not limited to, field painting of the following:
1. Exposed bare and covered pipes, ducts, and hangers.
 2. Exposed steel and iron work.
 3. Primed metal surfaces of equipment.
 4. Roof top HVAC equipment.

- F. Pigmented (Opaque) Finishes - Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness or other surface imperfections will not be acceptable.
- G. Transparent (Clear) Finishes - Use multiple coats to produce glass-smooth surface film of even luster. Provide a finish free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, or other surface imperfections.
 - 1. Provide satin finish for final coats, unless otherwise indicated.
- H. Concrete Stain shall be applied in accordance with manufacturer's instructions and as follows:
 - 1. Apply evenly and continuously over surface, but do not puddle the stain. If puddling should occur do not attempt to correct it.
 - 2. When first application of stain is dry, apply second application in same manner as first.
 - 3. When applying second application, if color shows considerably lighter on certain areas when wet with stain, apply additional stain to light area. Do not attempt to correct any puddles that may occur.
 - 4. After second application of stain is dry, apply chemical hardener in accordance with manufacturer's instructions and as follows:
 - a. Keep the entire surface wet for a minimum of 30 minutes.
 - b. As the surface becomes slippery, lightly mist the surface with water causing the material to lose its slipperiness.
 - c. As the surface again becomes slippery, thoroughly flush the entire surface with water and squeegee the surface completely dry to remove all surface alkali or chemical hardener residue.
- I. Completed Work - Match approved samples for color, texture and coverage. Remove, refinish or repaint work not in compliance with specified requirements.

3.05 Cleaning:

- A. At end of each work day, remove discarded paint materials, rubbish, cans and rags from project site.
- B. Upon completion of painting work, clean window glass and other paint-spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.
- C. Upon completion of concrete staining the powdery residue formed from the reaction of stain on concrete must be removed after final application of stain is dry. Flush area with water, scrub with a stiff brush, then remove water by appropriate method.
 - 1. Do not use soap, detergents, or other cleaning product.
 - 2. Rinse water may be slightly corrosive and have the capacity to stain. Use special care to avoid spattering of adjacent work.

3.06 Protection:

- A. Protect work of other trades, whether to be painted or not, against damage by painting and finishing work. Correct any damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect.
 - 1. Provide "Wet Paint" signs as required to protect newly-painted finishes. After completion of painting operations, remove temporary protective wrappings provided by others for protection of their work.
 - 2. At completion of work of other trades, touch-up and restore all damaged or defaced surfaces.

3.07 Exterior Paint Schedule:

- A. Ferrous Metal:
 - 1. Prime Coat - Red rust inhibitive primer.
 - a. Prime coat is not required on items delivered shop primed.
 - 2. First and Second Coats - High gloss alkyd enamel complying with FS TT-E-489.
- B. Zinc Coated Metal:
 - 1. Prime Coat - Zinc oxide primer coating complying with FS TT-P-641:
 - a. Prime coat is not required on items delivered shop primed.
 - 2. First and Second Coats - High gloss alkyd enamel complying with FS TT-E-489.
- C. Aluminum - Excluding pre-finished items:
 - 1. Prime Coat - Zinc chromate primer complying with FS TT-P-645.
 - 2. First and Second Coats - High gloss alkyd enamel complying with FS TT-E-489.
- D. Lane Marking Paint - Chlorinated rubber alkyd type conforming to ASSHTO M-248, and complying with FS TT-P-115, Type III.
- E. Fiberglass Reinforced Plastic (FRP): (Cornice and trim)
 - 1. First Coat - SW Exterior Wood Primer Y24W16
 - 2. Second and Third Coats - SW Weather Perfect Acrylic Latex B36 Series

3.08 Interior Paint Schedule:

- A. Ferrous Metal:
 - 1. Prime Coat - Red rust inhibitive pimer complying with FS TT-P-86.
 - a. Prime coat is not required on items delivered shop primed.
 - 2. First Coat - Interior enamel undercoat complying with FS TT-E-543.
 - 3. Second Coat - Odorless interior semi-gloss enamel complying with FS TT-E-509.

B. Zinc Coated Metal:

1. Prime Coat - Zinc oxide primer coating complying with FS TT-P-641.
 - a. Prime coat is not required on items delivered shop primed.
2. First Coat - Interior enamel undercoat complying with FS TT-E-543.
3. Second Coat - Odorless interior alkyd semi-gloss enamel complying with FS TT-P-509.

C. Stained Woodwork - Varnish rubbed finish consisting of three finish coats over stain plus filler on open grain wood:

1. Stain Coat - Interior oil stain complying with FS TT-S-711.
2. First Coat - Bleached shellac complying with FS TT-S-300.
3. Filler Coat on Open Grain Wood - Paste wood filler complying with FS TTF-336.
 - a. Wipe before first varnish coat.
4. Second and Third Coats - Oil Rubbing Varnish complying with FS TT-V-86.

D. Painted Woodwork:

1. First Coat - Wall and wood primer.
2. Second and Third Coats - Odorless interior alkyd semi-gloss enamel complying with FS TT-P-509.

E. Gypsum Drywall:

1. First Coat - Latex primer.
2. Second and Third Coats - Odorless interior semi-gloss enamel.

F. Epoxy Paint:

1. Provide products and installations in accordance with manufacturer's recommendations and instructions for the following substrates and conditions:
 - a. Gypsum Drywall
 - b. Concrete Masonry Units

G. Concrete:

1. First Coat - Interior flat latex base paint complying with FS TT-P-29.
2. Second Coat - Interior enamel undercoat complying with FS TT-E-543.

H. Concrete Floor Sealer:

1. Two coats of Sealtight Concrete Sealer as manufactured by W.R. Meadows, Inc.
 - a. Sealer shall comply with FDA approval at all food preparation areas.

- I. Paint interior light fixtures as directed by Architect. Paint shall be as recommended by fixture manufacturer.
- K. Paint ceiling tiles as directed by Architect. Paint shall be as recommended by ceiling tile manufacturer.

END OF SECTION

THIS PAGE LEFT BLANK INTENTIONALLY.

SECTION 09910 – EXTERIOR PAINTING**PART 1 - GENERAL****1.01 WORK IN OTHER SECTIONS**

- A. Preparation for painting.

1.02 FINISHES REQUIRED

- A. No finishes required on Face Brick.

1.03 COLORS AND SAMPLES

- A. Preliminary selection made from manufacturer's sample chips. Final selection from wall samples prepared until approved. Allow ample time for selection; do no work until colors are approved.

1.04 PACKAGES & LABELS

- A. Deliver material in original containers, manufacturer's labels thereon. Do not open containers or remove labels until Architect inspects.

1.05 CONDITIONS OF WORK

- A. Do no outside work during damp weather, when temperature is below 50 degrees F., or until surfaces have thoroughly dried from effects of such weather.

1.06 FIRE PREVENTION

- A. Take extraordinary care to prevent fire. Keep rubbing cloths and oil rags in tightly closed metal containers.

1.07 PROTECTION AND CLEANING

- A. Protect adjacent work with drop cloths. Clean paint splatters and stains from completed surfaces.

PART 2 - MATERIALS**2.01 MANUFACTURER & GRADE**

- A. Highest quality, manufactured by Benjamin Moore, PPG Industries, Pratt & Lambert, Sherwin Williams or approved.

2.02 MATERIAL LIST

- A. Submit complete and detailed list of materials proposed for use on the work. Include letter from manufacturer, stating that materials are the best of their respective kinds and suitable for the intended purpose.

PART 3 - EXECUTION**3.01 MIXING & THINNING**

- A. Proprietary Products
Mix and thin in strict accordance with manufacturer's directions.

3.02 PROTECTION

- A. Before applying paint or other finish, remove or provide ample protection for hardware, plates, light fixtures and similar items. Replace upon completion.
Employ skilled craftsmen for removing and reinstalling above items.

3.03 APPLICATION

- A. Highest quality, by skilled mechanics, in accordance with best trade practices. Spread material evenly, without runs or sags. Cut sharp lines against glass, other materials and different colors. Vary shades of successive coats to prevent skipping. Allow ample time between coats for thorough drying. Do not paint putty for at least three (3) weeks after it is applied.

3.04 DEFECTIVE WORK

- A. Contractor responsible whatever the cause; refinish at Contractor's expense. Repair work damaged during construction. Leave in first class condition at time of final acceptance.

3.05 SCHEDULE OF FINISHES

- A. Concrete
Sherwin Williams Company, #B36W306, White Exterior White

END OF SECTION

**SECTION 13281:
ASBESTOS ABATEMENT**

PART 1 — GENERAL

1.1 DESCRIPTION AND SCOPE OF WORK

- A. This section addresses Contractor requirements for employee certification, qualifications, equipment, preparation, disturbance and disposal of asbestos-containing materials (ACM), including asbestos-contaminated contractor equipment, during removal and disposal of ACM prior to demolition of the old south end of concourse C at 2411 Winchester Road, Memphis, Tennessee 38116.
- B. Based on information provided by Memphis-Shelby County Airport Authority (MSCAA) Asbestos Survey Report conducted in December 1990, the following asbestos containing materials (ACM) are present and will be abated through this project:

- Vinyl Asbestos Floor Tiles – Primarily located on the First Floor, Apron Level of unrenovated space

Due to significant damage to ACM located on the 1st floor areas, the following procedures must be followed:

- All hard surfaces must be wet wiped with amended water, removed from the rooms, and disposed of as construction debris
- C. Bidders are required to visit the premises prior to the time of submitting proposals for the work described herein, and thoroughly inspect the conditions under which the contract is to be executed. The Contractor is responsible for field verification of all locations and quantities and determining all varying field conditions prior to the submission of their bid. Bids should include the removal of all ACM identified in the specifications. Quantities provided herein are estimates and are meant to include all ACM.
- D. The Contractor shall furnish all labor, materials, facilities, equipment, services, submittal preparation and revision, employee training and testing, permits and agreements, supplies, waste transport and disposal necessary to perform abatement of all ACM. All work shall be performed in accordance with these specifications, EPA, OSHA, NIOSH, and Shelby County Health Department and any other applicable federal, State and local government regulations. If there is any conflict between Federal, State or local regulations and these specifications, the most stringent provisions shall apply. The scope of work shall include:
1. Preparation, submission and payment for a Shelby County Health Department “Asbestos Notification Form” for the site. Notification must be submitted at least 10 days prior to commencing with any on site activities that may disturb ACM. The ten days cannot include Saturday, Sunday, or any Holidays. If a revised Notification is submitted to the Department, a copy shall be provided.
 2. Abatement of ACM shall utilize containment methods and decontamination specified herein at each abatement work area so that asbestos contamination outside of the work area does not occur, and the work area is left clean following abatement.
 3. Legal packing, transport and disposal of asbestos-containing and asbestos-contaminated waste including contaminated disposable contractor equipment and supplies, to a licensed Landfill. Contractor shall be responsible to fulfill all requirements for legal transport, admission and disposal, including pre-arrangement for asbestos disposal, tipping and

- special handling charges, provision of the required disposal form with each load disposed, length limitations and shall include in his bid price all costs pertaining thereto.
4. OSHA-required worker personal air monitoring to detect and assess the presence and concentration of airborne fibers.
 5. Contractor shall coordinate his work with any and all subcontractors, the MSCAA Project Manager, and must comply with all applicable Federal, State and local regulations.
 6. Electrical power will be available onsite, but could be sporadic. Contractor shall be prepared to provide temporary power in some areas through the use of extension cords, generators, etc.
 7. Restroom facilities will not be available onsite. Contractor shall provide sanitary facilities for his workers.
 8. Water will not be available onsite. Contractor shall be prepared to get the water from a nearby fire hydrant. All water used must be metered and water use will be included in your bid. All temporary water connections shall be turned off and all water hoses disconnected at the end of the work shift. All wastewater from the abatement activities shall be pre-filtered, stored in barrels and re-used as amended water or disposed of as contaminated waste.
 9. Contractor is responsible for site security throughout the work.
- E. If additional, previously inaccessible or observable, suspect ACM is exposed during the work it shall be immediately reported to the Owner and not disturbed until the suspect material has been adequately sampled and analyzed, and a directive issued by the Owner.
 - F. This specification does not take the place of a licensed Asbestos Project Designer Specification. Contractor is obligated to have the asbestos abatement project adequately designed by a licensed Asbestos Project Designer.
 - G. The Contractor agrees to defend and hold MSCAA harmless from any and all fines, levies or penalties. This includes the cost to defend penalties issued by any jurisdictional authorities as a result of actions or work procedures used by the Contractor or his sub-Contractors or any persons or organizations assisting or employed directly or indirectly by the Contractor.
 - H. If the Contractor has any questions as to possible errors or omissions in this Specifications, he shall immediately bring the discrepancy or other question to MSCAA Project Manager's attention in writing and obtain a written decision as to the methods and materials to be used, before the submission of his bid. Failure to obtain clarification in writing shall not relieve the Contractor of performing the normal good practice of the industry.
 - I. No consideration or allowance will be granted for any misunderstanding or discrepancies of work practices or materials used without written permission from the Owner.

1.2 REFERENCES

- A. The publications listed below and any subsequent additions or alterations form a part of this specification to the extent referenced. The Asbestos Abatement Contractor shall review these documents prior to bidding and construction to familiarize himself with the project. Whenever there is a conflict or overlap among the above references, the most stringent provisions shall apply. References are by basic designation only.
 1. Environmental Protection Agency (EPA): 40 CFR Part 61, Subpart M, "National Emission Standards for Hazardous Air Pollutants".
 2. Occupational Safety and Health Administration (OSHA): 29 CFR 1910, Section 134 "Respiratory Protection", Section 1001 "Asbestos" and 29 CFR 1926 Section 1101 "Asbestos".
 3. Department of Transportation (CFR Title 49, Parts 172-178).
 4. National Institute for Occupational Safety and Health (NIOSH): "Respiratory Protection A Guide for the Employee."

5. Occupational Safety & Health Standards, State of Tennessee, Part 8, Health Standards; 12-99-17, Hazardous Waste Operations and Emergency Response; 12-145, Asbestos; 12-202, Toxic Materials and Harmful Physical Agents; 12-203, Hazard Communication; 12-64, Personal Protective and Life Saving Equipment.
6. Shelby County Health Department codes:
<http://www.shelbycountyttn.gov/index.aspx?nid=931>

1.3 DEFINITIONS

- A. Where applicable or stated, terms as used in this section shall have the following definitions. All terms not defined herein shall have the meaning given in the applicable publications and regulations. Unless otherwise clear from the context, as used in this contract:
1. Abatement: all activities from the initiation of work area preparation through successful clearance air testing performed at the conclusion of an abatement project.
 2. Abatement Contractor or Contractor: the firm engaged to remove and dispose of ACM.
 3. Adequately Wetted: sufficiently mixed or coated with water or an aqueous solution to prevent dust emissions.
 4. Amended Water or Wetting Agent: water to which a surfactant has been added and mixed in accordance with the manufacturer's instructions. The material must be odorless, non-flammable, nontoxic, non-irritating, and non-carcinogenic, and shall be applied as a mist using a low-pressure airless sprayer recommended by the surfactant manufacturer.
 5. Asbestos-Containing Materials (ACM): shall mean any building material containing greater than one percent asbestos, or potentially contaminated on their surface with asbestos fibers.
 6. Asbestos-Contaminated: any materials or objects which may be contaminated by asbestos or asbestos-containing material as determined by the MSCAA Project Manager or defined herein.
 7. Asbestos Disposal: the removal of wrapped, adequately wetted and labeled ACM, asbestos-containing wastes and asbestos-contaminated objects from the site to the Central Maui Landfill, including all fees and expenses for hauling and disposal.
 8. Asbestos Wastes: all ACM as well as those which have been potentially contaminated with asbestos and have not been cleaned completely to the satisfaction of the Owner. Such waste may include building materials, insulation, disposable clothing and protective equipment, polyethylene sheeting and tape, vacuum filters, Contractor's equipment, or other materials designated in these specifications, Federal, State or local authorities, or the Owner.
 9. Authorized Visitors: any visitors authorized by the Contractor or Owner.
 10. Competent Foreman (Competent Person): definitions and responsibilities as delineated in 29 CFR 1926.1101 and as outlined herein.
 11. Decontamination Area shall be adjacent to the work area and shall consist of an area covered by an impermeable drop cloth on the floor or horizontal working surface, of sufficient size as to accommodate cleaning of equipment and removing personal protective equipment without spreading contamination beyond the area.
 12. MSCAA Project Manager: this person will represent MSCAA and will work closely with the Contractor's Designer, Supervisor, and Competent Person. The MSCAA Project Manager will closely monitor the project and compliance with specifications and all applicable rules, requirements, and regulations. Weekly progress reporting meetings will be required on this project.

13. Time Weighted Average (TWA): The TWA is an 8-hour time weighted average of airborne concentration of fibers (longer than 5 micrometers) per cubic centimeter of air which represents the employee's 8-hour workday asbestos exposure as determined by Appendix A of 29 CFR 1926.1101.
14. Visible Emissions: means any emissions containing particulate asbestos that are visually detectable without the aid of instruments.
15. Work Area: an area where asbestos removal or other abatement procedures are being performed. A work area is considered a contaminated space between the time preparation begins and the time the area is certified clean by the MSCAA Project Manager.

1.4 QUALITY ASSURANCE

- A. The Contractor shall employ an Asbestos Project Designer certified by the State of Tennessee in accordance with 1200-03-11-.02, to prepare the Work Plan, Respiratory Protection Plan, Shelby County Health Department "Asbestos Notification Form", to determine if the training is appropriate and current for the type of work to be performed on this project, the Contingency Plan and to review all required materials prior to submittal for completeness, legibility and validity.

1.5 SUBMITTALS PRIOR TO WORK

- A. Submit, and revise as necessary, a project-specific Work Plan describing the following activities in the order listed below, a minimum of twenty (20) working days prior to the planned start of work. Work shall not begin until written approval of the submittal is obtained. Delays due to inadequate submittals shall not constitute a cause for additional payment or contract time extension.
 1. Copy of the Contractor's current asbestos license and registration as a State of Tennessee asbestos entity.
 2. Copies of all abatement workers, Project Designer, Competent Person, and Contractor/Supervisor State of Tennessee asbestos program certification cards, physician release forms, respirator fit test, and written documentation that each employee whose duties require entrance into each work area is medically approved to wear respirators and has been properly trained in their use, inspection, care, maintenance, and fit testing, within the previous 12 months. These same records are required for employees added after the start of this project prior to their starting work. No untrained person or one who is not fully qualified and preapproved shall be present in work areas.
 3. A dated schedule and sequence of work for the project.
 4. Shelby County Health Department "Asbestos Notification Form" for the site.
 5. A written respiratory protection program that meets the requirements of OSHA 29 CFR 1910.134 (b) and OSHA 29 CFR 1926.1101.
 6. A contingency plan for emergencies at the work site, including fire, accident, heat related injury, toxic atmosphere, power failure or any other event that may require modifications or abridgement of decontamination or work area isolation procedures.
 7. Standard Operating Procedures for asbestos abatement work which identifies the nature, location and work methods to abate each identified ACM, and ensures maximum protection and safeguard from asbestos exposure for the public, employees, and the environment. This standard operating procedure shall describe in detail:
 - a. Demarcation and signage of all regulated areas.
 - b. Equipping authorized entrants with proper protective clothing and respiratory protection prior to entering a work area from the outside.
 - c. Safe work practices in the work place, including provisions for communications, exclusion of eating, drinking, smoking in all work areas and the Decontamination Area, or use of procedures or equipment that would in any

way reduce the effectiveness of respiratory protection or other engineering controls

- d. Enforcement of proper exit practices and procedures from each work area to the outside.
- e. Identification of the wetting agent, description of methods of asbestos removal to be used in ways that minimize release of fibers.
- f. Packing, labeling, loading, transportation and disposal of contaminated material in a way that prevents exposure and contamination.
- g. Emergency evacuation of personnel for medical or safety reasons (fire or smoke) so that exposure will be minimized.
- h. Prevention of accidents, especially from electrical shocks, slips and falls, and entanglements in loose cords and equipment.
- i. Provisions for effective supervision and OSHA-specified personnel air monitoring during the work.
- j. Engineering systems to minimize worker exposure to fibers in each work area.

1.6 SUBMITTALS DURING WORK

- A. Copy of any revised Notification submitted to the Shelby County Health Department.
- B. Within three days of collection, Contractor's worker personal air monitoring results shall be provided to the MSCAA Project Manager.
- C. The Contractor shall maintain security and safety logs showing names of persons entering each work area during asbestos removal work, record of any accident, emergency evacuation, and any other safety and/or health incident.

1.7 SUBMITTALS AFTER WORK IS COMPLETED

- A. Contractor shall provide the following listed materials to the MSCAA Project Manager prior to the tenth working day after completion of abatement.
 - 1. The project name, contractor, contractor license number, work duration, material removed, containment and respiratory protection employed, asbestos waste facility, total quantity of waste, Project Designer name and certification number, air sampling technician(s) name(s), air sampling method and results with maximum work area and non-work area results.
 - 2. Listing of employees (workers and contractor/supervisors), and their certifications, who worked on this project.
 - 3. Final copy of the Shelby County Health Department "Asbestos Notification Form" for the site.
 - 4. Daily Field Reports containing an official record of all activities that occurred each day of abatement activity, identifying the project and Contractor name, the air monitoring company, names of the asbestos foreman and workers, and other pertinent information.
 - 5. A copy of the Contractor's security and safety logs.
 - 6. Copies of each ACM disposal form/waste manifest, signed by the receiving landfill.
 - 7. A written statement signed by the asbestos abatement Contractor that all asbestos abatement and disposal was completed in compliance with this specification, Federal, State and County regulations, and the approved Work Plan.

1.8 PERMITS, WARNING SIGNS, LABELS AND POSTERS

- A. Contractor shall erect OSHA-specified warning signs around each work area and at every point of potential entry from the outside, including the entrance to each Decontamination Area. The

warning signs shall be a bright color so that they shall be easily noticeable. The size of the sign and its lettering shall be no less than OSHA requirements.

- B. Contractor shall also provide OSHA-required labels for all containers utilized to transport contaminated material from work areas to the disposal landfill.
- C. Contractor shall provide any other signs, labels, warnings, and posted instructions that are necessary to protect, inform, and warn all persons of the hazard from asbestos exposure. At a minimum, the following items shall be maintained at the job site:
 1. A copy of the latest applicable regulations of NIOSH, the U.S. Environmental Protection Agency Regulations for Asbestos, 40 CFR 61 Subparts A and M; a copy of OSHA Asbestos Regulations, 29 CFR 1926.1101; a copy of the approved Work Plan; and a copy of these specifications.
 2. A copy of the Contractor's Contingency Plan for emergencies and a list of telephone numbers for nearest local hospital and/or emergency squad, fire department and the names of the designated individual(s) in charge of this project.
 3. Contractor's name, list of Contractor's organizational chain of command at the construction site, and phone number of responsible representative who may be reached 24-hours a day.
 4. A list of Contractor's employees authorized to enter the regulated area, and copies of their State of Tennessee asbestos program identification cards.
 5. Signs and labels as required by 29 CFR 1926.1101 (e)(2), and (k), including Material Safety Data Sheets (MSDS). MSDSs shall be provided in accordance with OSHA 29 CFR 1910.1200 for each regulated material used including but not limited to surfactants, spray adhesives and solvents.
 6. Records of all air sampling conducted as required by this Section.

1.9 AUTHORITY TO STOP WORK

- A. The MSCAA Project Manager or his representative shall have the authority to stop asbestos abatement work any time he determines that conditions do not conform to the specifications or applicable regulations. The work stoppage shall continue until corrective steps have been taken and specified conditions restored to the satisfaction of the MSCAA Project Manager. Standby time required to resolve violations shall be at the Contractor's expense. Stop Work Orders may be issued for, but shall not be limited to, the following:
 1. Any condition inside or outside the work area where the MSCAA Project Manager establishes that any violation of applicable pollution control, health and safety requirements has occurred, including exceeding the following limits: within the Work Area, 0.1 fibers per cubic centimeter, or in non- work areas 0.05 fibers per cubic centimeter. If fiber concentrations outside the Work Area reach 0.1 fibers/cubic centimeter, Contractor shall stop work and initiate cleanup procedures to reduce outside asbestos levels to below 0.01 f/cc.
 2. Violation of any pollution control or health and safety requirement of these specifications, or any state, local or federal law or regulation.
 3. Visible emissions from work areas.
 4. Inadequate or improper signage.
 5. Improper or inadequate use of personal protective equipment.

PART 2 — PRODUCTS

2.1 MATERIALS, TOOLS AND EQUIPMENT

- A. All materials, tools, and equipment must comply, at a minimum, with this specification and relevant Federal, State, and local codes.

1. Electrical equipment shall be Underwriters Laboratory listed and approved and shall have ground fault circuit interrupter protection.
2. Hand and power tools shall be equipped with HEPA-filtered local exhaust ventilation if used to drill, cut into, or otherwise disturb ACM.
3. Ladders or scaffolds shall be OSHA-approved and be of sufficient dimensions and quantities so that all work surfaces can be easily and safely accessed by the Contractor employees and inspectors.
4. Plastic sheeting and bags shall be transparent polyethylene or equivalent with a thickness of at least 6 mils for all applications.
5. Protective clothing shall be as specified herein.
6. Surfactants shall be chemical wetting agents added to water to improve penetration into asbestos-containing materials and thereby reduce the generation of airborne asbestos fibers.
7. Tape and glue shall be capable of sealing plastic joints and attaching plastic to finished surfaces without resultant damage to same when they are removed.
8. Warning signs and labels shall comply with 29 CFR 1926.1101(k)(7) and all other Federal, State, or local codes and regulations and include the words DANGER, ASBESTOS, CANCER AND LUNG DISEASE HAZARD, AUTHORIZED PERSONNEL ONLY, RESPIRATORS AND PROTECTIVE CLOTHING ARE REQUIRED IN THIS AREA. The warning signs shall be a bright color so that they shall be easily noticeable. The size of the sign and its lettering shall be no less than OSHA requirements.
9. Waste containers shall be bags, closed polyethylene-lined carts, drums, or other approved closed containers.

2.2 RESPIRATORY PROTECTION SYSTEMS

- A. Contractor shall provide all employees with marked respiratory protective equipment approved by NIOSH and meeting the requirements of OSHA and shall comply with all provisions of 29 CFR 1926.1101. When respirators with disposable filters are employed, the Contractor shall provide sufficient filters for daily filter replacement by employees. Fit testing procedures must be documented and comply with 29 CFR 1926.1101. Inspectors shall provide their own respiratory protection.
- B. At a minimum, half mask negative pressure respirators with NIOSH approved asbestos cartridges shall be worn by all personnel in the work areas during abatement activities. Regulations and procedures in 29 CFR 1926.1101 shall apply.
- C. Respiratory protection specified herein shall be worn within Work Areas at all times, including during loading and unloading of waste containers and at the transport truck, removal of asbestos containing material and cleaning of work areas.
- D. Facial hair such as beards, long sideburns, and moustaches which interfere with the seal of air purifying respirators shall not be allowed.
- E. Respiratory protection maintenance and decontamination procedures shall meet the following requirements:
 1. Respiratory protection shall be inspected and decontaminated on a daily shift basis in accordance with OSHA 29 CFR 1910.134(b).
 2. HEPA-filters for negative pressure air filtering respirators shall be changed after each work shift.

3. Respiratory protection shall be the last piece of personal protection equipment to be removed. All persons exiting a work area shall wear respirators when going through decontamination procedures stated herein.
4. Respirators shall be stored in a dry place and in such a manner that the facepiece and exhalation valves are not distorted.
5. Organic solvents shall not be used for washing of respirators.
6. Whenever respirator design permits, wearers shall perform a positive and negative air pressure fit test each time a respirator is worn. Powered air-purifying respirators shall be tested for adequate flow (using the methods specified by the manufacturer) every four hours of use and each time the wearer enters or exits a work area.

2.3 PROTECTIVE CLOTHING

- A. Provide daily to all employees, authorized visitors, and inspectors two sets of protective disposable clothing consisting of full body coveralls, head covers, gloves, boot-type shoe covers, and eye protection in accordance with 29 CFR 1926.1101(h)(I) and hard hats. Protective equipment shall be worn by all employees during asbestos abatement activities. Protective equipment and clothing shall NOT be altered, including, but not limited to, cutting/removing booties and cutting holes for pockets.
- B. All disposable protective clothing shall be discarded and disposed of as asbestos waste each time the wearer exits from a work area.

PART 3 — EXECUTION

3.1 EMERGENCY PRECAUTIONS

- A. The Contractor shall establish and maintain emergency and fire exits from each work area for his employees. Emergency exits shall not pass through a work area. Exits shall be checked daily for exterior blockages or impediments to exiting.
- B. Contractor shall be prepared to administer appropriate first aid to injured personnel at the site after decontamination. Seriously injured personnel shall be treated immediately in a work area or evacuated without performing decontamination.

3.2 GENERAL PRE-ASBESTOS ABATEMENT PREPARATIONS

- A. The Contractor shall prepare work areas according to the following general sequence of steps and procedures to insure that proper control and protection systems are in place prior to initiation of any work which could generate airborne asbestos fibers. No ACM disturbance shall begin until the work area has been fully prepared as described herein. All persons in each work area shall wear respirators and protective clothing throughout all preparation, removal, cleanup, and waste handling operations.
- B. The Contractor shall post warning signs in English in and around each work area in compliance with 29 CFR 1910.1001(j)(3), 29 CFR 1910.1001(q)(1), 29 CFR 1926.1101(k), HIOSH Regulation 12-202-13, and to satisfy all Federal, state and local requirements. Warning signs in compliance with 29 CFR 1926.1101(k) shall be posted at the outside doorway to the Decontamination Area which shall be the only non-emergency entrance into that work area. The MSCAA Project Manager may also require that the Contractor post additional warning signs around that work area or at other potential entrances or exposure points. Warning signs shall be readily visible to any person attempting to enter the work area.
- C. The Competent Person shall be on-site continuously throughout all asbestos abatement operations and shall have Contractor/Supervisor certification per the State of Tennessee.
- D. Provide a Decontamination Area, installed prior to disturbing ACM.
- E. The Contractor shall post or have available the following documents at or near the Decontamination Area:

1. A copy of the U.S. Environmental Protection Agency Regulations for Asbestos, 40 CFR 61 Subparts A and M; a copy of OSHA Asbestos Regulations, 29 CFR 1926.1101; and a copy of HIOSH 12-145.
2. A list of telephone numbers for nearest local hospital and/or emergency squad, fire department and the names of the designated individual(s) in charge of this project.
3. A copy of the asbestos abatement specifications.
4. List of names of the Contractor's employees authorized to enter the regulated area.
5. Contractor's name, list of Contractor's organizational chain of command at the site, and phone number of responsible representative who may be reached 24 hours a day.
6. Signs and labels as required by 29 CFR 1926.1101(e)(2) and (k), including Material Safety Data Sheets (MSDS). MSDSs shall be provided in accordance with OSHA 29 CFR 1910.1200 for each regulated material used including but not limited to surfactants and most solvents.

3.3 PERSONNEL PROTECTION AND DECONTAMINATION

- A. The Contractor shall ensure that all entrants to asbestos work areas have been instructed in the proper care of their personally issued respiratory equipment, including daily maintenance, sanitizing procedures, etc. and are wearing the specified personal protective equipment.
- B. Post written procedures in the workplace and train all personnel in the procedures for the evacuation of the injured and the handling of potential fires. Provide aid to a seriously injured worker without delay for decontamination. Make provisions to minimize exposure of rescue workers and to minimize spreading of contamination during evacuations and fire procedures.
- C. Inspect respiratory equipment at the beginning of each work period, including breaks and lunch periods.
- D. When entering the Work Area through the Decontamination Area, change from street clothes into clean protective clothing and protective gear consisting of a disposable protective suit, gloves, work boots and air-purifying respirator with HEPA filter cartridges. Pick up equipment and tools and enter the Work Area.
- E. When exiting from the Work Area through the Decontamination Area, remove and dispose of all protective clothing into plastic bags labeled for asbestos waste. Clean the entire exterior of PPE using a HEPA vacuum, remove respirator and wash, while protecting electrical components and filters from water, and wipe thoroughly to decontaminate the respirator. After drying, store the decontaminated respirator in the assigned space and dress into street clothes.

3.4 PROJECT MANAGER'S APPROVAL OF REMOVAL WORK

- A. On completion of asbestos removal work at each work area, but prior to post-abatement cleaning of a work area, the Contractor shall request the Project Manager to conduct an inspection for approval of the removal work. All ACM shall have been removed, gross debris cleaned up, and waste bags and/or containers removed from each work area prior to this approval.

3.5 CLEANING AND FINAL DECONTAMINATION

- A. All persons in a work area shall wear approved respiratory and personal protective equipment throughout all cleanup and waste disposal activities.
- B. After all asbestos-containing (or contaminated) materials have been removed, Contractor shall perform a thorough cleanup and decontamination of each work area using HEPA vacuuming. Final cleaning shall be performed only after all waste is packaged and removed, but prior to dismantling any barrier or the Decontamination Area.

- C. Cleaning shall be assessed by visual inspection of the MSCAA Project Manager or designee. If visual inspection does not reveal any dust or other signs of contamination, abatement in that work area shall be deemed complete. If the MSCAA Project Manager or designee finds remnant evidence of asbestos-containing materials at the work area, the Contractor shall re-clean that work area at his own expense, to the satisfaction of the Project Manager.

3.6 ASBESTOS WASTE DISPOSAL

- A. Determine and comply with all waste handling, transportation, schedule and disposal requirements of the landfill, and any other disposal or recycling site used. Transportation methods shall comply with the provisions of EPA Title 40, Part 61, Subpart M, Department of Transportation, EPA, state and local regulations and with any hazardous waste regulations for temporary storage, transport, and disposal.
- B. Package, label, and remove all asbestos waste as specified herein. Packaging shall be accomplished in a manner that minimizes waste volume, but insures waste containers shall not tear or break.
- C. For all wastes removed from the site, complete a written Asbestos Disposal Manifest on the form supplied by the Landfill. After disposal, obtain signature of the landfill operator, and forward the original Manifest to the MSCAA Project Manager. Approval of Contractor's payment requests may be denied until receipt of completed Manifests.
- D. Wrapped waste may be temporarily stored onsite on any concrete slab. The temporary storage area shall be prominently identified and posted with signs, and waste containers shall be covered with polyethylene sheeting and otherwise protected from further contamination or physical damage.

3.7 AIR MONITORING BY CONTRACTOR

- A. The Contractor shall furnish the required pumps and conduct personal air monitoring to document compliance of his employees with OSHA regulations (29 CFR 1926.1101), all other applicable laws and the project specifications. Numbers and frequencies of personal air sampling shall be as required by OSHA regulations but not less than two samples per eight hour work shift during times of asbestos removal work. Analysis of samples shall be performed pursuant to NIOSH Method 7400 (revised).
- B. The Contractor shall also furnish the required pumps and conduct perimeter air monitoring throughout the project in at least the following three (3) locations, (keeping in mind that they could be one in the same, depending on how the work site is laid out):
- Entrance/exit of containment area(s)
 - Loadout area(s)
 - Decon exit area(s)
- C. Sampling for PCM analysis shall employ cellulose ester collection filters with 0.8 micron pore size or less. Cassettes shall be loaded with filters under clean laboratory conditions. A 5 micron pore-size cellulose ester backing filter shall be placed behind the collecting filter, followed by the cellulose support pad and the cassette base. A metal or an electrically conductive cowl shall be used in conjunction with the sampling train.
- D. The filter assembly shall be upstream of all other components in the sampling train. An air flow measuring device (when used) shall be downstream of the filter and the pump assembly, or integral with the pump assembly.
- E. Sampling pumps shall supply constant flow. An air flow measuring/metering device shall be used, and shall be high quality rotameter, mass flow, dry gas meter, or critical orifice. Measuring devices shall have a range of at least 1.5 times the desired flow rate and be readable to at least +/- 5% of the desired flow rate. They shall be calibrated against standards of higher accuracy before and after sampling, and all calibrations recorded.

3.8 FINAL CLEARANCE AIR MONITORING

- A. Sampling should commence a minimum of one hour after the project/building is completely dry. No visible pools of water or condensation shall be present during final air clearance testing.
- B. A minimum of five (5) samples inside and five (5) samples outside of each work shall be collected and analyzed by PCM. Samples shall be collected in a random fashion inside the work area. The equipment shall be placed so as to obtain a representative sample of the entire work area.
- C. Any homogeneous work area that does not meet the clearance criteria of 0.01 fibers per cubic centimeter (f/cc) shall be thoroughly re-cleaned using wet methods, with negative pressure ventilation systems in operation. Upon completing new samples shall be collected in the manner prescribed above. This process shall be repeated until the site passes the test.

END OF SECTION

THIS PAGE LEFT BLANK INTENTIONALLY

SECTION 15050
GENERAL PROVISIONS, BASIC MATERIALS AND METHODS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division - 1 Specification sections, apply to the work of this section.
- B. Throughout the specifications, types of materials may be specified by manufacturer's name and catalog number in order to establish standards of quality and performance and not for the purpose of limiting competition.

1.02 DESCRIPTION OF WORK

- A. Plumbing Work: Provide complete and operable systems of the following types, usually categorized as PLUMBING work:
 - 1. Sanitary waste.
 - 2. Domestic hot and cold water.
 - 3. Water heaters .
 - 4. Condensate piping.
 - 5. Piping and insulation to effect foregoing.
- B. Heating, Ventilating and Air Conditioning Work: Provide complete and operable systems of the following types, usually categorized as HEATING, VENTILATING, AND AIR CONDITIONING work:
 - 1. Split systems heat pumps.
 - 2. Split system cooling w/ electric heat.
 - 3. Fans.
 - 4. Air distribution.
 - 5. Temperature control.
 - 6. Ductwork, refrigerant piping and insulation to effect foregoing.

1.03 SECTION INCLUDES

- A. Includes all labor, materials, equipment, tools, instruments, etc. required to furnish and install a complete heating, ventilating and air conditioning system.
 - 1. This contractor shall verify the correct voltage of all equipment before purchase.
- B. Work By Others:
 - 1. The General Contractor shall provide foundation for equipment, chases, furring, curbs with roof flashing, framed openings, finish painting and all other similar work of a general construction nature. The General Contractor shall also provide all temporary water, electric power, heating, and toilet facilities required for general construction purpose.
 - 2. The Plumbing Contractor shall provide floor drains, site drains, etc. as required for disposal of waste water resulting from heating and air conditioning installation. The Mechanical Contractor shall install drain lines for condensate, to point of discharge over receptor, provided by plumbing contractor.
 - 3. The Electrical Contractor shall provide complete power wiring and connection to all motor driven and electrically operated heating and air conditioning equipment. Furnishing and

installing necessary disconnect switches, not specified herein, and all other such work of an electrical nature shall be provided by the Electrical Contractor. Control wiring at or above 120 volts shall be by the Electrical Contractor. Control wiring below 120 volts shall be by the Mechanical Contractor.

C. Explanation and Precedence of Drawings:

1. For purposes of clearness and legibility, drawings are essentially diagrammatic and, although size and location of equipment are drawn to scale where ever possible, the contractor shall make use of all data in all of the contract documents and shall verify this information at building site.
2. The drawings indicate required size and points of termination of pipes and ducts, and suggest proper routes of pipe to conform to structure avoid obstructions and preserve clearances. However, it is not intended that drawings indicated all necessary offsets, and it shall be the work of this section to install piping in such a manner as to conform to structure, avoid obstructions, preserve headroom and keep openings and passageways clear without further instruction or cost to the Owner.
3. Shop Drawings shall be furnished by this section, indicating all changes to meet space requirements, code requirements, and as necessary to resolve all space conflicts.
4. It is intended that all apparatus be located symmetrical with architectural elements, and shall be installed at exact height and locations as shown on the architectural drawings.
5. The Contractor shall fully inform himself regarding any and all peculiarities and limitations of the spaces available for the installation of all work and materials furnished and installed under the contract. He shall exercise due and particular caution to determine that all parts of his work are made quickly and easily accessible.
6. The Contractor shall be guided by the architectural details and conditions existing at the job, correlating this work with that of the other trades, and report to the architect any discrepancies and interferences shall result in the correcting of these errors or omissions by the contractor at his own expense. All work installed under this division which deviates from the drawings and specifications as directed by the Architect.
7. The Contractor shall be solely responsible for taking his own measurements and installing his work to suit conditions encountered.

D. Related Sections:

1. Section 03300 - Cast-In-Place Concrete.
2. Division 9 - Finishes.
3. Division 15 - Mechanical.
4. Division 16 - Electrical.

E. Quality Assurance:

1. All work shall be executed and inspected in accordance with all local and state codes, laws, ordinances, rules and regulations applicable to the particular class of work. The Contractor shall include in his quotation all applicable service charges, fees, permits, royalties, taxes, and other similar costs in connection therewith. If to the knowledge of the Contractor, the drawings or specifications are at variance with the above mentioned laws, rules and regulations, he shall promptly notify the architect in writing so any necessary changes can be provided for in his contract. If the Contractor performs any work knowing it to be contrary to such laws, rules and regulations, and without notice as required above, he shall bear all cost arising there from.
2. In addition to applicable codes, etc. the following industry standards, specifications and codes are minimum requirements:
 - a. American Society of Mechanical Engineers Standards.

- b. Underwriters Laboratories, Inc. Standards.
- c. American Society of Heating, Refrigeration, and Air Conditioning.
- d. National Fire Protection Association.
- e. American Standards Association.
- f. American National Standards Institute
- g. Occupational Safety and Health Act
- h. American Society for Testing and Materials
- i. Factory Insurance Agency.
- j. American Refrigeration Institute.
- k. Air Moving And Conditioning Association.
- l. National Bureau Of Standards.
- m. National Sanitation Foundation.
- n. American Water Works Association.
- o. Society Of Automotive Engineers.
- p. American Gas Association.
- q. Sheet Metal and Air Conditioning Contractors National Association, Inc.
- r. Factory Mutual Insurers' Standards.

F. Submittals:

1. Equipment Submittals, Refer to Section 01340: Copies of equipment drawings and/or manufacturer's descriptive data of a nature to completely identify the quality of the material or equipment intended for installation shall be submitted for approval before beginning any construction and within 30 days after signing contract. Failure to submit data for approval within 30 days time limit shall be construed as meaning the Contractor shall furnish equipment called for by name. **All data shall be submitted in one binder, indexed by flysheet on front page. Submittals shall include the number of copies as specified in Section 01340. All copies are to be identical.** No exception shall be made to this procedure and time schedule.
2. Maintenance and Operating Instructions, Refer to Section 01700:
 - a. Before acceptance of this work by the Architect, the Contractor shall furnish complete, clean bound copies of all supplementary shop drawings, diagrams, parts lists, serial number and inventory of equipment, manufacturer's operating and maintenance instructions, and all other similar material pertinent to the satisfactory maintenance and operation of mechanical systems and equipment furnished under this division of the work. After completion of his work and after satisfactory tests and adjustments of systems and equipment, the contractor shall provide the services of a competent mechanic for the period of two days for the purpose of instruction the Owner's authorized representative in the maintenance and operation of the mechanical facilities.
 - b. The Contractor shall also provide a glass, wood framed enclosure with a clear and concise typed set of system operating instructions for each system. System operating instructions shall be submitted for approval prior to posting.
3. If equipment submitted is a substitution for the equipment specified, then the contractor shall be responsible for any costs associated with any substitutions. The contractor is responsible for coordinating all aspects of the equipment submitted including but not limited to the electrical, structural, and mechanical requirements of the equipment submitted.

G. Delivery, Storage and Handling:

1. Make provisions for the delivery and safe storage of all materials, and arrange with other

trades on the job for the introduction into the building of equipment too large to pass through finished openings.

2. Arrange to have materials delivered to the job at such stages of the work as will expedite the work as a whole. Mark and store all materials in such a manner as to be easily checked or inspected.

H. Job Conditions:

1. Inspection of Site: Prior to submitting his bid, the Contractor shall visit the site of the proposed construction and shall thoroughly acquaint himself with existing utilities, working conditions to be encountered, etc. No additional compensation shall be allowed for conditions increasing the Contractor's cost which were not known or appreciated by him when submitting his proposal if the condition was obvious and could have been discovered by him if he had visited the project and thoroughly informed himself of all existing conditions which would affect his work.
2. Openings Through Walls, Floors and Roof: Ascertain that all openings through walls, floors, ceilings, and roof and through any other parts of the structure shall be properly sized and located. Prepare a sleeve plan for all sleeves required in proposed structure.
3. Protection of Work: This Contractor shall protect his work at all times from danger by freezing, breakage, dirt, foreign materials, etc., and shall replace all work so damaged. The Contractor shall use every precaution to protect the work of others, and he will be held responsible for all damage to other work caused by his work or through the neglect of his workmen.

I. Test and Inspection Reports:

1. Provide typewritten reports to Owner's representative indicating time, pressure, personnel involved and other pertinent data for all vacuum or pressure testing.
2. Provide copies of all test or inspection reports by public agencies for systems such as plumbing drainage.
3. Balancing and testing reports for HVAC systems shall be provided.

J. Shop Drawings: Submit one blue line copy and one reproducible, sepia is acceptable, for following:

1. Entire ductwork system, thoroughly coordinated with surrounding construction.
2. All mechanical equipment rooms.
3. As required for project coordination.

K. Guarantee:

1. The Contractor shall guarantee all work performed under this contract to be free from defects in material and workmanship for a period of one year from date of final acceptance of such work by the Architect.
2. Latent defects arising during this period shall, upon notification by the Owner's Representative, be promptly corrected by the Contractor at no additional cost to the Owner. Loss of refrigerant or lubricant shall be considered as defect in workmanship.

1.04 UTILITY CONNECTIONS & EXTENSIONS, PERMITS AND FEES

- A. Arrange for all utility connections, extensions, and water meter required to serve systems included in this Division. See civil drawing & specifications for further coordination.
- B. Pay all costs for utility extensions required to serve systems in this Division.
- C. All permits, fees, utility extension costs, etc., required for the work in Division 15 shall be paid for

under the Sections involved.

1.05 USE OF DOCUMENTS

- A. Drawings and Specifications together describe the project. Any provisions occurring in one shall be considered to occur in both. Where discrepancies occur between Drawings and Specifications, the more stringent requirement shall prevail.
- B. The abbreviation "HVAC" where used herein shall mean "Heating, Ventilating and Air Conditioning".
- C. Refer to the various working drawings for other trades in order that work required herein shall conform in detail with the work of others.
- D. No additional compensation will be allowed for any labor or material unless this Contractor can clearly show same to be an addition beyond the intent and meaning of the Drawings and/or Specifications.
- E. The Drawings are diagrammatic; therefore, for all dimensions and exact locations, refer to the Architectural and Structural Drawings unless specifically noted otherwise.
- F. In preparation of the Drawings, it is intended that they be utilized by competent mechanics in completing the system installations.
- G. Where equipment is specified to be installed in accordance with manufacturer's recommendations, a copy of these recommendations shall be kept on the job site at all times and shall be made available to the Owner's representative upon a request for same.

1.06 RECORD (AS-BUILT) DRAWINGS

- A. Prepare reproducible record drawings of all systems installed herein. Drawings shall be prepared utilizing plastic "Mylar" transparencies of the bidding drawings. Standard symbols and drafting techniques shall be followed. After submitting and obtaining Owner's approval of white prints of the completed record drawings, deliver to Owner the approved reproducible drawings.
- B. Job site record set of black-line drawings shall be posted neatly each day to indicate work progress and information for record drawings. Posting shall be done with colored pencils coded to the various systems. Incorporate all changes and departures from bidding drawings. Show principal dimensions of all concealed work. Show all piping encountered in excavation work.
- C. Bear all costs for printing, drafting, record keeping, etc. involved in preparation of the above record drawings.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Materials shall be best intended for and meet with approval of Owner. Owner will reserve the right to reject any materials not in accordance with those required or not meeting with Owner's approval, either before or after installation.
- B. Materials and/or equipment specified herein to be a certain manufacture or brand are sued as a standard and materials and/or equipment of other manufacture may be submitted for substitution

ISSUED FOR BID/CONSTRUCTION

15050
PAGE 5

provided that they meet or exceed quality and all capacities specified and space requirements shown on the drawings.

2.02 SAFETY DEVICES

- A. Provide suitable guards on all equipment to enclose belts, pulleys, motor shafts, electrical contacts, etc. Removable guards shall be cast iron, sheet metal or wire mesh, rigidly secured.
- B. Pressure and temperature relief devices of proper size and rating shall be provided on each item of equipment where normally required.

2.03 PIPE AND PIPE FITTINGS

- A. All pipe and fittings shall be uniform in size, free from defects, and of sufficient strength to suit particular system.
- B. Copper pipe shall be hard-drawn type "L" or "K" copper water tubing conforming to ASTM B-88 for solder joints. All buried copper pipe shall be soft type "K" copper.
- C. Fittings shall be wrought copper conforming to ASA 816.22 and meeting ASTM B-75, except that drainage piping shall be DWV solder joint fittings.
- D. Solder fittings for use with copper tubing shall be wrought or cast brass fittings, drainage pattern or standard design as required.
- E. Joints for water copper tubing shall be made with 95-5 (tin and antimony) solder. No lead allowed. Joints for refrigerant piping shall be silver brazed.
- F. PVC (no other plastic will be allowed) pipe and fittings shall be Schedule 40 or 80 and conform to ASTM standards. Schedule 40 drainage pattern fittings shall be used for drainage systems. Schedule 40 pressure pattern fittings shall be used for pressure system.

2.04 UNIONS

- A. Unions for copper pipe 2" (5.08 cm) and under shall be 125 psi swp brass ground-joint type with solder ends. Unions for copper 2-1/2" and larger shall be 150 psi swp brass companion flanges for solder connection, ASA B16.24.
- B. Patented type dielectric fittings or couplings shall be provided in pipe systems wherever dissimilar metals are joined.

2.05 HANGERS AND SUPPORTS

- A. All materials required for proper support of equipment and piping shall be provided. Each hanger shall be suitable for structural conditions, vibration, temperature, pipe material, and expansion conditions encountered.
- B. Hangers for support of horizontal piping shall be vertically adjustable hangers with malleable swivel ring or wrought steel clevis type hanger suspended on threaded steel rod hangers, Fee and Mason Fig. 199 and 239 respectively. Clevis type hanger shall be utilized for larger piping.
- C. All vertical piping shall be supported with Fee and Mason Fig. 241. Riser clamps shall be properly anchored to the building.

- D. Where piping runs of three or more pipes are grouped together, pipe racks consisting of "Unistrut", or approved equal shall be utilized.
- E. Clamps, inserts, bolts, channel and angle iron, racks, rollers, etc., shall be provided for duct, piping and equipment supports as required. All hanger and support components shall be adequate for loads involved. Strict compliance with manufacturer's recommendations shall be maintained in applying all devices.

2.06 VALVES AND STRAINERS

- A. Valves shall be approved standard weight valves suitable for working pressure of 125 psi swp minimum, and adequate for service intended. Gate, globe and ball valves shall be re-packable when open and under pressure. Valves shall be fitted and constructed of materials recommended by valve manufacturer for particular service.
- B. Gate valves 2-1/2" and larger shall be flanged, brass or bronze trimmed with rising stems. (Gate valves for special close-fitting situations may be non-rising stem type, as approved by Architect). Valves shall have liberal sized stuffing boxes and shall be packed with Crane, Garlock, or other approved metallic packing. Valves shall be capable of being repacked under pressure when open. Valve passages shall be full area of pipes. Valves 2-1/2" and larger shall be Jenkins 651-A, Powell 1793, Crane 465 1/2 or approved equal.
- C. Ball valves shall have stainless steel ball and stem, Teflon or EPT seat, Watts B-6000-SS, or approved equal. Bronze body shall be used for 3" and smaller sizes.
- D. Lubricated-plug type valves shall be flanged for 2-1/2" and larger, screwed for smaller sizes. Valves shall be Rockwell 142 for smaller sizes and 143 for larger sizes, or approved equal.

2.07 MOTORS

- A. Motors 1/2 HP and larger shall generally be 3 phase. Motors smaller than 1/2 HP shall be single phase.
- B. Motors for driving heating, ventilating, and air conditioning equipment shall be furnished by suppliers of such equipment and shall be the type that has characteristics suitable for continuous operating conditions. Motors shall consist of new NEMA frame construction, 40 degrees C. temperature rise, suitable for the available electric current characteristics, and have self lubricating, quiet operating, bearings.
- C. Motors shall be suitable for operation at +/- 10% rated voltage. Equipment manufacturer shall provide "boost" transformer if required to meet this specification.
- D. Refer to Division 16 Electrical, for additional motor requirements.

2.08 MOTOR CONTROLLERS

- A. Motor controllers shall be of a single manufacturer and of the type indicated on the plans. All starters shall be equipped with three overload relays and external reset. Provide integral or detached contacts, indicating lights, and other accessory features as required. Motor controllers shall be manufactured by Cutler-Hammer, Allen Bradley, General Electric, and Westinghouse.

- B. Refer to Division 16 Electrical, for additional motor requirements.

2.09 THERMOMETERS

- A. Adequate instrumentation shall be provided for operation, evaluation, adjustment, and malfunction indications of systems.
- B. Thermometers shall be installed with separable sockets, bronze in nonferrous systems and stainless steel in ferrous systems. Thermometers shall be red mercury type with 9" long, adjustable angle white face with black figures.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Inspection of Site: Prior to submitting his bid, the HVAC Contractor shall visit the site of the proposed construction and shall thoroughly acquaint himself with existing utilities, working conditions to be encountered, etc. No additional compensation shall be allowed for conditions increasing the Contractor's cost which were not known or appreciated by him when submitting his proposal if the condition was obvious and could have been discovered by him if he had visited the project and thoroughly informed himself of all existing conditions which would affect his work.
- B. Workmanship, Materials, and Equipment: All work shall be performed in a workmanship manner and shall present a neat and mechanical appearance when completed. All materials shall be of type, quality, and minimum rating prescribed herein or indicated on the plans. Where material and equipment are indicated by manufacturer's name, type, model or catalog number, such items or one of those so specified must be included in the base bid for contract. Other materials and equipment will not be acceptable.
- C. Coordination: The Contractor shall coordinate his work with that of the other contractors on the job and also with that of the Owner, in order that there will be no delay in the proper installation and completion of the work. If, in the opinion of the architect, any piping, equipment, etc., has been improperly placed or installed due to lack of coordination with the other trades, such piping and equipment shall be relocated as directed by the Architect and at the Contractor's expense.
- D. Cutting and Patching: This contractor shall perform all cutting and patching required for the introduction and placement of his work. He shall employ men to perform all patching work that are skilled in the particular trade involved. Cutting and patching required as a result of the omission of an opening in construction, shall be done by the contractor at his own expense. Refer to Section 01045.
- E. Painting and Identification: The following protective painting and identification of equipment shall be provided under this division of the work; other finish painting shall be provided under the "Painting" division of the specifications.
 - 1. Equipment including motors, and similar factory fabricated and assembled units shall be furnished baked enamel as specified hereinbefore. Equipment surfaces damaged during this course of construction shall be refinished by the contractor.
 - 2. All finish painting shall be provided by the General Contractor under painting division of the specifications.
 - 3. Detached motor controllers, disconnects, etc., shall be identified with metal or plastic plates with etched letters to completely identify the service of the electrical equipment.
 - 4. All exposed gas piping outdoors shall be painted silver, and all interior gas piping shall be

painted yellow.

3.02 PIPING SYSTEMS

- A. Piping systems shall be erected straight and true without undue strains and parallel with building lines, and in accordance with quality standards for trades involved.

3.03 PIPE JOINTS

- A. Copper pipe ends and fittings shall be thoroughly cleaned before applying solder or brazing alloy. Brazed joints in copper piping shall have 1300 deg F melting point silver-phosphorous brazing alloy using petroleum base flux. Soldered joints in copper piping shall have 95-5 tin-antimony solder applied using petroleum base flux.
- B. Screwed joints in steel piping shall have standard, clean-out tapered threads, with pipe ends reamed. Teflon tape shall be used as joint-seal or screwed joints. At least three threads shall be exposed after pulling joints up tight.
- C. Welded joints in steel piping shall be electric or gas welded using appropriate type welding rods. Gas fuel pipe shall be welded, except at connections where threaded malleable fittings shall be used.
- D. Piping shall be installed with anchors, loops, offsets and expansion control devices, as required, to prevent excess strains on piping systems.
- E. All joints in PVC piping shall be solvent type as per manufacturer's recommendations.

3.04 HANGERS AND SUPPORTS

- A. Contractor shall provide proper supports for all equipment and piping furnished and/or installed. Strap hangers will not be allowed.
- B. Each hanger or support shall be suitable for purposes and conditions encountered for the job. All piping shall be substantially supported in neat and workmanlike manner and shall be free from sagging, with loops, etc., as required for expansion and contraction. All exposed hangers in finished spaces shall have cast escutcheons with set screw or steel ceiling plates.
- C. Where piping runs of three or more pipes are grouped together, pipe racks shall be provided. Piping runs shall be coordinated with other trades.
- D. For insulated piping, except refrigerant suction lines, provide 6" long, 22 gage saddle at bearing points so that hangers will not crush or wrinkle insulation. Hangers for such piping shall be sized to contain insulation.
- E. Horizontal suspended piping shall have minimum number of hangers required or outlined herein:
 - (1) Cast iron soil pipe shall have one hanger or support for each pipe length located close to joints.
 - (2) Copper tubing shall have hangers spaced 8'-0" maximum for 1-1/4" and larger tubing and

6'0" maximum for smaller tubing.

- F. Vertical piping shall be supported with friction riser clamps or other satisfactory methods as dictated by particular situations as recommended by hanger manufacturer.
- G. Clamps, inserts, bolts, channel and angle iron, racks, etc., shall be furnished for duct, piping and equipment supports as required. All hanger and support components shall be adequate for loads involved. Strict compliance with manufacturer's recommendations shall be maintained in applying all devices.
- H. Equipment shall be supported adequately with all bracing, foundations, angles, channels, hangers, etc., furnished herein.
- I. Approved floor stands, wall brackets, etc., may be used to support lines running near floors or walls, which can be safely supported by floors or walls. Pipe lines near walls may be supported by hangers from approved wall brackets.
- J. No piping may be hung from other piping unless specifically so detailed on Drawings and approved by Owner.

3.05 UNIONS

- A. Unions shall be installed at each pipe system connection to a piece of equipment and as required.
- B. Unions shall be installed as equipment side of all shut-off valves, fixtures, and traps.

3.06 VALVES

- A. Gate or ball valves shall be used at all connections to equipment. Ball valves shall be provided with plastic insulated lever handles color-coded for each service and used on domestic water through 3" size.
- B. Lubricated-plug type valves shall be used at all gas connections to equipment.
- C. Valves, strainers, and components shall be installed in accordance with manufacturer's recommendations.
- D. Ball valves 3 inches and smaller shall be used on domestic water systems.

3.07 THERMOMETERS

- A. Provide thermometers at all lines leaving water heaters lines and at other required locations.
- B. Gauges shall be installed on gauge cocks at suction and discharge of all pumps.
- C. Gauge cocks and capped thermometer wells shall be provided where required.

3.08 EQUIPMENT INSTALLATIONS

- A. Equipment shall be installed in accordance with manufacturer's recommendations.

- B. All equipment components such as motors, lubrication points, disconnects, etc., shall be readily accessible for servicing and replacement.
- C. Motors and motor control devices shall be installed having suitable electrical characteristics to operate at required voltages.
- D. All HVAC equipment (Exhaust Fans, etc.) shall be provided with permanent metal identification tags, screwed at all four corners to equipment, with all pertinent information engraved into tag. Information shall include, but not be limited to; capacities, voltage and phase, horsepower, make and model numbers, and pressure.

3.09 SLEEVES AND ESCUTCHEONS

- A. Sleeves shall be installed where piping passes through structures. All structural openings shall be approved by the structural engineer. Sleeves shall be ample sizes for pipe movement and shall not be used for pipe support. Sleeve openings shall be packed with an approved fireproof material. Insulation for ductwork and cold piping shall be continuous through each sleeve.
- B. Sleeves through structural concrete members shall be galvanized steel pipe unless otherwise required to be of different materials. Sleeves through other than structural components of building shall be 20 gauge galvanized sheet metal or approved plastic with lock seam joints. Sleeves shall be sufficient sizes to pass pipe insulation through where pipe is insulated.
- C. Sleeves shall be set flush with walls and ceilings. Floor sleeves shall extend 1" above floors in finished areas and 2" in all other areas. Where piping passes through below-grade walls or on-grade floors, spaces between sleeves and pipes shall be caulked with oakum and lead or other suitable waterproofing. Spaces between pipes and floor sleeves shall be filled with glass fiber and non-hardening caulking.
- D. In finished areas chromium plated escutcheon plates shall be installed where exposed piping passes through walls, ceilings and floors of projects. Plates shall be properly sized to conceal sleeves and fastened to pipe or insulation. Exposed hanger rods in finished spaces shall have cast iron escutcheons with set screws.

3.10 EXCAVATION AND BACKFILLING

- A. Contractor shall provide proper sheathing and bracing, where necessary for work involved. Bell holes for all bell and spigot pipe shall be provided.
- B. All excavations shall be maintained free of standing water.
- C. Any pipe bed not on undisturbed, well compacted earth shall have a clean and compact sand pipe bed.
- D. After underground work has been completely installed and thoroughly tested, trenches and other excavations shall be backfilled, with fill being tamped in layers as specified elsewhere. All backfilling materials shall be free from cinders and harmful or corrosive materials.
- E. After all backfilling has been completed, all spoilage shall be removed from project site.

3.11 PIPE SYSTEM CLEANING

- A. After installations are completed and before testing, all piping systems shall be thoroughly cleaned (blown-out, flushed-out, swabbed out/or chemically treated until clean).
- B. Potable (cold and hot) water systems shall be cleaned and sterilized as required by governing codes and result certified by an Owner-approved testing laboratory.

3.12 TESTING

- A. All piping shall be tested and proven tight before covering is applied or piping concealed. All tests shall be witnessed by Owner or Owner's Representative.
- B. All piping except sanitary and storm drainage systems shall be tested by hydrostatic or pneumatic pressure at least 1 1/2 time maximum operating pressure but not less than 100 psi for sufficient time to detect all leaks and defects.
- C. Each test set-up shall provide for changes in ambient temperatures from causing false pressure readings during tests.
- D. Each pipe system shall be tested and balanced so that design conditions are achieved at each piece of equipment.
- E. Each pipe system shall be completely balanced and tested including the following:
 - (1) All valves shall be opened to full open position.
 - (2) Water in systems shall be examined to determine if water has been treated and cleaned.
 - (3) Remove and clean all strainers.
 - (4) Proper pump rotation shall be verified.
 - (5) All temperature controls shall be set for proper operating conditions.
 - (6) Operation of all automatic valves shall be checked.
- F. Sanitary and rainleader systems shall be thoroughly tested by hydrostatic or pneumatic pressure suitable to local plumbing code; however, of not less than 10 feet of water column to detect all leaks and defects.

3.13 ADJUSTMENTS

- A. Upon completion of the installation of all work and equipment, the Contractor shall start all equipment and make all necessary adjustments to place entire heating, ventilating, air conditioning, and plumbing systems in a satisfactory condition for continuous safe operation.
- B. All filters shall be replaced with the specified type after the period of adjustment.
- C. Air circulation system shall be cleaned free of all dirt and debris and adjusted to provide uniform heating and/or cooling of all spaces served by each system. Test adjustments shall be continued until

uniform temperature within conditioned areas has been attained two (2) degrees Fahrenheit for one (1) degree above and below thermostatic setting.

- D. Lubricate all bearings of equipment furnished using only lubricant recommended by a manufacturer of such equipment. Tag each piece of equipment with date of lubrication, with subcontractor's name imprinted thereon. Bearings shall be left in cool, trouble free, operating condition.
- E. Temperature and safety controls shall be adjusted as necessary to insure continuous, trouble free, safe, and automatic operation of systems including boiler, gas, burner, refrigerating equipment, etc.
- F. Clean Up: The Contractor shall at all times keep the premises free from accumulation of waste materials or rubbish caused by his employees or work. At the completion of the work, the contractor shall remove all surplus materials, tools, etc., and shall leave the premises "broom clean".

END OF SECTION

THIS PAGE LEFT BLANK INTENTIONALLY

**SECTION 15195
MECHANICAL IDENTIFICATION**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following mechanical identification materials and their installation:
 - 1. Equipment markers.
 - 2. Equipment signs.
 - 3. Access panel and door markers.
 - 4. Pipe markers.
 - 5. Duct markers.
 - 6. Valve tags.
 - 7. Valve schedules.
 - 8. Warning tags.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For color, letter style, and graphic representation required for each identification material and device.
- C. Valve numbering scheme.
- D. Valve Schedules: For each piping system. Furnish extra copies (in addition to mounted copies) to include in maintenance manuals.

1.4 QUALITY ASSURANCE

- A. ASME Compliance: Comply with ASME A13.1, "Scheme for the Identification of Piping Systems," for letter size, length of color field, colors, and viewing angles of identification devices for piping.

1.5 COORDINATION

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Coordinate installation of identifying devices with location of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.

ISSUED FOR BID/CONSTRUCTION

2.1 EQUIPMENT IDENTIFICATION DEVICES

- A. Equipment Markers: Engraved, color-coded laminated plastic. Include contact-type, permanent adhesive.
 - 1. Terminology: Match schedules as closely as possible.
 - 2. Data:
 - a. Name and plan number.
 - b. Equipment service.
 - c. Design capacity.
 - d. Other design parameters such as pressure drop, entering and leaving conditions, and speed.
 - 3. Size: 2-1/2 by 4 inches for control devices, dampers, and valves; 4-1/2 by 6 inches for equipment.
- B. Access Panel and Door Markers: 1/16-inch- thick, engraved laminated plastic, with abbreviated terms and numbers corresponding to identification. Provide 1/8-inch center hole for attachment.
 - 1. Fasteners: Self-tapping, stainless-steel screws or contact-type, permanent adhesive.

2.2 PIPING IDENTIFICATION DEVICES

- A. Manufactured Pipe Markers, General: Preprinted, color-coded, with lettering indicating service, and showing direction of flow.
 - 1. Colors: Comply with ASME A13.1, unless otherwise indicated.
 - 2. Lettering: Use piping system terms indicated and abbreviate only as necessary for each application length.
 - 3. Pipes with OD, Including Insulation, Less Than 6 Inches: Full-band pipe markers extending 360 degrees around pipe at each location.
 - 4. Pipes with OD, Including Insulation, 6 Inches and Larger: Either full-band or strip-type pipe markers at least three times letter height and of length required for label.
 - 5. Arrows: Integral with piping system service lettering to accommodate both directions; or as separate unit on each pipe marker to indicate direction of flow.
- B. Pretensioned Pipe Markers: Precoiled semirigid plastic formed to cover full circumference of pipe and to attach to pipe without adhesive. Equal to Seton Setmark.
- C. Shaped Pipe Markers: Preformed semirigid plastic formed to partially cover circumference of pipe and to attach to pipe with mechanical fasteners that do not penetrate insulation vapor barrier. Equal to Seton Setmark.

2.3 VALVE TAGS

- A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers, with numbering scheme approved by Architect. Provide 5/32-inch hole for fastener.
 - 1. Material: 0.032-inch-thick brass.

2. Valve-Tag Fasteners: Brass wire-link or beaded chain.

2.4 VALVE SCHEDULES

- A. Valve Schedules: For each piping system, on standard-size bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.
 1. Valve-Schedule Frames: Glazed display frame for removable mounting on masonry walls for each page of valve schedule. Include mounting screws.
 2. Frame: Extruded aluminum.
 3. Glazing: ASTM C 1036, Type I, Class 1, Glazing Quality B, 2.5-mm, single-thickness glass.

2.5 WARNING TAGS

- A. Warning Tags: Preprinted or partially preprinted, accident-prevention tags; of plasticized card stock with matte finish suitable for writing.
 1. Size: Approximately 4 by 7 inches.
 2. Fasteners: Brass grommet and wire.
 3. Nomenclature: Large-size primary caption such as DANGER, CAUTION, or DO NOT OPERATE.
 4. Color: Yellow background with black lettering.

PART 3 - EXECUTION

3.1 APPLICATIONS, GENERAL

- A. Products specified are for applications referenced in other Division 15 Sections. If more than single-type material, device, or label is specified for listed applications, selection is Installer's option.

3.2 EQUIPMENT IDENTIFICATION

- A. Install equipment markers with permanent adhesive on or near each major item of mechanical equipment. Data required for markers may be included on signs, and markers may be omitted if both are indicated.
 1. Letter Size: Minimum 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
 2. Data: Distinguish among multiple units, indicate operational requirements, indicate safety and emergency precautions, warn of hazards and improper operations, and identify units.
 3. Locate markers where accessible and visible. Include markers for the following general categories of equipment:
 - a. Main control and operating valves, including safety devices and hazardous units such as gas outlets.
 - b. Fire department hose valves and hose stations.

- c. Meters, gages, thermometers, and similar units.
- d. Fuel-burning units, including boilers, furnaces, heaters, stills, and absorption units.
- e. Pumps, compressors, chillers, condensers, and similar motor-driven units.
- f. Coils, evaporators, rooftop units, and similar equipment.
- g. Fans, blowers, primary balancing dampers, and mixing boxes.
- h. Packaged HVAC central-station and zone-type units.
- i. Tanks and pressure vessels.
- j. Strainers, filters, humidifiers, water-treatment systems, and similar equipment.

3.3 PIPING IDENTIFICATION

- A. Install manufactured pipe markers indicating service on each piping system. Install with flow indication arrows showing direction of flow.
 - 1. Pipes with OD, Including Insulation, Less Than 6 Inches: Pretensioned pipe markers. Use size to ensure a tight fit.
 - 2. Pipes with OD, Including Insulation, 6 Inches and Larger: Shaped pipe markers. Use size to match pipe and secure with fasteners.
- B. Locate pipe markers and color bands where piping is exposed in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; above accessible ceilings; and exterior nonconcealed locations as follows:
 - 1. Near each valve and control device.
 - 2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
 - 3. Near penetrations through walls, floors, ceilings, and nonaccessible enclosures.
 - 4. At access doors, manholes, and similar access points that permit view of concealed piping.
 - 5. Near major equipment items and other points of origination and termination.
 - 6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
 - 7. On piping above accessible acoustical ceilings.

3.4 VALVE-TAG INSTALLATION

- A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; plumbing fixture supply stops; shutoff valves; faucets; convenience and lawn-watering hose connections; and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.
- B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following:

1. Valve-Tag Size and Shape:
 - a. Cold Water: 2 inches, round.
 - b. Hot Water: 2 inches, round.
 - c. Fire Protection: 2 inches, round.
 - d. Gas: 2 inches, round.
 - e. Steam: 2 inches, round.
2. Valve-Tag Color:
 - a. Cold Water: Natural.
 - b. Hot Water: Natural.
 - c. Fire Protection: Natural.
 - d. Gas: Natural.
 - e. Steam: Natural.

3.5 VALVE-SCHEDULE INSTALLATION

- A. Mount valve schedule on wall in accessible location in each major equipment room.

3.6 WARNING-TAG INSTALLATION

- A. Write required message on, and attach warning tags to, equipment and other items where required.

3.7 ADJUSTING

- A. Relocate mechanical identification materials and devices that have become visually blocked by other work.

3.8 CLEANING

- A. Clean faces of mechanical identification devices and glass frames of valve schedules.

END OF SECTION

THIS PAGE LEFT BLANK INTENTIONALLY

**SECTION 15400
PLUMBING**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Includes the furnishing of all labor, materials, equipment, tools, instruments, etc., required to furnish and install a complete plumbing system in accordance with these specifications together with the accompanying drawings and shall in general include but is not necessarily limited to the following:
 - 1. Sanitary drainage system
 - 2. Roof drainage
 - 3. Vent systems
 - 4. Domestic cold water system
 - 5. Domestic hot water system
 - 6. Condensate drainage system.
 - 7. Plumbing fixtures and trim
 - 8. Roughins for Owner-provided equipment.
 - 9. Other items as indicated on the drawings.
 - 10. Everything necessary for a complete and satisfactory installation, including all necessary parts, devices, accessories, etc., required by the Codes or that may be required to satisfactorily complete the installation of the above items shall be provided by the Plumbing Contractor.
 - 11. Verify the correct voltage of all equipment before purchase.
- B. Include all applicable service charges, tap fees, connection charges, payments to utilities for construction of service lines and meters, fees, permits, royalties, taxes and other similar costs in connection therewith.
- C. Work by Others:
 - 1. Provide and install piping chases, access to piping facilities, toilet partitions, toilet accessories, waterproofing, sumps, concrete trenches, finished painting, and all other such work of a general construction nature. Provide all temporary water, electric power, heating, and toilet facilities as required for general construction purposes.
 - 2. Provide all work related directly to heating, ventilating and air conditioning construction.
 - 3. Provide all electrical power outlets as required to connect electrically operated equipment furnished by the Plumbing Contractor.
- D. Explanation and Precedence of Drawings:
 - 1. For purposes of clearness and legibility, plumbing drawings are essentially diagrammatic and, although size and location of equipment are drawn to scale wherever possible, the Contractor shall make use of all data in all of the Contract Documents and shall verify this information at building site.
 - 2. The Drawings indicate required size and points of termination of pipes and suggest proper routes of pipe to conform to structure, avoid obstructions and preserve clearances. However, it is not intended that drawings indicate all necessary offsets, and it shall be the work of this section to install piping in such a manner as to conform to structure, avoid obstructions, preserve headroom, and keep openings and passageways clear, without further instruction or cost to the Owner.
 - 3. Prepare shop drawings showing location of all underground piping before concrete footings, etc., are poured to familiarize himself with location of same. An "extra" shall not be allowed for relocation of any piping due to interference of structural elements.
 - 4. Shop Drawings shall be furnished by this Section, indicating all changes to meet space requirements, code requirements, and as necessary to resolve all space conflicts.
 - 5. It is intended that all apparatus to be located symmetrical with architectural elements, and shall be installed at exact height and locations as shown on the architectural drawings.

ISSUED FOR BID/CONSTRUCTION

15400

6. Become fully informed regarding any and all peculiarities and limitations of the spaces available for the installation of all work and materials furnished and installed under the Contract. Exercise due and particular caution to determine that all parts of his work are made quickly and easily accessible. Although the locations of the equipment and piping may be shown on the drawings in certain positions, the Plumbing Contractor shall be guided by the architectural details and conditions existing at the job, correlating this work with that of the other trades, and report to the Architect any discrepancies or interferences that are discovered. Failure to report such discrepancies and interferences shall result in the correcting of these errors or omissions by the Plumbing Contractor at his own expense. All work installed under this division which deviates from the drawings and specifications without prior approval of the Architect, shall be altered by the Contractor at his own expense, to comply with the Drawings and specifications as directed by the Architect.
7. Be solely responsible for taking measurements and installing work to suit conditions encountered.

1.02 QUALITY ASSURANCE

- A. Codes, Permits and Ordinances: All work shall be executed and inspected in accordance with all local or state codes, laws, ordinances, rules and regulations applicable to the particular class of work. Include in quotation all applicable service charges, fees, permits, royalties, taxes, and other similar costs in connection therewith. If to the knowledge of the Contractor, the drawings or specifications are at variance with the above mentioned laws, rules and regulations, he shall promptly notify the Architect in writing so any necessary changes can be provided for in his contract. If the Contractor performs any work knowing it to be contrary to such laws, rules or regulations, and without notice as required above, he shall bear all costs arising therefrom.
- B. Perform all work specified herein in accordance with the codes and standards listed below. When the Specifications are more stringent than the listed codes and standards, the Specifications shall take precedence. In case of conflict, obtain decision from the Architect.
 1. NFPA 54: National Fuel and Gas Code.
 2. NFPA 101: Life Safety Code.
 3. ANSI Handicapped Code A117.1.
 4. AGA: American Gas Association.
 5. ANSI: American National Standards Institute.
 6. ASME: American Society for Mechanical Engineers.
 7. ASTM: American Society for Testing and Materials.
 8. AWWA: American Water Works Association.
 9. MSS: Manufacturer's Standardization Society of the Valve and Fitting Institute.
 10. NEMA: National Electrical Manufacturers Association.
 11. NFPA: National Fire Protection Association.
 12. UL: Underwriters Laboratories, Inc.
 13. ADA: Americans with Disabilities Act.

1.03 SUBMITTALS

- A. Equipment Submittals, Refer to Section 01340:
 1. All equipment shall be submitted, with descriptive data for approval or rejection. All equipment shall be submitted in an indexed, bound brochure. All items shall be submitted at one time. Partial pre-submittals will be considered only as an expediency upon special request.
 2. Each submittal brochure shall be signed, on the index page, by Contractor. This signature shall indicate the Contractor has examined all data therein and found same to be in order.
 3. Data shall be organized and listed as follows:
 - a. Plumbing Fixtures and Trim
 - b. Drains
 - c. Cleanout Covers
 - d. Valves
 - e. Pipe Hangers and Supports
 - f. Pipe Insulation
 - g. Water Heaters
 4. Brochure describing material and equipment shall be submitted within thirty days of signing the contract, for

approval or rejections. Failure to submit data for approval within the thirty day time limit will be construed as meaning the Plumbing Contractor will furnish equipment called for by name.

5. Where equipment is specified to be installed in accordance with manufacturer's recommendations, a copy of these recommendations shall be kept on the job site at all times and shall be made available to the Architect.

- B. Record Drawings: Make drawings showing the exact location of all piping installed underground. These drawings shall be made on sheets the same size as the working drawings, in accordance with Section 01720. Deliver to the Architect in accordance with Section 01700.
- C. Operating and Maintenance Brochures:
 1. Prepare two complete "Operating and Maintenance" brochures. Brochures shall contain descriptive data on all items submitted in Submittal Brochures. Include parts lists and operating instructions for all operating equipment. The most convenient source of securing replacement parts shall be listed for each piece of equipment; generally the local distributor or sales representative. Brochure shall be bound and tab indexed and clearly labeled on the cover indicating the project name, date and responsible parties.
 2. Brochures shall be turned over to Architect for the Owner prior to Contract Closeout. Refer to Section 01720.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Make provisions for the delivery and safe storage of all materials, and arrange with other trades on the job for the introduction into the building of equipment too large to pass through finished openings.
- B. Arrange to have materials delivered to the job at such stages of the work as will expedite the work as a whole. Make and store all materials in such a manner as to be easily checked or inspected.

1.05 JOB CONDITIONS

- A. Openings through Walls, Floor and Roof: Ascertain that all openings through walls, floors, ceilings and roof and through any other parts of the structure shall be properly sized and located. Prepare a sleeve plan for all sleeves required in proposed structure.
- B. Protection of Work: The Plumbing Contractor shall protect his work at all times from danger by freezing, breakage, dirt, foreign materials, etc., and shall replace all work so damaged. The Plumbing Contractor shall use every precaution to protect the work of others, and he will be held responsible for all damage to other work caused by his work or through the neglect of his workmen.
- C. **Prior to start of any construction, verify gas, water and sewer availability. Verify sewer depth, size and location. Verify water pressure, size and location. Verify gas pressure, size and location. Report any discrepancy among Contract Documents to the Architect for clarification. This is a prerequisite requirement.**

1.06 GUARANTEE

- A. Guarantee all work performed under this Contract to be free from defects in material and workmanship for a period of one (1) year from date of final acceptance of such work by the Architect.
- B. Latent defects arising during this period shall, upon notification by the Owner, be promptly corrected by the Plumbing Contractor at no additional cost to the Owner.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Materials and/or equipment involved in the specified installation shall be of the best for the purpose intended and shall meet with the approval of the Architect. The Architect reserves the right to reject any materials and workmanship not

in accordance with those specified or not meeting with the Architect's approval, either before or after installation.

- B. Materials and/or equipment specified herein to be a certain manufacture or brand are used as a standard and materials and/or equipment of other manufacture may be submitted for substitution provided that they meet or exceed quality and all capacities specified and space requirements shown on the Drawings.

2.02 MATERIALS

A. Pipes and Fittings:

1. All pipes specified herein shall be uniform in size, sound and free from defects smooth on the inside and of sufficient strength to suit the particular system.
2. Steel pipe shall conform to ASTM A120 and shall be schedule 40 galvanized. Galvanized fittings for pressure piping shall be for minimum 125 psi swp, of weight consistent with pipe used with and of malleable iron, ASA B16.4. Fittings for non-pressure steel piping systems shall be black cast iron drainage fittings, ASA B16.12.4.
3. All copper pipe above grade shall be hard-drawn type "L" copper water tubing (ASTM B-88) for solder joints. All underground copper pipe within five feet of building shall be type "L" or "K" copper, as code requires. Fittings shall be wrought copper conforming ASA B16.22 or cast bronze conforming to ASA B16.18. All underground copper tubing shall have a coat of black asphaltum or as required by code.
4. PVC piping shall be as approved for drain, waste and vent piping in accordance with ASTM D-3034. Jointing shall be solvent weld. Provide cast-iron piping above all public areas including all meeting rooms, lobbies, guest laundries, restaurant areas, etc. Provide cast-iron piping in all air plenum spaces. Piping shall be insulated.
5. Building Water Service: Type "K" or "L" as required by code, with silfoss joints. At Contractor's option, sch 40 PVC pressure-rated plastic pipe with sch 80 solvent weld fittings may be used if permitted by governing codes.

B. Pipe Joints:

1. Screwed joints in steel piping shall have standard, clean-out tapered threads. Regularly manufactured pipe joint compound shall be applied to male threads only, or a pipe joint compound of white lead and linseed oil may be prepared.
2. Soldered joints in copper piping shall have 95-5 tin-antimony (no lead) solder applied using no-lead flux.
3. Brazed joints in copper piping shall have 1300EF melting point silver-phosphorus brazing alloy using no-lead flux.
4. Couplings or adapters for joining dissimilar piping materials shall be provided of types recommended by manufacturers.
5. No-Hub cast iron gaskets and stainless steel bands complying with ASA Code 022.

C. Pipe Hangers and Supports:

1. Furnish adequate pipe suspension systems in accordance with sound engineering practices, using standard or above standard, commercially accepted pipe hangers and suspension equipment. The Model number references used herein are those of Michigan Hanger Company, Inc.
2. Vertically adjustable hangers: Model 100 "Loop Hanger", or Model 400 "Clevis Hanger" shall be used on horizontal runs of soil, waste, vent, and similar piping with clevis type for pipe size larger than 4". All hangers shall be sized so that pipe insulation shall be continuous through hangers. Provide 6" long, 22 gage metal saddle at hangers.
3. Vertically adjustable copper coated hangers: Model 101 "Loop Hanger" or Model 402 "Clevis Hanger" shall be used on horizontal uninsulated copper tubing, with clevis type for pipe size larger than 4".
4. All riser, branch supply, and individual fixture supplies within plumbing chase walls shall be anchored and supported with Michigan Hanger Company "Adjusto-System" using all components as required and PC Series plastic clamps on all pipe.
5. All vertical runs of piping shall be supported at each floor by Model 510 riser clamps, except that Model 511 copper plated riser clamps shall be used for copper pipe.
6. No wire hangers or perforated band hangers or similar materials will be acceptable.
7. All hangers or supports not specifically referred to herein must be submitted for approval prior to installation.

D. Sleeves and Escutcheons:

1. Sleeves through structural concrete members and sleeves for walls below grade and floors on grade shall be standard weight galvanized steel pipe. Sleeves through other than structural components of the building shall be

- 20 gauge galvanized sheet metal with lock seam joints.
2. Escutcheon plates to be installed where exposed piping passes through walls, ceilings, and floors of building, shall be minimum 20 gauge steel, chromium plated. Exposed hanger rods in finished spaces with ceiling shall have cast iron escutcheon with set screw.
- E. Valves:
1. Valves shall be of single manufacture insofar as applicable. Valves shall be Crane, Jenkins, Stockham, Nibco/Scott. Furnish and install access panels all valves; Refer to Section 08305.
 - a. Gates Valves: Milwaukee 125# W.O.G.
 - b. Ball Valves: Milwaukee 125# W.O.G.
 - c. Gas Cocks: I.P.S. to 2" and Flanged 2-1/2" and larger, Milwaukee.
- F. Cleanouts:
1. Cleanouts shall be provided in waste drainage lines where indicated on drawings and/or as required by plumbing code. Cleanouts shall be sized same as for pipe in which installed, except no cleanout need be larger than 4" in diameter. Cleanouts for PVC piping shall conform to ASTM D 3034.
 2. Where installed in exposed cast iron pipe, cleanouts shall consist of raised-head cast brass plug with caulking ferrule, Wade W-8550-A. Where installed in tapped drainage fittings, cleanouts shall be cast brass raised-head plug, Wade W-8590-A.
 3. Cleanouts in walls shall consist of raised solid head, cast brass plug with stainless steel cover, Wade W-8470-R.
 4. Where installed in floors, cleanouts shall consist of cast iron ferrule, brass plug, adjustable cast iron housing and nickel brass scoriated cover for flush mounting, Wade W-8130 AF.
- G. A. Insulation:
1. Attic, Chases, Concealed and Exposed Areas: 1" molded low-pressure fibrous-glass insulation with manufacturer's standard white vapor barrier glass cloth jacket.
 2. Exterior Walls, Cold Water and Hot Water: 1" Armaflex.
 3. All hot water, cold water and hot water return piping in system shall be insulated. (No Exceptions)
- H. Plumbing Fixtures:
1. Plumbing fixtures shall be furnished as indicated on the architectural and plumbing drawings and as specified herein, with all hot and cold water supplies, waste and vent connections, fittings, supports, trim and accessories. All fixtures shall be covered during construction of the building as a protection against dirt or injury. Coordinate setting of supports for fixtures and equipment with the general construction activities.
 2. All enameled cast iron fixtures shall be acid resisting enamel.
 3. All exposed metal work on or around fixtures, unless otherwise specified, shall be best quality chromium plated brass. Fixtures shall be Kohler, American Standard, or Eljer, of type and quality as scheduled.
- I. Plumbing Fixture Schedule: Refer to Drawings.

PART 3 - EXECUTION

3.01 INSPECTION OF SITE

- A. Prior to submitting bid, visit the site of the proposed construction and become thoroughly acquainted with existing utilities, working conditions to be encountered, etc. No additional compensation shall be allowed for conditions increasing the cost which were not known or appreciated by him when submitting the proposal if the condition was obvious and could have been discovered if the site had been visited and became thoroughly informed of all existing conditions which would affect this work.

3.02 WORKMANSHIP

- A. All work is to be installed by competent workmen in their respective fields. The installation is at all times to be under supervision of a supervisor who is thoroughly familiar with all portions of the installation.

- B. All work is to be accomplished in a finished and workmanlike manner in accordance with acceptable best standards of the trade.
- C. All work shall be performed in accordance with all State and Local Codes, and Health and Safety Codes.

3.03 COORDINATION

- A. Coordinate this work with that of the other contractors on the job and also with that of the Owner, in order that there will be no delay in the proper installation and completion of the work. If, in the opinion of the Architect, any piping, equipment, etc., has been improperly placed or installed due to lack of coordination with the other trades, such piping and equipment shall be relocated as directed by the Architect at the Contractor's expense.

3.04 CUTTING AND PATCHING

- A. Perform all cutting and patching required for the introduction and placement of his work. He shall employ men to perform all patching work that are skilled in the particular trade involved. Perform all cutting and patching required as a result of the omission of an opening in construction. Refer to Section 01045.

3.05 EXCAVATION AND BACKFILL

- A. Perform all excavation and backfilling as required to make plumbing installation. The Plumbing Contractor shall establish all lines and elevations prior to opening trenches and shall be responsible for correctness thereof. Trench bottoms shall be hollowed at bells so as to provide firm bearing for the full length of the pipe proper.
- B. After pipe joints have "set" and test have indicated leakproof installation, any water in trench shall be removed and backfill shall be brought to required grade. Backfill shall be placed in horizontal layers not to exceed 12 inches, properly moistened, and compacted to a density that will prevent settlement or shrinkage. Earth shall be tamped around pipe and bells by hand to prevent movement of pipe during backfilling. Where soil is rocky, hard, or not suitable for backfill, provide a sand base as required. All backfilling materials shall be free from cinders and other harmful corrosive materials. Comply with requirements of Sections 02200, 02221 and 02290.
- C. All water and sewer lines shall be installed below freeze line, with water piping buried a minimum of 24 inches or deeper, depending on local conditions and freeze line.
- D. Provide all sheathing and bracing, using the proper materials, where necessary for the work involved.
- E. Maintain all excavations required herein free of standing water.
- F. After all backfilling has been completed, remove all surplus excavation material from the Owner's property.
- G. Shrinkage of backfilled trenches shall be brought to finish grade by after ample time to allow for settlement.
- H. Properly anchor and thrust block all water service lines.

3.06 PIPES AND FITTINGS

- A. Determine in advance of construction, locations of all piping, sleeves, hangers, flow lines, elevations, etc. Pipe shall be erected neatly and workmanlike, parallel with building lines.
- B. Soil and waste piping inside the building shall be service weight cast iron soil pipe and fittings. An option to use Schedule 40 PVC drain, waste and vent piping is open to the Contractor. If Schedule 40 PVC is used in fire-rated walls, all penetrations of the drywall shall be made with metallic pipe. PVC shall not be used where code prohibits the use of same. The Contractor shall not use **cellular foam core** Schedule 40 PVC pipe anywhere on the project. In sound sensitive areas such as meeting rooms, lobby, and administrative areas, the drain pipe above the ceiling shall be cast iron – no exceptions.
- C. Domestic water piping above grade shall be Type "L" hard drawn copper. All underground copper pipe shall be Type

"K" soft copper with a coat of black asphaltum. Pipe shall have no joints when placed under concrete slab. Fittings shall be cast brass or wrought copper, suitable for sweat or brazed connections. Joints shall be made with no-lead solder. Joints shall be cleaned and no-lead flux applied before soldering.

- D. Building water main shall be Schedule 40 PVC pressure rated plastic pipe with Schedule 80 solvent weld fittings and shall be properly anchored and thrust blocks installed at all returns.
- E. Water piping shall not be installed in areas subject to freezing without adequate insulation or heat cable as required.
- F. All threaded piping shall have pipe joint compound applied to male threads only shall be cleaned free of dirt and burrs before joining. Two pipe threads shall be exposed after joining pipe.
- G. Isolate connections of copper and steel pipe and isolate piping above slab from piping below slab with cathodic isolating unions.
- H. All piping shall have provision for expansion and contraction with anchorage at each point, as required.

3.07 PIPE HANGERS AND SUPPORTS

- A. Provide proper support of all equipment and piping furnished and/or installed, except as specifically stated to be furnished by others.
- B. All piping shall be substantially supported in a neat and workmanlike manner and shall be free from sagging, with loops, etc., as required for expansion and contraction.
- C. For multiple pipe runs, trapeze hangers shall be fabricated from structural steel, i.e., steel channel or angle of sufficient strength. Where trapeze hangers are used, a U-Bolt shall be installed to anchor pipes at each hanger.
- D. Hanger locations shall not exceed a distance of 2'-6" from point of change in piping direction. All pipe 4" and larger suspended from bar joist shall have a hanger at each joist. Cast iron pipe shall have a hanger for each pipe length located close to hub. All pipe lengths over ten feet shall have a hanger at ten feet intervals.
- E. Subject to exceptions above, pipe shall be supported in accordance with the following schedule using mild steel hanger rods with National Coarse Threads.

<u>Pipe</u>	<u>Rod</u>	<u>Spacing (Max.)</u>
Up to 1"	3/8"	6'-0"
1 1/4" to 1 1/2"	3/8"	8'-0"
2"	3/8"	10'-0"
2 1/2" to 3 1/2"	1/2"	10'-0"
4"	5/8"	12'-0"
PVC (any size)	3/8"	5'-0"

- F. Clamps, inserts, bolts, racks, etc., shall be furnished for piping supports where required and shall have strength equal to that of rod scheduled.
- G. Vertical piping shall be supported with riser clamps or other satisfactory means as dictated by the particular situation and as recommended by the hanger manufacturer. Special situations shall be taken care of as directed by good practice. Base of each stack shall be supported with concrete base support.
- H. Equipment shall be supported adequately with all bracing, foundations, angles, channels, hangers, etc.

3.08 PAINTING

- A. The following protective painting and identification of equipment shall be provided under this Division of the work. Other finish painting shall be provided under the "Painting" Division of the specifications.
 - 1. Equipment, including pumps, motors, and similar factory fabricated and assembled units shall be furnished with factory applied protective prime coat paint of finished baked enamel as specified herein. Equipment surfaces damaged during course of construction shall be refinished by the Plumbing Contractor.
- B. Uncoated black ferrous piping and fittings except where concealed by furring or chases shall be cleaned and painted with one coat of black enamel heat resistant paint. Exposed cast iron piping shall be provided with one coat of asphalt varnish. Steel frame equipment supports shall be cleaned and painted with one coat of aluminum paint. Underground piping and fittings of various ferrous materials shall be provided with heavy coating of asphaltum or coat tar pitch. Underground water piping shall be provided with heavy coating of protective bituminous compound.

3.09 SLEEVES AND ESCUTCHEONS

- A. Masonry Walls: Sleeve all penetrations.
- B. Floors: Sleeve piping that penetrates floor system. Sleeves shall be installed flush with the top of the floor slab.
- C. Fire-Rated Gypsum Wallboard Partitions: Cut gypsum wallboard to fit pipe, and seal void between the wallboard and the pipe. For the following services, sleeves are not required:
 - 1. Rain water leaders.
 - 2. Domestic cold water piping.
 - 3. Any piping subject to condensing.
- D. Non-Fire-rated Drywall Partitions: Sleeves are not required. Seal wall penetration against pipe or insulation.
- E. Firestopping:
 - 1. Install piping, sleeves and insulation through fire-rated walls in accordance with U.L. Fire Resistant Directory. Coordinate installation of Division 15 pipe and ductwork with requirements of Section 07270.
 - a. Clearance Between Sleeve and Pipe: Minimum of 1/2" for hot piping and 1" for cold piping or as otherwise dictated by U.L. Fire Resistance Directory.
 - 2. Where piping penetrates the floor slab (second floor slab and above), provide and install "Code Red Fire Stop Device" as manufactured by ProSet Systems of Atlanta, Georgia.
- F. Provide chromium plated escutcheon plates for exposed uninsulated pipes projecting through floors or walls in "finished" spaces. Mechanical rooms, storerooms, electric closets and janitor's closets are not considered "finished" spaces.

3.10 UNIONS

- A. When not integral with equipment or valves, unions shall be installed adjacent to same for their easy removal. Unions are not required at solder connected water service valves. Unions shall be installed on equipment side of shut-off valves and fixtures traps. Dielectric unions shall be installed where dissimilar metals are joined.

3.11 VALVES

- A. Valves shall be installed at each piece of equipment and at branches off mains and as indicated.
- B. Valves shall be accessibly located and of same size as piping in which they are installed. Balancing cocks shall be installed where indicated or as required for a completely balanced hot water system.
- C. Access doors shall be provided by the Plumbing Contractor where indicated or where required to serve as access to concealed valves, with steel Prime Coated Finish.

3.12 FLASHING

- A. Vent pipes extending through roof shall be flashed in accordance with Section 07530.

3.13 CLEANOUTS

- A. Cleanouts shall be installed where shown on drawings and at all points where required for adequate service of drainage systems.
- B. Cleanouts shall be installed per code, at base of all stacks, and at all changes in direction of 45 degrees or more.
- C. Install cleanouts with covers where pipe is concealed in walls and floors.
- D. Where cleanouts are on accessible pipe, cleanout plugs shall be raised head type.
- E. All cleanout caps to be wiped with "Key Grease" for easy removal.

3.14 INSULATION

- A. Domestic hot and cold water lines, above grade, shall be insulated.
- B. Insulation shall be applied over clean, dry surfaces after piping has been tested and proven tight. Fittings, valve bodies, etc., shall be installed with factory molded covering or molded by hand with suitable insulating material and binder same thickness as adjoining pipe covering. Omit insulation at unions and flanges, and at these points level insulation neatly and finish as specified for fittings. All insulation shall be installed in strict accordance with manufacturer's recommendations. Runouts to be insulated per paragraph 2.02.G.
- C. Insulation on all piping shall be continuous thru hangers and sleeves. Cold water piping in ventilated chases and individual fixture supplies need not be vented.
- D. All horizontal runs of rainwater conductors shall be insulated.

3.15 CROSS CONNECTIONS

- A. Piping shall not be installed in a manner to permit back-siphonage or any flow of polluted water or other liquids into domestic water piping system under any condition.
- B. Air gaps, receptor type drains and approved vacuum breaking devices shall be provided as required by local codes and ordinances. Piping to hose-end faucets or to inlet below fixture overflow shall have vacuum breakers of make, design, size and location approved by the inspector of plumbing. Vacuum breakers shall not be concealed, shall be full size of pipe and shall be chrome plated.

3.16 PLUMBING FIXTURES

- A. All fixtures shall have adequate and approved roughing in full accordance with applicable codes. All exposed piping and appurtenances for fixtures shall be chrome plated. All fixtures shall have stops on water supply connections and chrome plated brass "P" traps, where exposed.
- B. No ferrous piping will be allowed in fixture supply connections. All supply adapters shall be all brass.
- C. Fixtures shall be installed as recommended by manufacturer and as outlined on the drawings.

3.17 SERVICING ACCESSIBILITY

- A. All equipment shall be placed and arranged so that all items requiring periodic service are accessible. This shall

05-31-2022

MSCAA 13-1368-02

include all motors, oil reservoirs, filters, valves, controls and related items. Provide access doors as required. refer to Section 08305.

3.18 TESTING AND ADJUSTING

- A. Upon completion of work, all equipment shall be cleaned and adjusted for proper operation and any defects discovered shall be corrected before final inspection prior to acceptance.
- B. Soil, waste and vent piping shall be tested by plugging all openings and filling entire system with water to level of highest vent stack and, or as required by local plumbing code. Test shall be maintained for not less than one hour.
- C. Water circuits shall thoroughly cleaned, pressure tested and proven tight with minimum 100 lbs. hydrostatic pressure. Test of interior piping shall be made prior to setting of fixtures. Complete system sterilization shall be provided as required by code.

3.19 CLEANUP

- A. The Contractor shall at all times keep the premises free from accumulation of waste materials or rubbish caused by his employees or work. At the completion of the work, the Contractor shall remove all surplus materials, tools, etc., and shall leave the premises "broom-clean" Refer to Section 01710.

END OF SECTION

SECTION 15950
TESTING, ADJUSTING, AND BALANCING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes TAB to produce design objectives for the following:
1. Air Systems:
 - a. Constant-volume air systems.
 - b. Variable-volume air systems.
 2. HVAC equipment quantitative-performance settings.
 3. Verifying that automatic control devices are functioning properly.
 4. Reporting results of activities and procedures specified in this Section.

1.3 DEFINITIONS

- A. Adjust: To regulate fluid flow rate and air patterns at the terminal equipment, such as to reduce fan speed or adjust a damper.
- B. Balance: To proportion flows within the distribution system, including submains, branches, and terminals, according to indicated quantities.
- C. Barrier or Boundary: Construction, either vertical or horizontal, such as walls, floors, and ceilings that are designed and constructed to restrict the movement of airflow, smoke, odors, and other pollutants.
- D. Draft: A current of air, when referring to localized effect caused by one or more factors of high air velocity, low ambient temperature, or direction of airflow, whereby more heat is withdrawn from a person's skin than is normally dissipated.
- E. NC: Noise criteria.
- F. Procedure: An approach to and execution of a sequence of work operations to yield repeatable results.
- G. RC: Room criteria.
- H. Report Forms: Test data sheets for recording test data in logical order.
- I. Static Head: The pressure due to the weight of the fluid above the point of measurement. In a closed system, static head is equal on both sides of the pump.
- J. Suction Head: The height of fluid surface above the centerline of the pump on the suction side.

- K. System Effect: A phenomenon that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
- L. System Effect Factors: Allowances used to calculate a reduction of the performance ratings of a fan when installed under conditions different from those presented when the fan was performance tested.
- M. TAB: Testing, adjusting, and balancing.
- N. Terminal: A point where the controlled medium, such as fluid or energy, enters or leaves the distribution system.
- O. Test: A procedure to determine quantitative performance of systems or equipment.
- P. Testing, Adjusting, and Balancing (TAB) Firm: The entity responsible for performing and reporting TAB procedures.

1.4 SUBMITTALS

- A. Qualification Data: Within 45 days from Contractor's Notice to Proceed, submit 6 copies of evidence that TAB firm and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.
- B. Sample Report Forms: Submit two sets of sample TAB report forms.
- C. Warranties specified in this Section.

1.5 QUALITY ASSURANCE

- A. TAB Firm Qualifications: Engage a TAB firm certified by either AABC or NEBB.
- B. Certification of TAB Reports: Certify TAB field data reports. This certification includes the following:
 - 1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
 - 2. Certify that TAB team complied with approved TAB plan and the procedures specified and referenced in this Specification.
- C. TAB Report Forms: Use standard forms from AABC's "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems", NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems", SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing" or TAB firm's forms approved by Architect.
- D. Instrumentation Type, Quantity, and Accuracy: As described in AABC's "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems", or NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems," Section II, "Required Instrumentation for NEBB Certification."
- E. Instrumentation Calibration: Calibrate instruments at least every six months or more frequently if required by instrument manufacturer.
 - 1. Keep an updated record of instrument calibration that indicates date of calibration and the name of party performing instrument calibration.

1.6 COORDINATION

- A. Coordinate the efforts of factory-authorized service representatives for systems and equipment, HVAC controls installers, and other mechanics to operate HVAC systems and equipment to support and assist TAB activities.
- B. Notice: Provide seven days' advance notice for each test. Include scheduled test dates and times.
- C. Perform TAB after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.
- D. Division 17 Temperature Controls contractor and the TAB contractor shall both be present during the testing, adjusting, and balancing of the systems. The balancing contractor shall work with the controls contractor to calibrate flow sensors, adjust control parameters, and set up equipment in order to properly balance the air and hydronic systems.
- E. Balancing contractor shall coordinate with the General Contractor, the Mechanical Contractor, the Commissioning Agent, and the Temperature Controls Contractor to schedule the balancing of the system.

1.7 WARRANTY

- A. National Project Performance Guarantee: Provide a guarantee on AABC's "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems" forms stating that AABC will assist in completing requirements of the Contract Documents if TAB firm fails to comply with the Contract Documents. Likewise, if firm is NEBB certified, provide a guarantee on NEBB forms stating that NEBB will assist in completing requirements of the Contract Documents if TAB firm fails to comply with the Contract Documents. Guarantee includes the following provisions:
 - 1. The certified TAB firm has tested and balanced systems according to the Contract Documents.
 - 2. Systems are balanced to optimum performance capabilities within design and installation limits.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.
 - 1. Contract Documents are defined in the General and Supplementary Conditions of Contract.
 - 2. Verify that balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers, are required by the Contract Documents. Verify that quantities and locations of these balancing devices are accessible and appropriate for effective balancing and for efficient system and equipment operation.
- B. Examine approved submittal data of HVAC systems and equipment.
- C. Examine Project Record Documents described in Division 1.
- D. Examine design data, including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.

- E. Examine equipment performance data including fan and pump curves. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system. Calculate system effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from those shown on Drawings. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," Sections 7 through 10; or in SMACNA's "HVAC Systems--Duct Design," Sections 5 and 6. Compare this data with the design data and installed conditions.
- F. Examine system and equipment installations to verify that they are complete and that testing, cleaning, adjusting, and commissioning specified in individual Sections have been performed.
- G. Examine system and equipment test reports.
- H. Examine HVAC system and equipment installations to verify that indicated balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers, are properly installed, and that their locations are accessible and appropriate for effective balancing and for efficient system and equipment operation.
- I. Examine systems for functional deficiencies that cannot be corrected by adjusting and balancing.
- J. Examine HVAC equipment to ensure that clean filters have been installed, bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.
- K. Examine terminal units to verify that they are accessible and their controls are connected and functioning.
- L. Examine plenum ceilings used for return air. Verify that return air openings at partitions in plenum are provided as described in Construction Documents.
- M. Examine strainers for clean screens and proper perforations.
- N. Examine three-way valves for proper installation for their intended function of diverting or mixing fluid flows.
- O. Examine heat-transfer coils for correct piping connections and for clean and straight fins.
- P. Examine system pumps to ensure absence of entrained air in the suction piping.
- Q. Examine equipment for installation and for properly operating safety interlocks and controls.
- R. Examine automatic temperature system components to verify the following:
 - 1. Dampers, valves, and other controlled devices are operated by the intended controller.
 - 2. Dampers and valves are in the position indicated by the controller.
 - 3. Integrity of valves and dampers for free and full operation and for tightness of fully closed and fully open positions. This includes dampers in variable-air-volume terminals.
 - 4. Automatic modulating and shutoff valves, including two-way valves and three-way mixing and diverting valves, are properly connected.
 - 5. Thermostats and humidistats are located to avoid adverse effects of sunlight, drafts, and cold walls.
 - 6. Sensors are located to sense only the intended conditions.
 - 7. Sequence of operation for control modes is according to the Contract Documents.
 - 8. Controller set points are set at indicated values.
 - 9. Interlocked systems are operating.
 - 10. Changeover from heating to cooling mode occurs according to indicated values.

- S. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.2 PREPARATION

- A. Prepare a TAB plan that includes strategies and step-by-step procedures.
- B. Complete system readiness checks and prepare system readiness reports. Verify the following:
 - 1. Permanent electrical power wiring is complete.
 - 2. Hydronic systems are filled, clean, and free of air.
 - 3. Automatic temperature-control systems are operational.
 - 4. Equipment and duct access doors are securely closed.
 - 5. Balance, smoke, and fire dampers are open.
 - 6. Isolating and balancing valves are open and control valves are operational.
 - 7. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
 - 8. Windows and doors can be closed so indicated conditions for system operations can be met.

3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems", NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems", or SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing," and this Section.
- B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. After testing and balancing, close probe holes and patch insulation with new materials identical to those removed. Restore vapor barrier and finish according to insulation Specifications for this Project.
- C. Mark equipment and balancing device settings with paint or other suitable, permanent identification material, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, to show final settings.
- D. Take and report testing and balancing measurements in inch-pound (IP).

3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.
- B. Prepare schematic diagrams of systems' "as-built" duct layouts.
- C. Determine the best locations in main and branch ducts for accurate duct airflow measurements.
- D. Check airflow patterns from the outside-air intake hoods and dampers and the return- and exhaust-air dampers, through the supply-fan discharge and mixing dampers.
- E. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- F. Verify that motor starters are equipped with properly sized thermal protection.
- G. Check dampers for proper position to achieve desired airflow path.

- H. Check for airflow blockages.
- I. Check condensate drains for proper connections and functioning.
- J. Check for proper sealing of air-handling unit components.
- K. Check for proper sealing of air duct system.

3.5 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

- A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.
 - 1. Measure fan static pressures to determine actual static pressure as follows:
 - a. Measure outlet static pressure as far downstream from the fan as practicable and upstream from restrictions in ducts such as elbows and transitions.
 - b. Measure static pressure directly at the fan outlet or through the flexible connection.
 - c. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from flexible connection and downstream from duct restrictions.
 - d. Measure inlet static pressure of double-inlet fans through the wall of the plenum that houses the fan.
 - 2. Measure static pressure across each component that makes up an air-handling unit, rooftop unit, and other air-handling and -treating equipment.
 - 3. Adjust fan speed higher or lower than indicated speed as required to meet scheduled performance. Make required adjustments to pulley sizes.
 - 4. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload will occur. Measure amperage in full cooling, full heating, economizer, and any other operating modes to determine the maximum required brake horsepower.
- B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows within specified tolerances.
 - 1. Measure static pressure at a point downstream from the balancing damper and adjust volume dampers until the proper static pressure is achieved.
 - a. Where sufficient space in submain and branch ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.
 - 2. Remeasure each submain and branch duct after all have been adjusted. Continue to adjust submain and branch ducts to indicated airflows within specified tolerances.
- C. Measure terminal outlets and inlets without making adjustments.
 - 1. Measure terminal outlets using a direct-reading hood or outlet manufacturer's written instructions and calculating factors.
- D. Adjust terminal outlets and inlets for each space to indicated airflows within specified tolerances of indicated values. Make adjustments using volume dampers rather than extractors and the dampers at air terminals.

1. Adjust each outlet in same room or space to within specified tolerances of indicated quantities without generating noise levels above the limitations prescribed by the Contract Documents.
2. Adjust patterns of adjustable outlets for proper distribution without drafts.

3.6 GENERAL PROCEDURES FOR HYDRONIC SYSTEMS

- A. Prepare test reports with pertinent design data and number in sequence starting at pump to end of system. Check the sum of branch-circuit flows against approved pump flow rate. Correct variations that exceed plus or minus 5 percent.
- B. Prepare schematic diagrams of systems' "as-built" piping layouts.
- C. Prepare hydronic systems for testing and balancing according to the following, in addition to the general preparation procedures specified above:
 1. Open all manual valves for maximum flow.
 2. Check expansion tank liquid level.
 3. Check makeup-water-station pressure gage for adequate pressure for highest vent.
 4. Check flow-control valves for specified sequence of operation and set at indicated flow.
 5. Set differential-pressure control valves at the specified differential pressure. Do not set at fully closed position when pump is positive-displacement type unless several terminal valves are kept open.
 6. Set system controls so automatic valves are wide open to heat exchangers.
 7. Check pump-motor load. If motor is overloaded, throttle main flow-balancing device so motor nameplate rating is not exceeded.
 8. Check air vents for a forceful liquid flow exiting from vents when manually operated.

3.7 PROCEDURES FOR HYDRONIC SYSTEMS

- A. Measure water flow at pumps. Use the following procedures, except for positive-displacement pumps:
 1. Verify impeller size by operating the pump with the discharge valve closed. Read pressure differential across the pump. Convert pressure to head and correct for differences in gage heights. Note the point on manufacturer's pump curve at zero flow and verify that the pump has the intended impeller size.
 2. Check system resistance. With all manual valves and automatic control valves open, read pressure differential across the pump and mark pump manufacturer's head-capacity curve. Adjust combination balance and shut-off valve at pump discharge until indicated pump water flow is achieved.
 3. Verify pump-motor brake horsepower. Calculate the intended brake horsepower for the system based on pump manufacturer's performance data. Compare calculated brake horsepower with nameplate data on the pump motor. Report conditions where actual amperage exceeds motor nameplate amperage.
 4. Report flow rates that are not within plus or minus 5 percent of design.
- B. Measure pump flow rate and make final measurements of pump amperage, voltage, rpm, pump heads, and systems' pressures and temperatures including outdoor-air temperature.
- C. Measure the differential-pressure control valve settings existing at the conclusions of balancing.

3.8 PROCEDURES FOR VARIABLE-FLOW HYDRONIC SYSTEMS

- A. Every combination balance and shut-off valve at chilled and hot water coils shall be set to be 100% open as the permanent position. These balance valves shall be used to test performance of each coil by adjusting to achieve design water flow for test. After coil test, valve shall be left in 100% open position.

3.9 PROCEDURES FOR MOTORS

- A. Motors, 1/2 HP and Larger: Test at final balanced conditions and record the following data:
1. Manufacturer, model, and serial numbers.
 2. Motor horsepower rating.
 3. Motor rpm.
 4. Efficiency rating.
 5. Nameplate and measured voltage, each phase.
 6. Nameplate and measured amperage, each phase.
 7. Starter thermal-protection-element rating.
- B. Motors Driven by Variable-Frequency Controllers: Test for proper operation at speeds varying from minimum to maximum. Test the manual bypass for the controller to prove proper operation. Record observations, including controller manufacturer, model and serial numbers, and nameplate data.

3.10 PROCEDURES FOR HEAT-TRANSFER COILS

- A. Water Coils: Measure the following data for each coil:
1. Entering- and leaving-water temperature.
 2. Water flow rate.
 3. Water pressure drop.
 4. Dry-bulb temperature of entering and leaving air.
 5. Wet-bulb temperature of entering and leaving air for cooling coils.
 6. Airflow.
 7. Air pressure drop.
- B. Electric-Heating Coils: Measure the following data for each coil:
1. Nameplate data.
 2. Airflow.
 3. Entering- and leaving-air temperature at full load.
 4. Voltage and amperage input of each phase at full load and at each incremental stage.
 5. Calculated kilowatt at full load.
 6. Fuse or circuit-breaker rating for overload protection.

3.11 PROCEDURES FOR TEMPERATURE MEASUREMENTS

- A. During TAB, report the need for adjustment in temperature regulation within the automatic temperature-control system.
- B. Measure indoor wet- and dry-bulb temperatures every other hour for a period of two successive eight-hour days, in each separately controlled zone, to prove correctness of final temperature settings. Measure when the building or zone is occupied.
- C. Measure outside-air, wet- and dry-bulb temperatures.

3.12 TEMPERATURE-CONTROL VERIFICATION

- A. Verify that controllers are calibrated and commissioned.
- B. Check transmitter and controller locations and note conditions that would adversely affect control functions.
- C. Record controller settings and note variances between set points and actual measurements.
- D. Check the operation of limiting controllers (i.e., high- and low-temperature controllers).
- E. Check free travel and proper operation of control devices such as damper and valve operators.
- F. Check the sequence of operation of control devices. Note air pressures and device positions and correlate with airflow and water flow measurements. Note the speed of response to input changes.
- G. Check the interaction of electrically operated switch transducers.
- H. Check the interaction of interlock and lockout systems.
- I. Check main control supply-air pressure and observe compressor and dryer operations.
- J. Record voltages of power supply and controller output. Determine whether the system operates on a grounded or nongrounded power supply.
- K. Note operation of electric actuators using spring return for proper fail-safe operations.

3.13 TOLERANCES

- A. Set HVAC system airflow and water flow rates within the following tolerances:
 - 1. Supply, Return, and Exhaust Fans and Equipment with Fans: Minus 5 to plus 10 percent.
 - 2. Air Outlets and Inlets: Minus 5 to plus 10 percent.
 - 3. Heating-Water Flow Rate: Minus 5 to plus 10 percent.
 - 4. Cooling-Water Flow Rate: Minus 5 to plus 10 percent.

3.14 REPORTING

- A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems' balancing devices. Recommend changes and additions to systems' balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.
- B. Status Reports: As Work progresses, prepare reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced. Prepare a separate report for each system and each building floor for systems serving multiple floors.

3.15 FINAL REPORT

- A. General: Typewritten, or computer printout in letter-quality font, on standard bond paper, in three-ring binder, tabulated and divided into sections by tested and balanced systems.

- B. Include a certification sheet in front of binder signed and sealed by the certified testing and balancing engineer.
1. Include a list of instruments used for procedures, along with proof of calibration.
- C. Final Report Contents: In addition to certified field report data, include the following:
1. Pump curves.
 2. Fan curves.
 3. Manufacturers' test data.
 4. Field test reports prepared by system and equipment installers.
 5. Other information relative to equipment performance, but do not include Shop Drawings and Product Data.
- D. General Report Data: In addition to form titles and entries, include the following data in the final report, as applicable:
1. Title page.
 2. Name and address of TAB firm.
 3. Project name.
 4. Project location.
 5. Architect's name and address.
 6. Engineer's name and address.
 7. Contractor's name and address.
 8. Report date.
 9. Signature of TAB firm who certifies the report.
 10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
 11. Summary of contents including the following:
 - a. Indicated versus final performance.
 - b. Notable characteristics of systems.
 - c. Description of system operation sequence if it varies from the Contract Documents.
 12. Nomenclature sheets for each item of equipment.
 13. Data for terminal units, including manufacturer, type size, and fittings.
 14. Notes to explain why certain final data in the body of reports varies from indicated values.
 15. Test conditions for fans and pump performance forms including the following:
 - a. Settings for outside-, return-, and exhaust-air dampers.
 - b. Conditions of filters.
 - c. Cooling coil, wet- and dry-bulb conditions.
 - d. Face and bypass damper settings at coils.
 - e. Fan drive settings including settings and percentage of maximum pitch diameter.
 - f. Inlet vane settings for variable-air-volume systems.
 - g. Settings for supply-air, static-pressure controller.
 - h. Other system operating conditions that affect performance.
- E. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:
1. Quantities of outside, supply, return, and exhaust airflows.
 2. Water and steam flow rates.
 3. Duct, outlet, and inlet sizes.
 4. Pipe and valve sizes and locations.

5. Terminal units.
6. Balancing stations.
7. Position of balancing devices.

F. Air-Handling Unit Test Reports: For air-handling units with coils, include the following:

1. Unit Data: Include the following:
 - a. Unit identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and unit size.
 - e. Manufacturer's serial number.
 - f. Unit arrangement and class.
 - g. Discharge arrangement.
 - h. Sheave make, size in inches, and bore.
 - i. Sheave dimensions, center-to-center, and amount of adjustments in inches.
 - j. Number of belts, make, and size.
 - k. Number of filters, type, and size.
2. Motor Data:
 - a. Make and frame type and size.
 - b. Horsepower and rpm.
 - c. Volts, phase, and hertz.
 - d. Full-load amperage and service factor.
 - e. Sheave make, size in inches, and bore.
 - f. Sheave dimensions, center-to-center, and amount of adjustments in inches.
3. Test Data (Indicated and Actual Values):
 - a. Total airflow rate in cfm.
 - b. Total system static pressure in inches wg.
 - c. Fan rpm.
 - d. Discharge static pressure in inches wg.
 - e. Filter static-pressure differential in inches wg.
 - f. Preheat coil static-pressure differential in inches wg.
 - g. Cooling coil static-pressure differential in inches wg.
 - h. Heating coil static-pressure differential in inches wg.
 - i. Outside airflow in cfm.
 - j. Return airflow in cfm.
 - k. Outside-air damper position.
 - l. Return-air damper position.

G. Apparatus-Coil Test Reports:

1. Coil Data:
 - a. System identification.
 - b. Location.
 - c. Coil type.
 - d. Number of rows.
 - e. Fin spacing in fins per inch o.c.
 - f. Make and model number.
 - g. Face area in sq. ft..
 - h. Tube size in NPS.

- i. Tube and fin materials.
 - j. Circuiting arrangement.
- 2. Test Data (Indicated and Actual Values):
 - a. Airflow rate in cfm.
 - b. Average face velocity in fpm.
 - c. Air pressure drop in inches wg.
 - d. Outside-air, wet- and dry-bulb temperatures in deg F.
 - e. Return-air, wet- and dry-bulb temperatures in deg F.
 - f. Entering-air, wet- and dry-bulb temperatures in deg F.
 - g. Leaving-air, wet- and dry-bulb temperatures in deg F.
 - h. Water flow rate in gpm.
 - i. Water pressure differential in feet of head or psig.
 - j. Entering-water temperature in deg F.
 - k. Leaving-water temperature in deg F.
 - l. Refrigerant expansion valve and refrigerant types (for DX coils).
 - m. Refrigerant suction pressure in psig (for DX coils).
 - n. Refrigerant suction temperature in deg F (for DX coils).
- H. Electric-Coil Test Reports: For duct coils include the following:
 - 1. Unit Data:
 - a. System identification.
 - b. Location.
 - c. Coil identification.
 - d. Capacity in Btuh.
 - e. Number of stages.
 - f. Connected volts, phase, and hertz.
 - g. Rated amperage.
 - h. Airflow rate in cfm.
 - i. Face area in sq. ft.
 - j. Minimum face velocity in fpm.
 - 2. Test Data (Indicated and Actual Values):
 - a. Heat output in Btuh.
 - b. Airflow rate in cfm.
 - c. Air velocity in fpm.
 - d. Entering-air temperature in deg F.
 - e. Leaving-air temperature in deg F.
 - f. Voltage at each connection.
 - g. Amperage for each phase.
- I. Fan Test Reports: For supply, return, and exhaust fans, include the following:
 - 1. Fan Data:
 - a. System identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and size.
 - e. Manufacturer's serial number.
 - f. Arrangement and class.
 - g. Sheave make, size in inches, and bore.

- h. Sheave dimensions, center-to-center, and amount of adjustments in inches.
 - 2. Motor Data:
 - a. Make and frame type and size.
 - b. Horsepower and rpm.
 - c. Volts, phase, and hertz.
 - d. Full-load amperage and service factor.
 - e. Sheave make, size in inches, and bore.
 - f. Sheave dimensions, center-to-center, and amount of adjustments in inches.
 - g. Number of belts, make, and size.
 - 3. Test Data (Indicated and Actual Values):
 - a. Total airflow rate in cfm.
 - b. Total system static pressure in inches wg.
 - c. Fan rpm.
 - d. Discharge static pressure in inches wg.
 - e. Suction static pressure in inches wg.
- J. Round and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:
 - 1. Report Data:
 - a. System and air-handling unit number.
 - b. Location and zone.
 - c. Traverse air temperature in deg F.
 - d. Duct static pressure in inches wg.
 - e. Duct size in inches.
 - f. Duct area in sq. ft..
 - g. Indicated airflow rate in cfm.
 - h. Indicated velocity in fpm.
 - i. Actual airflow rate in cfm.
 - j. Actual average velocity in fpm.
 - k. Barometric pressure in psig.
- K. Compressor and Condenser Reports: For refrigerant side of unitary systems, stand-alone refrigerant compressors, air-cooled condensing units, or water-cooled condensing units, include the following:
 - 1. Unit Data:
 - a. Unit identification.
 - b. Location.
 - c. Unit make and model number.
 - d. Compressor make.
 - e. Compressor model and serial numbers.
 - f. Refrigerant weight in lb.
 - g. Low ambient temperature cutoff in deg F.
 - 2. Test Data (Indicated and Actual Values):
 - a. Inlet-duct static pressure in inches wg.
 - b. Outlet-duct static pressure in inches wg.
 - c. Entering-air, dry-bulb temperature in deg F.

- d. Leaving-air, dry-bulb temperature in deg F.
- e. Condenser entering-water temperature in deg F.
- f. Condenser leaving-water temperature in deg F.
- g. Condenser-water temperature differential in deg F.
- h. Condenser entering-water pressure in feet of head or psig.
- i. Condenser leaving-water pressure in feet of head or psig.
- j. Condenser-water pressure differential in feet of head or psig.
- k. Control settings.
- l. Unloader set points.
- m. Low-pressure-cutout set point in psig.
- n. High-pressure-cutout set point in psig.
- o. Suction pressure in psig.
- p. Suction temperature in deg F.
- q. Condenser refrigerant pressure in psig.
- r. Condenser refrigerant temperature in deg F.
- s. Oil pressure in psig.
- t. Oil temperature in deg F.
- u. Voltage at each connection.
- v. Amperage for each phase.
- w. Kilowatt input.
- x. Crankcase heater kilowatt.
- y. Number of fans.
- z. Condenser fan rpm.
- aa. Condenser fan airflow rate in cfm.
- bb. Condenser fan motor make, frame size, rpm, and horsepower.
- cc. Condenser fan motor voltage at each connection.
- dd. Condenser fan motor amperage for each phase.

L. Instrument Calibration Reports:

- 1. Report Data:
 - a. Instrument type and make.
 - b. Serial number.
 - c. Application.
 - d. Dates of use.
 - e. Dates of calibration.

3.16 INSPECTIONS

A. Initial Inspection:

- 1. After testing and balancing are complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the Final Report.
- 2. Randomly check the following for each system:
 - a. Measure airflow of at least 10 percent of air outlets.
 - b. Measure water flow of at least 5 percent of terminals.
 - c. Measure room temperature at each thermostat/temperature sensor. Compare the reading to the set point.
 - d. Measure sound levels at two locations.
 - e. Measure space pressure of at least 10 percent of locations.
 - f. Verify that balancing devices are marked with final balance position.
 - g. Note deviations to the Contract Documents in the Final Report.

3.17 ADDITIONAL TESTS

- A. Within 90 days of completing TAB, perform additional testing and balancing to verify that balanced conditions are being maintained throughout and to correct unusual conditions.
- B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional testing, inspecting, and adjusting during near-peak summer and winter conditions.

END OF SECTION

THIS PAGE LEFT BLANK INTENTIONALLY

**SECTION 16000:
ELECTRICAL GENERAL PROVISIONS**

PART 1: GENERAL

1.01 SUMMARY

- A. The General Conditions, Instructions to Bidders, and all other general requirements of these specifications shall be considered a component part of this division of the specifications. This section specifies general requirements for the electrical and low-voltage installation.

1.02 RELATED SECTIONS

- A. Division 0 and 1 Specifications
- B. Section 16050 Basic Materials and Methods
- C. Section 16450 Grounding and Bonding of Electrical Systems
- D. Section 16460 Grounding and Bonding of Telecommunications Equipment
- E. Section 16720 Fire Alarm System
- F. Section 16752 Structured Cabling System

1.03 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. B3 Soft or Annealed Copper Wires
 - 2. B8 Concentric-Lay-Stranded Copper Conductors, Hard, Medium Hard, Soft
 - 3. B33 Tinned Soft or Annealed Copper Wire for Electrical Purposes
- B. Institute of Electrical and Electronics Engineers (IEEE):
 - 1. 142-82 Recommended Practice for Grounding of Industrial and Commercial Power Systems
 - 2. 383-2.5 IEEE Standard for Type Test of Class LE Electric Cables, Field Splices, and Connections for Nuclear Power Generating Stations
 - 3. 1100-1992 Recommended Practice for Powering and Grounding Sensitive Electronic Equipment in Industrial and Commercial Power Systems
- C. Underwriters' Laboratories (UL):
 - 1. 83 Thermoplastic Insulated Wire and Cables
 - 2. 96 Lightning Protection Components
 - 3. 96A System Installation
 - 4. 467 Grounding and Bonding Equipment
- D. National Fire Protection Association (NFPA):
 - 1. 780 Lightning Protection Code
 - 2. 70 National Electrical Code (NEC)
 - 3. NEC Article No. 250 - Grounding

ISSUED FOR BID/CONSTRUCTION

1.02 REQUIREMENTS:

- A. Installation of all electrical work shall comply with the requirements of the latest adopted edition of the NEC (National Electrical Code), and all other local, State and Federal laws, ordinances, codes, regulations, and requirements. All work shall also comply with MSCAA standards. Division 16 shall obtain and pay for all licenses, fees, and permits required to perform work covered by Division 16 and obtain and pay for all inspections by all applicable authorities having jurisdiction. Copies of all permits shall be supplied to the Manager of Building Maintenance.
- B. The manufacturer shall notify the Architect, subsequent to submission of bid, about any part of the design that fails to comply with the above mentioned requirements. If after contract is awarded, minor changes and additions required by aforementioned authorities, even though such work is not shown on drawings or covered in specifications, shall be borne by Division 16.
- C. All workers at MEM must obtain a badge, which shall be coordinated through the MSCAA Operations Division. For badging information, contact the Identification Office at (901) 922-8005.

1.03 SUBMITTALS, SHOP DRAWINGS, OPERATING AND MAINTENANCE MANUALS:

- A. Submit complete copies of all proposed materials, equipment, and shop drawings for approval, or rejection. Submittal format and process shall follow section 01330 of the Project Manual. Any and all additional costs incurred by the substitution of electrical material or equipment, or installation thereof, whether electrical or under other Division of the Specifications, shall be borne by the Contractor under Division 16.
- B. Submittals and shop drawings shall include all job related materials and equipment provided by Division 16.
- D. The Architect reserves the right to reject all materials and equipment which fails to meet or exceed these minimum requirements. Any and all additional costs incurred by the substitution of electrical material or equipment, or installation thereof, whether electrical or under other Division of the Specifications, shall be borne by Division 16.
- E. Test and Inspection Reports:
 - 1. Provide typewritten reports to Owner indicating item, personnel involved and other pertinent data as noted in this and other sections of Division 16 for testing of power, lighting, feeders, equipment, signal, emergency power systems, fire alarm system, etc.
 - 2. Provide copies of all tests or inspection reports performed by public agencies for electrical systems and fire alarm system.
- F. Operating and Maintenance Manuals:
 - 1. Provide complete operating and maintenance manuals covering all equipment and systems installed by Division 16.
 - 2. Operating and Maintenance Manuals shall include:
 - a. Complete parts lists including sources of supply.
 - b. Wiring diagrams with control sequence and operating instructions for all operating equipment.

c. Approved submittals.

3. Brochures shall be in a three-ring binder with hard cover and tab indexed. Label front cover indicating project name, date and local responsible vendors for furnishing parts and information on equipment.

1.04 PRODUCT DELIVERY & STORAGE:

- A. Make provisions for the delivery, unloading, handling, and storage of all equipment and materials for the project. All equipment shall be protected from dust and moisture-proofed with a heavy polyethylene plastic sheet, or laminated kraft paper having a moisture barrier, during all stages of construction.

1.05 PROJECT/SITE CONDITIONS:

- A. Bidders shall visit the site of work before submitting bids in order to determine the nature and scopes of all work to be done, or required by codes and authorities to be done, and to meet the requirements as indicated in the drawings and specifications.

1.06 DOCUMENTS:

- A. Drawings and Specifications together describe the project. Any provisions occurring in one shall be considered to occur in both. Where discrepancies occur between Drawings and Specifications, the more stringent requirement shall prevail.
- B. Division 16 drawings and specifications shall govern in those instances where requirements are greater than those specified in NEC and local amendments.

1.07 GUARANTEE:

- A. Guarantee to the Owner all work performed under this contract to be free from defects in workmanship and/or materials for a period of one year from date of final acceptance of the building by the Owner.
- B. Lamps for lighting fixtures shall be excluded from the guarantee, but one complete and operating set of lamps shall be in place at time of final acceptance of the building by the Owner.

1.08 RECORD (AS-BUILT) DRAWINGS:

- A. Prepare reproducible record drawings of all "AS-BUILT" systems installed herein. Refer to Section 01770 for requirements of format for drawings and submission.

1.09 RECORD DRAWINGS:

- A. Keep a set of blue-line prints at the job site exclusively for recording deviations from the drawings which are necessary because of job conditions. Record locations and depths of buried and concealed feeder conduits from fixed, easily identifiable objects, such as building walls. Where feeder conduits are concealed in walls, indicate distances of building corners or other building features not likely to be disturbed by future alterations. Mark deviations in colored pencils so that work of various systems can be easily identified.
- B. When work is completed, record all deviations as specified in Section 01770. Submit final record drawings as required by said section.

PART 2: PRODUCTS**2.01 GENERAL:**

- A. See requirements of section 16050 "Basic Materials and Methods" and all other sections for Division 16 for detailed product information.
- B. All material and equipment shall be new and listed, labeled or certified by a nationally recognized testing laboratory to meet Underwriters Laboratories, Inc. Standards where test standards have been established. Equipment and material that are not covered by UL Standards will be accepted provided equipment and material are listed, labeled, certified or otherwise determined to meet safety requirements of a nationally recognized testing laboratory. Equipment of a class that no nationally recognized testing laboratory accepts, certifies, lists, labels, or determines to be safe, will be considered if inspected or tested in accordance with national industrial standards, such as NEMA, or ANSI.
- C. Division 16 shall personally, or through an authorized representative, constantly supervise the work and check all materials, site delivered, prior to installation, for conformance with approved shop drawings and/or plans and specifications.

PART 3: EXECUTION**3.01 PREPARATION & COORDINATION:**

- A. Coordinate all Division 16 work with that of other trades in order that there will be no delay in the proper installation and completion of the work. Division 16 shall be responsible for any work and materials resulting from lack of coordination.
- B. Utilities shall not be interrupted without prior coordination and approval from the MSCAA Building Maintenance manager, telephone number (901) 922-8615 or the Maintenance Service Desk at (901) 922-8040. Approval is required for each and every interruption. A minimum of 24-hour notice is required for utility interruptions. Include all overtime and other additional cost as required to complete required work.
- C. Drawings are generally diagrammatic, location of outlets and equipment is approximate. Exact routing of wiring and locations of outlets to be governed by structural conditions and obstruction. Wiring for equipment requiring maintenance and inspection shall be readily accessible.

3.02 SLEEVES, CUTTING AND REPAIRING:

- A. All concrete floor and roof penetrations must be accomplished by core drilling. Use of a rotary hammer or other impact tools for this purpose is prohibited. Cord drilling efforts must be coordinated with tenants occupying space below cored floor slab. The contractor shall be responsible for any damage resulting from core drilling.
- B. Sealing of new and pre-existing floor penetrations must be filled full depth with hydraulic cement and sealed with epoxy or polyurethane caulk, Evazote 380 E. S. P. with hindered amine light stabilizer. The installation shall be inspected by the MSCAA Building Maintenance Manager, telephone number (901) 922-8615. Contractor shall coordinate with MSCAA development division for any x-ray or ultra-sound requirements for concrete floor/roof penetrations. No drilling through concrete beams shall be allowed.
- C. The contractor shall be responsible for inspecting all areas of core drilling for electrical, plumbing, communications, etc. and is fully responsible for all repairs to any damage.

- D. No drilling or ramset fastening is allowed in the pan sections of the concrete structure. Any attachments installed above the ceiling shall be suspended from the joist structure only.
- E. Attachments to the glazed brick walls shall be anchored in the mortar joints. No holes shall be drilled in brick, nor anchors attached to the brick itself.
- F. Penetrations through the roof shall be coordinated with MSCAA. Provide all weatherproof sleeves and pitch pockets for electrical wiring passing through roof system. Verify with roof manufacturer for type sleeve/pitch pocket required. It shall be the responsibility of the contractor to restore the roof to such a condition as to not invalidate the roof warranty.

3.03 POWER AND CONTROL WIRING:

- A. All temperature control and interlock wiring shall be provided and installed by Division 15.
- B. Division 15 shall provide and install all temperature control instruments, dampers, thermostats, float switches, pressure switches, control relays, solenoid valves, motors, factory installed integral mounted starters, control panels, starter coils, contactor coils, and motorized dampers/louvers and other devices functioning to control mechanical and plumbing equipment.
- C. Separately mounted starters for mechanical/plumbing equipment shall be provided by Division 15 and installed by Division 16.
- D. All power wiring of every description shall be provided and installed by Division 16 including wiring required for equipment furnished under other sections. Coordinate Division 16 work with that of all other Sections that furnish equipment requiring electrical connections.
- E. Division 16 shall provide and install all disconnect switches, flexible conduit and wiring, plugs, cords, connectors, and outlet boxes required for all electrically operated equipment.

3.04 CLEANING AND PAINTING:

- A. After other work is accomplished, clean exposed conduit, panel enclosures, and other equipment for preparation of surfaces to be painted.
- B. Paint all surfaces in areas having painted finish on adjacent surfaces as follows:
 - 1. Exterior conduit.
 - 2. Panel/switchgear enclosures.
 - 3. Interior exposed conduit.
 - 4. All other electrical equipment which does not have a corrosion prevention finish.
- C. Division 16 shall identify and mark all surfaces to allow painters to identify paint type and color.

3.05 IDENTIFICATION OF CIRCUITS AND EQUIPMENT:

- A. Properly identify all electrical equipment including main switchboard and individual devices on it. Panelboards, safety switches and disconnects, contactors, individually mounted breakers, relays, and transformers with black phenolic plates with 3/8" white engraved lettering on the face of each, permanently attached with two tapped screws. Starters and relays connected under this Division shall be identified whether furnished under this Division or under other Divisions of this contract.
- B. Panelboard identification plates shall indicate the panel by name as indicated on drawings.

- C. Provide in the directory frame of each switchboard or panelboard a neatly, typed directory card. This directory card shall describe the general area and the type of electrical load served by each circuit. Do not label directory card in free hand. Identify each panelboard's voltage system (Example: 120/208 V.-3 Ph.-4 W) on the inside of panelboard's door directly above the directory card with black phenolic plates with 1/4" white engraved lettering, permanently attached with an approved cement. In addition to the requirements of the NEC, install an identification nameplate which will clearly indicate information required for use and maintenance of items such as panelboards, cabinets, motor controllers (starters), safety switches, separately enclosed circuit breakers, individual breakers and controllers in switchgear and motor control assemblies, control devices and other significant equipment. New directory cards shall be provided for all panelboards with revised circuiting, in accordance with above.
- D. Identification and Location of Existing Underground Electrical Conductors: It shall be the responsibility of the electrical contractor to locate and identify all existing underground electric services, feeders, branch circuits, control wiring, fire alarm, clocks/bells, etc. Memphis City Schools will provide assistance by the provision of existing as-built drawings and maintenance personnel with knowledge of prior installations.

3.06 INSPECTION AND TESTS:

- A. Furnish all materials, equipment, labor, instruments, etc., and all other services required for a complete and satisfactory test and adjustment of the electrical system and related work provided under Division 16.
- B. Test all feeders and circuits with a "Megger" tester to determine that the system is free of short circuits and that phase conductors are not grounded. Submit test reports as specified.

3.07 DEMOLITION AND CONTINUITY OF ELECTRICAL SERVICE:

- A. Utilities shall not be interrupted without prior coordination and approval from the MSCAA Building Maintenance manager, telephone number (901) 922-8615 or the Maintenance Service Desk at (901) 922-8040. Approval is required for each and every interruption. A minimum of 24-hour notice is required for utility interruptions. Include all overtime and other additional cost as required to complete required work. After an electrical service interruption has been made, make all necessary connections and other electrical work as required to maintain continuity of electrical service.
- B. Maintain existing communications and data systems including fire alarm system, telephone system, intercom system, security system, and all other systems that are required to remain in service. Relocations and/or removal of any security device, including CCTV cameras, access control equipment, etc. shall be approved by MSCAA.
- C. Become familiar with conditions at the jobsite and plan the installation of the electrical work to conform with existing conditions and that shown and specified, so as to provide the best possible assembly of the combined work of all trades.
- D. Division 16 shall patch and repair all holes in walls, ceilings, floor, and furniture due to electrical demolition. Refer to Section 3.02.
- E. Make alterations and additions to existing electrical work as indicated, and as required to accommodate new construction and to clear all interferences therewith. This includes disconnecting or otherwise altering existing electrical work as required, whether indicated on the Drawings or not.
- F. Remove, relocate, and repair existing installations as follows:

1. Remove abandoned conduit and wiring to source of supply.
 2. Remove exposed abandoned conduit and boxes including abandoned conduit above accessible ceiling finishes.
 3. Disconnect abandoned outlets and remove devices.
 4. Provide blank cover for abandoned outlets which are not removed.
 5. Disconnect and remove abandoned panelboards and distribution equipment.
 6. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.
 7. Disconnect and remove abandoned luminaries, brackets, stems, hangers, and other accessories.
 8. Identify all existing circuits and feeders using a "circuit tracer" and label panel directories for loads served.
 9. Remove all low voltage devices as indicated on the Drawings.
 10. Removing existing low voltage copper and fiber optic cabling associated with all removed equipment. In cable trays where it may be impossible to remove all cabling without breaking the cables, cut cables must be labeled as 'unused'. Provide an allowance for repair of any cables broken during the removal process. It is the intent of this project to remove as much unused cabling as possible.
- G. All salvaged equipment shall be returned to MSCAA at their designated location for their use or disposed of off-site as directed by MSCAA. The schedule of construction efforts and removal of debris shall be coordinated so as not to disrupt other tenants or endanger the safety of the public. Final approval shall be the responsibility of the MSCAA Development Division.

3.08 EARTHQUAKE RESISTANT INSTALLATION/FASTENING:

- A. All electrical equipment and raceways shall be anchored to withstand forces generated by earthquake motions and be installed to the latest requirements of the local area seismic zone.
- B. Suspended ceiling: Fixtures shall be securely fastened at each corner to the ceiling framing member by mechanical means with a UL listed fixture clip.
- C. Hangers or supports for conduits, raceways, and surface mounted fixtures shall be "trapeze" type hangers using steel channel with clamps using 1/4" all thread rod fastened to building structure.
- D. Provide flexible link of 4'- 0" sealtite on conduit connections to all switchgear rated over 100 amps.

END OF SECTION

THIS PAGE LEFT BLANK INTENTIONALLY.

SECTION 16050:**BASIC MATERIALS AND METHODS****PART 1: GENERAL****1.01 REQUIREMENTS INCLUDED**

- A. Requirements of the following Section apply to all equipment, material, and work specified by Division 16.
- B. All material and equipment shall be "new" and listed, labeled or certified by a nationally recognized testing laboratory to meet Underwriters Laboratories, Inc. standards where test standards have been established. Equipment and material which are not covered by UL Standards will be accepted provided equipment and material is listed, labeled, certified or otherwise determined to meet safety requirements of a nationally recognized testing laboratory. Evidence of compliance shall include certified test reports and definitive shop drawings.
- C. All products and equipment types specified in this Section may not necessarily be required for this project. Disregard Specifications for devices which are neither indicated nor required for this project.

PART 2: PRODUCTS**2.01 RACEWAY AND FITTINGS**

- A. Electrical Metallic Tubing (EMT)
 - 1. EMT shall be used only in dry locations within the confines of the building's walls and in slabs above the ground floor. EMT in ground floor and roof slabs is unacceptable. Dry location shall be as defined in the NEC.
 - 2. EMT shall be used for feeders and branch circuits in the above areas.
 - 3. EMT, 9' A.F.F., shall be supported securely each 10 linear feet and within 18" of each outlet box, junction box, cabinet and fitting
 - 4. Exposed 1" EMT and smaller, below 9' A.F.F., shall be supported securely with two hole straps each 5 linear feet and within 18" of each outlet box, junction box, cabinet and fitting.
 - 5. Minimum size of EMT shall be 1/2" for lighting switch legs, fire alarm, and communications systems with the following exception: 3/4" EMT, minimum, shall be used in approved slabs. Minimum size of EMT for power wiring shall be 3/4".
 - 6. No set screws couplings or connectors shall be permitted. Fittings shall be as manufactured by Raco or Steel City.
- B. Galvanized Rigid Steel Conduit (GRS):
 - 1. GRS conduit shall be used in all runs on the exterior of the building.
 - 2. GRS conduit shall be used in all damp and wet locations, as defined by the NEC.
 - 3. GRS conduit shall not be used in underground feeders, ground floor slabs and roof slabs.
 - 4. Compression type, GRS fittings, in place of "Erickson" type, may be used on the exterior of the building. Set screw type, rigid fittings may not be used in any situation.
 - 5. GRS conduit, 9' A.F.F., shall be supported as per the NEC.
 - 6. Exposed 1" and smaller GRS conduit, on exterior walls below 9' A.F.F., shall be supported securely with two hole straps each 5 linear feet and within 18" of each outlet box, junction box, cabinet and fitting.

7. 3/4" GRS conduit shall be used on all drops from swivel type covers to support lighting fixtures and outlet boxes. All couplings shall be the threaded type.
 8. Minimum size of GRS conduit shall be 1/2" for switch leg, fire alarm, and communications systems with the following exception. 3/4" GRS minimum shall be used in slabs above ground floor slab. . Minimum size of GRS for power wiring shall be 3/4". Use of GRS in roof slabs is unacceptable.
- C. Intermediate Metal Conduit (IMC): This is not allowed.
- D. Polyvinyl Chloride Schedule 40 Conduit (PVC):
1. All conduits in ground level slabs, roof slabs and underground shall be PVC up to the point of transition to vertical rise above grade. Transitions shall be made with standard or prefabricated GRS elbows and conduit. No PVC shall emerge from the ground or the concrete slab or encasement. PVC shall convert to GRS conduit prior to upturn/downturn with GRS elbows.
 2. No exposed PVC conduit shall be allowed.
 3. Minimum size of PVC conduit shall be 3/4" in all applications. Maximum size of PVC conduit in 4" slabs shall be 1-1/4" and in 6" slabs shall be 2-1/2".
 4. Use threaded fittings on all PVC connectors and adapters.
 5. All PVC conduit bends shall be made with standard "ells" or with an approved bender. No blowtorch shall be used for bending.
 6. A grounding conductor shall be installed in each PVC conduit, sized in accordance with NEC Tables 250.66 and 250.122. A minimum #14 AWG copper grounding conductor shall be installed in each PVC conduit used to install control circuits such as fire alarm and those not covered by the above NEC tables.
- E. Flexible Nonmetallic Conduit: This is not allowed.
- F. Armored Cable, Type AC: This is not allowed.
- G. Metal-Clad Cable, Type MC: This is not allowed.
- H. Flexible Metal Conduit:
1. Flexible metal conduit, maximum length of 6', shall be used for termination points at equipment that may possibly vibrate such as motors, HVAC equipment, etc.
 2. Flexible metal conduit, maximum length of 6', shall be used at junction boxes to connect lighting fixtures installed in suspended ceilings.
 3. Flexible metal conduit may not be concealed in walls.
 4. Minimum size of flexible metal conduit shall be 1/2" for lighting fixtures, and 1/2" for utilization equipment other than lighting fixtures.
 5. Liquid tight flexible metal conduit shall be used in the following locations:
 - a. Flexible raceways exposed to intermittent or continuous moisture.
 - b. The termination of line and load feeders to all transformers.
 - c. The termination point at all HVAC pump motors.
 6. Flexible metal conduit shall be supported as in accordance with NEC and these Specifications.
- I. Floor Mounted Conduit Requirements: No conduit shall be routed on the floor across the path required to service the supplied or adjoining equipment. Conduit may be routed, on 1-5/8" strut, parallel and close to the supplied or adjoining equipment as long as it does not obstruct the path to the supplied or adjoining equipment.

- L. Supports: All new conduit and cable systems shall be supported from or mounted to the building's structure. The suspended ceiling or its support wires are not recognized as part of the building's structure.

2.02 WIREWAYS, PULL BOXES, JUNCTION BOXES

- A. General: Pull boxes, junction boxes, and wiring gutters shall be of the types and minimum sizes indicated, or as required by Code for the conditions involved where types and sizes are not indicated. Provide and install junction boxes and pull boxes as required whether indicated on Drawings or not.
- B. Pull Boxes:
1. All pull boxes shall be sized in accordance with the NEC.
 2. All pull boxes shall have solid tops, sides and bottoms. No factory knockouts, single or concentric, shall be allowed.
- C. Junction Boxes:
1. All junction boxes for fire alarm and communications systems, located above suspended ceilings, shall be identified by having their covers painted as noted below.
- | <u>SYSTEM</u> | <u>COLOR</u> |
|----------------|--------------|
| Fire Alarm | Red |
| Communications | Blue |
- D. Pull and Junction Box Support: All pull and junction boxes shall be mounted to the building structure or surface as in accordance with the NEC. The suspended ceiling or its support wires are not recognized as part of the building's structure.
- E. Outlet Boxes:
1. General: Outlet boxes and covers shall be steel or cast ferrous metal with zinc or other suitable metallic rust-proofing coating, or cast aluminum, all of the proper sizes and types to accommodate the conduits, conductors, connections, devices, fixtures, architectural, and structural conditions involved.
 2. Ceiling Boxes: Ceiling outlet boxes shall be four-inch octagonal, 2-1/8" deep for exposed work or furred ceiling work, and three inches deep for concrete work. All boxes for the concrete work shall be of the type especially designed for this construction. Plaster rings and/or fixture studs shall be provided where required. Ceiling outlet boxes for recessed lighting fixtures in lay-in ceilings and in accessible acoustical tile ceilings shall be four inches square, 1-3/4 inches deep.
 3. Wall Boxes: Flush mounted types of boxes shall, in general, be suitable for the device housed and correspond to the type wall in which mounted. All boxes shall be provided with extension rings, covers and/or plaster rings with sufficient depth to bring the covers flush with the finished wall and to match the device mounted or the purpose intended.
 4. Plaster walls shall utilize 4 inch square boxes or gang boxes, 1-1/2" deep with plaster ring for normal use and square cornered masonry boxes for through-wall use. Masonry boxes shall be similar to those specified for concrete block use.
 5. Concrete block walls with flush outlets shall utilize square cornered, extra deep masonry boxes. Boxes shall be RACO No.S 570 through 578, Steel City No. GW-135 through GW-635, Appleton No.S M1-350 through M5-350 or equal.
 6. Where mullion switches are indicated, a narrow box suitable for mounting in the mullions should be used. Box shall be 1-5/16 inch wide by 1-5/8 inch deep by 3-3/4 inches high as manufactured by RACO or equal.

8. Pull boxes and junction boxes shall be code gauge sheet steel, sized according to the NEC with galvanized finish inside and outside. Covers for pull boxes and wiring gutters shall be secured with screws in an approved manner. Pull boxes and junction boxes where exposed to weather and moisture in wet or damp locations shall be galvanized weatherproof type with threaded hubs and gasketed covers.

2.03 SUPPORTS

- A. Conduit Clamps: Conduit clamps and backs shall be one-hole design of cadmium-plated malleable iron.
- B. Ceiling Hangers: Ceiling hangers shall be wrought iron adjustable split ring or clevis type. Wire, perforated strap, ceiling grid clips, etc., will not be acceptable. Hanger rods shall be 1/4" minimum hot-dip galvanized all-thread rod.

2.04 PENETRATIONS

- A. Refer to Section 16000 of this Specification

2.05 WIRE AND CABLE

- A. General: Insulated conductors and cable shall be in compliance with this Specification and with UL 83 and UL 44 requirements. Conductors shall be copper. All branch circuits shall be identified with panel and circuit number using wrap-around labels at all wiring terminations and splices.
- B. Wiring for Power, Control and Lighting 600 volts and less, 90 degree C, shall be as follows:
 1. Insulation: Conductor insulation shall be 600 volts, NEC types as noted below.
 2. All conductors shall be "stranded" unless otherwise noted.
 3. Branch Circuits: #12 to #6: THHN.
 4. Power Feeders: #4 to 500 MCM: XHHW, THHN.
 5. Motor Circuits & Fire Alarm: THHN.
 6. High temperature and other special conditions: Types NEC approved for the conditions involved.
 7. Signaling, sound, communications, alarm, indicating, and other special system wire shall be copper, of the types specified hereinafter with the equipment, or as indicated or as recommended by the equipment manufacturers if neither indicated nor specified.
 8. Color Coding: Insulated conductors shall be color coded as follows:

System	Service	Color
120V/208V, 3 phase	Phase A	Black
	Phase B	Red
	Phase C	Blue
277/480V, 3 phase	Phase A	Brown
	Phase B	Orange
	Phase C	Yellow
All	Neutral	White
All	Ground	Green or Bare
All	Isolated Ground	Green with orange trace/tape

9. Conductor Material Requirements: Provide 98% conductivity copper conductors with 600 volt insulation. No aluminum conductors will be allowed. #10 AWG and larger shall be stranded. All insulation shall be THHN as required by the NEC and MSCAA standards
10. All conductors shall be UL approved and made in the United States of America.
11. All conductors must be delivered to job site new in original wrapping, package or reel.
12. Use factory color coded conductors where commercially available. If not available, use black conductors and band with colored tape.
13. All low voltage conductors shall identified by the use of adhesive numbers. These conductors shall be identified at their origin, each junction box and at their termination.
14. Use pulling compound to pull all feeders.
15. Install pull boxes in feeders over 200' in length. Install pull boxes in branch circuits over 100' in length. A loop of slack shall be left in each pull box.
16. Install feeder conductors in continuous spans from origin to termination without splices where possible. Where splices or taps are necessary or required, they shall be made in outlet, pull or junction boxes.
17. All conductors sharing the same enclosure shall have insulation rated for the highest voltage present in the enclosure.

2.06 WIRE TERMINATIONS AND SPLICING

A. Lugs and Connectors:

1. Provide and install lugs, adapters, connectors, fittings, and associated hardware required for complete wiring and cable terminations of all equipment including equipment supplied by Owner and other Sections.
2. For cable connections of #4 AWG conductors and larger, except for connections to molded case circuit breakers: Burndy series "YA" one hold for lugs and "YS" series for cable splice connectors.
 - a. Lugs and connectors shall be compression type using a hydraulic compression tool to provide the correct circumferential pressure.
 - b. Provide lugs and connectors with Burndy "RYAC" shrinkable tubing insulation after assembly.
3. For cable connections #8 to #6 to all equipment, except for connections to molded case circuit breakers: Burndy series "QA-B" for lugs and Burndy series "OR" for cable splice connectors.
4. O.Z. series "PT" with cover for taps in #6 and larger conductors and T&B series 54600 series of #8 and smaller conductors.
5. Lugs for #14 and smaller conductors Burndy type YAV/YAV-F to suit terminal, applied with proper tool.
6. For splices in #12 and #10 wire, "3M" Scotchlock type "Y" and "R".

B. Splice Insulation: Electrical tape with vinyl plastic backing or rubber tape with protective friction tape in conformance with Federal Specification HH-1-510a and HN-I-553.

C. Motor Connections: Shall be made with ring tongue compression terminals-base of varnish cambric tape, Scotchfill, Plymouth 2002, followed by 4 layers, as required, of Scotch 33+, Plymouth 4353, or equal.

D. Cable Ties: Shall be Scotchflex #760, T&B-RAP, or equal.

2.07 SWITCHGEAR AND PANELBOARDS

A. All equipment listed below is indicated as manufactured by Cutler Hammer, the preferred manufacturer for airport equipment. Alternates by Westinghouse, Siemens, or Square D are

acceptable. Circuit breakers within existing panelboards shall be of the same manufacturer as the existing panelboard.

- B. General: Unless otherwise indicated on Drawings, switchboards and panelboards shall be by Cutler-hammer, 3 phase, 4 wire with non-reduced copper bussing, full size neutral, and grounding bus. Enclosure shall be complete with cabinet, trims, interiors, and doors. Location and mounting of panelboards shall be as indicated on the drawings. Where conflicts with other equipment or building features occur, the Contractor shall relocate the panel, as directed by the Owner's designated representative, anywhere within a 10 ft. radius of the location shown at no additional cost. No Neutral conductors shall be derated.
- C. Molded case circuit breakers: Thermal-magnetic circuit breakers shall be Cutler-Hammer, or compatible with existing equipment class 650, bolt-on, and UL listed for switching duty and HACR rated. Multi-Pole breakers shall have common trip. Where indicated or required, circuit breakers shall have ground fault tripping devices.
- D. Circuit breakers for existing panelboards and switchboards shall be compatible with panel and have integrated equipment short circuit rating equal to or greater than the lowest rated device. Provide all required lugs, adapters, etc. required for installation.
- E. Interior and enclosure:
 - 1. Bus Material: Full sized copper (non-tapered), sized in accordance with NEMA PB 2.
 - 2. Bus Connections: Totally enclosed front accessible.
 - 3. Provide a 1 x 1/4 inch (25 x 6 mm) copper ground bus with sufficient lugs for terminating the equipment grounding conductors. In addition to the normal ground bus, provide a 1 x 1/4 inch (25 x 6 mm) isolated copper ground bus with sufficient lugs for terminating the isolated grounding conductors.
 - 4. Enclosure: ANSI 49 gray baked enamel finish with locking cover, NEMA Type 1 enclosures for indoor use and NEMA 3R enclosures for outdoor use unless otherwise noted.
 - 5. Future Provisions: Fully equip spaces for future devices with full bussing and bus connection provisions; continuous current rating as indicated on Drawings.
 - 6. Panel directory cards in clear plastic pouch attached to inside of door.
 - 7. Provide 4" concrete pad for floor mounted switchgear.
- F. Fuse Protection:
 - 1. Provide fuses of indicated types and sizes, in place, for each device requiring fuses. Furnish (3) spare fuses of each size and type required for the electrical system and deliver these to the Owner's authorized representative in a suitable, clearly labeled box.
 - 2. Fuses 601 amperes and larger shall be Bussman Type KRP-C Hi-Cap Current-Limiting fuses, or approved equal. The fuse must hold 300% of rated current for a minimum of 45 seconds.
 - 3. Fuses 600 amperes or smaller shall be Bussman Type LPS" or "KTN", low-peak, current limiting type.
 - 4. Motor circuits with fuse protection shall be protected by Bussmann Low-Peak or Fusetron Dual-Element fuses or approved equal - except large motors requiring KRP-C Hi-Cap fuses in sizes larger than 600 amperes. Low-Peak or Fusetron fuses shall be installed not in excess of 125% of motor nameplate current rating except for special conditions where high ambient temperature prevails or where prolonged starting current is necessary - under such conditions the fuse should be 150 to 200% of motor full load current. Where fuse gaps are larger than size required for proper motor protection rating of fuse, use Bussman fuse reducers.

5. Provide Buss TRON-HEB in-line fuse-holder with appropriate fuse for all exterior pole-mounted lighting units and all other lighting units where required by notation on the drawings.

G. Disconnect Switches:

1. General: Except as otherwise specified below, Division 16 shall provide disconnect switches for all motors and other electrically operated equipment, regardless of who furnishes and installs the motors and other electrically operated equipment. Types and locations of these devices shall be as indicated, or as required where types and/or locations are not indicated.
2. Disconnect switches located on panelboards and motor control centers shall be as specified under the corresponding heading. Those devices NOT located on other equipment shall be as specified below, and separately mounted.
3. Disconnect Switches: Cutler-Hammer, heavy duty, fused as required unless otherwise indicated in Drawings. Enclosures shall be NEMA 3R raintight type for devices exposed to weather; NEC required types for devices in other special locations; and NEMA 1 type for devices in other locations.
4. Disconnect Switches shall be non-fused safety switches where integral overcurrent protection is not required, and fused safety switches where integral over-current is required, except that other suitable properly rated switches may be used for fractional hp motors and other small loads. Switches shall be heavy duty. Motor rated switches shall be horsepower rated.
5. All control circuits extending outside of starter enclosures to remote controls shall operate on 120 volts, and shall have overcurrent protection. Where 120 volts is directly available from the motor feeder, the control transformer shall be omitted.

2.08 STARTERS AND CONTACTORS

- A. General: Starter and contactor enclosures shall be NEMA 3R raintight type for devices exposed to weather; NEC required types for devices in other special locations; and NEMA 1 type for devices in other locations.
- B. Contactors: Electrically held, Cutler Hammer, ampere rating and number of poles as indicated on Drawings. Alternates by Westinghouse, Siemens, or Square D shall be acceptable.
- C. Time Switches: Tork No. 7200ZL.
- D. Photocell: Tork No. 2100.

2.09 TRANSFORMERS, DRY TYPE

- A. General: Cutler Hammer, 60 HZ, BIL 10 kv, 115°C maximum temperature rise above a 40°C ambient. Provide and install appropriate hangers, brackets, and supports for ceiling or walls as required. Alternates by Westinghouse, Siemens, or Square D shall be acceptable.
- B. 3 phase 4 wire: 480 volts delta primary and 208Y/120 volt, 4-wire grounded wye secondary with six 2½% taps, two above and four below normal.
- C. 1 phase 3 wire: 480 volts delta primary and 120/240 volt with three 5% taps, one above and two below normal.
- D. Provide 4" concrete pad for all floor mounted transformers.
- E. Grounding: See Section 16450.

- F. The contractor shall provide additional external vibration dampening and isolating means for mounting all transformers to floors, walls and building structure. The methods and materials used shall be submitted to engineer for approval prior to installation.

2.10 WIRING DEVICES

- A. General: All wiring devices shall be listed by U.L. 20, CSA, ANSI and NEMA for voltage, current, and configuration indicated, heavy duty Specification grade. Color as indicated by architect. Catalog numbers listed are those of Hubbell, unless otherwise noted. Acceptable alternates are the equivalent devices as manufactured by Leviton, Bryant, or Pass and Seymour.

B. Switches:

1. Single Pole: No. 1221I.
2. Two Pole: No. 1222I.
3. Three Way: No. 1223I.
4. Four Way: No. 1224I.
5. Key-operated: No. 122(X)-L
6. Dimmers: Lutron "Nova" - wattage as required.

In multiple switch installations where voltage between live parts of switches exceeds 150 volts, use "screwless wire-lock terminal" type switches.

C. Receptacles:

1. NEMA 5-20R, 20A, 125V, duplex receptacle, No. 5362.
2. NEMA 5-20R, 20A, 125V, isolated ground, orange, No. IG5361.
3. NEMA 5-20R, 20A, 125V, ground fault interrupter, No. GF5362.
4. NEMA 5-20R, 20A, 125V, surge suppressor, No. 5352IS.
5. NEMA 5-15R, 15A, 125V, safety type receptacle, No. SG-62HI.
6. NEMA L5-15R, 15A, 125V, single twistlock receptacle, No. 4710.
7. NEMA L7-15R, 15A, 277V, single twistlock receptacle, No. 4760.

D. Recessed rectangular floor boxes (except for Platform #201 in Sanctuary):

1. No. B-2437 single gang box with: (1) No. 5362 duplex receptacle, (1) No. S-3825 duplex cover, and No. SB-3083 carpet flange.
2. No. B-4233 two gang box with: (1) No. 5362 duplex receptacle, (1) No. S-3825 duplex cover, (1) No. S-2825 tele/data cover, and No. SB-3084 carpet flange.

- E. Wiring Devices: Electrical outlet boxes located on opposite sides of 1 hour or 2 hour rated wall shall be separated by a horizontal distance of 24" minimum.

F. Cover Plates:

1. Receptacle and switch device covers: Stainless steel.
2. Exterior of building: Weatherproof cover plates shall be cast, gasketed spring lid type "TAYMAC" safety cover.
3. Plates for surface mounted outlets galvanized steel.
4. Telephone and Data covers: Stainless steel.

- G. Mounting heights, unless otherwise noted on the Drawings (measured from finished floor to centerline):

1. Install wall switches 48" above finished floor.

2. Install wall dimmers 48" above finished floor.
 3. Install receptacles 18" above finished floor, 44" above counters.
 4. Install tele/data outlets 18" above finished floor.
 5. Install telephone "W" wall outlets 48" above finished floor.
 6. No outlet shall be located lower than 15".
- H. Other Devices Not Specified Above: As indicated on the drawings.
- I. Cord and Plugs: Provide and install flexible conduit, cord, and attachment plugs as required for all electrically operated equipment. Size cord and plug for connected load and rating of circuit overcurrent protection.

PART 3: EXECUTION

3.01 INSTALLATION/ERECTION

A. Raceways, Fittings & Supports:

1. Conceal conduits in finished ceilings and finished walls of all areas, except within mechanical and maintenance/storage areas where they shall run exposed, if they cannot be concealed. All exposed conduits installed parallel to building members.
2. Fasten conduits securely to boxes with locknuts and bushings to provide good electrical continuity.
3. Provide chrome escutcheon plates at all exposed wall, ceiling and floor conduit penetrations.
4. Support individual surface mounted conduits with clamps, suspend conduits with rod hangers; supports for 3/4 inch conduit placed on maximum 7-foot centers; maximum 10-foot centers on conduits 1 inch and larger. Support multiple conduit runs from Kindorf b-907 channels with c-105 and c-106 series straps.
5. Rigid steel conduit bushings to be complete with non-removable insulator lining - O.Z. type "B", type "BLG" where ground connection is required.
6. Conduit bends: Long radius.
7. Flash conduits through roof, using Stoneman Engineering "Multi-Flash" assemblies joint.
8. To facilitate pulling of feeder conductors, install junction boxes as shown or required; junction boxes where noted, left with 18-inch pigtails and cover plates with 1/2-inch knockouts.
9. Run concealed, except as shown or otherwise noted; where exposed install parallel with walls or structural elements; vertical runs to be plumb; horizontal runs level or parallel with structure; conduit groups neatly racked together with straight runs, all bends parallel and uniformly spaced.
10. Install as high as practicable to maintain adequate head room shown or required. Notify Architect, before installation, whenever head room of less than 8 feet 0 inches will result.
11. Clearance: Do not obstruct spaces required by Code in front of electrical equipment, access doors, etc.
12. Penetrations: Refer to Section 16000 of this Specification.

B. Conductors:

1. All branch circuit conduits to contain two wires plus an equipment grounding conductor, except that where more wires are in a raceway, the number of wires is indicated by "slash marks" on branch circuit symbol. Conduits/raceways serving isolated ground receptacles shall have an equipment grounding conductor plus an additional isolated grounding conductor.
2. All branch circuit wiring shall be No. 12 AWG, except as noted next to homerun or as scheduled on Drawings. Where a wire size is indicated on a home run, that wire size shall be installed from the beginning of run complete to the last connection or

connections throughout the entire run. No reduction in wire size shall be made at any point in the conduit run.

3. Neutral conductor identified by white outer sheath with different tracers of "EZ" numbering tags where more than one grounded conductor is contained in single conduit.
4. Ungrounded branch circuit conductors in conduits shall have identifying sheaths of different colors as before noted (same phasing carried through project), identified with "EZ" numbering tag in each junction box and in each panel.
5. Feeder Cables: Install in one continuous section unless splices are approved.
 - a. Swab conduits before installing cables and exercise care in pulling to avoid damage or disarrangement of conductors using approved grips.
 - b. No cable shall be bent to a smaller radius than the spool on which it was delivered by the manufacturer.
 - c. Color code feeder cables at terminals, with linen tags provided in each pull box.

C. Large Junction and Pull Boxes:

1. Installation:
 - a. Where mounted to concrete walls or ceilings, attach with Kindorf No. D-255 inserts.
 - b. Where rod suspended install to Kindorf No. 907 channels.
2. Construction:
 - a. Where other than outlet boxes are required, pull-boxes and covers shall be constructed of code gauge galvanized steel, with angle iron framing where required.

D. The following locations shall have Ground-Fault circuit-interrupter protection for all 125V, 15 or 20 receptacles whether indicated on drawings or not:

1. All receptacles in bathrooms.
2. All roof outlets.
3. Outdoors and exposed to weather.
4. As required by code.

END OF SECTION

**SECTION 16450:
GROUNDING AND BONDING OF ELECTRICAL SYSTEMS**

PART 1: GENERAL

1.01 SUMMARY

- A. The General Conditions, Instructions to Bidders, and all other general requirements of these specifications shall be considered a component part of this division of the specifications. This section specifies general grounding and bonding requirements of electrical installations.

1.02 RELATED SECTIONS

- A. Division 0 and 1 Specifications
- B. Section 16000 Electrical General Provisions
- C. Section 16050 Basic Materials and Methods
- D. Section 16460 Grounding and Bonding of Telecommunications Equipment

1.03 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. B3 Soft or Annealed Copper Wires
 - 2. B8 Concentric-Lay-Stranded Copper Conductors, Hard, Medium Hard, Soft
 - 3. B33 Tinned Soft or Annealed Copper Wire for Electrical Purposes
- B. Institute of Electrical and Electronics Engineers (IEEE):
 - 1. 142-82 Recommended Practice for Grounding of Industrial and Commercial Power Systems
 - 2. 383-2.5 IEEE Standard for Type Test of Class LE Electric Cables, Field Splices, and Connections for Nuclear Power Generating Stations
 - 3. 1100-1992 Recommended Practice for Powering and Grounding Sensitive Electronic Equipment in Industrial and Commercial Power Systems
- C. Underwriters' Laboratories (UL):
 - 1. 83 Thermoplastic Insulated Wire and Cables
 - 2. 96 Lightning Protection Components
 - 3. 96A System Installation
 - 4. 467 Grounding and Bonding Equipment
- D. National Fire Protection Association (NFPA):
 - 1. 780 Lightning Protection Code
 - 2. 70 National Electrical Code (NEC)
 - 3. NEC Article No. 250 - Grounding

PART 2: PRODUCTS

2.01 GROUNDING WIRES

- A. General Purposes: UL and NEC approved types, copper, with dual rated THHN-THWN insulation color identified green.
- B. Size wire not less than what is shown and not less than required by the NEC.

2.02 GROUND RODS

- A. Copper-clad steel, 3/4-inch diameter by 15 feet long.

PART 3: EXECUTION**3.01 INSTALLATION**

- A. Underground Grounding Connections: Which are buried or otherwise normally inaccessible, and excepting specifically those connections for which access for periodic testing is required, shall be made by exothermic weld. Exothermic welds shall be made strictly in accordance with the weld manufacturer's written recommendations. Welds which have "puffed up" or which show convex surfaces, indicating improper cleaning, are not acceptable.
- B. Compression connector shall be the type which uses a hydraulic compression tool to provide the correct pressure. Tools and dies shall be as recommended by the manufacturer. An embossing die code or other standard method shall provide visible indication that a connector has been adequately compressed on the ground wire.
- C. Equipment Grounding: Metallic structures, enclosures, raceways, junction boxes, outlet boxes, cabinets, machine frames, and other conductive items in close proximity with electrical circuits shall be grounded for personnel safety and to provide a low impedance path for possible ground fault currents with an equipment grounding conductor sized per NEC Article 250 unless otherwise noted.

3.02 SECONDARY EQUIPMENT AND CIRCUITS

- A. Conduit Systems:
 - 1. Ground all metallic conduit systems.
 - 2. All conduit systems shall contain a grounding conductor.
- B. Branch Circuits: Install equipment grounding conductors in all feeders and branch circuits including:
 - 1. Receptacle outlets.
 - 2. Directly connected computer equipment.
 - 3. Motors and motor controllers.
 - 4. Fixed equipment and appliances.
 - 5. Items of equipment where the final connection is made with flexible metal conduit
 - 6. Lighting circuits.
 - 7. Panel feeders.
 - 8. Additional locations and systems as shown.
 - 9. Fire Alarm
 - 10. Paging/Intercom system.
- C. Boxes, Cabinets, Enclosures, and Panelboards:

1. Bond the grounding wires to each pullbox, junction box, outlet box, cabinets, and other enclosures through which the ground wires pass.
 2. Provide lugs in each box and enclosure for ground wire termination.
 3. Provide equipment grounding conductor in all panelboard feeders.
 4. Provide an additional equipment grounding conductor in all panelboard feeders for isolated ground loads (as required).
- D. Receptacles are not approved for grounding through their mounting screws. Ground with a ground wire from green ground terminal on the receptacle to the outlet box ground screw.
- E. Fixed electrical appliances and equipment shall have a ground lug installed for termination of the green ground conductor.
- F. All insulated grounding conductors shall be identified as per the NEC.
- G. All grounding conductors shall be terminated under approved grounding fittings or screws. All terminations shall be made to bright metal surfaces with tapped bolts, screws, etc. or be bolted through the surface with cadmium plated bolts, star-washers and nuts.
- H. All grounding conductors shall be effectively bonded to grounding electrodes, ground buses and equipment enclosures, EXCEPTION: Isolated grounding conductors shall be bonded to the designed isolated grounding strip in its supplying panelboard or if so designed and required to the main service ground bus or grounding electrode.

3.03 CONDUCTIVE PIPING

- A. Bond all conductive piping systems in the building to the electrical system ground. Bonding connections shall be made as close as practical to the water pipe ground or service equipment ground bus.
- B. Insulating type, grounding bushings shall be installed at the origin and termination of all service and feeder conduits. The grounding conductor, pulled in each conduit, shall be bonded to this grounding bushing and to the grounding terminal in the cabinet, switchboard or panelboard.

3.04 GROUND RESISTANCE TEST

- A. Tests: Field tests shall be performed and reports submitted. All testing procedures shall conform to "Acceptance Testing Specifications for Electrical Power Distribution Systems" as issued by the National Electrical Testing Association, Inc.
- B. Grounding System: The ground connection on each piece of equipment shall be checked for tightness and the entire system shall be checked for continuity. The resistance of each ground system shall be measured with a Meg-type ground tester. The maximum ground resistance shall be 5 ohms. If the measured ground resistance exceeds 5 ohms, additional ground rods and/or grounding electrodes shall be installed until a value of 5 ohm or less is obtained.

END OF SECTION

THIS PAGE LEFT BLANK INTENTIONALLY

**SECTION 16460:
GROUNDING AND BONDING OF COMMUNICATIONS SYSTEMS**

PART 1: GENERAL

1.01 SUMMARY

- A. This section includes the specifications for grounding and bonding of telecommunications equipment as specified and as shown on contract drawings

1.02 RELATED SECTIONS

- A. Division 0 and 1 Specifications
- B. Section 16000 Electrical General Provisions
- C. Section 16050 Basic Materials and Methods
- D. Section 16450 Grounding and Bonding of Electrical Systems
- E. Section 16752 Structured Cabling

1.03 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. B3 Soft or Annealed Copper Wires
 - 2. B8 Concentric-Lay-Stranded Copper Conductors, Hard, Medium Hard, Soft
 - 3. B33 Tinned Soft or Annealed Copper Wire for Electrical Purposes
- B. Institute of Electrical and Electronics Engineers (IEEE):
 - 1. 142-82 Recommended Practice for Grounding of Industrial and Commercial Power Systems
 - 2. 383-2.5 IEEE Standard for Type Test of Class LE Electric Cables, Field Splices, and Connections for Nuclear Power Generating Stations
 - 3. 1100-1992 Recommended Practice for Powering and Grounding Sensitive Electronic Equipment in Industrial and Commercial Power Systems
- C. Underwriters' Laboratories (UL):
 - 1. 83 Thermoplastic Insulated Wire and Cables
 - 2. 96 Lightning Protection Components
 - 3. 96A System Installation
 - 4. 467 Grounding and Bonding Equipment
- D. National Fire Protection Association (NFPA):
 - 1. 780 Lightning Protection Code
 - 2. 70 National Electrical Code (NEC)
 - 3. NEC Article No. 250 – Grounding
- E. Telecommunications Industry Association/Electronic Industries Association (TIA/EIA):
 - 1. ANSI/TIA/EIA-607 Commercial Building Grounding and Bonding Requirements for Telecommunications
- F. Building Industry Consulting Services International (BICSI):

ISSUED FOR BID/CONSTRUCTION

1. Telecommunications Distribution Methods Manual
- G. Local, County, State and Federal regulations and codes in effect as of the date of purchase shall be complied with.
- H. Equipment of foreign manufacture must meet U.S. codes and standards. It shall be indicated in the proposal the components which may be of foreign manufacture, if any, and the country of origin

1.04 DESIGN REQUIREMENTS

- A. Install communications grounding system following ANSI/TIA/EIA-607, "Commercial Building Grounding and Bonding Requirements for Telecommunications", the BICSI Telecommunications Distribution Methods Manual, and the project drawings.

1.05 SUBMITTALS

- A. Submit all required documents in accordance with Specification 01330 Submittals
- B. Product Data:
 1. Manufacturer's catalog data and applicable special fabrication and installation details
 2. Installation, terminating and splicing procedures
 3. Instructions for handling and storage
 4. Dimensions and weights

1.06 QUALITY ASSURANCE

- A. Follow Specification 01455 Quality Assurance and Testing Laboratory Services
- B. Furnish products of latest proven design, new and in current production. Do not use obsolete components or out-of-production products
- C. Tests for Insulated Cable: Pass vertical tray flame test following IEEE 383-2.5

PART 2: PRODUCTS

2.01 MANUFACTURERS

- A. Cable Manufacturers
 1. Anixter
 2. Cablec
 3. Okonite
- B. Ground Rod and Connector Manufacturers
 1. Blackburn
 2. Copperweld
 3. Thomas & Betts
- C. Exothermic Connector Manufacturers
 1. Burndy (Therm-O-Weld)
 2. Erico (Cadweld)
- D. Grounding Connectors
 1. Burndy
 2. O.Z. Gedney
 3. Thomas & Betts

- E. The list above is provided as a supplement and is not intended to exclude other manufacturers which meet or exceed the requirements listed herein

2.02 MATERIALS

- A. Grounding Conductors: Bare or insulated (green in color) copper AWG wire following ASTM-B3, ASTM-B8 and ASTM-B33, of following sizes:
 - 1. A minimum of 6 AWG, stranded copper conductor should be used for communications
- B. Grounding Connectors: It is recommended that connectors should be one of the following:
 - 1. Tin-plated copper
 - 2. Copper
 - 3. Copper alloy
- C. Ground Rods: A minimum of 10 feet long, 3/4 inch diameter, copper-clad steel
- D. Where single conductor insulated grounding conductors are required, furnish insulation, green in color (or tape marking), rated for 600 volts
- E. Telecommunications Main Grounding Busbar (TMGB):
 - 1. The TMGB shall be a predrilled copper busbar with standard NEMA bolt hole sizing and spacing for the type of connectors to be used
 - 2. The TMGB shall be sized for the immediate requirements and allow for growth
 - 3. The minimum dimensions are 6 mm thick x 100 mm wide, with variable length
 - 4. The busbar should be electrotin plated for reduced contact resistance
- F. Telecommunications Grounding Busbar (TGB):
 - 1. The TGB shall be a predrilled copper busbar with standard NEMA bolt hole sizing and spacing for the type of connectors to be used
 - 2. The TGB shall be sized for the immediate requirements and allow for 100% growth
 - 3. The minimum dimensions are 6 mm thick x 50 mm wide, with variable length
 - 4. The busbar should be electrotin plated for reduced contact resistance

PART 3: EXECUTION

3.01 PREPARATION

- A. Copper and copper alloy connections should be cleaned prior to connection
- B. In new construction, the electrical contractor must provide accessible means to a direct electrical service ground, which is one of the best points for grounding communications systems. NEC Section 250-71(b) requires an intersystem bonding connection accessible at the electrical service equipment, such as:
 - 1. Approved external connection on the power service panel. The NEC allows direct connection to a provided 3 AWG copper conductor
 - 2. Exposed metallic service raceway (using an approved bonding connector)
 - 3. Grounding electrode conductor

3.02 INSTALLATION

- A. Install work following drawings, manufacturer's instructions and approved submittal data
- B. Bonding conductors shall be routed with minimum bends or changes in direction and should be made directly to the points being bonded

- C. Bonding connections should be made by using:
 - 1. Bolt connectors, clamps, or lugs. Use listed hardware that has been laboratory tested to eliminate most field problems
 - 2. Exothermic welding (see NEC Section 250.8 and 250.70) within the ground electrode system, for parts of a grounding system that are subject to corrosion or that must carry high currents reliably, or for locations that require minimum maintenance
- D. Install main ground loop minimum 1-1/2 feet below ground surface
- E. Drive rods vertically, leaving top 18 inches exposed above finished grade. Exothermic-weld below-grade grounding connections, except at ground rods. Install additional ground rods as required to pass resistance test
- F. Make rods vertically, leaving top 18 inches exposed above finished grade. Exothermic-weld below-grade grounding connections, except at ground rods. Install additional ground rods as required to pass resistance test.
- G. Make above-grade grounding connections with mechanical connectors or thermal connections.
- H. Ground small groups of isolated equipment with No. 2 AWG minimum insulated conductor connected to the main loop
- I. Telecommunications Raceway and Support Systems Grounding:
 - 1. Bond and ground raceway, cable rack or tray and conduit together and permanently ground to the equipment grounding busbar. Connection to conduit may be with grounding bushing or ground clamp
 - 2. Connect ladder-type cable tray to grounding electrode system. Telecommunications cable tray that is located in the same room as the TMGB shall be connected to the TMGB
 - 3. Bond and ground raceway at low voltage motor control centers or other low voltage control equipment, except conduit which is effectively grounded to sheet metal enclosure by bonding bushing or hubs need not be otherwise bonded
 - 4. Where a grounding conductor is run in or on a cable tray, bond grounding conductors to each section of cable tray with a cable tray ground clamp
 - 5. Where only grounding conductor is installed in a metal conduit, bond both ends of conduit to grounding conductors
 - 6. Provide flexible "jumpers" around raceway expansion joints and across cable tray jointsparted to allow for expansion and hinged cable tray connections. Provide copper bonding straps for steel conduit
- J. Telecommunications Grounding and Bonding Infrastructure:
 - 1. Install the TMGB in the Main Communications Room (MCR) as close to the panelboard as possible. The TMGB should also be located so that the bonding conductor is as short and straight as possible. Maintain clearances required by applicable electrical codes
 - 2. If a panelboard is not installed in the MCR, locate the TMGB near the backbone cabling and terminations.
 - 3. The TMGB shall be insulated from its support with a recommended separation of 2 inches
 - 4. Connect the TMGB to the main electrical service ground for the building and telecommunications primary protectors
 - 5. The minimum Telecommunications Bonding Backbone (TBB) conductor size shall be No. 3 AWG. The TBB originates at the TMGB and extends throughout the building using the telecommunications backbone pathways, and connects to the TGB(s) in all telecommunication closets and equipment rooms

6. Install the TGBs in the telecommunications closets and equipment rooms as close to the panel board as possible. The TGB should also be located so that the bonding conductor is as short and straight as possible. Maintain clearances required by applicable electrical codes. The TGB shall be insulated from its support with a recommended separation of 2 inches
7. Properly bond and ground all communications cabinets, equipment racks, raceway, cable rack or tray, and conduit together and permanently ground to the TGB

K. Telecommunications Cable Armor and Shield:

1. Terminate and ground shield of shielded control cable at one end only, preferably at the control panel end for instrument and communication cable and at the supply end for electronic power cables. Maintain shield continuity by jumpering the ground shield across connection point where it is broken at junction boxes, or other splice points. Insulate these points from ground
2. Connect ground wire in power cable assemblies at each terminal point to a ground bus, if available, or to the equipment enclosure. Do not extend these ground wires through "doughnut" CTs used for ground fault relaying, but do extend ground leads from stress cones. Ground power cable armor and shield at each terminal point
3. Bond and ground exposed cable shields and metallic sheaths according to the manufacturer's guidelines. They should also be grounded as close as possible to the point of entrance

3.03 IDENTIFICATION

- A. Grounding system components shall be labeled twelve (12) inches from each end of the Telecommunications Bonding Conductor (TBC) and every ten (10) feet where exposed
- B. Label all equipment grounding conductors to indicate the rack and panel being grounded and the ground bar to which the TBC is connected
- C. All TBC's in the building, including, but not limited to, those connecting building steel, grounding electrodes, water pipes, radio towers, and telecommunications structural components shall be labeled
- D. All TGBs shall be labeled according to their location
 1. For example, the TGB located in an ICR shall be labeled "TGB-CAA-ICR"
 2. The labeling scheme to be utilized shall be finalized for approval during the implementation

3.04 TESTING

- A. Test grounding system before grid trenches are backfilled. Test for ground resistance after installation of underground grid and grounding connections
- B. Install test wells at locations as required for testing, using a pipe surrounding the rod And connections with a cover placed on top at grade level
- C. Test system resistance at *each* test well using "fall of potential" method: Maximum resistance of 5 ohms
- D. Upon completion of the electrical system, including all grounding, the Electrical Contractor shall test the system for stray currents, ground shorts, etc. Approved instruments, apparatus, services, and qualified personnel shall be utilized. If stray currents, shorts, etc., are detected, eliminate or correct as required. The test procedure shall be as follows:
 1. Open all main disconnects for the system being tested
 2. Disconnect the system neutral from the service entrance or step-down transformer neutral connection
 3. Connect a DC ohmmeter across the system neutral and equipment ground

4. An ohmmeter reading in excess of 100 ohms shall indicate that the system neutral and equipment ground are properly isolated
 5. An ohmmeter reading less than 100 ohms shall indicate that the system contains ground shorts (stray currents) at some point along the system neutral
 6. Grounded neutrals may be identified by disconnecting individual neutral conductors from the system, one at a time, while monitoring the ohmmeter
 7. The systems shall be re-tested after correction of all ground shorts is complete.
- E. The contractor shall notify MSCAA prior to testing the grounding system. At the MSCAA's discretion, MSCAA may require that an MSCAA Representative be present for a portion of or the entire testing process
- F. Within 10 days of completion of testing of the grounding system, all test documentation shall be submitted to MSCAA for review.

END OF SECTION

**SECTION 16720:
FIRE ALARM SYSTEM**

PART 1: GENERAL

1.01 SUMMARY

A. General

Requirements of the following Sections apply to all work and material specified in this Section:

1. Section 16000 "Electrical General Provisions".
2. Section 16050 "Basic Materials and Methods".
3. Section 16450 "Grounding and Bonding of Electrical Systems".

B. Summary

This performance specification provides the minimum requirements for the Life Safety System. The system shall include, but not be limited to all equipment, materials, labor, documentation and services necessary to provide additional devices to the existing fire alarm detection and notification system.

- C.** Upon award of construction contract, the contractor shall contact Simplex to begin the design of this addition to their existing system. Detailed design and shop drawings for the installation shall be completed by Simplex.

1.02 MANUFACTURER

- A.** The new devices indicated on the Drawings shall be tied into the existing Johnson Controls/Simplex system for Memphis International Airport.
- B.** All System components shall be the cataloged products of a single supplier. All products shall be listed by the manufacturer for their intended purpose.

1.03 ALTERNATES

- A.** Alternates are not allowed.

1.04 REFERENCES AND CODES

A. General

1. All work and materials shall conform to all applicable Federal, State and local codes and regulations governing the installation. If there is a conflict between the referenced standards, federal, state or local codes, and this specification, it is the bidder's responsibility to immediately bring the conflict to the attention of the Engineer for resolution. National standards shall prevail unless local codes are more stringent. The bidder shall not attempt to resolve conflicts directly with the local authorities unless specifically authorized by the Engineer.
2. System components proposed in this specification shall be UL listed to operate together as a system. The supplier shall provide evidence, with his submittal, of listings of all proposed equipment and combinations of equipment. The supplier shall be responsible for filing of all documents, paying all fees (including, but not limited to plan checking and permit) and securing all permits, inspections and approvals. Upon receipt of approved drawings from the authority having jurisdiction, the supplier shall immediately forward two sets of drawings to the Owner. These drawings shall either be stamped approved or a copy of the letter stating approval shall be included.

ISSUED FOR BID/CONSTRUCTION

B. Codes

The equipment and installation shall comply with the current provisions of the following codes and standards:

1. NFPA 70 - 2020 National Electric Code® plus local amendments
2. NFPA 72 - 2019 National Fire Alarm Code®
3. NFPA 90A - 2021 Air Conditioning Systems
4. NFPA 101- 2021 Life Safety Code®
5. UL 864 - Control Units for Fire Protective Signaling Systems.
6. UL 268 - Smoke Detectors for Fire Protective Signaling Systems.
7. UL 268A - Smoke Detectors for Duct Applications.
8. UL 521 - Heat Detectors for Fire Protective Signaling Systems.
9. UL 228 - Door Closers-Holders, With or Without Integral Smoke Detectors.
10. UL 464 - Audible Signaling Appliances.
11. UL 38 - Manually Actuated Signaling Boxes for Use with Fire-Protective Signaling Systems
12. UL 346 - Waterflow Indicators for Fire Protective Signaling Systems
13. UL 1971 - Signaling Devices for the Hearing-Impaired.
14. UL 1481 - Power Supplies for Fire Protective Signaling Systems.
15. Factory Mutual (FM) approval
16. Memphis Fire Department and Tennessee State Fire Marshall's Office
17. Americans with Disabilities Act (ADA)
18. ISO 9000
19. ISO 9001

1.05 SYSTEM DESCRIPTION**A. General**

1. The Contractor shall furnish all labor, services and materials necessary to furnish and install a complete, functional renovation of the existing fire alarm system (System) to accommodate removals as noted on the Drawings. The System shall comply in respects with all pertinent codes, rules, regulations and laws of the Local Authority Having Jurisdiction. The System shall comply in all respects with the requirements of the specifications, manufacturer's recommendations and Underwriters Laboratories Inc. (UL) listings.
2. It is further intended that upon completion of this work, the Owner be provided with:
 - a Complete information and drawings describing and depicting the entire system(s) as installed, including all information necessary for maintaining, troubleshooting, and/or expanding the system(s) at a future date.
 - b Complete documentation of system(s) testing.
 - c Certification that the entire system(s) has/have been inspected and tested, is/are installed entirely in accordance with the applicable codes, standards, manufacturer's recommendations and ULI listings, and is/are in proper working order. Contractor shall use "Fire Alarm System Certification and Description" as required by NFPA 72 edition.

B. Description

Provide new notification devices as follows:

1. Provide horn/horn strobes located as shown on the drawings.
2. Provide synchronized visual notification appliances located as shown on the drawings.
3. Provide connection to the new dry sprinkler system for Room 213.
4. Provide connection as needed to existing system, including all accessories as may be required.

1.06 SUBMITTALS

A. Closeout Submittal

Closeout submittal shall follow the format of Section 01770. In addition, the close out submittals shall include:

1. Project specific operating manuals covering the installed Life Safety System. A generic or typical owner's instruction and operation manual shall not be acceptable to fulfill this requirement.
2. The application program listing for the system as installed at the time of acceptance by the building owner and/or local AHJ.
3. The name, address and telephone of the authorized factory representative.
4. A completed Record of Completion similar to NFPA 72, 2019 edition figure 4.5.2.1.

1.06 QUALITY ASSURANCE

A. Qualification of Contractors

1. The contractor shall have successfully installed similar system fire detection, signaling control components on a previous project of comparable size and complexity. The owner reserves the right to reject any control components for which evidence of a successful prior installation performed by the contractor cannot be provided.
2. The contractor shall have in-house engineering and project management capability consistent with the requirements of this project. Qualified and approved representatives of the system manufacturer shall perform the detailed engineering design of central and remote control equipment. Qualified and approved representatives of the system manufacturer shall produce all panel and equipment drawings and submittals, operating manuals. The contractor is responsible for retaining qualified and approved representative(s) of those system manufacturers specified for detailed system design and documentation, coordination of system installation requirements, and final system testing and commissioning in accordance with these specifications.

1.07 WARRANTY AND MAINTENANCE

A. Warranty

1. The contractor shall warranty all materials, installation and workmanship for one (1) year from date of acceptance, unless otherwise specified. A copy of the manufacturer's warranty shall be provided with close-out documentation and included with the operation and installation manuals.
2. The System Supplier shall maintain a service organization with adequate spare parts stock within 50 miles of the installation. Any defects that render the system inoperative shall be repaired within 24 hours of the owner notifying the contractor.

PART 2: PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: The equipment and service described in this specification are those supplied and supported by Johnson Controls/Simplex Grinnell and represent the base bid for the equipment. No substitutions will be accepted.

2.2 ALARM NOTIFICATION APPLIANCES

- A. General: Equip alarm notification appliances for mounting as indicated. Provide terminal blocks for system connections.
- B. Visual Notification Appliances: 24 VDC operation, wall mounted, compatible with ADA requirements with the word "FIRE" clearly visible. Candela as per the drawings.
 - 1. Combination notification appliances consist of factory combined, audible and visual notification units in a single mounting assembly.
- D. Fire Alarm Speaker/Strobes: AMP-96 or equal voice evacuation system, equipped additionally with visual notification for compliance with NFPA and ADA. This voice evacuation system for the assembly area shall interface with the main fire alarm control unit.

2.3 ADDRESSABLE CIRCUIT INTERFACE MODULES

- A. Addressable Circuit Interface Modules: Arrange to monitor one or more system components that are not otherwise equipped for multiplexing communication. Modules transmit identification and status to the FACU using a communication transmitter and receiver with unique identification and capability for status reporting to the FACU. Modules shall be used for monitoring of non-addressable detectors, and for control of notification appliances and AHU systems.
- B. Addressable Circuit Interface Modules shall be capable of mounting in a standard electric outlet box. Modules will receive their operating power from the signaling line or a separate two wire pair running from an appropriate power supply as required.
 - 1. Type 2: Line Powered Monitor Circuit Interface Module: This type of module is an individually addressable module that has both its power and its communications supplied by the two wire multiplexing signaling line circuit. It provides location specific addressability to an initiating device by monitoring normally open dry contacts. This module shall communicate four zone status conditions (normal, short, current limited, and open) to the FACU.
 - 2. Type 3: Line Powered Control Module: This type of module will provide non-supervised form C relay switching with a single "Form C" contact rated at 2 A @ 24 VDC, power limited and at 1/2 A @ 120 VAC, non-power limited. Both power and communications to this module shall be supplied by the two wire multiplexing signaling line circuit. The system shall be capable of energizing 100% of the relays connected to the signaling line circuit.
- C. The Circuit Interface Module shall be supervised and uniquely identified by the FACU. Module identification shall be transmitted to the FACU for processing according to the program instructions. Should the module become non-operational, tampered with, or removed, a discrete trouble signal, unique to the module, shall be transmitted to, and annunciated at, the FACU.
- D. The Circuit Interface Module shall be capable of being programmed for its "address" location on the multiplexing signaling line circuit. The Circuit Interface Module shall be compatible with addressable manual stations and addressable sensors on the same multiplexing signaling line circuit.

PART 3: EXECUTION

3.01 INSTALLATION

A. Installation Sequence

1. Installation of the systems shall be conducted in stages and phased such that circuits and equipment are installed in the following order:
 - a Riser conduits, AC power conduits and control cabinets.
 - b Conduits and wiring for complete notification circuits and appliance installation throughout facility.
 - c Pre-test the audible and visual notification appliance circuits.
 - d Install all new detection devices.
 - e Terminations between field devices and the associated control equipment.
 - f Complete contractor pre-test of system.
 - g Complete system testing.

B. Conductors

1. The requirements of this section apply to all system conductors, including all signaling line, initiating device, notification appliance, auxiliary function, remote signaling, AC and DC power and grounding/shield drain circuits, and any other wiring installed by the Contractor pursuant to the requirements of these Specifications.
2. All circuits shall be rated power limited in accordance with NEC Article 760.
3. All new system conductors shall be of the type(s) specified herein.
4. All initiating circuit, signaling line circuit, AC power conductors, shield drain conductors and grounding conductors, shall be solid copper, stranded or bunch tinned (bonded) stranded copper.
5. All signaling line circuits, including all addressable initiating device circuits shall be 16 AWG minimum multi-conductor jacketed twisted cable or twisted shielded or as per manufacturer's requirements.
6. All non-addressable initiating device circuits, 24 VDC auxiliary function circuits shall be 14 AWG minimum or per manufacturer's requirements.
7. All audible notification appliance circuits shall be 14 AWG minimum twisted pairs or twisted pairs shielded or per manufacturer's requirements.
8. All visual notification appliance circuits shall be 14 AWG minimum THHN or twisted pairs or twisted shielded pairs or per manufacturer's requirements.

3.02 FIELD QUALITY CONTROL

- A. All intelligent analog addressable devices shall be tested for current address, sensitivity, and user defined message.
- B. All wiring shall be tested for continuity, shorts, and grounds before the system is activated.
- C. All test equipment, instruments, tools and labor required to conduct the tests shall be made available by the installing contractor.
- D. A pre-test of the modifications to the fire alarm system shall be conducted with Johnson Controls/Simplex and the associated contractor. This pre-test must be scheduled and successfully completed at least 24 hours in advance of any test with the Memphis Fire Department. MSCAA's Maintenance Department and Airport Communications will participate in this test. Close coordination is required so that all parties may attend. A minimum of 72 hours advanced notification is required to both Simplex and MSCAA to schedule the pre-test. The pre-test must be performed after hours. Upon completion of the pre-tests Simplex will provide written confirmation of the successful completion of the pre-test. One copy of this certification is to be

ISSUED FOR BID/CONSTRUCTION

provided to the Memphis Fire Department fire marshal and one copy to MSCAA.

- E. At the final test and inspection, a factory trained representative of the system manufacturer shall demonstrate that the system functions properly in accordance with these specifications. The representative shall provide technical supervision, and participate during all of the testing for the system.
- F. All fire alarm testing shall be in accordance with National Fire Alarm Code, NFPA 72.
- G. The test with the Memphis Fire Department for occupancy must be performed after hours and must be closely coordinated with MSCAA's Maintenance Department and Airport Communications. Provide MSCAA with a copy of any documentation from the Memphis Fire Department, including deficiencies noted with the fire system, or approval of the system.

END OF SECTION

**SECTION 16752:
STRUCTURED CABLING SYSTEM**

PART 1: GENERAL

1.01 SUMMARY

- A. This section will include all the specifications for the installation of the structured cabling system supporting voice, data and video communications.

1.02 RELATED SECTIONS

- A. Division 0 and 1 Specifications
- B. Section 16000 Electrical General Provisions
- C. Section 16460 Grounding and Bonding for Communications Systems

1.03 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.
- B. Specific reference in specifications to codes, rules, regulations, standards, manufacturer's instructions, or requirements of regulatory agencies shall mean the latest printed edition of each in effect at the date of contract unless the document is shown dated.
- C. Telecommunications Industry Association /Electronic Industries Association (TIA/EIA) 568B-Commercial Building Telecommunications Wiring Standards.
- D. TIA/EIA 569A-Commercial Building Standard for Telecommunications Pathways and Spaces.
- E. ANSI/TIA/EIA 606-Administration Standard for Telecommunications Infrastructure of Commercial Buildings.
- F. ANSI/TIA/EIA 607-Commercial Building Grounding and Bonding Requirements.
- G. TIA/EIA TSB-67-Transmission Performance Specifications for Field Testing of Unshielded Twisted Pair Cabling Systems.
- H. TIA/EIA TSB-72-Centralized Optical Fiber Cabling Guidelines.
- J. TIA/EIA TSB-75-Additional Horizontal Cabling Practices for Open Offices.
- I. ANSI/TIA/EIA 568-B.2-1-Additional Transmission Performance Guidelines for 4-Pair 10052 Category 6 Cabling.
- J. TIA/EIA PN-3398 (Cabling practices for Open Offices).
- K. International Standards Organization/International Electromechanical Commission (ISO/IEC) DIS 11801
- L. Underwriters Laboratories (UL®) Cable Certification and Follow Up Program.
- M. National Electrical Manufacturers Association (NEMA).
- N. American Society for Testing Materials (ASTM).
- O. National Electric Code (NEC®).
- P. Institute of Electrical and Electronic Engineers (IEEE).
- Q. American National Standards Institute (ANSI) X3T9.5 Requirements for UTP at 100Mbps.

1.05 SUBMITTALS

- A. Submit manufacturer's data for all proposed equipment.
- B. Submit Shop drawings indicating the intended cable layout and pulling plan prior to beginning cable pulling.
 - 1. Contractor shall provide general procedures for the installation process.
 - 2. Contractor shall identify pulling point locations.
 - 3. Contractor shall identify pulling tensions and bend radii.
- C. Calculations and recorded values for actual cable run pulling tensions and recordings of their actual values.
- D. Cable inventory data for all structured cabling and termination equipment. Submit data electronically on data diskettes and CD-ROM in an MSCAA approved format. Data to be provided includes:
 - 1. Manufacturer's Name
 - 2. Manufacturer's Part Numbers and Com Code Numbers
 - 3. Cable Numbers utilizing the MSCAA cable numbering standard.
- E. As-Built (Record Drawings): Shall be provided in the format as detailed in Section 01770.

1.06 CONTRACTOR'S DUTIES.

- A. Contractor shall install all cabling required to provide a fully operational, tested, certified and warranted cabling system.
- B. Contractor shall provide all calculations and analysis to support design and engineering decisions as specified in the Submittals section.
- C. Contractor shall have the chosen manufacture provide written guidelines for what constitutes warranty liability issues regarding moves, adds, and changes to the cable plant performed by MSCAA personnel.

1.07 QUALITY ASSURANCE

- A. All installers shall be trained and certified by the manufacturer for the installation of the proposed cabling solution.
- B. Hardware manufacturer's experience: All components shall be produced by manufacturers who have been regularly engaged in the production of telecommunications cabling components of the types to be installed in this project for a minimum period of five years.

PART 2: PRODUCTS**2.01 GENERAL**

- A. Manufacturers
 - 1. AMP
 - 2. Belden
 - 3. Comm Scope
 - 4. Corning
 - 5. Siemens
- B. The list above is provided as a supplement and is not intended to exclude other manufacturers which meet or exceed the requirements listed herein.
- C. The CONTRACTOR shall supply materials as described and shown.
- D. The CONTRACTOR shall supply all cabling necessary to interconnect all system equipment including equipment located in the Telecommunications Rooms.

2.02 MATERIAL DESIGN AND PERFORMANCE STANDARDS

- A. Applications standards supported should include, but not be limited to, IEEE802.3, 10/100/1000BaseT.
- B. Fiber Cable Standards
1. Fiber optic cable shall be certified to meet all parts of EIA-455 and comply with the NEC.
 - a. Cable installed in plenums or air-handling spaces shall meet UL 910 and shall be marked OFNP in accordance with the NEC.
 - b. Riser cable shall meet UL 1666 and be marked OFNR in accordance with the NEC.
 - c. Fiber optic patch cords shall be of the manufactured duplex type, and from the same manufacture as the termination hardware and cable to ensure compatibility and performance. Field fabricated patch cords shall be not be allowed.
 - d. Proper bend radius shall be maintained throughout the entire run of cabling and at all termination locations.
 2. All fiber optic cable shall utilize the appropriate sheath for the particular application. This shall be in accordance with ANSI/EIA/TIA-568-B standards. Any cable placed in space used as an air return or in any way connected with air handling plenums or building ventilation shall be low-smoke, fire retarding cable, and must comply with the National Electrical Code Articles 725, 760, and 800. No cabling shall be placed in plenums without written approval from the Owner's Project Manager. All fiber optic cable shall include a #10 THWN stranded yellow trace wire, run continuous, the full length of the cable.
 3. Building Cables: Building cables shall meet the following requirements:
 - a. Non-plenum Rated — Non-plenum, riser rated cable consisting of multiple fibers, shall have a Polyvinyl Chloride (PVC) outer jacket. The cable should have a non-filled ribbon structure with a nonmetallic crossply PVC core tube. The cable shall be UL listed and meet the NEC requirements for OFNR.
 - b. Plenum Rated - Plenum rated cable consisting of multiple fibers shall have a Plenum PVC outer jacket. Each group of fibers shall have a color-coded Low Smoke PVC buffer. The buffered fibers are organized in subunits of fibers, reinforced with aramid yarn for extra strength and surrounded with a color-coded Low Smoke tube. The cable and each subunit shall be UL listed and meet the NEC requirements for OFNP.
 4. Optical fiber conductors shall follow standard color code schemes. Fiber numbers and binders shall correspond to the color codes as follows:

	Color	Fiber/Binder No.	Color
1	Blue	7	Red
2	Orange	8	Black
3	Green	9	Yellow
4	Brown	10	Violet
5	Slate	11	Rose
6	White	12	Aqua
 5. Preparation for delivery: The fiber optic cable shall be shipped on reels in lengths as specified with a minimum overage of ten (10) percent.

- a. The cable shall be wound on the reel so that unwinding can be done without kinking the cable.
 - b. Two (2) meters of cable at both ends of the cable shall be accessible for testing.
 - c. Marking: Each reel shall have a permanent label attached showing length, cable identification number, cable size, cable type, attenuation, bandwidth, and date of manufacture. Labels shall be water resistant and the writing on the labels shall be indelible.
6. Unless otherwise specified, all fiber optic cables shall be installed in inner duct throughout the entire length of the cable run.

C. Fiber Horizontal Cable

1. SINGLE-MODE FIBER OPTIC CABLE SPECIFICATIONS

- a. Single mode fibers must comply with TIA/EIA 492, ANSI/ICEA S-83-596, and ANSI/ICEA S-83-640. Fiber must comply with TIA/EIA 455 and IEC 793 test methods for required attributes. Fibers shall have dual wavelength capability; transmitting at 1310 and 1550 nm ranges and shall be rated for use as riser cabling. The coating shall be mechanically strippable. The sheath color for all single mode riser and single mode plenum rated cables shall be yellow in color.
- b. The cable shall meet or exceed the following requirements:

Parameter	Requirement
Core Diameter	8.3 gm
Cladding Diameter	125.0 ± 1.0 gm
Cladding Non-Circularity	0.5 %
Core/Cladding Concentricity	< 0.5 gm
Coating Diameter	245 gm ± 10 gm
Mode Field Diameter	8.8 ± 0.5 gm @ 1310 nm
Minimum Proof Strength	100,000 psi
Cable Minimum Bending Radius During Installation:	20 times cable diameter
After Installation:	10 times cable diameter
Operating Temp. Range	-20°C to 70°C
Storage Temp. Range	-40°C to 70°C
Maximum Fiber Loss Depressed Clad	0.4 dB/km at 1310 NM 0.3 dB/km at 1550 NM
Gigabit Ethernet Distance Guarantee	5000 meters @ 1310 nm and 1550nm
Maximum Dispersion	2.8 ps/nm-km 1285 to 1330 nm
Fiber Macrobend (100 turns @ 75 mm diameter)	13.05 dB @ 1310 nm 13.10 dB @ 1550 nm

- c. UL® listed
- d. ISO 9001 Certified Manufacturer

D. Copper Cable Standards:

1. All cable shall utilize the appropriate sheath for the particular application. This shall be in accordance with ANSI/EIA/TIA-568-B (or latest approved version) standards. Any cable placed in space used as an air return or in any way connected with air handling plenums or

building ventilation shall be low-smoke, fire retarding cable, and must comply with the National Electrical Code Articles 725, 760, and 800. No cabling shall be placed in plenums without written approval from the Owner.

E. Copper Horizontal Cable:

1. General Performance Specifications: The minimum requirements for all 4 pair, Unshielded Twisted Pair (UTP), Category 6 (or latest approved standard) cables shall conform to TIA/EIA 568B Commercial Building Telecommunications Cabling Standard, Horizontal Cable Section, and be part of the UL® LAN Certification and Follow-up Program. Cables shall be marked as UL verified with a minimum of a Category 6 (or latest approved standard) rating. Application standards supported should include, but not limited to, IEEE 802.3, 10Base5, 10BaseT, IEEE 802.5, 4 Mbps, 16 Mbps (328 ft [100m], 104 Workstations) and TP-PMD. In addition, these cables shall be capable of supporting high-end applications such as 1000 BASE-T Gigabit Ethernet.
2. Plenum, Category 6, Unshielded Twisted Pair (UTP) cable shall be composed of 24 AWG bare solid-copper conductors, insulated with TEFLON. The insulated conductors are twisted into pairs and sheathed with a low smoke PVC jacket. Cable shall be UL rated CMP. All 4-pair UTP cable shall be plenum rated unless specified otherwise.
3. Horizontal Category 6 data cabling shall be blue in color and have the following minimum electrical characteristics:

Freq (MHz)	Insertion Loss (dB)	NEXT (dB)	PS NEXT (dB)	ELFEXT (dB)	PS E LFEXT (dB)	Return Loss (dB)
0.772	1.8	76.0	74.0	70.0	67.0	\$
1	2.0	74.3	72.3	67.8	64.8	20
4	3.8	65.3	63.3	55.8	52.8	23
8	5.3	60.8	58.8	49.7	46.7	24.5
10	6.0	59.3	57.3	47.8	44.8	25
16	7.6	56.2	54.2	43.7	40.7	25
20	8.5	54.8	52.8	41.8	38.8	25
25	9.5	53.3	51.3	39.8	36.8	24.3
31.25	10.7	51.9	49.9	37.9	34.9	23.6
62.5	15.4	47.4	45.4	31.9	28.9	21.5
100	19.8	44.3	42.3	27.8	24.8	20.1
200	29	39.8	37.8	21.8	18.8	18
250	32.8	38.3	36.3	19.8	16.8	18

2.03 COMPONENTS

A. Outlets:

1. General Performance Specifications: Unless otherwise noted on the floor plans or within this document, all outlets shall be 8-position/8-conductor, insulation displacement modular outlets that conform to TIA/EIA 568B Commercial Building Telecommunications Cabling Standard, Horizontal Cable Section, and be part of the

UL® LAN Certification and Follow-up Program, and shall meet or exceed the following electrical and mechanical specifications:

- a. Category 6 minimum requirements and support 1 Gbps Ethernet

- b. T568B eight-position jack pin/pair assignments
- C. Insulation resistance: 500 MW minimum
- d. Dielectric withstand voltage 1,000 VAC RMS, 60 Hz minimum, contact-to-contact and 1,500 VAC RMS, 60 Hz minimum from any contact to exposed conductive surface.
- e. Contact resistance: 20 MW maximum
- f. Current rating: 1.5 A at 68° F (20°C) per IEC Publication 512-3, Test 5b
- g. Installations will utilize orange jacks. Faceplates/Dust Cover/Blanks shall be white in color.

B. Patch Cords:

1. Fiber Patch Cords

a. Multimode Fiber Patch Cords

- 1) Multimode fiber patch cords shall be terminated with SC connectors.
- 2) The multimode fiber patch cord shall consist of buffered, graded-index fiber with a 50 micron core with 3.0 mm Cordage and a 125 micron cladding. The fiber cladding shall be covered by aramid yarn and a jacket of flame-retardant PVC.
- 3) The multimode patch cord shall meet or exceed the following requirements:

Mated Connector Loss	j,i = 0.3 dB, a = 0.2 dB
Operating temperature	-40 to 70° C
Cable Retention	20 lb. minimum
Connection Repeatability	0.20 dB maximum change 100
Return Loss Minimum	-20dB

- 4) Contractor shall provide a quantity of patch cords equal to the number of ports on all patch panels of the appropriate length for the particular application. All slack in the patch cords shall be appropriately dressed using vertical and horizontal patch cord organizers to maintain a neat appearance.

b. Single-mode Fiber Patch Cords

- 1) Single-mode fiber patch cords shall be terminated with SC connectors.
- 2) The single-mode fiber patch cord shall consist of a stepped-index 8.3 micron core with 3.0 mm Cordage and a 125 micron cladding. The fiber cladding shall be covered by aramid yarn and a jacket of flame-retardant PVC.
- 3) The single-mode patch cord shall meet or exceed the following requirements:

Return Loss	-50 dB maximum
Operating temperature	-40 to 70° C
Mated connector loss	la = 0.35 dB, a = 0.2 dB
Cable Retention	20 lb. minimum
Connection Repeatability	0.20 dB maximum change 20 per reconnects 0

- 4) Contractor shall provide a quantity of patch cords equal to the number of ports on all patch panels of the appropriate length for the particular application. All slack in

the patch cords shall be appropriately dressed using vertical and horizontal patch cord organizers to maintain a neat appearance.

2. Copper Patch Cords

- a. Provide Category 6, factory made, Modular Patch Cords for each port on the patch panel. All cords shall conform to the requirements of TIA/EIA 568B Commercial Building Telecommunications Cabling Standard, Horizontal Cabling Section, and be part of the UL@ LAN Certification and Follow-up Program. Cords shall be equipped with an 8 pin modular connector on each end and shall conform to the length(s) specified on the detailed drawing. All patch cords shall be factory made and be part of the overall cabling system warranty.
- b. All Category 6 cordage shall be round, and consist of 24-AWG copper, stranded conductors, tightly twisted into individual pairs and shall meet or exceed the electrical specifications listed below.
- c. General Performance Specifications:

DC Resistance per lead	9.40./100m (328 ft), maximum
DC resistance unbalance	5%, Maximum
Mutual Capacitance	6.6 nF/100m (328 ft), maximum
Characteristic Impedance	10052± 15% from 1 to 100 MHz

- d. All station cabling patch cords shall be color-coded to differentiate between different systems. Data cabling shall be blue, voice cabling shall be white, paging system cabling shall be lilac, and security cabling shall be red. Provide Category 6, Patch Cords for each work area jack. The Category 6 Channel, which includes patch cords and horizontal cabling, shall meet the following minimum electrical requirements:

Guaranteed Channel Performance Specifications

Freq.	Insertion Loss	NEXT	PS NEXT	ELFEXT	PS ELFEXT	Return Loss
(MHz)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)
1	2.1	65.0	62.0	63.3	60.3	19.0
4	4.0	63.0	60.5	51.2	48.2	19.0
8	5.7	58.2	55.6	45.2	42.2	19.0
10	6.3	56.6	54.0	43.3	40.3	19.0
16	8.0	53.2	50.6	39.2	36.2	18.0
20	9.0	53.2	50.6	39.2	36.2	17.5
25	10.1	50.0	47.3	35.3	32.3	17.0
31.25	11.4	48.4	45.7	33.4	30.4	16.5
62.5	16.5	43.4	40.6	27.3	24.3	14.0
100	21.3	39.9	37.1	23.3	20.3	12.0
200	31.5	34.8	31.9	17.2	14.2	9.0
250	35.9	33.1	30.2	15.3	12.3	8.0

- e. UTP Patch cord lengths will be deployed as follows:

Length	Location/Application
--------	----------------------

3 ft	From the patch panel to the electronic equipment located within the equipment rack, cabinet or backboard
5 ft	From the patch panel to the electronic equipment located within the equipment rack, cabinet or backboard
7 ft	From the patch panel to the electronic equipment located within the equipment rack, cabinet or backboard and from the jack to the computer workstation

- f. Contractor shall provide a quantity of patch cords equal to the number of ports on all patch panels of the appropriate length and color for the particular application. All slack in the patch cords shall be appropriately dressed using vertical and horizontal patch cord organizers to maintain a neat appearance.

PART 3: EXECUTION

3.01 EXAMINATION AND VERIFICATION

- A. Verify conduits, raceways, boxes, cable tray, handholds and manholes are properly installed following BICSI recommended practices and ANSI/TIA/EIA 569A standards.
- B. Verify backboards are properly installed in all communications rooms.
- C. Verify conduit is minimum 1-inch diameter.
- D. Verify main grounding system is properly installed and tested following Section 16460 Grounding and Bonding for Communications Systems.
- E. Verify liquid-carrying pipes are not installed in or above voice and data system equipment rooms. This includes fire protection sprinkler systems. Do not proceed with installation in affected areas until removed, or approval is given from the MSCAA.
- F. Patch cords shall be warranted under the same channel and performance warranty as the overall structured cabling system. .

3.02 INSTALLATION

- A. Install work following drawings, horizontal cable schedules, manufacturer's instructions and approved submittal data. The number of cables per run, outlet configuration and other pertinent data shall be included on the drawings.
- B. All installation shall be done in conformance with TIA/EIA 568B, BICSI standards and manufacturer's installation guidelines. The Contractor shall ensure that the maximum pulling tensions of the specified distribution cables are not exceeded and cable bends maintain the proper radius during the placement of the facilities. Failure to follow the appropriate guidelines will require the Contractor to provide in a timely fashion the additional material and labor necessary to properly rectify the situation. This shall also apply to any and all damages sustained to the cables by the Contractor during the implementation.
- C. The SCS installation shall meet all applicable national and local codes pertaining to low voltage cable system installations.
- D. The Contractor shall provide service loops (slack) for all horizontal cables. A 6 foot service loop shall be provided above the access ceiling or in cable trays unless specified otherwise. An additional 6 foot service loop shall also be provided above the finished ceiling (or below the floor) in all work areas. This will allow for future changes or expansion without having to install new cables.
- E. The installation shall include coordination, testing and problem resolution with the system manufacturers.

- F. The Contractor shall supply horizontal cables to connect each jack to Room 213. The contractor shall terminate cables at all jacks. Owner will terminate in Room 213.
- G. Unless otherwise noted on the floor plans or within this document, the type of horizontal cables used for each work location shall be 4-pair unshielded twisted pair (UTP).
- H. The 4-pair UTP cables shall be run using a star topology format from the communications rooms on each floor to every work area information outlet. All cable routes shall be approved by MSCAA prior to installation of the cabling.
- I. The Contractor shall observe the bending radius and pulling strength requirements of the 4-pair UTP cable during handling and installation.
- J. Each run of cable between the patch panel and the information outlet (jack) shall be continuous without any joints or splices.
- K. The Contractor shall conceal horizontal distribution wiring internally within the walls. If obstructions exist, the Contractor shall secure approval by MSCAA prior to the use of an alternate method.
- M. At any point where station cables and tie cables installed within ceiling spaces must cross electrical circuits, communications cabling shall be routed at right angles to the electrical power circuits.
- N. Each work area outlet shall have a four, six, or eight jack faceplate over a single gang box, terminating the appropriate amount of Category 6 cables from the telecommunications closet. These cables shall terminate in Category 6 jacks, numbered with the labeling scheme identified in the contract drawings.
- O. Plastic cable ties shall not be used at any location within this project. All cables shall be bundled using Velcro wraps of the appropriate length. Velcro ties shall be installed in such a manner that cables may be easily removed or added to the cable bundle.

3.03 CABLE INSTALLATION

- A. General
 - 1. Any cable placed in space used as an air return or in any way connected with air-handling plenums or building ventilation shall be low-smoke, fire retarding cable, and must comply with the NEC 725, 760, and 800. No cabling shall be placed in plenums without written approval from MSCAA.
 - 2. All station cables shall be Category 6 plenum 4-pair unshielded twisted pair (UTP) copper cable. No substitutions will be accepted.
 - 3. All cables shall be installed per EIA/TIA 568B building standards to designated stations. All cables shall be terminated on Category 6 patch panels within the MCR/ICR/CR and on Category 6 rated 8 position modular jacks at the station end.
 - 4. All cabling will be UL Listed Type CMP or OFNP if it is placed in air-handling plenums without conduit. The cable sheath will be marked with the UL listing. No cabling shall be placed in plenums without written approval from MSCAA.
 - 5. Horizontal UTP and fiber optic cables will not be spliced, nor will these cables contain manufacturer splices.
 - 6. Contractor shall observe the bending radius and pulling strength requirements of the cabling during handling and installation.
 - 7. Contractor shall monitor pull tension continuously during installation and shall not exceed manufacturer's recommended pull tension.
 - 8. A cable lubricant specifically manufactured for cable pulling lubrication purposes and compatible with the cable sheathing material may be used on cables pulled in conduits or ducts to meet pull tension requirements.

9. Petroleum grease shall not be used as a cable lubricant.
 10. All conduit and cabinet entrances shall be sealed with an approved, re-enterable sealant material to prevent ingress of water, dust, or other foreign materials.
 11. The Contractor shall conceal all horizontal distribution wiring within conduit in the walls. If it becomes necessary to use an alternative method, the Contractor shall obtain approval from the MSCAA prior to the use of the alternate method.
 12. Install work following drawings, horizontal cable schedules, manufacturer's instructions, and approved submittal data. The number of cables per run, outlet configuration, and other pertinent data shall be included on the drawings.
 13. The installation shall meet all applicable national and local codes pertaining to low voltage cable system installations.
- B. The installation shall include coordination, testing, and problem resolution with the system vendors.
- C. Upon completion of the installation, the Contractor shall prepare as-built documentation of the entire horizontal cable installation as part of the structured cabling system (SCS). This documentation should include:
1. Drawings
 - a. All drawings shall be provided on CD-ROM in a form compatible with AutoCAD 2010. A complete set of project plans will be provided to the Contractor on disk. The Contractor shall modify the drawings by placing the cable information on a separate layer. All of the requested drawings shall be placed on these plans so that all cable routes are to scale and provide accurate information for use in the future when changes are made and the exact location of cables are required to avoid service interruptions.
 - b. A complete diagram of all terminations in the Communications Rooms.
 - c. A complete diagram of all copper and fiber cable.
 - d. Floor plans showing exact cable routings.
 - e. A complete diagram of all cable tray, conduits, and conduit sleeves and their associated fill ratios.
 2. Documentation
 - a. All cable inventory data documentation shall be submitted in an MSCAA approved format, so that data can be incorporated into cable management system databases. This shall include, but is not limited to, cable termination details, cable labeling information, and routing information.
 - b. Complete cross connect documentation is required.
 - c. Complete test results for all installed cables per manufactures testing procedures.
 3. This data shall be submitted prior to the use of any system components. System acceptance will not be provided without complete as-built documentation.
- D. Horizontal Cabling Installation
1. The 4-pair UTP cables shall be run using a star topology format from the MCR/ICR/CR to every individual Station Outlet. All cable routes shall use a pre-approved route.
 2. Horizontal cables will not be connected directly to telecommunications equipment. Suitable connecting hardware (i.e. patch panels and punch-down blocks) and factory-manufactured patch cords must be used to make the connection.
 3. Patch cords shall be manufactured by the same manufacture as the data patch panels and information modules, meet or exceed Category 6 requirements and specific performance requirements.

4. The length of each individual run of horizontal copper cable from the MCR/ICR/CR shall not exceed 295 ft (90 m) including service loops. The length of the cable described is from the ICR to the outlet.
5. Contractor shall observe and document the bending radius and pulling tension requirements of the 4-pair UTP cable during handling and installation.
6. Each run of cable between the termination block and the Station Outlet shall be continuous without any joints or splices.
7. The Contractor shall conceal all horizontal distribution wiring within conduit in the walls. If it becomes necessary to use an alternative method, the Contractor shall obtain approval from the MSCAA prior to the use of the alternate method.
8. In suspended ceiling where cable trays or conduit are not available, the contractor shall bundle station wiring with velcro cable ties at appropriate distances. The cable bundling shall be supported via "J" hooks attached to the existing building structure and framework using its own mounting equipment, (i.e. grid wire or threaded rod) at proper angles to the cable tray. Plenum rated cable and accessories shall be used in all appropriate areas.
9. No wiring shall be placed in space used as air return, or in any way connected with air handling plenums, or building ventilation unless approval is given from MSCAA.

3.04 CONTRACTOR'S FIELD QUALITY CONTROL

A. General

1. Communications Field verification services shall be required in a timely manner for the purpose of acceptance of the installation.

B. Field Verification Team

1. All members of the field verification team must be certified by the manufacturer as having completed the necessary training to complete their part of the field verification. Resumes of the entire team shall be provided along with documentation of completed training courses.

C. Testing Party Responsibility

1. The testing party shall provide qualified personnel at site after due notice and coordinate with MSCAA in performance of testing services.
2. The testing party shall perform specified inspection, sampling, and testing of products in accordance with specified standards.
3. The testing party shall ascertain compliance of hardware and cabling with requirements of the Contract Documents:
4. The testing party shall promptly notify the MSCAA of observed irregularities or non-conformance of Work or products.

D. Field Verification Reports

1. After each inspection and test, the testing inspectors shall promptly submit 2 copies of field verification report to the designated MSCAA representative.
 - a. Each report shall include:
 - 1) Date Issued.
 - 2) Project Title and number.
 - 3) Project Phase of Testing
 - 4) Field Verification Contractor name, address and telephone number.
 - 5) Name of inspector and job number.
 - 6) Date and time of sampling or inspection.

- 7) Record of temperature and weather conditions.
- 8) Date of test.
- 9) Identification of specification section.
- 10) Location of test in the Project.
- 11) Cable ID where applicable.
- 12) Type of inspection or test.
- 13) Results of tests and compliance with Contract Documents.

b. Interpretation of test results.

E. Contractors Responsibilities

1. Provide incidental labor and facilities to provide access to work to be tested, to facilitate tests and inspections, and for storage of test equipment.
2. Notify the MSCAA (1) week prior to expected time for performing inspection and testing services.

3.02 ACCEPTABLE ATTENUATION VALUES

A. The general attenuation equation for any link segment is as follows:

1. $\text{Link Attn.} = \text{Cable Attn.} + \text{Connection Attn.} + \text{Splice Attn.}$

B. Note: A connection is defined as the joint made by mating two fibers terminated with remateable duplex SC connectors or ST connectors

1. 8.µm Single Mode Attenuation Coefficients

- a. $\text{Cable Attn.} = \text{Cable Length (km)} \times (1.0 \text{ dB/lan@1310nm or } 1.0 \text{ dB/lan@1550nm})$
- b. $\text{Connection Attn. (SC connectors)} = .75\text{dB per connector pair}$
- c. $\text{Fusion Splice Attn.} = \text{Splices} \times 0.20 \text{ dB}$

- 2.. Note: If lower maximum attenuation values are specified by the chosen manufacturer, then the contractor is responsible for meeting those maximum attenuation values specified by the manufacturer.

3.03 TESTING CATEGORY 6

A. The Category 6 cable runs shall be tested for full compliance with TIA/EIA 568-B.1 and B.2-1, Category 6 specifications and construction documents. Testing shall be done with an ANSI/TIA/EIA 568B and TSB-95 UL Certified Level III test set at a minimum. Testing shall be performed as outlined in TSB-67, TSB-95, and ANSI/TIA/EIA 568B specifications and shall include length, wire map, characteristic impedance, attenuation, propagation delay, delay skew, return loss, Near-End Crosstalk (NEXT), Far-End Crosstalk (FEXT), Equal-Level Far-End Crosstalk (ELFEXT), Power Sum Equal-Level Far-End Crosstalk (PSELFEXT), and Attenuation to Crosstalk Ratio (ACR). Both ends shall pass TSB-67, TSB-95, and ANSI/TIA/EIA 568B requirements. Any pairs not meeting the requirements of the standard shall be brought into compliance by the Contractor at no charge to MSCAA. Complete end to end test results must be submitted to the MSCAA.

B. Electrical Characteristics:

Mutual Capacitance	47.8 nF/m
Characteristic Impedance	(± 3%) of 100 Ohms 1-550 MHz
DC Resistance Max	9.83 Ohms/100m)
Positive ACR	Out to 395 MHz-km

B. All Category 6 cables shall meet or exceed the following:

Freq (MHz)	Attn dB/100 m	NEXT (dB)	PS NEXT (dB)	ELFEXT (dB)	PS ELFEXT	Return Loss
0.772	1.6	76.0	74.0	70.0	67.0	I
1	1.8	74.3	72.3	67.8	64.8	20
4	3.6	65.3	63.3	55.7	52.7	23
8	5.1	69.8	58.8	49.7	46.7	24.5
10	5.8	59.3	57.3	47.8	44.8	25
16	7.3	56.3	54.3	43.7	40.7	25
20	8.2	54.8	52.8	41.7	38.7	25
25	9.2	53.3	51.3	39.8	36.8	24
31.25	10.4	51.9	49.9	37.9	34.9	24
62.5	15.0	47.4	45.4	31.8	28.8	22
100	19.3	44.3	42.3	27.8	24.8	20
200	28.3	39.8	37.8	21.7	18.7	18
250	32.1	38.3	36.3	19.8	16.8	17
300	35.6	37.2	35.2	18.2	15.2	17
350	38.9	36.2	34.2	16.9	13.9	16
400	42.0	35.3	33.3	15.7	12.7	16
450	45.0	34.5	32.5	14.7	11.7	16
500	47.9	33.8	31.8	13.8	10.8	15
550	50.6	33.2	31.2	12.9	9.9	15

3.05 OTDR REQUIREMENTS

A. Optical Fiber Cable Testing w/ OTDR

1. The Contractor shall test all fiber optic cable prior to the installation of the cable, the cable shall be tested on-site while on the reel. The Contractor shall assume all liability for the replacement of the cable should it be found defective at a later date.
2. All fiber testing shall be performed on all fibers in the completed end to end system. Testing shall consist of a bidirectional end to end OTDR trace performed per TIA/EIA 455-61. The system loss measurements and cable length shall be provided at 1310 and 1550 for single mode fibers. The OTDR shall be used only to determine the length of the cable and the attenuation of that cable. A power meter shall be used to determine the overall link attenuation, including connectors.
3. Fiber Optic Cables shall have a maximum loss of: (allowable cable loss per km)x(km of fiber in link) = maximum allowable loss
4. Loss numbers for the installed link shall be calculated by taking the sum of the bidirectional measurements and dividing that sum by two. The acquired loss statement shall be for the cable only and shall not include the connectors as part of the calculated loss.
5. Any link not meeting the requirements of the standard shall be brought into compliance by the Contractor, at no charge to the MSCAA.
6. Documentation shall be provided in both hard copy and on a CD-ROM to the point of contact.

3.06 LIGHT METER AND SOURCE**A. Optical Fiber Cable Testing w/ Power Meter**

1. Multimode Inter-Building and Composite Link Segments shall be tested in one direction at both 850-nm and 1300-nm wavelengths, unless warranty requires bi-directional testing.
2. Singlemode Inter-Building and Composite Link Segments shall be tested in one direction at both 1310-nm and 1550-nm wavelengths, unless warranty requires bi-directional testing.
3. Fiber links shall have a maximum loss of: (allowable cable loss per km)x(km of fiber in link)+(.75dB per connector pair)+(.2dB per fusion splice)=maximum allowable loss.

Note: The minor attenuation differences due to test direction are on par with the accuracy and repeatability of the test method. Therefore, testing in only one direction is warranted, unless warranty testing.

END OF SECTION

**MSCAA
DESIGN GUIDE and CONSTRUCTION STANDARDS**

INDEX

<u>SECTION</u>	<u>PAGE</u>
Airfield Construction Standards.....	2
A. Joints and Joint Sealants	2
B. Sodded Areas	2
C. Drainage	2
D. Concrete Aprons	2
E. Perimeter Fence	2
F. Construction Contractors	3
Airfield Electrical Construction Standards	4
A. General	4
B. Testing	4
C. Constant Current Regulators	4
D. Marking and Labeling	5
E. Lighting Cans, Junction Cans, Junction Can Plazas and Hand Holes	5
F. Connectors	6
G. Fixtures	6
H. Signs	6
Facilities Construction Standards.....	8
A. General	8
B. Penetrations	8
C. Signage	9
D. Electrical	9
E. Mechanical	9
F. Plumbing	10
G. Fire Alarm and Suppression Systems	10
H. Antennae	10
I. Miscellaneous	10
J. Construction Contractors	11
Painting Standards	13
A. Airfield	13
B. Roads	13
C. Paint Vendors	13
D. Terminal, Concourses, and South Parking Garage	13
E. Administration Building	14
F. Airfield Maintenance Building	15
G. Miscellaneous	15
Preferred Equipment	16
A. Architectural Finishes	16
B. Plumbing & Restrooms	21
C. Doors	22
D. Electrical	23
E. Mechanical	24
F. Miscellaneous	24

Airfield Construction Standards

A. Joints and Joint Sealants

1. All joints to be beveled on new construction and reseal projects.
2. All concrete joint sealants to be a non-sag silicone or preformed material. Silicone is preferred on reseal projects.

B. Sodded Areas

1. All safety areas are to be 100% sod.
2. All areas that have had earth disturbed shall be sodded and fertilized.
3. Any sodded area within 2' of an apron, pad or drainage structure shall be compacted to a minimum of 95% (Modified Proctor).

C. Drainage

1. Concrete down drains should be installed on any area that is sloped for drainage.
2. Any drain pipes that travel outside the SIDA fence should have proper security grates installed.
3. Outlets should have a run off pad; concrete if preferred but asphalt is acceptable for aprons or run-off pads.
4. The sub-base for concrete down drains, drain inlets or outlets should be compacted to a minimum of 95% (Modified Proctor).
5. All drain and under drain joints or connections should be properly grouted or sealed. All drain inlets and manholes boxes entries shall be properly grouted or sealed inside and outside junction structure.

D. Concrete Aprons

1. All sign bases, junction boxes and manholes on new construction are to have a minimum of a 6 ft. apron around the sign or structure, sloped away from the sign or structure.
2. Aprons should have a minimum thickness of 4".
3. Aprons should be flush with the structure bases and sloped to be flush with soil. The slope shall not exceed the FAA maximum.
4. The sub bases should be compacted for the structure bases and aprons to a minimum of 95% (Modified Proctor).

E. Perimeter Fence

1. Perimeter fence shall be a minimum of 10' tall fabric and shall include three-stand, double-sided barbed wire and 18" diameter concentric razor wire secured at 12" spacing.
2. Perimeter fence shall include a 6' paved lane under the fence. This will eliminate washouts, animal intrusions, reduce maintenance, and allow easy inspections by Airport Police.
3. Rolling, automatic gate operators shall be commercially/industrially rated and designed for high-security environments. Operators for gates with openings less than 15 feet must

operate at a minimum speed of 20” per second. Operators for gates with openings 15 feet or wider must include variable frequency drives and operate at a minimum speed of 36” per second.

F. Construction Contractors

1. The Contractor shall maintain all sodded areas through the duration of the contract. The Contractor shall be responsible for the upkeep of contracted areas including grass cutting, rut repair and maintaining proper drainage ditches.
2. Security gates that are installed must be maintained and in good working order by the contractor for the duration of the contract.
3. All areas that were used by the contractor must be left in conditions that will not hinder the normal routine maintenance of Airfield; this includes, but is not limited to debris removal, grading, drainage, and re-seeding or sod.

Airfield Electrical Construction Standards

A. General

1. Work performed shall be accomplished by crews with a minimum of one licensed journeyman per three apprentices.
2. All temporary cable installations shall be protected either by burying cable in grass areas or by installation in conduit for above ground applications. Other methods may be used for short term or emergency situations if approved by the Airfield Maintenance Electrical Supervisor. Location of temporary cables shall be marked sufficiently to prevent damage from construction and maintenance equipment.
3. In all circumstances enough cable shall be provided at light cans, junction cans and hand holes so as to allow a minimum of 3 feet extending above ground for maintenance purposes. The exception to this is in the installation of taxiway centerline lights on SMGCS routes where two interleaved circuits are present in the same light can. In this instance only the circuit that is attached to the transformer in an individual light can, should have the extra conductor provided. This prevents the can from becoming cluttered unnecessarily.
4. Constant current series circuits shall be limited in capacity to a maximum of 20kW. Preferred capacity is 15kW or less.

B. Testing

1. The contractor shall furnish all necessary equipment and appliances for testing the underground cable circuits after installation.
2. The contractor shall demonstrate that all lighting power and control circuits are continuous and free from short circuits and unspecified grounds.
3. The insulation resistance to ground of all non-grounded series circuits shall be not less than 500 M Ω and shall be maintained at the required level by the contractor during the term of the warranty period.
4. Each new series circuit, or new part of existing circuits being extended or replaced, shall be tested as follows:
 - i. Low voltage megger tests shall be performed to comply with (c.) above. Circuits shall then be subjected to a Hi-Pot test in accordance with engineer's specifications.
5. All new fixture installations may, at the owner's request, be subjected to photometric testing to certify performance in accordance with FAA specifications.

C. Constant Current Regulators

1. The constant current regulators shall be magnetic designs; the susceptibility to extraneous signals of solid-state designs is not acceptable. The regulators shall not have solid-state controls in the series circuit and shall be designed to prohibit radio communications interference. The regulators shall limit transient current peaks without the use of solid-state series circuit controls with soft-on feature.
2. Each regulator shall include a true RMS ammeter, and ON/OFF/REMOTE switch and brightness controls.

3. In addition, the regulators shall be provided with SPDT contacts rated 2 amperes at 120 volts to indicate the following functions for remote monitoring:
4. REMOTE/LOCAL selected at control switch. Primary Power ON.
5. Constant current regulators, including standby regulators furnished or installed by the contractor shall be provided with seismic restraints and include all necessary equipment including control and monitoring equipment (Crouse-Hinds/Transtech digitrac units) to make the regulators operational.

D. Marking and Labeling

1. Wire identification. The contractor shall furnish and install self-sticking wire labels or identifying tags on all control wires at the point where they connect to the control equipment or to the terminal blocks.
2. Series circuit cables shall be identified with Thomas and Betts ty-rap #TY546MT or approved equivalent suitable for wet environments. Metal tags secured by tie wire or other means shall not be acceptable. All marking means shall be approved by the Airfield Maintenance Electrical Supervisor.
3. All conductors of series circuit conductors shall be marked with their circuit designation at all points where the conductor is accessible.
4. The contractor shall furnish and install engraved plastic labels on the cases of regulators, breakers, and distribution and control relay cases. All circuit breakers or other disconnecting means shall be marked and identified with their circuit designation.
5. Fiber optic runs should include #10 THWN stranded yellow tracer wire for locating purposes and connected in its entirety as a continuous conductor. Alternatively, armored fiber optic cables will be considered in lieu of tracer wire.
6. Underground electrical warning tape shall be installed above all underground conduit installations not concrete encased in unpaved areas. Warning tape shall be located as shown on the plans above the counterpoise wire.

E. Lighting Cans, Junction Cans, Junction Can Plazas and Hand Holes

1. Except in extreme cases where other means are not practical, manholes or hand holes larger than 4 feet x 4 feet x 4 feet deep shall not be used.
2. Hand holes shall be equipped with spring loaded/assisted hinged covers of a design easily opened by one person.
3. The preferred method of connectivity shall be by use of junction can plazas consisting of FAA L-868 cans installed in concrete plazas. Each can shall contain a single circuit with the designation of the circuit imprinted in a brass marker embedded in the concrete adjacent to the can. If deemed necessary, and at the approval of the Airfield Maintenance Electrical Supervisor, more than one circuit may be installed in a conduit/can. Can lids should be flush with concrete plazas with dam rings on the cans.
4. All ducts installed under paved areas shall be encased in concrete.
5. All unused conduits shall have the open ends plugged with removable tapered plugs and be provided with a pull rope equivalent to IDEAL Power-Fish pull line (200 lb strength)

6. Drain lines shall be installed to provide positive drainage to eliminate standing water in airfield lighting bases, junction cans, and hand holes in locations determined by the designer.
7. L-868 cans used for the installation of in-pavement lights shall be of a two-piece design with the top section including a multi-hole ring (VEGA #2419MEM) as manufactured by Jaquith Industries.
8. Fixture hold down bolts shall be all-thread stainless steel, type 304 or as recommended by the fixture manufacturer.
9. Fixture hold down bolts for in-pavement lights shall be tightened to the proper torque per fixture manufacture's specifications. All bolt holes shall be cleaned using a source of compressed air prior to installation of any bolts. Threads on all bolts shall be coated with anti-seize compound approved for use on stainless steel. Bolts shall not extend past the threaded adapter ring or into the can. Final tightening of the bolts shall be done using a properly calibrated torque wrench of the required range and verified by the engineer. Electrically or pneumatically operated wrenches shall not be used to achieve the final torque on bolts.
10. Lock washers installed on hold down bolts for all fixtures shall be two piece 316 or 316L stainless steel washer. CRC type washers shall not be acceptable.
11. All cans shall have factory-installed hubs. Grommet cans are **not** acceptable unless approved for the application by the Airfield Maintenance Electrical Supervisor. Stub-in connections into existing light bases shall be Meyers hub installation.

F. Connectors

1. L-823 connectors used to splice L-824 type C #8 AWG cables shall be Elastimold style 54-D4-D4 or equivalent. L-823 connectors shall be made waterproof by a double layer of rubber tape (scotch 23 or equal) covered by a double layer of plastic tape (scotch 88 or equal). Heat shrink, is not allowable. One-piece shrink kits that encapsulate the entire splice shall not be used. Provide Scotch 23/Scotch 88 waterproofing at center connection to extend 1-1/2" each side of break and at each end of splice kit.

G. Fixtures

1. Runway and taxiway elevated light fixtures shall use a quartz bi-pin type lamp of the minimum wattage required for the application unless LED fixtures are approved by Airfield Maintenance Electrical Supervisor.
2. In-pavement fixtures should be manufactured of aluminum and utilize no more than two lamps with a maximum total wattage of 100 watts per fixture. L-850C edge lights and fixtures used for stop bars and runway guard lights may exceed this wattage, however.

H. Signs

1. Signs should be re-lampable without the use of tools.
2. Concrete foundations for signs shall contain separate housings for transformers. Transformers shall not be housed under a leg of the sign or any portion of the sign. Sign power should be fed through the sign leg.

3. Where practical, signs should be style 5, size 3, and be installed on a dedicated circuit.
4. All signs installed on the airfield should be marked on each end with 4" vinyl reflective labels with the sign's designation as shown on the plans.

Facilities Construction Standards

A. General

1. All work shall comply with the applicable construction codes and MSCAA standards. The contractor shall be responsible for construction code permits and shall arrange for all code required inspections. Copies of permits shall be supplied to the Manager of Building Maintenance.
2. Utilities will not be interrupted without prior coordination and approval from the MSCAA Building Maintenance Manager, telephone number (901) 922-8615 or the Maintenance Service Desk at (901) 922-8040. Approval is required for each and every interruption. A minimum of a 24-hour notice is required for utility interruptions.
3. All salvaged equipment shall be returned to MSCAA at their designated location for their use or disposed of off-site as directed by MSCAA.
4. Asbestos Containing Materials (ACMs) are specifically prohibited without specific written approval from MSCAA. Any installation of ACMs without prior written approval must be removed immediately by the installer in accord with local ACM removal regulations.

B. Penetrations

1. All concrete floor and roof penetrations must be accomplished by core drilling. Use of rotary hammer or other impact tools for this purpose is prohibited. Core drilling efforts must be coordinated with tenants occupying space below the cored floor slab. The contractor will be responsible for any damage resulting from core drilling.
2. Sealing of new and pre-existing floor penetrations must be filled full depth with hydraulic cement and sealed with epoxy or polyurethane caulk as noted under the Preferred Brands heading (pages 17 & 18). The installation shall be inspected by the MSCAA Development Division. Contractor shall coordinate with MSCAA Development Division for any x-ray or ultra-sound requirements for concrete floor/roof penetrations. No drilling through concrete beams unless approved by Development.
3. When drilling or core drilling through floors, walls, ceilings etc., the contractor is responsible for inspecting for electrical, plumbing, etc and is fully responsible for all repairs to anything damaged.
4. No drilling or ramset fastening is allowed in pan sections of the concrete structure. Any attachments installed above the ceiling will be suspended from the joist structure only.
5. No holes shall be drilled and no anchors shall be attached to the glazed brick, glazed wall tiles, or metal wall panels. Attachments shall be anchored in the mortar joints exclusively.
6. Penetrations through the roof are typically prohibited. When unavoidable, roof penetrations shall be coordinated with MSCAA and will be the responsibility of the contractor to restore the roof to such a condition as not to invalidate the roof warranty.
7. Hydraulic cement and core drill sealant shall be installed full depth. After curing, epoxy or polyurethane caulk shall be applied at the bottom of the plug and polyurethane caulk shall be applied at the top surface.

C. Signage

1. Signage shall comply with the standards established by MSCAA and final approval shall be the responsibility of MSCAA Development Division.

D. Electrical

1. Fiber optic runs should include #10 THWN stranded yellow tracer wire for locating purposes and connected in its entirety as a continuous conductor. Alternatively, armored fiber optic cables will be considered in lieu of tracer wire.
2. All electrical conductors will be installed in conduit and use of flex conduit is limited to runs of 6 feet or less. Conduit couplings and connectors utilizing setscrew fasteners are prohibited. Conduit shall be concealed from public view wherever possible. All conduits and electrical raceways shall contain an equipment grounding conductor.
3. All electrical conductors #14 AWG & larger shall be stranded copper wire unless otherwise approved in writing by MSCAA.
4. All emergency devices including emergency lights, exit lights, etc., shall be connected to emergency circuits. MSCAA does not allow battery packs.
5. MSCAA does not allow Bodine ballasts in fluorescent lighting fixtures. LED is preferred in all lay-in fixtures. Prior approval by Development must be received for use of fluorescent lay-in fixtures and the lamps shall be T8.
6. All use of cable trays is subject to MSCAA review and approval. Conduit installation must be independently supported and shall not be strapped to cable trays or any of the cable trays' support systems, including hangers and braces.
7. All equipment shall meet the appropriate UL listing for its intended purpose.
8. 23-kV rated cable shall conform to MLG&W standards. This requires cable having an aluminum or copper conductor, extruded conductor shield, ethylene propylene rubber insulation, extruded semi-conducting insulation shield, copper concentric neutral, and polyethylene jacket. The cable shall be suitable for direct burial, conduit/duct and aerial installations. All designers should re-verify MLG&W standards prior to publication of construction documents.

E. Mechanical

1. The use of flex duct shall not exceed more than four (4) feet and banded with metal straps, no tape. Use of flex duct other than at the end of a line or connected to air diffusers must be approved by MSCAA.
2. Controls for the HVAC system shall be open architecture and compatible with the JCI Metasys Extended Architecture System.
3. VAV Boxes shall be pressure dependent, electronic controls with no auxiliary fan or local filter.
4. A copy of the test and balance report shall be submitted to MSCAA Development. An independent contractor shall perform the testing and complete the report.
5. The contractor shall align all motors to the associated pump, gearbox, fan, etc. MSCAA Development and Maintenance shall inspect alignment prior to acceptance. Maximum

allowable angular and parallel misalignment is 0.003.

6. Heat trace cables shall have indicator lights installed in a visible location that illuminate when the cables are in operation.
7. UV lighting in HVAC and HEPA (MERV-14 Rating) filtration systems.

F. Plumbing

1. Brass ball valves shall be installed at the water supply point of origin and in the ceiling directly above any newly installed plumbing fixture where a utility chase wall is not present. If a walk-in utility chase exists, then ball valves shall be installed in the accessible chase no more than five (5) feet above finished floor. There shall be no more than 4 plumbing fixtures on one ball valve. Brass valve tags shall be placed on all newly installed valves clearly identifying the origin and destination.

G. Fire Alarm and Suppression Systems

1. The fire suppression system shall interface with the airport's Simplex Fire Alarm System.
2. All dry sprinkler pipe and fittings must be galvanized. All grooves in piping shall be the correct depth per industry standards.
3. See section Facilities Construction Standards – Construction Contractors for additional requirements.

H. Antennae

1. All work shall comply with the applicable construction codes and MSCAA standards.
2. No antenna is permitted on the roof; it must be installed within the infrastructure on one of the antenna farms or roof mounted antenna racks or in very limited cases with prior approval parapet mounted. Proposed antenna locations must be approved by MSCAA Development.
3. Cables are not allowed on the roof or to run bare down a wall. A conduit from the parapet location down the wall with an LB connector into the wall below the spandrel beam is required. Parapet mount must be properly sealed to prevent leaks through the concrete. Any wall penetrations must also be sealed. Cables from antennas mounted on racks must utilize the conduit pathway at the rack location.
4. Cables above the ceiling must be independently supported from the roof structure and run by a licensed low voltage contractor, or a licensed electrical contractor, in accordance with applicable codes.
5. Installer shall be responsible for construction code permits and shall arrange for all code required inspections. Copies of permits shall be supplied to the Manager of Building Maintenance.
6. MSCAA Maintenance will not provide the escort for antenna work; either installer or Operator must be badged or tenant will have to escort antenna personnel.

I. Miscellaneous

1. Relocation and/or removal of any security device including CCTV cameras, access control

equipment, etc. must be approved by MSCAA Development.

2. Non-shrink grout shall be used with all tile work, up to four (4) feet in height, laid on top of an approved waterproofing membrane.
3. All 12" X 12" ceiling tile shall be installed with the arrow on the back of the tile pointing south.
4. All flammable gas and liquid systems that are piped into buildings shall be properly equipped with seismic shutoff valves. Seismic shutoff valves shall be designed and installed to comply with all governing code requirements, insurance requirements, and MSCAA Construction Standard requirements. In the case of conflict between the listed requirements, the most stringent shall apply.
5. For in-pavement loop installations, loop wire must meet IMSA Spec 51-7. Lead-in wire, if needed, must meet IMSA Spec 50-2. Loop wire shall be one continuous length with no splices from the junction box or control cabinet and back again. The wire shall be twisted by hand four twists per foot in the lead-in slot. Loops must be cut in a rectangular shape, with each 90 degree corner transected with a 45 degree cut to prevent over bending/stressing of the loop wire. Loop saw cuts should be ¼" to 3/8" wide and a minimum of 1½" deep in concrete and 2" deep in asphalt. Loop Lead-in saw cuts should be 3/8" wide and a minimum of 1½" deep in concrete and 2" deep in asphalt. Properly seal the saw cuts with Dow Corning 890 SL self-leveling sealant.
6. The terrazzo floor shall be protected during construction. The removal, cutting, disfigurement or covering of the Terrazzo floor shall be reviewed and approved by MSCAA Development.
7. Only black steel pipe is permitted for use on systems containing diesel fuel, including tank vent stack piping, tank fill piping, and tank drain piping. No other material, including galvanized pipe, is allowed.
8. 90° brushed stainless steel corner protectors shall be installed on all new interior wall construction. The protectors shall be type 304 grade stainless, 22 gauge, 44" tall, 1.5" wings with a 3/8" wall grip edge, and a 1" radius at the top. Protectors shall be installed on top of the cove base and be adhered to the wall with F-26 construction adhesive.
9. Fire rated solid wood blocking that extends from wall stud to wall stud shall be installed for support of framed openings, wall mounted cabinets, wall mounted door hardware, wall mounted monitors, plumbing fixtures, toilet partitions, toilet accessories, mirrors, etc. on all new construction walls or remodels, excluding brick or block walls.
10. All fryers in kitchens must include automated in-line used cooking oil containment systems for proper collection and disposal. Tenants will be responsible for installation, maintenance, and used cooking oil recycling.

J. Construction Contractors

1. Electrical work performed shall be accomplished by crews with a minimum of one licensed journeyman per three apprentices.
2. The Contractor shall be responsible for maintaining a clean construction site and any space used for the removal of debris. The contractor shall be responsible for repair of any damage

caused by construction to as good or better condition.

3. If directed by Development the Contractor shall erect a temporary wall around the construction site. All temporary walls shall be constructed of metal studs; anchored on bottom with double stick tape and anchored to the roof deck on top (attachment to ceiling tiles or grid is prohibited). The outside (public side) of the wall shall be finished floor to ceiling with 5/8" drywall with 2 coats of flat off white latex paint. The bottom of the wall shall be trimmed with 4" black cove base. A 2"x6" chair rail, blocked 2" off the wall, shall be installed 36" to center above finished floor. The chair rail shall be sanded and painted with two coats of bronze paint (PPG Pitt-Tech Acrylic High Gloss DTM Industrial Enamel – Bronze Tone). The Contractor shall retain responsibility during construction to maintain the wall for aesthetic and security issues. MSCAA Development Division shall approve its location, any attachments to terrazzo floors and all signage and/or graphics. For short durations and in areas of limited public visibility, temporary walls may consist of metal studs and BC grade plywood with a high build primer and premium latex paint; use of these materials is allowed only with specific approval from MSCAA Development Division.
4. Walk-off mats shall be used at all access points to the construction area to prevent tracking of dust and debris and is responsible for cleanup if any dirt, dust and/or debris gets outside their construction limits.
5. When accessible to the public, the schedule of construction efforts and removal of debris shall be coordinated so as not to disrupt other tenants or endanger the safety of the public. Final approval shall be the responsibility of MSCAA Development Division. Unless directed otherwise, working at MEM requires a badge; coordinate with MSCAA Operations Division for specific project requirements. For badging information, the Identification Office telephone number is (901) 922-8005.
6. The contractor shall inform MSCAA Development Division, telephone number (901) 922-8033 at least 48 hours prior to startup of construction.
7. A set of completed as-built drawings shall be supplied to Development upon completion of the project.
8. Fire Alarm System – the Contractor shall contact Simplex to verify that the designer worked with Simplex during the design. If design is the responsibility of the Contractor, Contractor shall contact Simplex to design the installation.
9. A pre-test of the modifications to the fire alarm system shall be conducted with Simplex and the Contractor. This pre-test must be scheduled and successfully completed at least 24 hours in advance of any test with the Memphis Fire Department. MSCAA's Development Maintenance and Communications will participate in the pre-test, so close coordination is required. A minimum of 72 hours advanced notification is required to both Simplex and MSCAA to schedule the pre-test. The pre-test must be performed after hours. Upon completion of the pre-test, Simplex will provide written confirmation of the successful completion of the pre-test, a copy of which is to be provided to the MFD fire marshal, and a copy is to be provided to MSCAA.
10. The test with the Memphis Fire Department for occupancy must be performed after hours and closely coordinated with MSCAA Development, Maintenance and t Communications. Provide MSCAA a copy of any documentation from MFD, including deficiencies noted

with the fire system, or approval of the system.

Painting Standards

A. Airfield

1. Airfield painting shall comply with the latest revision of the P-620 specification. Thermoplastic markings are not acceptable.

B. Roads

1. Road painting shall comply with the latest revision of the TT-P-1952 specification. Thermoplastic markings are not acceptable.

C. Paint Vendors

1. This vendor list is provided for reference only in regards to the specific products listed in the following paragraphs. The list is not exhaustive or exclusive as equivalent vendors will be considered by MSCAA Paint Shop.
2. PPG Architectural Finishes, Inc. (1525 Three Place, Memphis, TN, 38116)
3. Sherwin-Williams (3850 Lamar Avenue, Suite 1, Memphis, TN)
4. Farrell-Calhoun (3185 Millbranch Avenue, Memphis, TN)

D. Terminal, Concourses, and South Parking Garage

1. Exterior White Fasciae, Cargo Docks, Ramp, Walls, and Columns
 - i. Sherwin-Williams Universal Primer (or equivalent)
 - ii. PPG Pitt-Tech Acrylic Satin – White
 - iii. Sherwin-Williams A-100 Acrylic Satin – White
2. Exterior CMU Walls
 - i. Block Filler
 - ii. PPG Pitt-Tech Acrylic Satin – White
 - iii. Sherwin-Williams A-100 Acrylic Satin – White
3. Interior Walls
 - i. Sherwin-Williams B31W4400 Promar 400 Interior Latex Semi-Gloss – White
 - ii. Farrell-Calhoun Acrylic Interior Semi-Gloss Latex Enamel 650 – Carriage House
 - iii. Offices (including Airport Police, most of Building Maintenance, and Cargo Building Offices): Farrell-Calhoun Acrylic Interior Semi-Gloss Latex Enamel 650 – Carriage House
 - iv. Offices (Mezzanine & Apron level concourse B): Farrell-Calhoun Interior Premium Eggshell Latex Enamel 370 – Snowglory
 - v. Gypsum Ceilings/Walls: Pittsburgh Paints PPG 1006-1 Color: Gypsum Various Sheens

- vi. Aluminum Curtainwall: Valspar Sherwin Williams Fluorpon Special Color: Special White 391B495
- 4. Doors and Frames
 - i. Brown Doors: Sherwin Williams Pro Industrial Acrylic Semi-Gloss – Kodiak Olive
 - ii. Green Doors: Sherwin Williams Pro Industrial Acrylic Semi-Gloss – Blarney Stone
 - iii. Brown Frames: Sherwin Williams Pro Industrial Acrylic Semi-Gloss – Bronze Tone
 - iv. Grey Frames and doors: Farrell-Calhoun Interior Alkyd Enamel Semi-Gloss – Zen Retreat
 - v. White Frames and doors (Concourse B): Farrell-Calhoun Interior Alkyd Enamel Semi-Gloss - Gypsum
- 5. Window Bases
 - i. Farrell-Calhoun Acrylic Interior Semi-Gloss Latex Enamel 650 – Carriage House
- 6. Exterior Metal Structures
 - i. Alkyd Industrial Gloss Enamel – White
 - ii. Alkyd Industrial Gloss Enamel – Farrell Calhoun Zen Retreat
- 7. Interior Metal Structure (Concourse B)
 - a. PT-2 Valspar Super Special White
- 8. Rotunda Columns (located in the “Y” of the B Concourse)
 - a. PT-2 Valspar Super Special White
- 9. ID Office
 - i. Walls: Farrell-Calhoun Interior Premium Eggshell Latex Enamel 370 – Carriage House
 - ii. Doors and Frames: match Terminal & Concourses doors and frames
- 10. Management Work Room
 - i. Walls: Farrell-Calhoun Interior Premium Eggshell Latex Enamel 370 – Carriage House
 - ii. Doors and Frames: match Terminal & Concourses doors and frames
- 11. FIS
 - i. Walls: Farrell-Calhoun Acrylic Interior Semi-Gloss Latex Enamel 650 – Carriage House
 - ii. Doors: PPG Pitt-Tech Acrylic Satin DTM Industrial Enamel 90-475 – Quick Silver
 - iii. Frames: PPG Pitt-Tech Acrylic Satin DTM Industrial Enamel 90-709/05 – Dark Silver
- 12. Painted Floors (Building Maintenance areas)
 - i. Farrell-Calhoun Floor and Deck Enamel 702 – Medium Gray

E. Administration Building

- 1. Walls

- i. Ceilings: Farrell-Calhoun Interior Premium Eggshell Latex Enamel 370 – Zurich White
- ii. Walls: Farrell-Calhoun Interior Premium Eggshell Latex Enamel 370 – Carriage House
- 2. Interior Doors and Frames
 - i. Sherwin-Williams Semi-Gloss Oil Base 1019 – Grey Statue

F. Airfield Maintenance Building

- 1. Walls
 - i. Walls: Farrell-Calhoun Acrylic Interior Semi-Gloss Latex Enamel 650 – Carriage House
- 2. Doors and Frames
 - i. Doors: PPG Pitt-Tech Acrylic Satin DTM Industrial Enamel 90-475 – Quick Silver
 - ii. Frames: PPG Pitt-Tech Acrylic Satin DTM Industrial Enamel 90-709/05 – Dark Silver

G. Miscellaneous

- 1. De-Ice Tanks
 - i. Farrell-Calhoun Premium Alkyd Industrial Gloss Enamel 800 – White
- 2. Exterior Light, Sign Pole, Sign Bases, and Bollards
 - i. PPG Alkyd Industrial Enamel Gloss Z-Line – Bronze Tone
- 3. Ticket Spitters and Bollards
 - i. Farrell-Calhoun Premium Alkyd Industrial Gloss Enamel 800 – Safety Zone Yellow
- 4. Colored Metal Surfaces
 - i. Red: Farrell-Calhoun Premium Alkyd Industrial Gloss Enamel 800 – International Red
 - ii. Orange: Farrell-Calhoun Premium Alkyd Industrial Gloss Enamel 800 – International Orange
 - iii. Yellow: Farrell-Calhoun Premium Alkyd Industrial Gloss Enamel 800 – Safety Zone Yellow

Preferred Equipment

A. Architectural Finishes

1. Flooring: VCT – Armstrong
2. Cove Base
 - i. Terminal Building: Armstrong or Roppe
 - ii. Administration Building: Johnsonite Rubber 700 Series; 4” high; #24 Grey Haze
 - iii. Offices: Flexco Rubber wallflowers series; 4” high; #03 Charcoal
3. 4” Rubber Wall Base
 - i. Manufacturer: Roppe
 - ii. Color: 123 Charcoal
4. 3/8” Epoxy Terrazzo TZ-3
 - i. Manufacturer: Key Resin
 - ii. Color: KEY 100-1779 Gull Wing Grey
 - iii. Location: Concourse B
5. 3/8” Epoxy Terrazzo TZ-1
 - i. Manufacturer: Key Resin
 - ii. Color: KEY 001-563 White Diamond
 - iii. Location: Concourse B
6. 3/8” Epoxy Terrazzo TZ-2
 - i. Manufacturer: Key Resin
 - ii. Color: Key 28-27 Hearthstone
 - iii. Location: Concourse B
7. 3/8” Epoxy Terrazzo TZ-4
 - i. Manufacturer: Key Resin
 - ii. Color: KEY 100-675 Pewter
 - iii. Location: Concourse B
8. 3/8” Epoxy Terrazzo TZ-5
 - i. Manufacturer: Key Resin
 - ii. Color: KEY 100-2018 Whale Gray
 - iii. Location: Concourse B
9. 3/8” Epoxy Terrazzo TZ-6
 - i. Manufacturer: Key Resin

- ii. Color: KEY 001-563 White Diamond
 - iii. Location: Concourse B
- 10. 3/8" Epoxy Terrazzo TZ-7
 - i. Manufacturer: Key Resin
 - ii. Color: KEY 001-754 Whiteish
 - iii. Location: Concourse A, B, & C Terminals
- 11. 3/8" Epoxy Terrazzo TZ-8
 - i. Manufacturer: Key Resin
 - ii. Color: KEY 012 Black
 - iii. Location: Concourse B
- 12. 3/8" Epoxy Terrazzo TZ-9
 - i. Manufacturer: Key Resin
 - ii. Color: KEY 001-753 White Glass
 - iii. Location: Concourse B
- 13. Accent Wall Tile T-1A
 - i. Manufacturer: Fireclay
 - ii. Product: Glazed Wall Tile White Clay Body (3"X12")
 - iii. Color: White Wash (V1)
 - iv. Grout Color: Laticrete #89 Smoke Grey
 - v. Location: Concourse B
- 14. Accent Wall Tile T-1B
 - i. Manufacturer: Fireclay
 - ii. Product: Glazed Wall Tile White Clay Body (3"X12")
 - iii. Color: Foggy Morning
 - iv. Grout Color: Laticrete #89 Smoke Grey
 - v. Location: Concourse B
- 15. Accent Wall Tile T-1C
 - i. Manufacturer: Fireclay
 - ii. Product: Glazed Wall Tile White Clay Body (3"X12")
 - iii. Color: Powder Blue
 - iv. Grout Color: Laticrete #89 Smoke Grey
 - v. Location: Concourse B
- 16. Accent Wall Tile T-1D

- i. Manufacturer: Fireclay
 - ii. Product: Glazed Wall Tile White Clay Body (3”X12”)
 - iii. Color: Mayan Blue
 - iv. Grout Color: Laticrete #89 Smoke Grey
 - v. Location: Concourse B
17. Accent Wall Tile T-1E
- i. Manufacturer: Fireclay
 - ii. Product: Glazed Wall Tile White Clay Body (3”X12”)
 - iii. Color: Martinique
 - iv. Grout Color: Laticrete #89 Smoke Grey
 - v. Location: Concourse B
18. Porcelain Tile T-2 (restroom Floor)
- i. Manufacturer: Casalgrande Padana
 - ii. Product: Balsaltina 18”X18” Naturale Finish
 - iii. Color: Linosa
 - iv. Grout Color: Laticrete #45 Raven
 - v. Location: Concourse B
19. Ceiling Tile
- i. Armstrong 2’ x 2’, Cortega Angled Tegular 704A (2’ x 2’ x 5/8”)
 - ii. Armstrong 2’ x 2’, Fissured Square Lay-in 756A (2’ x 2’ x 5/8”)
 - iii. Armstrong 2’ x 4’, Cortega Second Look 2765 (2’ x 4’ x 3/4”)
 - iv. Armstrong 44”X 48”, Optima Techzone
 - v. Armstrong 2’ X 2’, Ultima
20. Ceiling Grid: Armstrong Prelude
- i. Mains: 7300
 - ii. 4’ Ts: XL7348
 - iii. 2’ Ts: XL7328
 - iv. Wall mold: 7800
21. Ceiling Grid: Armstrong Suprafine XL
- i. Location: Concourse B
22. Ceiling Metal Panel:
- i. Accent Ceilings & Walls
 - ii. Perforated Aluminum Acoustic Backing Torsion Spring Hinged Pans

- iii. Color: Ultra White
- iv. Location: Concourse B
- 23. Ceiling Linear Metal
 - i. Accent Ceilings & Walls
 - ii. Pattern: Barcode
 - iii. Color: 8424 Walnut
 - iv. Location: Concourse B
- 24. Carpet (Hold Rooms)
 - i. Style Name: Resonance
 - ii. Style Number: J0118
 - iii. Color: 00406 Saddle
 - iv. Vendor: Continental Flooring (800-825-1221 Ext 206)
 - v. The pattern for the carpet is to run perpendicular to the concourse for hold room installations.
- 25. Carpet (Offices)
 - i. Style Name: Live Wire
 - ii. Style Number: 54733
 - iii. Color: 33506 Animated
 - iv. Vendor: Continental Flooring (800-825-1221 Ext 206)
- 26. Carpet (MEM Executive Offices)
 - i. Style Name: Ripple Effect
 - ii. Style Number: J0116
 - iii. Color: 00501 Laughs & Yawns
 - iv. Vendor: Continental Flooring (800-825-1221 Ext 206)
- 27. Carpet CPT-1 (Concourse B)
 - i. Manufacturer: Interface
 - ii. Product: Custom Soundwave Verse Sample
 - iii. No: 265317-005
- 28. Carpet Tile CPT-1A (Concourse B)
 - i. Manufacturer: Interface
 - ii. Product: Custom Groundwaves Verse Samples
 - iii. No: 265317-008
- 29. Carpet Tile CPT-1B (Concourse B)

- i. Manufacturer: Interface
 - ii. Product: Custom Off Line Sample
 - iii. No: 265317-007
- 30. Carpet Tile CPT-1 (Concourse B)
 - i. Manufacturer: Interface
 - ii. Product: Custom Off Line Sample
 - iii. No: 265317-002
- 31. Carpet Tile CPT-1D (Concourse B)
 - i. Manufacturer: Interface
 - ii. Product: Custom SL910 Sample
 - iii. No: 265317-013
- 32. Wood Paneling (Concourse B)
 - i. Strait Grain
 - ii. Species: White Oak
 - iii. Color: Custom
- 33. Quartz QZ-1 (Concourse B)
 - i. Manufacturer: Silestone
 - ii. Color: Blanco Maple
- 34. Quartz QZ-2 (Concourse B)
 - i. Manufacturer: Silestone
 - ii. Color: Cemento Spa. Polished Finish
- 35. Quartz QZ-3 (Concourse B)
 - i. Manufacturer: Cambria
 - ii. Color: Berwyn
- 36. Quartz QZ-4 (Concourse B)
 - i. Manufacturer: Cambria
 - ii. Color: Whitehall
- 37. Quartz QZ-5 (Concourse B)
 - i. Manufacturer: Silestone
 - ii. Color: Cemento Spa. Polished Finish
- 38. Quartz QZ-6 (Concourse B)
 - i. Manufacturer: Silestone
 - ii. Color: Whitehall

39. Quartz QZ-7 (Concourse B)
 - i. Manufacturer: Silestone
 - ii. Color: Whitehall
40. Curtain Wall (Concourse B)
 - i. Manufacturer: Kawneer
 - ii. Product: 1600 System 2
 - iii. Color: Interior Valspar Super Special White / Exterior Clear Anodized
41. Epoxy Flooring (Concourse B)
 - i. Manufacturer: BASF Building Systems
 - ii. Product: BASF Masterdeal 2500 LT Duty
 - iii. Color: Gray
42. Epoxy Flooring (Concourse B)
 - i. Manufacturer: Dex-O-Tex
 - ii. Product: Color Flake L
 - iii. Color: BX 520
43. Exterior Aluminum Composite Metal Paneling (Concourse B)
 - i. Manufacturer: Alucobond
 - ii. Product: Alucobond Plus – fire rated core
 - iii. Colors:
 1. Type 1: Titanium Metallic II
 2. Type 3A: Southwest Gold Metallic
 3. Type 3B: Harvest Gold Mica
 4. Type 3C: Driftwood Mica

B. Plumbing & Restrooms

1. Flush valves: Sloan, Royal
2. Electronic flush valve retrofits:
 - i. Urinals: Zurn ZRK-C-3.5, 3.5 GPF
 - ii. Water Closets: Zurn ZRK-C-3.5, 3.5 GPF
3. Plumbing fixtures: Crane, American Standard, Kohler
4. Partitions: Accurate, Stainless Steel, No sight design, overhead braced, Continuous, Hinge type-Integral, Hinge In-swing/out-swing standard closed position, Floor mounted
5. Sinks: American Standard, 0355.012 Lucerne wall mounted Lav. sink w/4" centers

6. Service Sinks: 8” centers w/ ZURN Z841M1 Faucet
7. Urinals: 6501.010 wash brook urinal American Standard white. Zurn Retro Flush Valve.
8. Water Closets
 - i. Wall-mounted: American Standard 2257.103 af wall toilet 4 bolt wall mount, white
 - ii. Floor-mounted: Kohler K-4368
9. Lavatories
 - i. Non-ADA: American Standard, vandal resistant lavatory faucet with grid drain 2385.130 polished chrome
 - ii. ADA: Delta – 511-WFHDF
10. Faucets: Sloan Optima EBF-85M infrared
11. Water closet gaskets: Wade Part # M-8 for wall hung closets
12. Backflow devices: Watts
13. Water coolers: Halsey Taylor – model #HAC8FS-Q(SS) wall-mounted
14. Toilet Accessories: Bobrick
 - i. Recessed towel dispenser and waste receptacle: B-3961
 - ii. Surface mounted toilet tissue dispenser: B-2888
 - iii. Sanitary napkin disposal: B-270
 - iv. Heavy duty robe hook: B-2116
 - v. Handicap tilt mirror: B-293 (24” x 36”)
 - vi. Grab bars: stainless steel with Snap Flange
15. Toilet Accessories: Non-Bobrick
 - i. Foam Dispenser – Spartan Chemical Company 975700
 - ii. Toilet paper dispenser: Shoreline 830 from Memphis Chemical (not for use in public restrooms)
 - iii. Toilet Seat Cover Cabinet: Franklin Brass #1988 (Stainless Steel)
16. Eye Wash Station: Bradley S19314F
17. Angle Stops: Brasscraft

C. Doors

1. Exterior: Steelcraft Door; 16 gauge metal, galvanized; fully reinforced for door closer and continuous gear hinge; with 24” x 32” window prep (if specified)
 - a. Standard doors shall be 3.0’ x 7.0’.
 - b. Jet Bridge doors shall be 4.0’ x 7.0’.
2. Interior: 3070 (3.0’ x 7.0’) solid core wooden door with prep for continuous gear hinge; with 24” x 32” window prep (if specified)

3. Window Kits (if specified): Anemostat #LOPRO Visionlite 24"x32" with Tempered Glass
4. Metal Frames: Fit door openings to frame for a Steelcraft door or solid core wooden door with fully reinforced frame for door closer and continuous gear hinge
5. Threshold: Aluminum to fit door frame
6. Drip Caps: 16 ad if outside door
7. Closers:
 - a. Standard Doors: LCN model 4041, arm RW/ PA, finish to match existing areas adjustment size 1-6 PC 23
 - b. Jet Bridge Doors: Dorma 1816HT Series with smoke detector
8. Hinges:
 - a. New doors shall have reinforcement on the hinge side and hinges shall be continuous geared hinges by National Guard Products, Stanley, or PBB. Minimum 0.120-inch thick hinge leaves with minimum overall width of 4 inches; fabricated to full height of door and frame. Fabricate hinges non-handed and to template screw locations. Continuous hinges guaranteed for the life of the opening.
 1. At electrified hardware locations provide electric transfer continuous hinges with a 12" removable hinge modification accessible without de-mounting door from the frame and Molex standardized plug connectors to accommodate up to 12 wires. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Provide sufficient number of concealed wires to accommodate electric function of specified hardware. Preferred hardware is Von Duprin EPT10.
 - b. Existing doors without reinforcement on the hinge side shall use hinges by Stanley FBB 179-4.5 x 4.5 x USP x NRP
9. Lock Prep: Yale 6-pin lockset-PB5407LN 694X497 Finish – US 10B
10. Keyways: 6-pin LFIC Cores with SA keyway
11. Panic Hardware: Dorma 9000 Series or Von Duprin RX QEL 98NL-F
12. Flush Bolts: Trimco, Burns, or Ives. Provide manual flush bolts with top rod of sufficient length to allow bolt location approximately six feet from the floor. Furnish dust proof strikes for bottom bolts. Surface bolts to be 8" in length and U.L. listed for labeled fire doors.
13. Low voltage door operators: Dorma ED900 Series or LCN 9000 Series

D. Electrical

1. Wire: THHN or equal for insulation
2. VFDs: PowerFlex 400 by Allen-Bradley including latest harmonic distortion units w/ Metasys board
3. High Voltage Substations: General Electrical, Cutler Hammer
4. Panels, breakers, and contactors: Westinghouse, ITE (Siemens), Square D, Allen Bradley,

Cutler Hammer

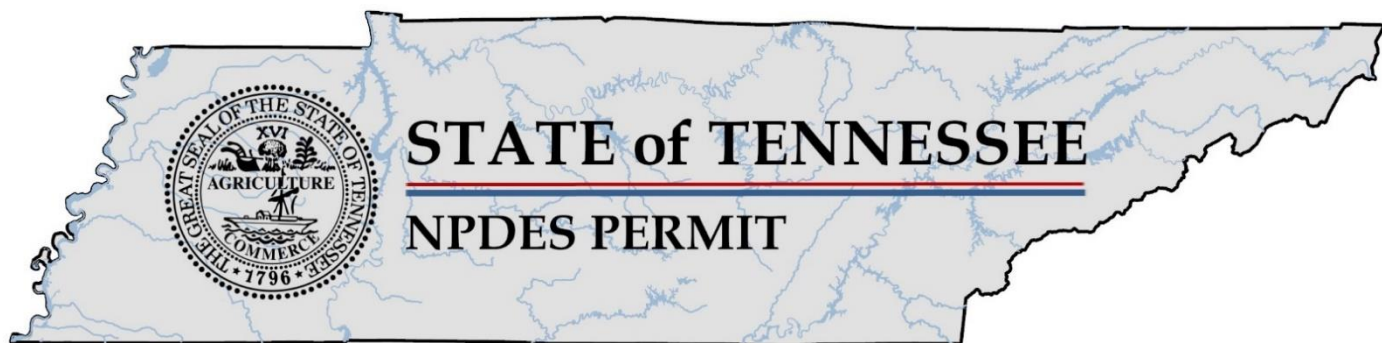
5. Devices: Leviton, Bryant, P&S, Hubbell
6. Device Covers: Stainless Steel
7. Lighting: G.E, Phillips, Sylvania, Lithonia
8. Fittings (no Set screws, couplings, or connectors): Raco, Steel City
9. Conduit/Wire: No MC or BX cable other than 6' or less to be used as whips from junction box to item being fed

E. Mechanical

1. Heaters: Trane, McQuay
2. Electronic Controls: Johnson Controls (FEC, NAE, BACnet MS/TP), Barber Coleman, Trane, McQuay
3. Valves, Hot/Chill Water: Johnson Controls, Barber Coleman, Honeywell
4. AHUs: Trane
5. Boilers: Cleaver Brooks
6. Chillers: Trane
7. Pumps: Peerless, Bell & Gossett, Aurora, Ingersoll Rand, Pyramid Pump, Grundfos
8. VAV Boxes (All VAVs shall be pressure dependent with electronic controls): Environmental Tech, Varitrane Systems, Tuttle & Bailey
9. Electronic Thermostats: TE-6700, BACnet MS/TP, N2, Johnson Control
10. Cooling Towers: Marley, BAC

F. Miscellaneous

1. Joint Seals and Floor Penetration Seals: Evazote 380 E. S. P. with Hindered Amine Light Stabilizer
2. Automatic Perimeter Fence Gate Operators: HySecurity



National Pollutant Discharge Elimination System (NPDES)

General Permit for Discharges of Stormwater Associated with Construction Activities

Permit Number TNR100000

Issued by
**Department of Environment and Conservation
Division of Water Resources
William R. Snodgrass - Tennessee Tower
312 Rosa L. Parks Avenue, 11th Floor
Nashville, Tennessee 37243-1102**

Under authority of the Tennessee Water Quality Control Act of 1977 (T.C.A. 69-3-101 et seq.) and the authorization by the United States Environmental Protection Agency under the Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977 (33 U.S.C. 1251, et seq.) and the Water Quality Act of 1987, P.L. 100-4, including special requirements as provided in Subpart 6.4 of this general permit, operators of point source discharges of stormwater associated with construction activities into waters of the State of Tennessee, are authorized to discharge stormwater associated with construction activities in accordance with the following permit monitoring and reporting requirements, effluent limitations, and other provisions as set forth in parts 1 through 10 herein, from the subject outfalls to waters of the State of Tennessee.

This permit is issued on: **September 27, 2021**

This permit is effective on: **October 1, 2021**

This permit expires on: **September 30, 2026**

for Jennifer Dodd
Director

Tennessee General Permit No. TNR100000
Stormwater Discharges Associated with Construction Activities

Table of Contents

PART 1

1.	COVERAGE UNDER THIS GENERAL PERMIT	1
1.1.	PERMIT AREA	1
1.2.	DISCHARGES COVERED BY THIS PERMIT	1
1.2.1.	Stormwater Discharges Associated with Construction Activities	1
1.2.2.	Stormwater Discharges Associated with Construction Support Activities	2
1.2.3.	Non-Stormwater Discharges Authorized by this Permit	2
1.2.4.	Other NPDES-Permitted Discharges	3
1.3.	LIMITATIONS ON COVERAGE	3
1.4.	OBTAINING PERMIT COVERAGE	5
1.4.1.	Notice of Intent (NOI)	6
1.4.2.	Stormwater Pollution Prevention Plan (SWPPP)	6
1.4.3.	Permit Application Fee	7
1.4.4.	Submittal of Documents to Local Municipalities	8
1.4.5.	Permit Coverage Through a Qualifying Local Program (QLP)	8
1.5.	NOTICE OF COVERAGE	9
1.5.1.	Permit Tracking Numbers	9
1.5.2.	Notice of Coverage (NOC)	9

PART 2

2.	CONSTRUCTION SITE OPERATORS	11
2.1.	TYPES OF OPERATORS	11
2.1.1.	Owner/Developer	11
2.1.2.	Commercial Builders	11
2.1.3.	Contractors	12
2.2.	RESPONSIBILITIES OF OPERATORS	12
2.2.1.	Permittees with Design Control	13
2.2.2.	Permittees with Day-to-Day Operational Control	13

PART 3

3.	NOTICE OF INTENT (NOI) REQUIREMENTS	15
3.1.	NOI SUBMITTAL	15
3.1.1.	Who Must Submit an NOI?	15
3.1.2.	Existing Sites	15
3.1.3.	New Sites or New Phases of Existing Sites	15
3.1.4.	New Operators	16
3.1.5.	Late NOIs	16
3.1.6.	Who Must Sign the NOI?	17
3.2.	FORMAT AND CONTENT OF THE NOI FORM	17
3.2.1.	NOI Form	17
3.2.2.	Construction Site Map	17
3.3.	WHERE AND HOW TO SUBMIT AN APPLICATION	18
3.3.1.	Traditional Submittal	18
3.3.2.	Submittal Using Electronic Forms	18
3.4.	TDEC ENVIRONMENTAL FIELD OFFICES (EFOS) AND CORRESPONDING COUNTIES	19

PART 4

4.	CONSTRUCTION AND DEVELOPMENT EFFLUENT GUIDELINES	20
4.1.	NON-NUMERIC EFFLUENT LIMITATIONS	20
4.1.1.	Erosion prevention and sediment controls.....	20
4.1.2.	Water Quality Riparian Buffer Zone Requirements	20
4.1.2.1.	Water quality riparian buffer zone exemption based on existing uses.....	22
4.1.2.2.	Pre-approved sites	22
4.1.3.	Dewatering.....	22
4.1.4.	Pollution Prevention Measures.....	23
4.1.5.	Prohibited Discharges	23

PART 5

5.	STORMWATER POLLUTION PREVENTION PLAN (SWPPP) REQUIREMENTS	24
5.1.	THE GENERAL PURPOSE OF THE SWPPP	24
5.2.	QUALIFICATION REQUIREMENTS.....	25
5.3.	SWPPP PREPARATION AND COMPLIANCE	26
5.3.1.	Existing Sites	26
5.3.2.	New Sites or New Phases of Existing Sites	26
5.3.3.	Signature Requirements	26
5.3.4.	SWPPP Availability	26
5.4.	KEEPING SWPPP CURRENT	27
5.4.1.	SWPPP Modifications.....	27
5.5.	COMPONENTS OF THE SWPPP.....	28
5.5.1.	SWPPP Narrative.....	28
5.5.2.	SWPPP and EPSC plans.....	29
5.5.3.	Erosion Prevention and Sediment Controls (EPSC)	30
5.5.3.1.	General criteria and requirements.....	30
5.5.3.2.	Construction phasing	31
5.5.3.3.	Projects Exceeding 50 acres of Disturbance.....	31
5.5.3.4.	Stabilization practices	33
5.5.3.5.	Structural practices	34
5.5.3.6.	Stormwater management.....	35
5.5.3.7.	Other items needing control.....	36
5.5.3.8.	Site Assessments.....	36
5.5.3.9.	Inspections	37
5.5.3.10.	Inspector qualifications.....	37
5.5.3.11.	Schedule of inspections	38
5.5.3.12.	Pollution prevention measures for non-stormwater discharges	39

PART 6

6.	SPECIAL CONDITIONS, MANAGEMENT PRACTICES, AND OTHER NON-NUMERIC LIMITATIONS.....	40
6.1.	RELEASES IN EXCESS OF REPORTABLE QUANTITIES	40
6.2.	SPILLS	40
6.3.	DISCHARGE COMPLIANCE WITH STATE WATER QUALITY STANDARDS	40
6.3.1.	Violation of water quality standards.....	40
6.3.2.	Discharge quality.....	40
6.4.	DISCHARGES INTO WATERS WITH UNAVAILABLE PARAMETERS OR EXCEPTIONAL TENNESSEE WATERS.....	41
6.4.1.	SWPPP/BMP Requirements	41
6.4.2.	Water Quality Riparian Buffer Zone Requirements	42

PART 7

7.	RETENTION, ACCESSIBILITY AND SUBMISSION OF RECORDS	44
7.1.	DOCUMENTS.....	44
7.2.	ACCESSIBILITY AND RETENTION OF RECORDS	44
7.2.1.	Posting Information at the Construction Site.....	44
7.3.	ELECTRONIC SUBMISSION OF DOCUMENTS	45

7.3.1. Monitoring Results.....	46
--------------------------------	----

PART 8

8. STANDARD PERMIT CONDITIONS	47
8.1. DUTY TO COMPLY	47
8.1.1. Duty to Comply	47
8.1.2. Penalties.....	47
8.1.3. Civil and criminal liability	48
8.1.4. Liability Under State Law	48
8.2. CONTINUATION OF THE EXPIRED GENERAL PERMIT	48
8.3. NEED TO HALT OR REDUCE ACTIVITY NOT A DEFENSE	48
8.4. DUTY TO MITIGATE	48
8.5. DUTY TO PROVIDE INFORMATION.....	49
8.6. OTHER INFORMATION	49
8.7. SIGNATORY REQUIREMENTS	49
8.7.1. Signatory Requirements for an NOI	49
8.7.2. Signatory Requirements for SWPPPs, Reports and Other Items.....	50
8.7.3. Duly Authorized Representative	50
8.7.4. Changes to Authorization.....	51
8.7.5. Signatory Requirements for Primary Permittees	51
8.7.6. Signatory Requirements for Secondary Permittees	52
8.8. OIL AND HAZARDOUS SUBSTANCE LIABILITY.....	52
8.9. PROPERTY RIGHTS.....	52
8.10. SEVERABILITY	52
8.11. INDIVIDUAL PERMITS.....	53
8.11.1. Required Individual Permit Coverage	53
8.11.2. Permittee-Requested Individual Permit Coverage.....	54
8.11.3. General Permit Termination	54
8.12. OTHER, NON-STORMWATER, PROGRAM REQUIREMENTS.....	54
8.13. PROPER OPERATION AND MAINTENANCE.....	54
8.14. Inspection and Entry.....	55
8.15. PERMIT ACTIONS	55

PART 9

9. REQUIREMENTS FOR TERMINATION OF COVERAGE.....	56
9.1. TERMINATION OF DEVELOPER AND BUILDER COVERAGE	56
9.1.1. Termination Process for Primary Permittees	56
9.1.2. NOT Review.....	57
9.2. TERMINATION OF BUILDER AND CONTRACTOR COVERAGE.....	57
9.2.1. Termination Process for Secondary Permittees	57
9.3. NOT CERTIFICATION.....	58
9.4. WHERE TO SUBMIT A NOT?	58

PART 10

10. DEFINITIONS, ACRONYMS AND RESOURCES	59
10.1. Definitions.....	59
10.2. Acronyms and Abbreviations.....	72
10.3. Resources, Hyperlinks, and Web Pages	73

APPENDIX A – NOTICE OF INTENT FORM (NOI)

APPENDIX B – NOTICE OF TERMINATION FORM (NOT)

APPENDIX C – INSPECTION REPORT FORM



PART 1

1. COVERAGE UNDER THIS GENERAL PERMIT

1.1. PERMIT AREA

The construction general permit (CGP) covers all areas of the State of Tennessee.

1.2. DISCHARGES COVERED BY THIS PERMIT

1.2.1. Stormwater Discharges Associated with Construction Activities

Discharge of stormwater associated with construction activity, as used in this permit, refers to stormwater point source discharges from areas where soil disturbing activities, or associated construction support activities (see Section 1.2.2) are located. Soil disturbing activities include but are not limited to clearing, grading, grubbing, filling and excavation.

This permit authorizes stormwater point source discharges from construction activities that result in soil disturbances of one or more acres. Soil disturbances of less than one acre are required to obtain authorization under this permit if construction activities are part of a larger common plan of development or sale that comprises at least one acre of cumulative land disturbance. One or more site operators must maintain coverage under this permit for all portions of a site that have not been permanently stabilized.

Projects of less than one acre of total land disturbance require authorization under this permit if:

- a) the director has determined that the stormwater discharge from a site is causing, contributing to, or is likely to contribute to a violation of a state water quality standard;
- b) the director has determined that the stormwater discharge is, or is likely to be a significant contributor of pollutants to waters of the state¹; or
- c) changes in state or federal rules require sites of less than one acre that are not part of a larger common plan of development or sale to obtain a stormwater discharge permit.

¹ *"Significant contributor of pollutants to waters of the state"* means any discharge containing pollutants that are reasonably expected to cause or contribute to a violation of a water quality criteria or receiving stream designated uses.



1.2.2. Stormwater Discharges Associated with Construction Support Activities

This permit also authorizes stormwater discharges from support activities associated with a permitted construction activity. Support activities may include concrete or asphalt batch plants, equipment staging yards, material storage areas, excavated material disposal areas and borrow areas. Support activities are authorized provided all of the following conditions are met:

- a) The support activity is related to a construction activity that is covered under this general permit.
- b) The operator of the support activity is the same as the operator of the construction activity.
- c) The support activity is not a commercial operation serving multiple unrelated construction projects by different operators.
- d) The support activity does not operate beyond the completion of the construction activity of the last construction project it supports.
- e) Support activities are identified in the Notice of Intent (NOI) and the Stormwater Pollution Prevention Plan (SWPPP). The appropriate erosion prevention and sediment controls and measures applicable to the support activity shall be described in a site-wide SWPPP covering all discharges from the support activity areas.

This permit does not authorize any process (dry weather) wastewater discharges from support activities. Process (dry weather) wastewater discharges from support activities must be authorized by an individual permit or other appropriate general permit.

TDOT projects shall be addressed in the *Waste and Borrow Policy*. Stormwater discharges associated with support activities that have been issued a separate individual permit or an alternative general permit are not authorized by this general permit.

1.2.3. Non-Stormwater Discharges Authorized by this Permit

The following non-stormwater discharges from site-wide SWPPP areas of permitted construction activities are authorized by this permit provided the non-stormwater component of the discharge is in compliance with Subsection 5.5.3.12:

- a) Dewatering of collected stormwater and groundwater, discharged in accordance with section 4.1.3.



- b) Waters used to wash dust and soils from vehicles where detergents are not used and detention and/or filtering is provided before the water leaves site. Wash removal of process materials such as oil, asphalt or concrete is not authorized.
- c) Water used to control dust in accordance with Section 5.5.3.7.
- d) Potable water sources, including waterline flushings, from which chlorine has been removed to the maximum extent practicable.
- e) Routine external building washdown that does not use detergents or other chemicals.
- f) Uncontaminated, non-turbid groundwater or spring water.
- g) Foundation or footing drains where flows are not contaminated with pollutants (e.g., lubricants and fluids from mechanized equipment, process materials such as solvents, heavy metals, etc.).
- h) Discharges from emergency fire-fighting activities.
 - i) Fire hydrant flushings.
 - j) Landscape irrigation.
- k) Pavement wash waters, provided spills or leaks of toxic or hazardous substances have not occurred (unless all spill material has been removed) and where soaps, solvents, and detergents are not used.
- l) Uncontaminated air conditioning or compressor condensate.

All non-stormwater discharges authorized by this permit must be free of sediment and other solids, must not cause erosion of soils, and must not result in sediment or erosion impacts to receiving streams.

1.2.4. Other NPDES-Permitted Discharges

Discharges of stormwater or wastewater authorized by and in compliance with a different NPDES permit may be mixed with discharges authorized by this permit.

1.3. LIMITATIONS ON COVERAGE

Except for discharges from support activities, as described in Section 1.2.2 and non-stormwater discharges listed in Section 1.2.3, all discharges covered by this permit shall be composed entirely of stormwater. This permit does not authorize the following discharges:

- a) Post-construction discharges - Stormwater discharges associated with permanent stormwater management structures after construction



activities have been completed, the site has undergone permanent stabilization and the coverage under this permit has been terminated.

- b) Discharges mixed with non-stormwater - Discharges that are mixed with sources of non-stormwater, other than discharges which are identified in Section 1.2.4 and in compliance with Subsection 5.5.3.12 of this permit.
- c) Discharges covered by another permit - Discharges associated with construction activities that have been issued an individual permit in accordance with Subpart 8.11.
- d) Discharges threatening water quality - Discharges from construction sites that the director determines will cause or has the reasonable potential to cause or contribute to violations of water quality standards. Where such a determination has been made, the division will notify the discharger in writing that an individual permit application is necessary as described in Subpart 8.11. The division may authorize coverage under this permit after appropriate controls and implementation procedures have been included in the SWPPP that are designed to bring the discharge into compliance with water quality standards.
- e) Discharges into waters with unavailable parameters - Discharges to waters with unavailable parameters that would cause measurable degradation of water quality for the parameter that is unavailable; or that would cause additional loadings of unavailable parameters that are bioaccumulative or that have criteria below method detection levels. Waters with unavailable parameters means any segment of surface waters that has been identified by the division as failing to support its designated classified uses. A discharge that complies with the additional requirements set forth in Subpart 6.4 is not considered to cause measurable degradation of waters with unavailable parameters, unless the division determines upon review of the SWPPP that there is a reason to limit coverage as set forth in Subpart 1.3(d) and the SWPPP cannot be modified to bring the site into compliance.
- f) Discharges into Outstanding National Resource Waters - Discharges into waters that are designated by the Water Quality Control Board as Outstanding National Resource Waters (ONRW) pursuant to Tennessee Rules, Chapter 0400-40-03-.06(5), except activities conducted by, or on behalf of, the National Park Service on its own lands.
- g) Discharges into Exceptional Tennessee Waters - Discharges that would cause more than de minimis DE MINIMIS degradation of water quality for any available parameter in waters designated by TDEC as Exceptional Tennessee Waters. A discharge that complies with the additional requirements set forth in Subpart 6.4 is not considered to cause more than de minimis degradation of available parameters unless the division determines upon review of the SWPPP that there is a reason to limit



coverage as set forth in Subpart 1.3(d)) and the SWPPP cannot be modified to bring the site into compliance.

- h) Discharges not protective of aquatic or semi-aquatic threatened and endangered species, species deemed in need of management or special concern species - Discharges or discharge-related activities that are likely to jeopardize the continued existence of listed or proposed threatened or endangered aquatic species, or their critical habitat, under the Endangered Species Act (ESA), or other applicable state law or rule.

Discharges or conducting discharge-related activities that will cause a prohibited “take” of federally listed aquatic species (as defined under Section 3 of the ESA and 50 CFR §17.3) unless such take is authorized under Sections 7 or 10 of the ESA.

Discharges or conducting discharge-related activities that will cause a prohibited “take” of state listed aquatic species², unless such take is authorized under the provisions of T.C.A. § 70-8-106(e).

- i) Discharges from a new or proposed mining operation - Discharges from new or proposed mining operations are not authorized.
- j) Discharges into waters with an approved Total Maximum Daily Load - Discharges of a pollutant to waters for which there is an EPA-approved or established total maximum daily load (TMDL) for that pollutant, unless the SWPPP incorporates measures or controls consistent with the assumptions and requirements of the TMDL.

Any discharge of stormwater or other fluids to groundwater via an improved sinkhole or injection well requires a Class V Underground Injection Control authorization by rule, or an individual permit under the provisions of Tennessee Rules, Chapter 0400-45-06.

1.4. OBTAINING PERMIT COVERAGE

A complete NOI, Stormwater Pollution Prevention Plan (SWPPP) and application fee³ are required to obtain coverage under this general permit. **Submitting for coverage under this permit means that an applicant has examined a copy of**

² As defined in the Tennessee Wildlife Resources Commission Proclamation, Endangered or Threatened Aquatic Species, and in the Tennessee Wildlife Resources Commission Proclamation, Wildlife in Need of Management.

³ Any reference to an “*application*” in this permit should be considered equivalent to the phrase “*complete NOI, SWPPP and application fee*”



this permit and thereby acknowledged the applicant's claim of ability to comply with permit terms and conditions.

1.4.1. Notice of Intent (NOI)

Operators wishing to obtain coverage under this permit must submit a complete NOI in accordance with Part 3, using the NOI form provided in Appendix A of this permit. Electronic submittal is encouraged (see NPDES Electronic Reporting for more information). The division may review NOIs and SWPPPs for completeness and accuracy and, when deemed necessary, investigate the proposed project for potential impacts to the waters of the state. Absent extraordinary circumstances, NOCs should be issued within 30 days of NOI submittal, unless the division has responded to the operator within that time requesting additional information. Permittees must obtain all required local authorizations related to stormwater management (see Section 1.4.4).

1.4.2. Stormwater Pollution Prevention Plan (SWPPP)

Operators wishing to obtain coverage under this permit must submit a site-specific SWPPP with the NOI, or sign and certify an existing site-specific SWPPP. The SWPPP shall address all of the operators' construction-related activities from the date construction commences to the date of termination of permit coverage, to the maximum extent practicable. The SWPPP must address the total acreage planned to be disturbed, including any associated construction support activities (see Section 1.2.2). The SWPPP must be developed, implemented and updated according to the requirements in Part 5 and Section 6.4.1. The SWPPP must be implemented prior to commencement of construction activities.

Preparation and implementation of the SWPPP may be a cooperative effort with all operators at a site. New operators with design and operational control of their portion of the construction site are expected to adopt, modify, update and implement their portion of the SWPPP. Alternatively, permittees at the site may develop and submit a SWPPP addressing only their portion of the project, as long as the proposed Best Management Practices (BMPs) are compatible with the previously submitted SWPPPs, as updated, and complying with conditions of this general permit.

SWPPPs must be updated or addended if site activities diverge significantly from those indicated in the initial SWPPP. A copy of the most recent version of the SWPPP must be available at the site.



Site operators who are building single family residences on at-grade lots (see Section 2.1.2) and who are submitting an application for coverage under this permit, may complete and submit Form CN-1249, the Stormwater Pollution Prevention Plan (SWPPP) for Single Family Residential Homebuilding Sites. This SWPPP template is available on our website at:

http://tdec.tn.gov/etdec/DownloadFile.aspx?row_id=CN-1249.

Form CN-1249 is not appropriate if significant grading of the lot or lots is necessary.

1.4.3. Permit Application Fee

The permit application fee should accompany the applicant's NOI form. The fee is based on the total acreage planned to be disturbed by an entire construction project for which the applicant is requesting coverage, including any associated construction support activities (see Section 1.2.2). The applicant may present documentation of areas in the project that will not be subject to disturbance at any time during the life of the project and have these areas excluded from the fee calculation.

The application fees shall be as specified in Tennessee Rules, Chapter 0400-40-11. The application will be deemed incomplete until the appropriate application fee is paid in full. Checks for the appropriate fee should be made payable to "Treasurer, State of Tennessee." Electronic payment methods, if made available by the State of Tennessee, are acceptable and are encouraged. The following conditions apply:

- a) If stormwater discharges from the site or acreage to be disturbed was previously authorized by a CGP, but coverage has been since terminated, a primary operator must submit a new application for coverage under the CGP.
- b) A new primary operator seeking subsequent coverage under an actively permitted activity must submit the subsequent coverage fee to obtain coverage under an active NOC.
- c) Acreage additions up to 10% of the original plan area, but not to exceed a total of 5 acres, and other minor modifications of the original plan do not require separate NOI submittal. These minor additions require submittal of a plan indicating the additional area(s) of disturbance, the total acreage to be disturbed, and the updated SWPPP. The permittee is responsible for thoroughly and accurately identifying all waterbodies (including wetlands and streams) located on the added acreage and to provide a determination of the water's status if not previously provided. An additional fee and



updated NOI are required only if the total acreage of disturbance would require a higher fee than originally paid, and then only the difference is due. New acreage disturbances cannot be added as previously disturbed acreage is stabilized, to create a 'rolling' total of disturbance. Iterative changes that would create cumulative impact exceeding 10% of the original plan area, or a total of 5 acres require submittal of updated NOI and SWPPP to the division.

- d) In addition to the application fee, an annual maintenance fee applies per Tennessee Rules, Chapter 0400-40-11-.02(12)(i).

1.4.4. Submittal of Documents to Local Municipalities

Some permittees may discharge stormwater through an NPDES-permitted municipal separate storm sewer system (MS4) who are not exempted in Section 1.4.5. These permittees are encouraged to coordinate with the local MS4 authority prior to submitting an NOI to the division. Permitting status of all permittees covered, or previously covered, under this general permit as well as the most current list of all MS4 permits is available at:

<http://tn.gov/environment/article/tdec-dataviewers>.

Permittees must obtain all necessary authorizations pursuant to provisions of any local ordinances that apply to construction activities, and permittees are expected to comply with any additional erosion prevention, sediment control, and construction stormwater management measures required by a local municipality, county or permitted MS4 program.

1.4.5. Permit Coverage Through a Qualifying Local Program (QLP)

Coverage equivalent to coverage under this general permit may be obtained from a qualifying local erosion prevention and sediment control MS4 program. A Qualifying Local Program (QLP) is a municipal stormwater program implemented for stormwater discharges associated with construction activity that has been formally approved by the division. More information about Tennessee's QLP program and MS4 participants can be found at:

<https://www.tn.gov/environment/permit-permits/water-permits1/npdes-permits1/npdes-stormwater-permitting-program/tennessee-qualifying-local-program.html>.

If a construction site is within the jurisdiction of, and has obtained a notice of coverage from, a QLP, the operator is authorized to discharge stormwater associated with construction activity under this general permit without the submittal of an application to the division. Permitting of stormwater runoff from



construction sites from federal or state agencies (e.g., Tennessee Department of Transportation and Tennessee Valley Authority) and the local MS4 program itself will remain solely under the authority of TDEC.

The division may require any operator located within the jurisdiction of a QLP to obtain permit coverage directly from the division. The operator shall be notified in writing by the division that coverage by the QLP is no longer applicable and how to obtain coverage under this permit.

1.5. NOTICE OF COVERAGE

1.5.1. Permit Tracking Numbers

Construction activities covered under this permit will be assigned permit tracking numbers in the sequence TNR100001, TNR100002, etc. Permit tracking numbers assigned under a previous construction general permit will be retained. An operator applying for new permit coverage will be assigned a new permit tracking number. Assigning a permit tracking number by the division to a proposed discharge from a construction activity does not confirm or imply an authorization to discharge under this permit. Operators receiving new permit coverage will be listed as active on the TDEC Dataviewer.

1.5.2. Notice of Coverage (NOC)

The NOC is a notice from the division to the primary permittee informing them that the NOI, the SWPPP, and the application fee were received and accepted. The primary permittee is authorized to discharge stormwater associated with construction activity as of the effective date listed on the NOC.

For new operators seeking subsequent coverage under an existing tracking number, the division will not issue a NOC. New operators that notify the division to be added to an existing coverage are covered upon receipt of notification of permit coverage by the division. The permit record reflecting the additional operator will be published on TDEC's DataViewer in the next update.

The division reserves the right to deny coverage to artificial entities (e.g., corporations or partnerships, excluding entities not required to register with the Tennessee Secretary of State) that are not properly registered and in good standing (i.e., listed with an entity status of "active") with the Tennessee Secretary of State, Division of Business Services. The division also reserves the right to issue permit coverage in the correct legal name of the individual or entity seeking



coverage, including each general partner of a general partnership in addition to the general partnership.

Alterations to channels or waterbodies (see definition of streams) that are contained on, traverse through or are adjacent to the construction site are not authorized by this permit. Such alterations may require an Aquatic Resources Alteration Permit (ARAP): <https://www.tn.gov/environment/permit-permits/water-permits1/aquatic-resource-alteration-permit--arap-.html>.

It is the responsibility of the applicant to thoroughly and accurately identify all waterbodies (see definition of streams) located on the site and to provide a determination of the water's status.

For channels, this determination must be conducted in accordance with Tennessee's standard operating procedures for hydrologic determinations set forth at Tennessee Rules, Chapter 0400-40-03.05(9). Wetlands determinations must include the submission of a wetland delineation completed utilizing the USACOE 1987 *Wetlands Delineation Manual* and applicable *Regional Supplement*. For the purposes of permitting, the permittee may choose to provide all aquatic features located on the site the protections afforded to streams and wetlands in lieu of conducting hydrologic determinations. ARAPs are independent requirements from CGP coverage and complete applications for ARAPs shall precede NOI submittal. The division reserves the right to delay or withhold issuance of coverage under the CGP in some cases until the appropriate ARAP coverage has been obtained.

The treatment and disposal of wastewater (e.g., sanitary, commercial or industrial wastewater) generated during and after the construction must be also addressed prior to issuance of the NOC. The NOC may be delayed until adequate wastewater treatment is identified and accompanying disposal permits are issued.

PART 2

2. CONSTRUCTION SITE OPERATORS

2.1. TYPES OF OPERATORS

2.1.1. Owner/Developer

An owner or developer of a project is a primary permittee. This person has operational or design control over construction plans and specifications, including the ability to make modifications to those plans and specifications. This person may include, but is not limited to, a developer, landowner, realtor, commercial builder, homebuilder, utility company, etc. This person may be an individual, a corporate entity, or a governmental entity. An owner's or developer's responsibility to comply with requirements of this permit extends until permit coverage is terminated in accordance with requirements of Part 9.

The site-wide permittee is the first primary permittee to apply for coverage for a construction activity. There may be other primary permittees for a project, but there is only one site-wide permittee. Where there are multiple operators associated with the same project, all operators are required to obtain permit coverage. Once covered by a permit, each operator is responsible for complying with the permit. Permittees are jointly and severally liable for a violation related to construction activities that affect the same project site, unless a permittee affirmatively demonstrates to the satisfaction of the Department that its own action, or failure to act, was not a cause of the violation.

2.1.2. Commercial Builders

A commercial builder can be a primary or secondary permittee at a construction site.

A commercial builder who purchases one or more lots from a primary permittee for the purpose of constructing and selling a structure⁴ and has design or operational control over construction plans and specifications for that portion of

⁴ e.g., residential house, non-residential structure, commercial building, industrial facility, etc.



the site, or is hired by an end user, such as a lot owner who may not be a permittee, must obtain coverage in one of the following ways:

- a) The site-wide permittee may transfer coverage to the commercial builder, for the entire site or just the acreage/lots the builder has purchased;
- b) The commercial builder may submit a new NOI for the acreage purchased, following requirements in Section 3.1.4; or
- c) The commercial builder may be hired by the primary permittee or a lot owner to build a structure, and by mutual agreement build on the site under the existing coverage of the site-wide permittee. In this case, the commercial builder signs the primary permittee's NOI and SWPPP as a contractor (see Section 2.1.3) and is considered a secondary permittee.

2.1.3. Contractors

A contractor is considered a secondary permittee. This person has day-to-day operational control of the activities necessary to ensure compliance with the SWPPP or other permit conditions (e.g., the contractor is authorized to direct workers at a site to carry out activities required by the SWPPP or comply with other permit conditions). A contractor may be:

- a general contractor
- a grading contractor
- an erosion control contractor
- a sub-contractor responsible for land disturbing activities or erosion prevention and sediment control (EPSC) implementation and maintenance
- a commercial builder hired by the primary permittee.

The contractor may need to include in their contract with the party that hired them specific details for the contractor's responsibilities concerning EPSC measures. This includes the ability of the contractor to make EPSC modifications. The contractor shall sign the primary permittee's NOI and SWPPP associated with the construction project at which they will be an operator (insofar as possible), or submit a separate NOI to the division indicating their intent to be added to the existing activity coverage as an operator.

2.2. RESPONSIBILITIES OF OPERATORS

A permittee may meet one or more of the operational control components in the definition of "operator" found in Subpart 2.1. Either Section 2.2.1 or 2.2.2, or both, will apply depending on the type of operational control exerted by an individual permittee.



2.2.1. Permittees with Design Control

Permittees with operational control over construction plans and specifications at the construction site, including the ability to make modifications to those plans and specifications, must ensure that:

- a) the project specifications meet the minimum requirements of Part 5 (SWPPP) and all other applicable conditions;
- b) the SWPPP indicates the areas of the project where they have operational control;
- c) all other permittees implementing and maintaining portions of the SWPPP impacted by any changes made to the plan are notified of such modifications in a timely manner;
- d) all common BMPs (i.e., sediment treatment basin and drainage structures) necessary for the prevention of erosion or control of sediment are maintained and effective until all construction is complete and all disturbed areas in the entire project are stabilized, unless permit coverage has been obtained and responsibility has been taken over by a new primary permittee; and
- e) all operators on the site have permit coverage, if required.

If parties with day-to-day operational control of the construction site have not been identified at the time the site-wide SWPPP is initially developed, the permittee with operational control shall be considered to be the responsible person until an NOI is submitted identifying the new operators (see Section 3.1.4). These new operators (e.g., general contractor, utilities contractors, sub-contractors, erosion control contractors, hired commercial builders) are considered secondary permittees. The SWPPP must be updated to reflect the addition of new operators.

2.2.2. Permittees with Day-to-Day Operational Control

Permittees with day-to-day operational control of the activities necessary to ensure compliance with the SWPPP or other permit conditions must ensure that:

- a) the SWPPP for portions of the project where they are operators meets the requirements of Part 5 and identifies the parties responsible for implementing the control measures identified in the plan;
- b) the SWPPP indicates areas of the project where they have operational control over day-to-day activities; and



- c) measures in the SWPPP are adequate to prevent soil erosion and control any sediment that may result from their earth disturbing activity.

Permittees with operational control over only a portion of a larger construction project are responsible for compliance with all applicable terms and conditions of this permit as it relates to their activities on their portion of the construction site. This includes, but is not limited to, implementation of Best Management Practices (BMPs) and other controls required by the SWPPP. Permittees shall ensure either directly or through coordination with other permittees, that their activities do not render another person's pollution control ineffective. All permittees must implement their portions of the SWPPP.



PART 3

3. NOTICE OF INTENT (NOI) REQUIREMENTS

3.1. NOI SUBMITTAL

3.1.1. Who Must Submit an NOI?

All operators must submit an NOI form. For the purpose of this permit and in the context of stormwater associated with construction activity, an “operator” means any person associated with a construction project who meets either or both of the following two criteria:

- a) The person has operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications. This person is considered the primary permittee and is typically:
 - the owner or developer of the project,
 - the owner or developer of a portion of the project (e.g., subsequent builder), or
 - the person who is the current owner of the construction site.
- b) The person has day-to-day operational control of the activities necessary to ensure compliance with the SWPPP or other permit conditions. This person is typically a contractor, or a commercial builder hired by the primary permittee, and is considered a secondary permittee.

3.1.2. Existing Sites

An operator presently permitted under the 2016 construction general permit shall be granted coverage under this new general permit. Coverage will be extended automatically without notification to the division or an additional fee being assessed. The existing SWPPP shall be modified according to the Section 5.3.1 of this permit.

If an operator does not wish to be continued under the new general permit, they may terminate coverage (Section 9.1). If a site with terminated coverage is unstable or if construction continues, a new NOI, SWPPP and application fee must be submitted.

3.1.3. New Sites or New Phases of Existing Sites

Except as provided in Section 3.1.4, operators must submit a complete NOI, SWPPP and an application fee in accordance with the requirements described



in Subpart 1.4. The complete application should be submitted at least 30 days prior to commencement of construction activities. The permittee is authorized to discharge stormwater associated with construction activity as of the effective date listed on the NOC or the TDEC DataViewer. The land disturbing activities shall not start until the NOC is received by the applicant according to Subpart 1.5.

3.1.4. New Operators

New operators proposing to conduct construction activities at a site with existing coverage must submit an NOI. The NOI should be submitted prior to the new operator commencing work at the site. The NOI must reference the project name and tracking number assigned to the primary permittee's NOI. The NOI may not need to be submitted immediately upon assuming operational control if the portion of the site controlled by the new operator is inactive and all the previously disturbed areas are permanently stabilized.

A new operator working as a residential home builder may submit Form CN-1249, the Stormwater Pollution Prevention Plan (SWPPP) for Single Family Residential Homebuilding Sites. This form may be found at:
http://tdec.tn.gov/etdec/DownloadFile.aspx?row_id=CN-1249.

If the primary permittee's company name has changed (but not the site ownership or authorized signators), an updated NOI should be submitted to the division within 30 days of the name change, along with documentation that the name change has been properly registered with the Tennessee Secretary of State, Division of Business Services. If the new operator agrees to comply with an existing site-wide SWPPP already implemented at the site, a copy of the SWPPP does not have to be submitted with the NOI.

If the transfer of ownership is due to foreclosure or a permittee filing for bankruptcy proceedings, the new owner (e.g., a lending institution) must obtain permit coverage if the construction activity is inactive but soil is not stabilized sufficiently. If the property is sufficiently stabilized permit coverage may not be necessary, unless and until construction activity at the site resumes.

3.1.5. Late NOIs

Dischargers are not prohibited from submitting NOIs after construction at their site has already begun. When a late NOI is submitted, and if the division authorizes coverage under this permit, such authorization is only for future discharges. Any prior, unpermitted, discharges or permit noncompliances are subject to penalties as described in Section 8.1.2.



3.1.6. Who Must Sign the NOI?

All construction site operators as defined in Subpart 2.1 must sign the NOI form. Signatory requirements for a NOI are described in Section 8.7.1. Signatures on electronically submitted NOIs are deemed to be equivalent to a hardcopy signature. An NOI that does not bear a valid signature will be deemed incomplete.

3.2. FORMAT AND CONTENT OF THE NOI FORM

3.2.1. NOI Form

The NOI form is provided in Appendix A of this permit. This form and its instructions set forth the required content of the NOI. The NOI form must be filled in completely. If the division notifies applicants by mail, E-mail, public notice or by making information available on the world wide web of electronic NOI forms (see NPDES Electronic Reporting), the operators may be required to use those electronic options to submit the NOI (Section 3.3.2)

Owners, developers and contractors that meet the definition of the operator in Subpart 2.1 shall apply for permit coverage on the same NOI, if possible. The division may accept separate NOI forms from different operators for construction activities on the same construction site when warranted.

After permit coverage has been granted to the primary permittee, any subsequent NOI submittals must include the site's previously assigned permit tracking number and the project name. The SWPPP shall be prepared in accordance with Part 5, and must be submitted with the NOI unless the NOI is only being submitted to add a secondary permittee to an existing coverage.

3.2.2. Construction Site Map

An excerpt (8 ½" by 11" or 11" by 17") from the appropriate 7.5 minute United States Geological Survey (USGS) topographic map (or other map showing contours) with the proposed construction site centered, must be included with the NOI. The entire proposed construction area must be clearly outlined on the map, with all acreage to be disturbed clearly identified. All outfalls⁵ discharging runoff from the property, streams receiving the discharge, and storm sewer systems conveying the discharge from outfalls shall be clearly identified and marked on the map. NOIs for linear projects must specify the location of each end

⁵ Phrase "point source" and term "outfall" are used interchangeably. For the purpose of this general permit, they can be considered synonyms.



of the construction area and all areas to be disturbed. Commercial builders that develop separate SWPPPs that cover only their portion of the project shall also submit a site or plat map that clearly indicates the lots for which they are applying for permit coverage, and the location of EPSCs that will be used at each lot (Section 5.5).

3.3. WHERE AND HOW TO SUBMIT AN APPLICATION

3.3.1. Traditional Submittal

The applicant shall submit the NOI, SWPPP and application fee to the appropriate Environmental Field Office (EFO) for the county where the construction activity is located and where stormwater discharges enters waters of the state. If a site straddles a county line of counties that are in different EFO service areas, the operators shall send the NOI and the application fee to the EFO that provides coverage for the majority of the proposed construction activity.

A list of counties and the corresponding EFOs is provided in Subpart 3.4. The division's Nashville Central Office will serve as a processing office for NOIs submitted by federal or state agencies (e.g., TDOT, TVA and the local MS4 programs).

3.3.2. Submittal Using Electronic Forms

The division is in the process of launching the new NPDES Electronic Reporting online customer portal for submission of permit applications and other reports. If the division notifies applicants by mail, E-mail, public notice or by making information available on the world wide web of electronic application submittal, the operators may be required to use those electronic options to submit the NOI, SWPPP and an application fee. For more information, visit <https://www.tn.gov/environment/program-areas/wr-water-resources/netdmr-and-electronic-reporting.html>.

3.4. TDEC ENVIRONMENTAL FIELD OFFICES (EFOS) AND CORRESPONDING COUNTIES

<u>EFO Name</u>	List of Counties
Chattanooga	Bledsoe, Bradley, Grundy, Hamilton, Marion, McMinn, Meigs, Polk, Rhea, Sequatchie
Columbia	Bedford, Coffee, Franklin, Giles, Hickman, Lawrence, Lewis, Lincoln, Marshall, Maury, Moore, Perry, Wayne
Cookeville	Cannon, Clay, Cumberland, DeKalb, Fentress, Jackson, Macon, Overton, Pickett, Putnam, Smith, Trousdale, Van Buren, Warren, White
Jackson	Benton, Carroll, Chester, Crockett, Decatur, Dyer, Gibson, Hardin, Haywood, Henderson, Henry, Lake, Lauderdale, Madison, McNairy, Obion, Weakley
Johnson City	Carter, Greene, Hancock, Hawkins, Johnson, Sullivan, Unicoi, Washington
Knoxville	Anderson, Blount, Campbell, Claiborne, Cocke, Grainger, Hamblen, Jefferson, Knox, Loudon, Monroe, Morgan, Roane, Scott, Sevier, Union
Memphis	Fayette, Hardeman, Shelby, Tipton
Nashville	Cheatham, Davidson, Dickson, Houston, Humphreys, Montgomery, Robertson, Rutherford, Stewart, Sumner, Williamson, Wilson

TDEC may be reached by telephone at the toll-free number 1-888-891-8332 (TDEC). Local [EFOs](#) may be reached directly when calling this number from the construction site, using a land line.



PART 4

4. CONSTRUCTION AND DEVELOPMENT EFFLUENT GUIDELINES

4.1. NON-NUMERIC EFFLUENT LIMITATIONS

Any point source authorized by this general permit must achieve, at a minimum, the effluent limitations representing the degree of effluent reduction attainable by application of best practicable control technology (BPT) currently available.

4.1.1. Erosion prevention and sediment controls

Design, install and maintain effective erosion and sediment controls to minimize the discharge of pollutants. At a minimum, such controls must be designed, installed and maintained to:

- 1.) Control stormwater volume and velocity to minimize soil erosion in order to minimize pollutant discharges;
- 2.) Control stormwater discharges, including both peak flowrates and total stormwater volume, to minimize channel and streambank erosion and scour in the immediate vicinity of discharge points;
- 3.) Minimize the amount of soil exposed during construction activity;
- 4.) Minimize the disturbance of steep slopes;
- 5.) Minimize sediment discharges from the site. The design, installation and maintenance of erosion and sediment controls must address factors such as the amount, frequency, intensity and duration of precipitation, the nature of resulting stormwater runoff, and soil characteristics, including the range of soil particle sizes expected to be present on the site;
- 6.) Provide and maintain natural buffers as described in Section 4.1.2, direct stormwater to vegetated areas and maximize stormwater infiltration to reduce pollutant discharges, unless infeasible;
- 7.) Minimize soil compaction. Minimizing soil compaction is not required where the intended function of a specific area of the site dictates that it be compacted; and
- 8.) Unless infeasible, preserve topsoil. Preserving topsoil is not required where the intended function of a specific area of the site dictates that the topsoil be disturbed or removed.

4.1.2. Water Quality Riparian Buffer Zone Requirements

The water quality riparian buffer zone requirements in this section apply to all streams with available parameters adjacent to construction sites (for waters with



unavailable parameters or Exceptional Tennessee Waters, see Section 6.4.2). A 30-foot natural water quality riparian buffer shall be preserved between such waterbodies and the disturbed areas, to the maximum extent practicable, during construction activities. The water quality riparian buffer is required to protect waters of the state that are not wet weather conveyances as identified using Tennessee's standard operating procedures for hydrologic determinations set forth in Tennessee Rules, Chapter 0400-40-03-.05(9).⁶ Because of the potential heavy sediment loading associated with construction site runoff, water quality riparian buffers are not primary sediment control measures and shall not be relied on as such; the primary purpose of water quality riparian buffers is additional pollutant removal. Stormwater discharges must enter the water quality riparian buffer zone as sheet flow, not as concentrated flow, where site conditions allow. Rehabilitation and enhancement of a natural buffer zone is allowed, if necessary, to improve its effectiveness in protecting waters of the state.

The water quality riparian buffer zone should be preserved between the top of stream bank and the disturbed construction area. The 30-foot criterion for the width of the buffer zone can be established on an average width basis at a project, as long as the minimum width of the buffer zone is more than 15 feet at any measured location. If the construction site encompasses both sides of a stream, buffer averaging can be applied to both sides, but each side must average the 30-foot criterion independently.

Construction activities within the water quality riparian buffer zone shall be avoided and existing forested buffer areas shall be preserved whenever possible. Where it is not practicable to maintain a full water quality riparian buffer, BMPs providing equivalent protection to a receiving stream as a natural water quality riparian buffer must be used. A justification for use and a design of equivalent BMPs shall be included in the SWPPP. Such equivalent BMPs are expected to be routinely used at construction projects typically located adjacent to surface waters. These projects may include sewer line construction, roadway construction, utility line or equipment installation, greenway construction, construction of a permanent outfall or a velocity dissipating structure.

⁶ If obtaining permit coverage for the first time following the effective date of this permit, 15-foot buffers are also required for any wet weather conveyance identified as waters of the United States by the U.S. Army Corps of Engineers or the Environmental Protection Agency.



This requirement does not apply to any valid Aquatic Resources Alteration Permit (ARAP), or equivalent permits issued by federal authorities. Additional buffer zone requirements may be established by the local MS4 program.

4.1.2.1. Water quality riparian buffer zone exemption based on existing uses

Water quality riparian buffer zones as described in Section 4.1.2 shall not be required in portions of the buffer where certain land uses exist and are to remain in place according to the following:

- a) A use shall be considered existing if it was present within the buffer zone as of the date of the Notice of Intent for coverage under the construction general permit. Existing uses may include buildings, parking lots, roadways, utility lines and on-site sanitary sewage systems. Only the portion of the buffer zone that contains the footprint of the existing land use is exempt from buffer zones. Activities necessary to maintain uses are allowed provided that no additional vegetation is removed from the buffer zone.
- b) If an area with an existing land use is proposed to be converted to another use or the impervious surfaces located within the buffer area are being removed, buffer zone requirements shall apply.

4.1.2.2. Pre-approved sites

Construction activity at sites that were pre-approved prior to February 1, 2010, is exempt from the buffer requirements of Section 4.1.2. Evidence of pre-approval for highway projects shall be a final right-of-way plan; and, for other construction projects, the final design drawings with attached written and dated approval by the local, state or federal agency with authority to approve such design drawings for construction.

4.1.3. Dewatering

Discharges from dewatering activities, including discharges from dewatering of trenches and excavations, are prohibited unless managed by appropriate controls. Appropriate controls may include weir tanks, dewatering tanks, gravity bag filters, sand media particulate filters, pressurized bag filters, cartridge filters or other control units providing the level of treatment necessary to comply with permit requirements.



4.1.4. Pollution Prevention Measures

The permittee must design, install, implement and maintain effective pollution prevention measures to minimize the discharge of sediment and other pollutants. At a minimum, such measures must be designed, installed, implemented and maintained to:

- a) Minimize the discharge of pollutants from equipment and vehicle washing, wheel wash water and other wash waters not containing soaps or solvents. Wash waters must be treated in a sediment basin or alternative control that provides equivalent or better treatment prior to discharge;
- b) Minimize the exposure of building materials, building products, construction wastes, trash, landscape materials, fertilizers, pesticides, herbicides, detergents, sanitary waste and other materials present on the site to precipitation and to stormwater; and
- c) Minimize the discharge of pollutants from spills and leaks, and implement chemical spill and leak prevention and response procedures.

4.1.5. Prohibited Discharges

The following discharges are prohibited:

- a) Wastewater from washout of concrete, unless managed by an appropriate control.
- b) Wastewater from washout and cleanout of stucco, paint, form release oils, curing compounds and other construction materials.
- c) Fuels, oils or other potential pollutants used in vehicle and equipment operation and maintenance.
- d) Soaps or solvents used in vehicle and equipment washing.



PART 5

5. STORMWATER POLLUTION PREVENTION PLAN (SWPPP) REQUIREMENTS

5.1. THE GENERAL PURPOSE OF THE SWPPP

A SWPPP must be prepared and submitted along with the NOI as required in Section 1.4.2. The primary permittee must implement the SWPPP and maintain effective Best Management Practices (BMPs) from commencement of construction activity until permanent stabilization is complete, or until the permittee does not have design or operational control of any portion of the construction site. If a SWPPP submittal contains contradictory or ambiguous information, the division will hold the permittee to the most stringent interpretation of the information submitted. Requirements for termination of site coverage are provided in Part 9.

A site-specific SWPPP must be developed for each construction project or activity covered by this permit. The design, inspection and maintenance of BMPs described in the SWPPP must be prepared in accordance with good engineering practices. At a minimum, BMPs shall be consistent with the recommendations contained in the current edition of the Tennessee Erosion and Sediment Control Handbook (the handbook).

Once a definable area has been permanently stabilized as described in Subsection 5.5.3.4, the permittee may identify this area on the SWPPP. No further SWPPP or inspection requirements apply to that portion of the site (e.g., earth-disturbing activities around one of three buildings in a complex are done and the area is permanently stabilized, one mile of a roadway or pipeline project is done and permanently stabilized, etc.).

For more effective implementation of BMPs, a cooperative effort by the different operators at a site to prepare and participate in a site-wide SWPPP is expected. Primary permittees at a site may develop separate SWPPPs that cover only their portion of the project. In instances where there is more than one SWPPP for a site, the permittees must ensure the stormwater discharge controls and other measures are compatible with one another and do not prevent another operator from complying with permit conditions. The site-wide SWPPP developed and submitted by the primary permittee must assign responsibilities to secondary permittees and coordinate all BMPs at the construction site. Assignment and coordination can be done by name or by job title.



5.2. QUALIFICATION REQUIREMENTS

For sites greater than five acres of disturbance, the narrative portion of the SWPPP shall be prepared by an individual who has a working knowledge of erosion prevention and sediment controls, such as (but not limited to):

- a registered engineer or landscape architect,
- a Certified Professional in Erosion and Sediment Control (CPESC) or
- a person that successfully completed the “Level II Design Principles for Erosion Prevention and Sediment Control for Construction Sites” course.

For sites less than or equal to five acres of disturbance, these qualification requirements do not apply, and the division provides the following optional templates:

- Form CN-1249, the Stormwater Pollution Prevention Plan (SWPPP) for Single Family Residential Homebuilding Sites. This SWPPP template is available at:
http://tdec.tn.gov/etdec/DownloadFile.aspx?row_id=CN-1249. Form CN-1249 is not appropriate if significant grading of the lot or lots is necessary.
- SWPPP Template for Sites Not Requiring Engineer Design from the DWR – NR – G – 02 - Construction Stormwater – 05172019 Guidance regarding construction stormwater general permit coverage involving sites with Non-Engineer Design SWPPPs:
<https://www.tn.gov/content/dam/tn/environment/water/policy-and-guidance/dwr-nr-g-02-cgp-non-engineering-swppp-final-051719.pdf>
Attachment A (template):
<https://www.tn.gov/content/dam/tn/environment/water/policy-and-guidance/dwr-nr-g-02-cgp-non-engineering-swppp-final-051719-template.docx>.

Plans and specifications for any building or structure, changes in topography and drainage, including the design or modification of sediment basins or other sediment controls involving structural, hydraulic, hydrologic or other engineering calculations shall be prepared by a professional engineer or landscape architect registered in Tennessee and signed and sealed in accordance with the Tennessee Code Annotated, Title 62, Chapter 2 and the rules of the Tennessee Board of Architectural and Engineering Examiners. Engineering design of sediment basins or equivalent sediment controls must be provided for construction sites involving



drainage to an outfall totaling 10 or more acres (Subsection 5.5.3.5) or 5 or more acres if draining to waters with unavailable parameters or Exceptional Tennessee Waters (Section 6.4.1).

5.3. SWPPP PREPARATION AND COMPLIANCE

5.3.1. Existing Sites

Operators of an existing site, presently permitted under the division's 2016 construction general permit, shall maintain full compliance with the existing SWPPP. The existing SWPPP shall be modified, if necessary, to meet requirements of this new general permit, and the SWPPP changes implemented as soon as practicable but no later than 12 months following the new permit effective date. The permittee shall make the updated SWPPP available for the division's review upon request.

5.3.2. New Sites or New Phases of Existing Sites

For construction stormwater discharges not authorized under an NPDES permit as of the effective date of this permit, a SWPPP that meets the requirements of Part 5 of this permit shall be prepared and submitted along with the NOI and an appropriate fee for coverage under this permit.

5.3.3. Signature Requirements

The SWPPP shall be signed by the operators in accordance with Subpart 8.7, and if applicable, certified according to requirements in Section 5.2. Signatures on electronically submitted documents are deemed equivalent to original signatures. A SWPPP that does not bear a valid signature will be deemed incomplete.

5.3.4. SWPPP Availability

A copy of the existing version of the SWPPP shall be retained on-site at the location which generates the stormwater discharge in accordance with Part 7 of this permit. If the site is inactive or does not have an onsite location adequate to store the SWPPP, the location of the SWPPP, along with a contact phone number, shall be posted on-site. If the SWPPP is located off-site, reasonable local access to the plan during normal working hours must be provided.

The permittee shall make the existing SWPPP and inspection reports available upon request to the director; the local agency approving erosion prevention and sediment control plans, grading plans, land disturbance plans or stormwater management plans; or the operator of an MS4.



5.4. KEEPING SWPPP CURRENT

5.4.1. SWPPP Modifications

The permittee must modify, update and recertify the SWPPP if any of the following conditions apply:

- a) Whenever there is a change in the scope of the project that would be expected to have a significant effect on the discharge of pollutants to the waters of the state and which has not otherwise been addressed in the SWPPP.
- b) Whenever there is a change in chemical treatment methods, including the use of different treatment chemical, different dosage or application rate or different area of application.
- c) Whenever inspections or investigations by site operators or local, state or federal officials indicate the SWPPP is proving ineffective in eliminating or significantly minimizing pollutants from sources identified under Section 5.5.2, or is otherwise not achieving the general objectives of controlling pollutants in stormwater discharges associated with construction activity. Where local, state or federal officials determine that the SWPPP is ineffective in eliminating or significantly minimizing pollutant sources, a copy of any correspondence to that effect must be retained in the SWPPP.
- d) Whenever any new operator (typically a secondary permittee) who will implement a measure of the SWPPP must be identified (see Subpart 3.1.1 for further description of which operators must be identified).
- e) Whenever it is necessary to include water quality protection measures as required by the applicable wildlife management agency intended to prevent a negative impact to legally protected state or federally listed fauna or flora (or species proposed for such protection – Subpart 1.3). Amendments to the SWPPP may be reviewed by the division, a local MS4, the EPA, or an authorized regulatory agency.
- f) Whenever a Total Maximum Daily Load (TMDL) is developed for the receiving waters for a pollutant of concern (e.g., siltation). A list of Tennessee's TMDLs can be found at:
<https://www.tn.gov/environment/program-areas/wr-water-resources/watershed-stewardship/tennessee-s-total-maximum-daily-load--tmdl--program.html>.



5.5. COMPONENTS OF THE SWPPP

The SWPPP must:

- a) identify all potential sources of pollutants likely to affect the quality of stormwater discharges from the construction site;
- b) describe practices to be used to reduce pollutants in stormwater discharges from the construction site; and
- c) assure compliance with the terms and conditions of this permit.

The SWPPP shall include the items described in Sections 5.5.1, 5.5.2 and 5.5.3.

5.5.1. SWPPP Narrative

Each SWPPP shall provide a description of pollutant sources and other information as indicated below:

- a) A description of all construction activities at the site, including the intended sequence of activities which disturb soils for major portions of the site (e.g., grubbing, excavation, grading, utilities and infrastructure installation).
- b) Estimates of the total area of the site and the total area that is expected to be disturbed by excavation, grading, filling or other construction activities.
- c) A description of the topography of the site, including an estimation of percent slope and delineation of drainage area (acres) serving each outfall. Drainage area estimates shall include off-site drainage, if applicable.
- d) Hydric soils must be clearly identified.
- e) A description of how the runoff will be handled to prevent erosion at the permanent outfall and receiving stream.
- f) An erosion prevention and sediment control (EPSC) plan with the proposed construction area clearly outlined. The plan shall indicate the boundaries of the permitted area, drainage patterns, approximate slopes anticipated after major grading activities, areas of soil disturbance, an outline of areas which are not to be disturbed, the location of major structural and nonstructural controls identified in the SWPPP, the location of areas where stabilization practices are expected to occur, streams and sinkholes, and identification on the erosion control plan of outfall points intended for coverage. The erosion control plan must meet requirements stated in Section 5.5.3.
- g) A description of any discharge associated with industrial activity other than construction stormwater that originates on site and the location of that activity and its permit number.



- h) Identification of any streams on or adjacent to the project, a description of any anticipated alteration of these waters and the permit number or the tracking number of the Aquatic Resources Alteration Permit (ARAP) or Section 401 Certification issued for the alteration.
- i) The name of the receiving waters (this does not include wet weather conveyances connecting the site discharge to the receiving stream).
- j) Identification if those receiving waters have unavailable parameters for siltation.⁷
- k) Identification if those receiving waters are Exceptional Tennessee Waters.⁸
- l) If applicable, clearly identify and outline the buffer zones established to protect waters of the state located within the boundaries of the project.
- m) A description of the construction phasing for projects of more than 50 acres (Subsection 5.5.3.2).
- n) The timing of the planting of the vegetation cover must be discussed in the SWPPP if permanent or temporary vegetation is to be used as a control measure. Planting cover vegetation during winter months or dry months should be avoided.

5.5.2. SWPPP and EPSC plans

The SWPPP must include EPSC plans (Section 5.5.3) showing the approximate location of each control measure and a description of when the measure will be implemented during the construction process (e.g., prior to the start of earth disturbance, as the slopes are altered and after major grading is finished). The different stages of construction and the EPSC measures that will be utilized during each stage shall be depicted on multiple plan sheets as described below.

Three separate EPSC plan sheets should be developed for most sites, with the exception of single-lot homes, commercial lots, or linear infrastructure projects of less than or equal to 5 acres, for which a single plan sheet may be sufficient:

- a. The first plan sheet will address the EPSC measures necessary to manage stormwater runoff, erosion and sediment during the initial land disturbance (grading) stage.

⁷ DWR Construction Stormwater Permitting Map Viewer can be found at: <https://tdeconline.tn.gov/dwrcgp/>

⁸ List of Exceptional Waters and ORNWs in Tennessee can be found at: https://tdec.tn.gov:8090/pls/enf_reports/f?p=9034:34304; corresponding map viewer is under development



- b. A second plan sheet will address the EPSC measures necessary to manage stormwater runoff, erosion and sediment during any interim grading and construction stages.
- c. The third plan sheet will address the EPSC measures necessary to manage stormwater runoff, erosion and sediment during the final grading stage while permanent site stabilization is being achieved.

The description and implementation of controls shall address the following minimum components, as described in Sections 5.5.3, 5.5.3.6 and 5.5.3.7. Additional controls may be necessary to comply with Section 6.3.2.

5.5.3. Erosion Prevention and Sediment Controls (EPSC)

5.5.3.1. General criteria and requirements

- a) The erosion prevention controls shall be designed to eliminate to the maximum extent practicable the dislodging and suspension of soil in water. Sediment controls shall be designed to retain mobilized sediment on site to the maximum extent practicable.
- b) All control measures must be properly selected, installed and maintained in accordance with the manufacturer's specifications and/or good engineering practices. If periodic inspections or other information indicate a control has been used inappropriately, or incorrectly, the permittee must replace or modify the control.
- c) If sediment escapes the permitted area, off-site accumulations that have not reached a stream must be removed at a frequency sufficient to minimize off-site impacts (e.g., sediment that has escaped a construction site and collected in a street must be removed so that it does not subsequently wash into storm sewers and streams during the next rain or so that it does not pose a safety hazard to users of public streets). Permittees shall not initiate remediation or restoration of a stream without receiving prior authorization from the division. This permit does not authorize access to private property. Arrangements concerning the removal of sediment on adjoining property must be settled by the permittee and the adjoining landowner.
- d) Sediment must be removed from sediment traps, silt fences, sediment basins and other sediment controls when design capacity has been reduced by 50%.
- e) Erodible material storage areas (e.g., overburden and stockpiles of soil) and borrow pits that are used primarily for the permitted project are considered a part of the site and shall be identified on the NOI, addressed in the SWPPP and included in the fee calculation. TDOT projects shall be addressed in the Waste and Borrow Manual per the Statewide Stormwater Management Plan (SSWMP).



- f) Pre-construction vegetative ground cover shall not be destroyed, removed or disturbed more than 14 days prior to commencement of grading or earth moving activities unless the area is subsequently temporarily or permanently stabilized.
- g) Clearing and grubbing must be held to the minimum necessary for grading and equipment operation. Existing vegetation at the site shall be preserved to the maximum extent practicable. The limits of soil disturbance shall be clearly outlined in the SWPPP and the areas to remain undisturbed clearly indicated on the site, with the methods to be used to mark these areas described in the SWPPP.
- h) Construction must be sequenced to minimize the exposure time of graded or denuded areas.
- i) EPSC measures must be in place and functional before earth moving operations begin and must be constructed and maintained throughout the construction period stages as appropriate. Temporary measures may be removed at the beginning of the workday but must be replaced at the end of the workday.
- j) Off-site vehicle tracking of sediment and the generation of dust shall be minimized. A stabilized construction access shall be described and implemented to reduce the tracking of mud and dirt onto public roads by construction vehicles.

5.5.3.2. Construction phasing

Construction phasing is recommended on all projects regardless of size as an effective practice for minimizing erosion and limiting sedimentation. It is recommended that construction be phased to keep the total disturbed area less than 50 acres at any one time. This includes off-site borrow or disposal areas that meet the conditions of Section 1.2.2. Areas where construction is completed must be stabilized within 14 days (Subsection 5.5.3.4).

5.5.3.3. Projects Exceeding 50 acres of Disturbance

On projects where the permittee chooses to disturb more than 50 acres at one time, the following additional requirements shall apply:

- a) The permittee shall notify the division immediately if more than 50 acres of disturbance at one time is planned.
- b) Site assessments, as described in Subsection 5.5.3.8, shall be conducted on a quarterly basis.
- c) Operator inspections as described in Subsection 5.5.3.9 shall be conducted twice per week and following any rainfall event of more than 0.5 inches in



24 hours. Inspections following rainfall events can be counted as one of the twice-weekly inspections.

- d) Data describing the erodibility of soils on site, how the soil type erodibility will dictate the needed control measures and how the soil may affect the expected quality of runoff from the site shall be provided. The data may be referenced or summarized. Hydric soils must be clearly identified.
- e) A geospatial file shall be submitted to the division which identifies the project area boundaries as a polygon feature. This polygon feature can be submitted in any common data format (e.g., .kml file, shapefile, feature layer, etc.) that is compatible with common geographic systems software (e.g., Google Earth, ESRI, QGIS, etc.). The file name should reflect the same site name provided on the permit application, or a permit tracking number, if available.
- f) Stormwater runoff monitoring shall be conducted at each outfall draining 10 or more acres (Section 5.5.3.5) or 5 or more acres if draining to waters with unavailable parameters or Exceptional Tennessee Waters (Section 6.4.1).

Code	Parameter	Qualifier	Unit	Sample Type	Monitoring Frequency	Statistical Base
00070	Turbidity	Report	NTU	Grab	Monthly	Daily Maximum
00070	Turbidity	Report	NTU	Grab	Monthly	Monthly Average
00530	Total Suspended Solids (TSS)	Report	mg/L	Grab	Monthly	Daily Maximum
00530	Total Suspended Solids (TSS)	Report	mg/L	Grab	Monthly	Monthly Average
45613	Floating solids or visible foam-visual	Report	Y=1;N=0	Visual	Monthly	Value
50050	Flow	Report	MGD	Estimate	Monthly	Daily Maximum
50050	Flow	Report	MGD	Estimate	Monthly	Monthly Average

The permittee shall maintain a log of rainfall events including date, estimated duration (in hours), and total estimated rainfall per calendar day. For sampling events, the permittee shall provide an estimate of the total volume of the discharge per sampled outfall and the interval between the storm event sampled and the end of the previous measurable (greater than 0.1 inch rainfall) storm event.



The permittee shall report the estimated total drainage area and estimated acreage of land disturbance in the drainage area for each outfall for each sampling event. Record of the estimated drainage area and amount of land disturbance for a given sample event shall be reported in the notes section of the Discharge Monitoring Report.

5.5.3.4. Stabilization practices

The SWPPP shall include a description of temporary and permanent stabilization practices, including site-specific scheduling of the implementation of the practices. Site plans should ensure that existing vegetation is preserved when possible. Stabilization practices may include: temporary seeding, permanent seeding, mulching, geotextiles, sod stabilization, vegetative buffer strips, protection of trees and the preservation of mature vegetation. When seasonal or climate conditions would prevent timely establishment of vegetation other stabilization practices must be utilized. Use of impervious surfaces for permanent stabilization in lieu of a permanent vegetative cover should be avoided where practicable. No stabilization control measures or EPSC measures are to be installed in a stream without obtaining a Section 404 permit and an Aquatic Resources Alteration Permit (ARAP).

Stabilization measures shall be initiated as soon as possible in portions of the site where construction activities have temporarily or permanently ceased. Temporary or permanent soil stabilization at the construction site must be completed within 14 days after the construction activity in that portion of the site has temporarily or permanently ceased. In the following situations, temporary stabilization measures are not required:

- a) Where the initiation of stabilization measures is precluded by snow cover or frozen ground conditions or adverse soggy ground conditions, stabilization measures shall be initiated as soon as practicable.
- b) Where construction activity on a portion of the site is temporarily ceased, but soil disturbing activities is planned to resume within 2weeks.
- c) In arid, semiarid, and drought-stricken areas where initiating vegetative stabilization measures immediately is infeasible, alternative stabilization measures such as properly anchored mulch, soil binders or matting must be employed.

Steep slopes shall be stabilized within one week after construction activity on the slope has temporarily or permanently ceased.



Permanent stabilization with perennial vegetation (using native herbaceous and woody plants where practicable) or other permanently stable, non-eroding surface shall replace any temporary measures as soon as practicable. Unpacked gravel containing fines (silt and clay sized particles) or crusher runs will not be considered a non-eroding surface. On sites where disturbed acreage will be returned to its prior agricultural use (i/e. row crops, pasture) normal agricultural practices can be substituted.

5.5.3.5. Structural practices

The SWPPP shall include a description of structural practices utilized to divert flows from exposed soils, store flows or otherwise limit runoff and discharge of pollutants from exposed areas of the site. Such practices may include, but are not limited to silt fences, earth dikes, drainage swales, sediment traps, check dams, subsurface drains, pipe slope drains, level spreaders, storm drain inlet protection, rock outlet protection, reinforced soil retaining systems, gabions and temporary or permanent sediment basins. Structural controls shall not be placed in streams except as authorized by a section 404 permit and/or Aquatic Resources Alteration Permit (ARAP).

EPSC measures shall be designed to minimize erosion and maximize sediment removal resulting from a 2-year, 24-hour storm (the design storm). The design of erosion prevention and sediment controls must adhere to good engineering practices. The drainage area recommendations and treatment design specifications are provided in the Tennessee Erosion and Sediment Control Handbook. Chemical treatment of the stormwater runoff may be necessary to minimize the amount of sediment being discharged when clay and other fine particle soils or highly erodible soils are present at the construction site. However, the use of cationic polymers for treatment is prohibited.

For an outfall that receives drainage from 10 or more acres, a minimum sediment basin volume that will provide treatment for a calculated volume of runoff from a 2-year, 24-hour storm and runoff from each acre drained, or equivalent control measures as specified in the Tennessee Erosion and Sediment Control Handbook, shall be provided until permanent stabilization of the site. A drainage area of 10 or more acres includes disturbed and undisturbed portions of the site and areas adjacent to the site, all draining through the common outfall. Where an equivalent control measure is substituted for a sediment basin, the equivalency (with respect to sediment removal) must be justified to the division. Runoff from any undisturbed acreage should be diverted around the disturbed area and the sediment basin. Diverted runoff can be omitted from the volume calculation.



Sediment storage expected from the disturbed areas must be included. Discharges from basins and impoundments shall utilize outlet structures that only withdraw water from near the surface of the basin or impoundment, unless infeasible.

All calculations related to drainage areas, runoff coefficients, basin volumes and equivalent control measures must be provided in the SWPPP. The discharge structure from a sediment basin must be designed to retain sediment during the lower flows in accordance with the most current version of the Tennessee Erosion and Sediment Control Handbook. Muddy water to be pumped from excavation and work areas must be held in settling basins, filtered or chemically treated prior to its discharge into surface waters. Water must be discharged through a pipe, grassed or lined channel or other equivalent means so that the discharge does not cause erosion and sedimentation. Discharged water must not cause an objectionable color contrast with the receiving stream.

Sediment structures treating drainage areas in excess of 25 acres require a site-specific design that accurately defines the site hydrology, site-specific sediment loading, hydraulics of the site, and adheres to all Tennessee Erosion and Sediment Control Handbook design recommendations for sediment basins.

Velocity dissipation structures shall be installed if needed to provide for non-erosive discharge velocities to wet weather conveyances or streams.

5.5.3.6. Stormwater management

The following factors must be accounted for in the design of all stormwater controls:

- a) The nature of stormwater runoff and run-on at the site, including factors such as expected flow from impervious surfaces, slopes, and site drainage features. Stormwater controls must be designed to control stormwater volume, velocity, and peak flow rates to minimize discharges of pollutants in stormwater, as well as minimizing channel and streambank erosion at discharge points.
- b) The soil type and range of soil particle sizes expected to be present on the site.
- c) Description of any measures that will be installed during the construction process to control pollutants in stormwater discharges that will occur after construction operations have been completed, including a brief



description of applicable State or local erosion and sediment control requirements.

5.5.3.7. Other items needing control

- a) No solid materials, including building materials, shall be placed in waters of the state, except as authorized by a section 404 permit and/or Aquatic Resources Alteration Permit (ARAP). Litter, construction debris and construction chemicals exposed to stormwater shall be picked up prior to storm events or before being carried off the site by wind so that they do not become a pollutant source for stormwater discharges. EPSC materials shall be prevented from becoming a pollutant source for stormwater discharges.
- b) The SWPPP shall identify and provide the necessary EPSC measures for the installation of any waste disposal system, sanitary sewer or septic system. Permittees must also comply with applicable state and local waste disposal, sanitary sewer or septic system regulations as necessary.
- c) The SWPPP shall include a description of construction and waste materials expected to be stored on-site. The SWPPP shall also include a description of controls used to reduce pollution from materials stored on site. Controls may include storage practices to minimize exposure of the materials to stormwater or spill prevention and response.

5.5.3.8. Site Assessments

Site assessment shall be conducted at each outfall draining 10 or more acres (Section 5.5.3.5) or 5 or more acres if draining to waters with unavailable parameters or Exceptional Tennessee Waters (Section 6.4.1). The site assessment is a documented site inspection conducted by a qualified individual to verify the installation, functionality and performance of the EPSC measures described in the SWPPP. Site assessments shall cover the entire disturbed area and occur within 30 days of construction commencing at each portion of the site that drains the qualifying acreage. The site assessment shall be performed by individuals with one or more of the following qualifications:

- 1. A licensed professional engineer or landscape architect;
- 2. A Certified Professional in Erosion and Sediment Control (CPESC); or
- 3. A person who has successfully completed the "Level II Design Principles for Erosion Prevention and Sediment Control for Construction Sites"



At a minimum, site assessments should be performed to verify the installation, functionality and performance of the EPSC measures described in the SWPPP. If structural BMPs (or equivalent EPSC measures) are not constructed or construction is in progress at the time of the site assessment, a follow-up monthly assessment(s) are required until the BMPs are constructed per the SWPPP. The site assessment should be performed with the inspector and should include a review and update (if applicable) of the SWPPP. Modifications of plans and specifications for any building or structure, including the design of sediment basins or other sediment controls involving structural, hydraulic, hydrologic or other engineering calculations shall be prepared by a licensed professional engineer or landscape architect and stamped and certified in accordance with the [Tennessee Code Annotated](#), Title 62, Chapter 2 and the rules of the [Tennessee Board of Architectural and Engineering Examiners](#).

5.5.3.9. Inspections

Operators shall ensure proper installation, maintenance, and overall effectiveness of erosion prevention and sediment controls (EPSCs) by performing twice weekly site inspections. Inspections must verify and document the functionality and performance of the EPSC measures described in the SWPPP. Initial inspections shall also indicate if all EPSCs have been installed as designed in the submitted SWPPP and EPSC plans; and, if not, measures that need to be taken so those EPSCs meet the design specifications in the field SWPPP and EPSC plans.

5.5.3.10. Inspector qualifications

Twice weekly inspections can be performed by:

- a) a person with a valid certification from the "Level I - Fundamentals of Erosion Prevention and Sediment Control" course,
- b) a licensed professional engineer or landscape architect,
- c) a Certified Professional in Erosion and Sediment Control (CPESC), or
- d) a person who has successfully completed the "Level II - Design Principles for Erosion Prevention and Sediment Control for Construction Sites" course.

An inspector performs and documents the required inspections, paying particular attention to time-sensitive permit requirements, such as stabilization and maintenance activities.



5.5.3.11. Schedule of inspections

- a) Inspections described in paragraphs b, c and d below, shall be performed at least twice weekly. Inspections shall be performed at least 72 hours apart. Where sites or portions of construction sites have been temporarily stabilized, inspections only have to be conducted once per month until construction activity resumes. Inspection requirements do not apply to definable areas that have been permanently stabilized. Changes to the inspection frequency and the justification for such request must be included in the records kept on site. For projects by the Tennessee Department of Transportation (TDOT) and the Tennessee Valley Authority (TVA), such request must be submitted to the division's Nashville Central Office. The division reserves the right to require more frequent inspections if deemed necessary to ensure compliance at a site.
- b) Qualified personnel, as defined in Subsection 5.5.3.10 (provided by the permittee or cooperatively by multiple permittees), shall inspect disturbed areas of the construction site that have not been permanently stabilized, areas used for storage of materials that are exposed to precipitation, structural control measures, locations where vehicles enter or exit the site and each outfall.
- c) Disturbed areas and areas used for storage of materials that are exposed to precipitation shall be inspected for evidence of, or the potential for, pollutants entering the site's drainage system. EPSC measures shall be observed to ensure that they are operating correctly.
- d) Outfall points shall be inspected to determine whether EPSC measures are effectively preventing sediment discharges off-site or impacts to receiving waters. Where discharge locations are inaccessible, nearby downstream locations shall be inspected. Locations where vehicles enter or exit the site shall be inspected for evidence of offsite sediment tracking.
- e) Based on the results of the inspection, any inadequate control measures or control measures in disrepair shall be replaced, modified or repaired as necessary, before the next rain event; but in no case more than seven days after the need is identified.
- f) Based on the results of the inspection, the site description identified in the SWPPP in accordance with Section 5.5.1 and pollution prevention measures identified in the SWPPP in accordance with Section 5.5.3 shall be revised as appropriate. Such revisions shall be made no later than seven days following the inspection. In addition, any modifications to pollution prevention measures shall be implemented as soon as practicable but no later than 14 days following the inspection.



- g) All inspections shall be documented on the *Construction Stormwater Inspection Certification Form* provided in Appendix C of this permit. An alternative inspection form may be used as long as the form contents and the inspection certification language are equivalent to the division's form and the permittee has obtained a written approval from the division to use the alternative form. The form must contain the printed name and signature of the inspector and the certification must be executed by a person who meets the signatory requirements of Section 8.7.2. Inspection reports must be submitted to the division within 10 days of the request.
- h) Inspectors shall accurately document site conditions in their inspection reports. Falsifying inspection records, or other documentation; or failure to complete inspection documentation shall result in a violation of this permit and any other applicable acts or rules.
- i) The initial primary permittee (such as a developer) is no longer required to inspect portions of the site that are covered by a subsequent primary permittee (such as a home builder). Subsequent primary permittees who have obtained coverage under this permit shall conduct twice weekly inspections as per the requirements in Subsection 5.5.3.9.

5.5.3.12. Pollution prevention measures for non-stormwater discharges

The SWPPP must identify source(s) of all non-stormwater discharge(s) listed in Section 1.2.3 if it is to be combined with stormwater discharges associated with construction activity. The SWPPP shall identify and ensure the implementation of appropriate pollution prevention measures for the non-stormwater components of the discharge. Any non-stormwater must be discharged through stable discharge structures. Estimated volume of the non-stormwater components of the discharge must be included in the design of all impacted control measures.



PART 6

6. SPECIAL CONDITIONS, MANAGEMENT PRACTICES, AND OTHER NON-NUMERIC LIMITATIONS

6.1. RELEASES IN EXCESS OF REPORTABLE QUANTITIES

The discharge of hazardous substances or oil in the stormwater discharges from a facility shall be prevented or minimized in accordance with the applicable SWPPP for the facility. This permit does not relieve the permittee of the reporting requirements of 40 CFR 117 and 40 CFR 302.

6.2. SPILLS

This permit does not authorize the discharge of hazardous substances or oil resulting from an on-site spill.

6.3. DISCHARGE COMPLIANCE WITH STATE WATER QUALITY STANDARDS

6.3.1. Violation of water quality standards

This permit does not authorize stormwater or other discharges that would cause or contribute to a violation of a state water quality standard (Tennessee State Rules, Chapters 0400-40-03, 0400-40-04). Such discharges constitute a violation of this permit.

Where a discharge is already authorized under this permit and the division determines the discharge to cause or contribute to the violation of applicable state water quality standards, the division will notify the operator of such violations. The permittee shall take all necessary actions to ensure future discharges do not cause or contribute to the violation of a water quality standard and shall document these actions in the SWPPP.

6.3.2. Discharge quality

- a) The construction activity shall be carried out in such a manner that will prevent violations of water quality criteria as stated in the Tennessee Rules, Chapter 0400-40-03-.03. This includes, but is not limited to, the prevention of any discharge that causes a condition in which visible solids, bottom deposits or turbidity impair the usefulness of waters of the state for any of the uses designated for that water body by Tennessee Rules, Chapter 0400-40-04. Construction activity carried out in the manner required by



this permit shall be considered in compliance with the Tennessee Rules, Chapter 0400-40-03-.03.

- b) There shall be no distinctly visible solids, scum, foam, oily slick, or the formation of slimes, bottom deposits, or sludge banks of such size or character as may be detrimental to fish and aquatic life.
- c) The stormwater discharge must not contain total suspended solids, turbidity, or color in such amounts or character that will result in any objectionable appearance compared to the turbidity or color of the receiving water, considering the nature and location of the water.
- d) The stormwater discharge shall not contain pollutants in quantities that will be hazardous or otherwise detrimental to humans, livestock, wildlife, plant life, or fish and aquatic life in the receiving stream. This provision includes species covered under Subpart 1.3.
- e) Solids or other materials removed by any sediment control treatment devices must be disposed of in a manner that prevents its entrance into or pollution of any surface or subsurface waters.

6.4. DISCHARGES INTO WATERS WITH UNAVAILABLE PARAMETERS OR EXCEPTIONAL TENNESSEE WATERS

6.4.1. SWPPP/BMP Requirements

- a) Discharges that would cause measurable degradation of waters with unavailable parameters or that would cause more than de minimis degradation of Exceptional Tennessee Waters are not authorized by this permit (Subpart 1.3). To be eligible to obtain and maintain coverage under this permit, the operator must satisfy, at a minimum, the following additional requirements for discharges into waters with unavailable parameters for siltation and for discharges to Exceptional Tennessee Waters⁹. All other provisions of this general permit that apply to receiving waters with available parameters shall also apply.
- b) The SWPPP must certify that EPSC measures used at the site are designed to control stormwater runoff generated by a 5-year, 24-hour storm event (the design storm), at a minimum, either from total rainfall in the designated period or the equivalent intensity as specified on the following website https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html.

⁹ or discharges upstream of such waters and because of the proximity to the segment and the nature of the discharge is likely to cause more than de minimis degradation in the unavailable or exceptional segment.



- c) The permittee shall perform inspections described in Section 5.5.3.9 at least twice every calendar week. Inspections shall be performed at least 72 hours apart.
- d) If the division finds that an operator is contributing to the impairment of a receiving stream despite complying with the SWPPP, the operator will be notified by the division in writing that the discharge is no longer eligible for coverage under the general permit. The operator may update the SWPPP and implement the necessary changes designed to eliminate further impairment of the receiving stream. If the permittee does not implement the SWPPP changes within seven days of receipt of notification, the permittee will be notified in writing that continued discharges must be covered by an individual permit (Subpart 8.11). To obtain the individual permit, the operator must file an individual permit application and submit an updated SWPPP. The project must be stabilized immediately and remain stable until the SWPPP is updated and the individual permit is issued. Only discharges from earth disturbing activities necessary for stabilization are authorized to continue until the individual permit is issued.
- e) For an on-site outfall in a drainage area totaling five or more acres, a minimum sediment basin volume that will provide treatment for a calculated volume of runoff from a 5-year, 24-hour storm and runoff from each acre drained; or equivalent control measures as specified in the Tennessee Erosion and Sediment Control Handbook, shall be provided until permanent stabilization of the site.
- f) For an on-site outfall in a drainage area totaling 3.5 - 4.9 acres, a minimum sediment trap volume or engineering equivalent that will provide treatment for a calculated volume of runoff from a 5-year, 24-hour storm and runoff from each acre drained, is required until permanent stabilization of the site. A drainage area of 3.5 - 4.9 acres includes both disturbed and undisturbed portions of the site or areas adjacent to the site, all draining through the common outfall.

6.4.2. Water Quality Riparian Buffer Zone Requirements

Sites that contain, or are adjacent to, receiving waters with unavailable parameters for siltation or designated as Exceptional Tennessee Waters shall preserve a 60-foot natural water quality riparian buffer zone adjacent to the receiving stream. All other buffer zone requirements as stated in Section 4.1.2 will apply.



The natural water quality riparian buffer zone shall be preserved between the top of stream bank and the disturbed construction area. The 60-foot criterion for the width of the buffer can be established on an average width basis at a project, as long as the minimum width of the buffer is more than 30 feet at any measured location. If the construction site encompasses both sides of a stream, buffer averaging can be applied to both sides, but each side must average the 60-foot criterion independently.

This requirement does not apply to an area that is being altered under the authorization of a valid Aquatic Resources Alteration Permit (ARAP), or equivalent permits issued by federal authorities. Additional natural buffer zone requirements may be established by the local MS4 program.



PART 7

7. RETENTION, ACCESSIBILITY AND SUBMISSION OF RECORDS

7.1. DOCUMENTS

The primary permittee shall retain copies of SWPPPs, reports required by this permit, records of all data used to complete the NOI and the NOT for a period of at least three years from the date the NOT is submitted. This period may be extended by written request of the director.

7.2. ACCESSIBILITY AND RETENTION OF RECORDS

The permittee shall retain a copy of the SWPPP and a copy of the permit at the construction site (or other location accessible to the division) from the date construction commences to the date of termination of permit coverage. Permittees with day-to-day operational control over SWPPP implementation shall have a copy of the SWPPP available at a central location onsite for the use of all operators and those identified as having responsibilities under the plan whenever they are on the construction site.

7.2.1. Posting Information at the Construction Site

A notice shall be posted near the main entrance of the construction site visible to the public with the following information:

- a) a copy of the NOC with the NPDES permit tracking number for the construction project;
- b) a name or company name; E-mail address (if available); telephone number and address of the project site owner/operator or a local contact person; and
- c) the location of the SWPPP (Subpart 7.2).

The notice must be maintained in a legible condition. The notice shall be posted in a local public building if posting this information near a main entrance is infeasible due to safety concerns or if the site is not accessible to the public. If the construction project is a linear construction project (e.g., pipeline or highway), the notice must be placed in a publicly accessible location near where construction is actively underway and moved as necessary. This permit does not provide the public with any right to trespass on a construction site for any reason, including inspection of a site. This permit does not require permittees to allow members of the public access to a construction site.



The permittee shall also retain the following items in an appropriate location on-site (or other location accessible to [the division](#)):

- a) A rain gauge (or use a reference site for a record of daily precipitation) and accurate [rainfall](#) records;
- b) A copy of all required inspection reports; and
- c) Records of the dates when major grading activities occur, when construction activities temporarily or permanently cease on a portion of the site, and when stabilization measures are initiated.

7.3. ELECTRONIC SUBMISSION OF DOCUMENTS

This permit requires the submission of forms developed by the [director](#) in order for a person to comply with certain requirements, including, but not limited to, making reports, submitting inspection findings, applying for permit coverage and requesting for termination of permit coverage. The [director](#) may make these forms available electronically and, if submitted electronically, then that electronic submission shall comply with the requirements of Chapter [0400-01-40](#). Electronic submission may be required when available, unless waived by the Commissioner in accordance with 40 C.F.R. § 127.15.

If [the division](#) notifies applicants by mail, E-mail, public notice or by making information available on the world wide web of electronic forms (see [NPDES Electronic Reporting](#)), the [operators](#) may be required to use those electronic options to submit the [NOI](#) (Section 3.3.2)

In the event of large-scale emergencies and/or prolonged electronic reporting system outages, an episodic electronic reporting waiver may be granted by the Commissioner in accordance with 40 CFR § 127.15. A request for a deadline extension or episodic electronic reporting waiver should be submitted to DWRWater.Compliance@tn.gov, in compliance with the Federal NPDES Electronic Reporting Rule.

In the event that [NPDES Electronic Reporting](#) is not functioning, the permittee shall comply with reporting conditions by mailing reports with wet-ink original signatures shall to the following address:



*STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF WATER RESOURCES
COMPLIANCE & ENFORCEMENT UNIT
William R. Snodgrass - Tennessee Tower
312 Rosa L. Parks Avenue, 11th Floor
Nashville, Tennessee 37243-1102*

For purposes of determining compliance with this permit, data provided to the division electronically is legally equivalent to data submitted on signed and certified forms. A copy must be retained for the permittee's files.

7.3.1. Monitoring Results

Monitoring results (if applicable, for projects exceeding 50 acres of disturbance at one time, see Subsection 5.5.3.3) shall be recorded monthly and submitted monthly using NetDMR. Submittals shall be no later than 15 days after the completion of the reporting period. If NetDMR is not functioning, a completed DMR with an original signature shall be submitted to the address for Compliance and Enforcement Unit as listed in the Subpart 7.3 above. The first DMR is due on the 15th of the month following permit effectiveness.

DMRs must be signed and certified by a responsible corporate officer as defined in Tennessee Rule 0400-40-05-.05(6), a general partner or proprietor, or a principal municipal executive officer or ranking elected official, or his duly authorized representative. Such authorization must be submitted in writing and must explain the duties and responsibilities of the authorized representative.



PART 8

8. STANDARD PERMIT CONDITIONS

8.1. DUTY TO COMPLY

8.1.1. Duty to Comply

The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Tennessee Water Quality Control Act (TWQCA) and is grounds for an enforcement action, permit termination, revocation and reissuance, modification; or for denial of a permit renewal application.

8.1.2. Penalties

Pursuant to T.C.A. § 69-3-115 of The Tennessee Water Quality Control Act of 1977, as amended:

- a) Any person who violates an effluent standard or limitation or a water quality standard established under this part (T.C.A. § 69-3-101, et. seq.); violates the terms or conditions of this permit; fails to complete a filing requirement; fails to allow or perform an entry, inspection, monitoring or reporting requirement; violates a final determination or order of the board, panel or commissioner; or violates any other provision of this part or any rule or regulation promulgated by the board, is subject to a civil penalty of up to ten thousand dollars (\$10,000) per day for each day during which the act or omission continues or occurs.
- b) Any person unlawfully polluting the waters of the state or violating or failing, neglecting, or refusing to comply with any of the provisions of this part (T.C.A. § 69-3-101, et. seq.) commits a Class C misdemeanor. Each day upon which such violation occurs constitutes a separate offense.
- c) Any person who willfully and knowingly falsifies any records, information, plans, specifications, or other data required by the board or the commissioner, or who willfully and knowingly pollutes the waters of the state, or willfully fails, neglects or refuses to comply with any of the provisions of this part (T.C.A. § 69-3-101, et. seq.) commits a Class E felony and shall be punished by a fine of not more than twenty-five thousand dollars (\$25,000) or incarceration, or both.



8.1.3. Civil and criminal liability

Nothing in this permit shall be construed to relieve the discharger from civil or criminal penalties for noncompliance. Notwithstanding this permit, the discharger shall remain liable for any damages sustained by the State of Tennessee, including but not limited to fish kills and losses of aquatic life and/or wildlife, as a result of the discharge to any surface or subsurface waters. Additionally, notwithstanding this permit, it shall be the responsibility of the discharger to conduct stormwater discharge activities in a manner such that public or private nuisances or health hazards will not be created. Furthermore, nothing in this permit shall be construed to preclude the State of Tennessee from any legal action or relieve the discharger from any responsibilities, liabilities, or penalties established pursuant to any applicable state law or the Federal Water Pollution Control Act.

8.1.4. Liability Under State Law

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable local, state or federal law.

8.2. CONTINUATION OF THE EXPIRED GENERAL PERMIT

Permittees shall maintain coverage under this general permit until a new general permit is issued.

Operator(s) of an existing site permitted under the division's 2016 construction general permit shall maintain full compliance with the existing SWPPP. The existing SWPPP shall be modified according to the Section 5.3.1 of this permit.

8.3. NEED TO HALT OR REDUCE ACTIVITY NOT A DEFENSE

It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

8.4. DUTY TO MITIGATE

The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit that has a reasonable likelihood of adversely affecting human health or the environment.



8.5. DUTY TO PROVIDE INFORMATION

The permittee shall furnish to the division or an authorized representative of the division, within a time specified by the division, any information that the division may request to determine compliance with this permit or other information relevant to the protection of the waters of the state. The permittee shall also furnish to the division, upon request, copies of records required to be kept by this permit.

8.6. OTHER INFORMATION

When the permittee becomes aware that he or she failed to submit any relevant facts or submitted incorrect information in the Notice of Intent or in any other report to the director, he or she shall promptly submit such facts or information.

8.7. SIGNATORY REQUIREMENTS

All NOIs, SWPPPs, NOTs, Construction Stormwater Inspection Certifications, Construction Stormwater Monitoring Report forms, reports, certifications or information either submitted to the director or the operator of a large or medium Municipal Separate Storm Sewer System (MS4) shall be signed as described in Sections 8.7.1 and 8.7.2 and dated.

8.7.1. Signatory Requirements for an NOI¹⁰

The NOI shall be signed as follows:

- a) For a corporation, by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means:
 - i. a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation, or
 - ii. the manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated site including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive

¹⁰ As specified in 40 CFR 122.22(a)(1)-(3) [48 FR 14153, Apr. 1, 1983, as amended at 48 FR 39619, Sept. 1, 1983; 49 FR 38047, Sept. 29, 1984; 50 FR 6941, Feb. 19, 1985; 55 FR 48063, Nov. 16, 1990; 65 FR 30907, May 15, 2000]



measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

- b) For a general partnership, by each general partner in the general partnership,
- c) For a sole proprietorship, by the proprietor,
- d) For a municipality, state, federal, or other public agency, by either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a Federal agency includes:
 - i. the chief executive officer of the agency, or
 - ii. a senior executive officer having responsibility for the overall operations of a principle geographic unit of the agency (e.g., Regional Administrators of [EPA](#)).

NOTE: The division does not require specific assignments or delegations of authority to responsible corporate or municipal, state, federal, or other public agency officers. The division will presume that these officers have the requisite authority to sign permit applications unless the entity has notified the [director](#) to the contrary. Procedures governing authority to sign permit applications may provide for assignment or delegation to applicable positions rather than to specific individuals.

8.7.2. Signatory Requirements for SWPPPs, Reports and Other Items

SWPPPs, Construction Stormwater Inspection Certification forms, reports, certifications or other information submittals required by the permit and other information requested by [the division](#), including but not limited to Notice of Violation responses, shall be signed by a person described in Section 8.7.1, or by a duly authorized representative of that person.

8.7.3. Duly Authorized Representative

For a purpose of satisfying signatory requirements for reports (Section 8.7.2), a person is a duly authorized representative only if:

- a) the authorization is made in writing by a person described in Section 8.7.1;
- b) the authorization specifies an individual having responsibility for the overall operation of the regulated site or activity such as the position of



plant manager, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company; a duly authorized representative may thus be either a named individual or any individual occupying a named position; and

- c) the written authorization is submitted to the director or an appropriate EFO. The written authorization shall be a written document including the name of the newly authorized person or any individual occupying a named position as described in paragraph b) above, and the corresponding contact information (title, mailing address, phone number and E-mail address) for the authorized person or position. The written authorization shall be signed by the newly authorized person accepting responsibility and by the person described in Section 8.7.1 delegating the authority.

8.7.4. Changes to Authorization

If an authorization under Sections 8.7.1 or 8.7.3 is no longer accurate because a different individual or position has responsibility as the primary or secondary permittee, but the company name (permittee name) remains the same, a new NOI and SWPPP certification shall be submitted and signed by the new party who meets signatory authority satisfying the requirements of Sections 8.7.1 or 8.7.3 . The NOI shall include the new individual's information (title, mailing address, phone number and E-mail address), the existing tracking number and the project name.

8.7.5. Signatory Requirements for Primary Permittees

Primary permittees required to sign an NOI and SWPPP because they meet the definition of an operator (Subpart 2.1) shall sign the following certification statement on the NOI and on the SWPPP:

"I certify under penalty of law that this document and all attachments were prepared by me, or under my direction or supervision. The submitted information is to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. As specified in Tennessee Code Annotated Section 39-16-702(a)(4), this declaration is made under penalty of perjury."



8.7.6. Signatory Requirements for Secondary Permittees

Secondary permittees required to sign an NOI and SWPPP because they meet the definition of an operator but who are not primarily responsible for preparing an NOI and SWPPP, shall sign the following certification statement on the NOI and on the SWPPP:

"I certify under penalty of law that I have reviewed this document, any attachments, and the SWPPP referenced above. Based on my inquiry of the construction site owner/developer identified above and/or my inquiry of the person directly responsible for assembling this NOI and SWPPP, I believe the information submitted is accurate. I am aware that this NOI, if approved, makes the above-described construction activity subject to NPDES permit number TNR100000, and that certain of my activities on-site are thereby regulated. I am aware that there are significant penalties, including the possibility of fine and imprisonment for knowing violations, and for failure to comply with these permit requirements. As specified in Tennessee Code Annotated Section 39-16-702(a)(4), this declaration is made under penalty of perjury."

8.8. OIL AND HAZARDOUS SUBSTANCE LIABILITY

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject to Section 311 of the Clean Water Act or Section 106 of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA).

8.9. PROPERTY RIGHTS

The issuance of this permit does not convey any property rights of any sort, or any exclusive privileges; nor does it authorize any injury to private property, any invasion of personal rights or any infringement of federal, state or local laws or regulations. The issuance of this permit does not authorize trespassing or discharges of stormwater or non-stormwater across private property.

8.10. SEVERABILITY

The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit shall not be affected thereby.



8.11. INDIVIDUAL PERMITS

8.11.1. Required Individual Permit Coverage

The director may require any person covered by this permit to apply for and obtain an individual NPDES permit to ensure adequate protection of designated uses of a receiving stream. Any interested person may petition the director in writing to take action under this paragraph but must include in their petition the justification for such an action. Where the director requires a discharger authorized to discharge under this permit to apply for an individual NPDES permit, the director shall notify the discharger in writing that an individual permit application is required. This notification will include a brief statement of the reasons for this decision, an application form, a statement setting a deadline for the discharger to file the application and a statement that coverage under this general permit shall terminate upon the effective date of an individual NPDES permit; or denial of coverage under an individual permit. An individual NPDES permit is required only when additional permit terms or conditions beyond those set forth herein are necessary to protect water quality. Criteria for the division to require an individual NPDES permit may include, but are not limited to:

- a) Due to unique site conditions the discharge may result in greater than de minimis degradation, or a threat to threatened or endangered aquatic or semi-aquatic species.
- b) The total acreage to be disturbed and/or total drainage area to an outfall may exceed the capability of standard EPSCs and other BMPs to prevent pollution to waters.
- c) Steep grades or erosive soil conditions warrant site-specific controls that exceed the conditions of the CGP.
- d) Other site-specific conditions, such as contaminated soils or public lands.

The notification may require stabilization of the site and suspend coverage under this general permit until the individual permit is issued. Individual permit applications and updated SWPPP shall be submitted to the appropriate Environmental Field Office of the division as indicated in Subpart 3.4. The director may grant additional time to submit the application upon request of the applicant. If a discharger fails to submit in a timely manner an individual NPDES permit application as required by the director under this paragraph, then the applicability of this permit to the discharger will be terminated at the end of the day specified by the director for application submittal.



If the decision to require an individual NPDES permit precedes the issuance of coverage under this general permit, earth disturbing activities cannot begin until the individual permit is issued.

8.11.2. Permittee-Requested Individual Permit Coverage

Any discharger authorized by this permit may request to be excluded from the coverage of this permit by applying for an individual permit. Any discharger that knowingly cannot abide by the terms and conditions of this permit must apply for an individual permit. In such cases, the permittee shall submit an individual application in accordance with the requirements of 40 CFR 122.26(c)(1)(ii), with reasons supporting the request, and a SWPPP to the appropriate division's Environmental Field Office. The request may be granted by issuance of an individual permit, or alternative general permit, if the reasons cited by the permittee are adequate to support the request.

8.11.3. General Permit Termination

When an individual NPDES permit is issued to a discharger otherwise subject to this permit, or the discharger is authorized to discharge under an alternative NPDES general permit, the applicability of this permit to the discharger is terminated on the effective date of the individual permit or the date of authorization of coverage under the alternative general permit, whichever the case may be. When an individual NPDES permit is denied to an owner or operator otherwise subject to this permit, or the owner or operator is denied for coverage under an alternative NPDES general permit, the applicability of this permit to the individual NPDES permittee is terminated on the date of such denial, unless otherwise specified by the director. Coverage under the Tennessee Multi-Sector General Permit for the Discharge of Stormwater from an Industrial Activity (TMSP) will not be considered as an alternative general permit under this section without being specified by the director.

8.12. OTHER, NON-STORMWATER, PROGRAM REQUIREMENTS

No condition of this permit shall release the permittee from any responsibility or requirements under other environmental statutes or regulations.

8.13. PROPER OPERATION AND MAINTENANCE

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related equipment) which are installed or used by the permittee to achieve compliance with the conditions of this permit and with the requirements of SWPPPs.



Proper operation and maintenance requires the operation of backup or auxiliary facilities or similar systems, installed by a permittee, when determined by the permittee or the division to be necessary to achieve compliance with the conditions of the permit.

8.14. INSPECTION AND ENTRY

The permittee shall allow authorized representatives of the Environmental Protection Agency, the director or an authorized representative of the commissioner of TDEC, or, in the case of a construction site which discharges through a municipal separate storm sewer, an authorized representative of the MS4 receiving the discharge, upon the presentation of credentials and other documents as may be required by law:

- a) to enter upon the permittee's premises where a regulated facility or activity is located or conducted or where records must be kept under the conditions of this permit;
- b) to have access to and copy at reasonable times, any records that must be kept under the conditions of this permit; and
- c) to inspect any facilities or equipment, including monitoring and control equipment.

8.15. PERMIT ACTIONS

This permit may be issued, modified, revoked, reissued or terminated for cause in accordance with this permit and the applicable requirements of T.C.A. § 69-3-108. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

PART 9

9. REQUIREMENTS FOR TERMINATION OF COVERAGE

9.1. TERMINATION OF DEVELOPER AND BUILDER COVERAGE

9.1.1. Termination Process for Primary Permittees

Primary permittees wishing to terminate coverage under this permit must submit a completed Notice of Termination (NOT) form provided in Appendix B of this permit (representative photo or video documentation of site stabilization is recommended). Electronic submittal is encouraged (see NPDES Electronic Reporting for more information). Primary permittees who abandon a site and fail to submit the NOT will be in violation of this permit. If the NOT was not submitted five years following the “estimated end date” (as identified on the NOI), the division can terminate the CGP coverage, unless the permittee specifically requests to maintain coverage. Signs notifying the public of the construction activity shall be in place until the NOT form has been submitted. Primary permittees may terminate permit coverage only if the conditions described below occur at the site:

- a) For areas where the primary permittee has control, all earth-disturbing activities and, if applicable, construction support activities permitted under Section 1.2.2 at the site are complete and the following requirements are met:
 - i. For any areas that were disturbed during construction, are not covered by permanent structures and over which the permittee had control during the construction activities; the requirements for permanent vegetation or non-vegetative stabilization described in Subsection 5.5.3.4 are met;
 - ii. The permittee has removed and properly disposed of all construction materials, as well as waste and waste handling devices. The permittee has removed all equipment and vehicles that were used during construction, unless they are intended for long-term use following termination of permit coverage;
 - iii. The permittee has removed all stormwater controls that were installed and maintained during construction, except those that are intended for long-term use following termination of permit coverage;
 - iv. The permittee has identified in the SWPPP who is responsible for ongoing maintenance of any stormwater controls left on the site for long-term use following termination of permit coverage, and
 - v. The groundcover achieves permanent stabilization.



- b) The permittee has transferred control of all areas of the site for which he is responsible (including, but not limited to, infrastructure, common areas, [stormwater](#) drainage structures, [sediment](#) control basin) under this permit to another [operator](#), and that [operator](#) has submitted an [NOI](#) and obtained coverage under this permit.
- c) The permittee obtains coverage under an individual or alternative general NPDES permit.

9.1.2. NOT Review

The division may review [NOTs](#) for completeness and accuracy and, when necessary, investigate the proposed site for which the [NOT](#) was submitted. Coverage under the permit is terminated when the permit record is published on [TDEC's DataViewer](#) as "Inactive." [Operators](#) may be liable for discharges that occur from the site after termination.

The division retains the right to deny termination of coverage under this general permit upon receipt of the [NOT](#). If the local Environmental Field Office has information indicating that the permit coverage is not eligible for termination, written notification will be provided within 30 days of receipt that permit coverage has not been terminated. The notification will include a summary of existing deficiencies. When the site meets the termination criteria, the [NOT](#) should be re-submitted.

If any permittee files for bankruptcy or the site is foreclosed on by the lender, the permittee shall notify [the division](#) of the situation so that [the division](#) may assess the site to determine if permit coverage should be obtained by any other person or whether other action is needed.

9.2. TERMINATION OF BUILDER AND CONTRACTOR COVERAGE

9.2.1. Termination Process for Secondary Permittees

Secondary permittees must request termination of coverage under this permit by submitting a [NOT](#) when they are no longer an [operator](#) at the construction site. Electronic submittal is encouraged (see [NPDES Electronic Reporting](#) for more information). Secondary permittees receive coverage under this permit but are not normally mailed a NOC. Consequently, [the division](#) may, but is not required to, notify secondary permittees that their notice of termination has been received. If [the division](#) has reason to believe that the secondary permittee's [NOT](#) should



not have been submitted, the division will deny the secondary permittee's NOT in writing, with specific reasons as to why the NOT should not have been submitted.

9.3. NOT CERTIFICATION

The NOT and the following certification must be signed in accordance with Subpart 8.7 of this permit:

"I certify under penalty of law that either: (a) all stormwater discharges associated with construction activity from the portion of the identified facility where I was an operator have ceased or have been eliminated or (b) I am no longer an operator at the construction site. I understand that by submitting this notice of termination, I am no longer authorized to discharge stormwater associated with construction activity under this general permit, and that discharging pollutants in stormwater associated with construction activity to waters of the state is unlawful under the Tennessee Water Quality Control Act where the discharge is not authorized by a NPDES permit. I also understand that the submittal of this notice of termination does not release an operator from liability for any violations of this permit or the Tennessee Water Quality Control Act. I certify under penalty of law that this document and all attachments were prepared by me, or under my direction or supervision. The submitted information is to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. As specified in Tennessee Code Annotated Section 39-16-702(a)(4), this declaration is made under penalty of perjury."

9.4. WHERE TO SUBMIT A NOT?

Electronic submittal is encouraged (see [NPDES Electronic Reporting](#) for more information). Otherwise, the NOT shall be submitted to the Environmental Field Office (EFO) which issued the NOC to the primary permittee. A list of counties and the corresponding EFOs is provided in Subpart 3.4. The appropriate permit tracking number must be clearly printed on the form.

PART 10

10. DEFINITIONS, ACRONYMS AND RESOURCES

10.1. DEFINITIONS

2-year 24-hour 5-year 24-hour	<p>2-year and 5-year design storm depths and intensities</p> <p>The estimated design rainfall amounts, for any return period interval (i.e., 2-yr, 5-yr, 25-yr, etc.,) in terms of either 24-hour depths or intensities for any duration, can be found by accessing the data available at https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html. Other data sources may be acceptable with prior written approval by TDEC Division of Water Resources.</p>
ARAP	<p>Aquatic Resource Alteration Permit</p> <p>Persons who wish to make an alteration to a <u>stream</u>, river, lake or wetland must first obtain a water quality permit. Physical alterations to properties of waters of the state require an ARAP or a §401 Water Quality Certification (§401 certification). Examples of <u>stream</u> alterations that require a permit from the division include:</p> <ul style="list-style-type: none"> • Dredging, excavation, channel widening, or straightening • Bank sloping; stabilization • Channel relocation • Water diversions or withdrawals • Dams, weirs, dikes, levees or other similar structures • Flooding, excavating, draining and/or filling a wetland • Road and utility crossings • Structural fill <p>General ARAPs are developed and maintained by the division to provide a streamlined, expedited means of authorizing projects that singularly or cumulatively propose minor impacts to water resources.</p>
BMP	<p>Best Management Practices ("BMPs") means schedules of activities, prohibitions of practices, maintenance procedures and other management practices to prevent or reduce the discharge of pollutants to <u>waters</u> of the state. BMPs also include treatment requirements, operating procedures; and practices to control plant site runoff,</p>



	<p>spillage, leaks, sludge or waste disposal, or drainage from raw material storage. BMPs include source control practices (non-structural BMPs) and engineered structures designed to treat runoff.</p> <p><u>Structural BMPs</u> are facilities that help prevent pollutants in stormwater runoff from leaving the site.</p> <p><u>Non-structural BMPs</u> are techniques, activities and processes that reduce pollutants at the source.</p>
borrow pit	<p>Borrow Pit is an excavation from which erodible material (typically <u>soil</u>) is removed to be fill for another site. There is no processing or separation of erodible material conducted at the site. Given the nature of activity and pollutants present at such excavation, a borrow pit is considered a construction activity for the purpose of this permit.</p>
buffer zone	<p>Buffer Zone or Water Quality Riparian Buffer is a permanent strip of natural perennial vegetation, adjacent to a <u>stream</u>, river, wetland, pond, or lake that contains dense vegetation made up of grass, shrubs, and/or trees. The purpose of a water quality riparian buffer is to maintain existing water quality by minimizing risk of any potential <u>sediments</u>, nutrients or other pollutants reaching adjacent surface waters and to further prevent negative water quality impacts by providing canopy over adjacent waters</p>
clearing	<p>Clearing refers to removal of vegetation and disturbance of <u>soil</u> prior to grading or excavation in anticipation of construction activities. Clearing may also refer to wide area land disturbance in anticipation of non-construction activities. Clearing, grading and excavation do not refer to clearing of vegetation along existing or new roadways, highways, dams or power lines for sight distance or other maintenance and/or safety concerns, or cold planning, milling, and/or removal of concrete and/or bituminous asphalt roadway pavement surfaces. The clearing of land for agricultural purposes is exempt from federal <u>stormwater</u> NPDES permitting in accordance with Section 401(1)(1) of the 1987 Water Quality Act and state <u>stormwater</u> NPDES permitting in accordance with the Tennessee Water Quality Control Act of 1977 (<u>T.C.A. 69-3-101 et seq.</u>).</p>



commencement	Commencement of construction: the initial disturbance of <u>soils</u> associated with clearing, grading, excavating or other construction activities.
common plan	Common plan of development or sale is broadly defined as any announcement or documentation (including a sign, public notice or hearing, sales pitch, advertisement, drawing, permit application, zoning request, computer design) or physical demarcation (including boundary signs, lot stakes, surveyor markings) indicating construction activities may occur on a specific plot. A common plan of development or sale identifies a situation in which multiple areas of disturbance are occurring on contiguous areas. This applies because the activities may take place at different times, on different schedules, by different <u>operators</u> .
control measure	Control measure refers to any Best Management Practice (BMP) or other method used to prevent or reduce the discharge of pollutants to waters of the state.
CWA	CWA means the Clean Water Act of 1977 or the Federal Water Pollution Control Act (33 U.S.C. 1251, et seq.)
director	Director means the director, or authorized representative, of the Division of Water Resources of the State of Tennessee, Department of Environment and Conservation.
degradation	Degradation means the alteration of the properties of waters by the addition of pollutants, withdrawal of water, or removal of habitat, except those alterations of a short duration.
de minimis	De Minimis is degradation of a small magnitude, as provided in this paragraph: (a) <u>Discharges and withdrawals</u> : 1. Subject to the limitation in part 3 of this subparagraph, a single discharge other than those from new domestic wastewater sources will be considered de minimis if it uses less than five percent of the available assimilative capacity for the substance being discharged. 2. Subject to the limitation in part 3 of this subparagraph, a single water withdrawal will be considered de minimis if it removes less than five percent of the 7Q10 flow of the <u>stream</u> .



	<p>3. If more than one activity described in part 1 or 2 of this subparagraph has been authorized in a segment and the total of the authorized and proposed impacts uses no more than 10% of the assimilative capacity, or 7Q10 low flow, they are presumed to be de minimis. Where the total of the authorized and proposed impacts uses 10% of the assimilative capacity, or 7Q10 low flow, additional degradation may only be treated as de minimis if the Division finds on a scientific basis that the additional degradation has an insignificant effect on the resource.</p> <p>(b) Habitat alterations authorized by an Aquatic Resource Alteration Permit (ARAP) are de minimis if the Division finds that the impacts, individually and cumulatively, are offset by impact minimization and/or in-system mitigation, provided however, in Outstanding National Resource Waters (ONRWs) the mitigation must occur within the ONRW.</p>
discharge of a pollutant	Discharge or discharge of a pollutant refers to the addition of pollutants to waters from a source.
disturbed area	Disturbed area means the total area presented as part of the development (and/or of a larger common plan of development) subject to being cleared, graded, grubbed, filled or excavated during the life of the development. The area cannot be limited to only the portion of the total area that the site-wide owner/developer initially disturbs through the process of various land clearing activities or in the construction of roadways, sewers, drainfields, and water utilities, <u>stormwater</u> drainage structures, etc., to make the property marketable.
division	Division means the Division of Water Resources of the State of Tennessee, Department of Environment and Conservation
exceptional waters	Exceptional Tennessee Waters are surface waters designated by the division as having the characteristics set forth at Tennessee Rules, Chapter 0400-40-03-.06(4). Characteristics include waters within parks or refuges; scenic rivers; waters with threatened or endangered species; waters that provide specialized recreational opportunities; waters within areas designated as lands



	unsuitable for mining; waters with naturally reproducing trout; waters with exceptional biological diversity and other waters with outstanding ecological or recreational value.
permanent stabilization	<p>Permanent Stabilization means that all <u>soil</u> disturbing activities at the site have been completed and one of the three following criteria is met:</p> <ol style="list-style-type: none">(1) A perennial, preferably native, vegetative cover with a uniform (i.e., evenly distributed, without large bare areas) density of at least 70 percent has been established on all unpaved areas and areas not covered by permanent structures, and all slopes and channels have been permanently stabilized against erosion.(2) Equivalent permanent stabilization measures such as the use of riprap; permanent geotextiles; hardened surface materials including concrete, asphalt, gabion baskets or Reno mattresses have been employed.(3) For construction projects on land used for agricultural or silvicultural purposes, <u>permanent stabilization</u> may be accomplished by returning the disturbed land to its preconstruction agricultural or silvicultural use.
improved sinkhole	<p>Improved sinkhole is a natural surface depression that has been altered in order to direct fluids into the hole opening. Improved sinkhole is a type of injection well regulated under the Underground Injection Control (UIC) program. Underground injection constitutes an intentional disposal of waste waters in natural depressions, open fractures and crevices, such as those commonly associated with weathering of limestone.</p>
Level 1	<p>Level 1 - Fundamentals of Erosion Prevention and Sediment Control training and certification program administered by University of Tennessee Water Resources Research Center (https://tnepsc.org/index.asp). The Fundamentals course is a foundation-building course intended for individuals involved in land-disturbing activities covered by the Construction General Permit. The course aims to build a working knowledge of erosion and <u>sedimentation</u> processes and practices and is intended for: site inspectors, inspection and enforcement personnel from all levels of government, plan preparers and reviewers, and designers and engineers. Topics include:</p>

	<p>Construction General Permit and related <u>SWPPP</u> requirements; function, installation, limitations, inspection and maintenance of Best Management Practices; roles of local officials and state government agencies involved in the permitting process; and basic hydrologic and erosion processes. Upon successful completion of a Course Certification Exam, the participant receives a Level 1 TNEPSC certificate. The Level 1 certificate is valid for three full years following the year that the certificate was issued. To meet the requirement for Level 1 certified staff, TDOT may develop and administer an approved equivalent Level1 training and certification program as provided in the TDOT individual <u>MS4</u> Permit. The equivalent TDOT Level 1 certification is valid only for TDOT staff and for projects where TDOT is the primary site <u>operator</u>.</p>
Level 2	<p>Level 2 - Design Principles for Erosion Prevention and Sediment Control for Construction Sites training and certification program administered by University of Tennessee Water Resources Research Center (https://tnepsc.org/index.asp). It is an advanced 2-day workshop designed for engineers and other professionals who have completed the prerequisite Level 1 course. The Level 2 Design workshop provides the general tools needed for developing an acceptable, working <u>SWPPP</u>. Topics discussed in the course include: hydrologic methods for determining peak flows; principles of <u>soil</u> erosion, scouring and <u>sediment</u> transport processes, including practice examples for preventing erosion; and open channel principles and practices for designing a stable channel, including use and examples of riprap, blankets and matting, and vegetation; <u>stormwater</u> control requirements and design; <u>sedimentation</u> principles; and <u>temporary sediment basin</u> design requirements, and detailed examples. The Level 2 Design workshop provides a Certificate of Completion after attending both days and successfully completing the take-home exam.</p>
linear project	<p>Linear Project is a land disturbing activity as conducted by an underground/overhead utility or highway department, including, but not limited to, any cable line or wire for the transmission of electrical energy; any conveyance pipeline for transportation of gaseous or liquid substance; any</p>



	cable line or wire for communications; or any other energy resource transmission ROW or utility infrastructure, e.g., roads and highways. Activities include the construction and installation of these utilities within a corridor. Linear project activities also include the construction of access roads, staging areas and borrow/spoil sites associated with the linear project. Land disturbance specific to the development of residential and commercial subdivisions or high-rise structures is not considered a linear project.
measurable degradation	Measurable Degradation , as used in the context of <u>discharges</u> or withdrawals, means changes in parameters of waters that are of sufficient magnitude to be detectable by the best available instrumentation or laboratory analyses.
month	Month or Monthly refers to calendar months.
MS4	"Municipal Separate Storm Sewer System" or "MS4" is defined in 40 CFR §122.26(b)(8) to mean a conveyance or system of conveyances (e.g., roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains) that are: <ul style="list-style-type: none">a) owned and operated by a state, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to state law) having jurisdiction over disposal of sewage, industrial wastes, <u>stormwater</u>, or other wastes, including special districts under state law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that <u>discharges</u> to waters of the United States;b) designed or used for collecting or conveying <u>stormwater</u>;c) not a combined sewer; andd) not part of a Publicly Owned Treatment Works (POTW) as defined in 40 CFR §122.2.
operator	Operator for the purpose of this permit and in the context of <u>stormwater</u> associated with construction activity, means any person (typically considered the primary permittee)

	<p>associated with a construction project that meets either of the following two criteria:</p> <ul style="list-style-type: none"> a) This person has operational or design control over construction plans and specifications, including the ability to make modifications to those plans and specifications. This person is typically the owner or developer of the project or a portion of the project (e.g., subsequent builder) or the person who is the current owner of the construction site. b) This person has day-to-day operational control of those activities at a project which are necessary to ensure compliance with a <u>SWPPP</u> for the site or other permit conditions. This person is typically a contractor or a commercial builder who is hired by the primary permittee and is considered a secondary permittee. <p>It is anticipated that at different phases of a construction project, different types of parties may satisfy the definition of “operator” (see Part 2 of this permit).</p>
point source (or outfall)	<p>Point source means any discernible, confined and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel or other floating craft from which pollutants are or may be discharged. This term does not include introduction of pollutants from non-point source agricultural and silvicultural activities, including <u>stormwater</u> runoff from orchards, cultivated crops, pastures, range lands, forest lands or return flows from irrigated agriculture or agricultural <u>stormwater</u> runoff. In short, outfall is a point where runoff leaves the site as a concentrated flow in a discrete conveyance. Phrase “point source” and term “outfall” are used interchangeably in this general permit, and can be considered synonyms.</p>
pollutant	<p>Pollutant means sewage, industrial wastes, or other wastes.</p>
QLP	<p>Qualifying State, Tribal, or local erosion and sediment control program is one that includes, as defined in 40 CFR 122.44(s):</p>



	<ul style="list-style-type: none">a) Requirements for construction site <u>operators</u> to implement appropriate erosion and <u>sediment</u> control best management practices.b) Requirements for construction site <u>operators</u> to control waste such as discarded building materials, concrete truck washout, chemicals, litter, and sanitary waste at the construction site that may cause adverse impacts to water quality.c) Requirements for construction site <u>operators</u> to develop and implement a <u>stormwater</u> pollution prevention plan. A stormwater pollution prevention plan includes site descriptions, descriptions of appropriate control measures, copies of approved State, Tribal or local requirements, maintenance procedures, inspection procedures and identification of non-<u>stormwater</u> discharges.d) Requirements to submit a site plan for review that incorporates consideration of potential water quality impacts.
rainfall	A rainfall event is defined as any occurrence of rain preceded by 10 hours without precipitation that results in an accumulation of 0.01 inches or more. Instances of rainfall occurring within 10 hours of each other will be considered a single rainfall event.
registered engineer	Registered Engineer and Registered Landscape Architect An engineer or landscape architect certified and registered by the State Board of Architectural and Engineer Examiners pursuant to Section 62-202, Tennessee Code Annotated, to practice in Tennessee.
runoff coefficient	Runoff coefficient means the fraction of total rainfall that will appear at the conveyance as runoff. Runoff coefficient is also defined as the ratio of the amount of water that is not absorbed by the surface to the total amount of water that falls during a rainstorm.
sediment	Sediment means solid material, both inorganic (mineral) and organic, that is in suspension, is being transported; or has been moved from the site of origin by wind, water, gravity or ice as a product of erosion.
sediment basin	Sediment basin A temporary basin consisting of an embankment constructed across a wet weather



	conveyance, an excavation that creates a basin or by a combination of both. A sediment basin typically consists of a forebay cell, dam, impoundment, permanent pool, primary spillway, secondary or emergency spillway and surface dewatering device. The size and shape of the basin depends on the location, size of drainage area, incoming runoff volume and peak flow, <u>soil</u> type and particle size, land cover, and receiving <u>stream</u> classification (i.e., waters with unavailable parameters, Exceptional TN Waters, or waters with available parameters).
sedimentation	Sedimentation means the action or process of forming or depositing sediment.
soil	Soil or Topsoil means the unconsolidated mineral and organic material on the immediate surface of the earth that serves as a natural medium for the growth of plants.
steep slope	Steep Slope or Steep Grade means a natural or created slope of 35% grade or greater. Designers of sites with steep slopes must pay attention to <u>stormwater</u> management in the <u>SWPPP</u> to engineer runoff around or over a steep slope so as not to erode the slope. In addition, site managers should focus on erosion prevention on the slopes and stabilize the slopes as soon as practicable to prevent slope failure or sediment discharges from the project.
stormwater	Stormwater means rainfall runoff, snow melt runoff, and surface runoff and drainage.
stream	A Stream is a surface water that is not a wet weather conveyance. Therefore, as used in this permit, "stream" includes lakes, wetlands and other non-linear surface waters.
construction stormwater	Stormwater associated with industrial activity is defined in 40 CFR 122.26(b)(14) and incorporated here by reference. Most relevant to this permit is 40 CFR 122.26(b)(14)(x), which relates to construction activity including clearing, grading, filling and excavation activities, including borrow pits containing erodible material. Disturbance of soil for the purpose of crop production is exempt from permit requirements, but stormwater discharges from agriculture-related activities that involve construction of structures (e.g., barn construction, road construction, pond construction) are considered associated with industrial



	activity. Maintenance to the original line and grade, hydraulic capacity; or to the original purpose of the facility (e.g., re-clearing, minor excavation performed around an existing structure necessary for maintenance or repair and repaving of an existing road) is not considered a construction activity for the purpose of this permit.
discharge-related activities	Stormwater discharge-related activities means activities that cause, contribute to or result in point source stormwater pollutant discharges. These activities may include excavation, site development, grading and other surface disturbance activities; and activities to control stormwater including the siting, construction and operation of best management practices (BMPs).
SWPPP	Stormwater Pollution Prevention Plan is a written site-specific plan required by this permit that includes a narrative pollution prevention plan and graphical erosion and sediment control plan. In its basic form, the plan contains a site map, a description of construction activities that could introduce pollutants to stormwater runoff, a description of measures or practices to control these pollutants, and erosion and sediment control plans and specifications. It must be prepared and submitted before construction begins. In order to effectively reduce erosion and <u>sedimentation</u> impacts, Best Management Practices (BMPs) must be designed, installed and maintained during land disturbing activities. The <u>SWPPP</u> should be prepared in accordance with the <u>Tennessee Erosion and Sediment Control Handbook</u> .
take	Take of an endangered species means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct.
the handbook	<u>Tennessee Erosion and Sediment Control Handbook</u> is a guidance issued by the Division of Water Resources for the purpose of developing Stormwater Pollution Prevention Plans and Erosion and Sediment Control Plans required by the TNCGP. The handbook is designed to provide information to planners, developers, engineers and contractors on the proper selection, installation and maintenance of BMPs. The handbook is intended for use during the design and



	construction of projects that require erosion and sediment controls to protect waters of the state.
temporary stabilization	Temporary stabilization is achieved when vegetation or non-erodible surface has been established on the area of disturbance and construction activity has temporarily ceased. Under certain conditions, temporary stabilization is required when construction activities temporarily cease. However, if future construction activity is planned, permit coverage continues.
TMDL	<p>Total maximum daily load (TMDL) means the sum of the individual wasteload allocations for <u>point sources</u> and load allocations for nonpoint sources and natural background (40 CFR 130.2(l)). TMDL is a study that quantifies the amount of a pollutant in a <u>stream</u>, identifies the sources of the pollutant and recommends regulatory or other actions that may need to be taken in order for the <u>stream</u> to cease being polluted. TMDLs can also be described by the following equation:</p> <p>$\text{TMDL} = \text{sum of nonpoint sources (LA)} + \text{sum of } \underline{\text{point sources (WLA)}} + \text{margin of safety}$</p> <p>A list of completed TMDLs that have been approved by EPA can be found at our web site: https://www.tn.gov/environment/program-areas/wr-water-resources/watershed-stewardship/tennessee-s-total-maximum-daily-load--tmdl--program.html</p>
treatment chemicals	Treatment chemicals are polymers, flocculants or other chemicals used to reduce turbidity in stormwater discharges by chemically bonding to suspended silts and other soil materials and causing them to bind together and settle out. Common examples of anionic treatment chemicals are chitosan and anionic PAM.
turbidity	Turbidity is the cloudiness or haziness of a fluid caused by individual particles (suspended solids) that are generally invisible to the naked eye, similar to smoke in air.
waste site	Waste site is an area where material from a construction site is disposed of. When the material is erodible, such as soil, the site must be treated as a construction site.



waters or waters of the state	Waters (or waters of the state) means any and all water, public or private, on or beneath the surface of the ground, which are contained within, flow through, or border upon Tennessee or any portion thereof, except those bodies of water confined to and retained within the limits of private property in single ownership which do not combine or effect a junction with natural surface or underground waters.
unavailable parameters	Waters with unavailable parameters means any segment of surface waters that has been identified by the division as failing to support one or more classified uses. For the purpose of this permit, pollutant of concern is siltation. Based on the most recent assessment information available to staff, the division will notify applicants and permittees if their discharge is into, or is affecting, waters with unavailable parameters. Resources to be used in making this determination include biennial compilations of impaired waters, databases of assessment information, updated GIS coverages (https://tdeconline.tn.gov/dwr/), and the results of recent field surveys. GIS coverages of the streams and lakes not meeting water quality standards, plus the biennial list of waters with unavailable parameters, can be found at https://www.tn.gov/environment/program-areas/wr-water-resources/water-quality/water-quality-reports---publications.html .
week	A one-week period is a synonym of a calendar-week ; typically, a period from Sunday through Saturday.
wet weather conveyance	Wet weather conveyances are man-made or natural watercourses, including natural watercourses that have been modified by channelization, that meet the following: a) The conveyance carries flow only in direct response to precipitation runoff in its immediate locality. b) The conveyance's channels are at all times above the ground water table. c) The flow carried by the conveyance is not suitable for drinking water supplies. d) Hydrological and biological analyses indicate that, due to naturally occurring ephemeral or low flow under normal weather conditions, there is not sufficient water



	to support fish or multiple populations of obligate lotic aquatic organisms whose life cycle includes an aquatic phase of at least two months. (Tennessee Rules, Chapter 0400-40-3-.04(3)).
--	---

10.2. ACRONYMS AND ABBREVIATIONS

7Q10	7-day minimum, 10-year recurrence interval
<u>ARAP</u>	Aquatic Resource Alteration Permit
<u>BMP</u>	Best Management Practice
BPT	Best Practicable Control Technology Currently Available
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CGP	Construction General Permit (this NPDES permit)
<u>CWA</u>	Clean Water Act
<u>EFO</u>	Environmental Field Office (see Subpart 3.4)
EPA	(U.S.) Environmental Protection Agency
EPSC	Erosion Prevention and Sediment Control
<u>MS4</u>	Municipal Separate Storm Sewer System
NOC	Notice of Coverage (see Subpart 1.5)
NOI	Notice of Intent (to be covered by this permit – see Section 1.4.1)
NOT	Notice of Termination (see Part 9)
NPDES	National Pollutant Discharge Elimination System
ONRW	Outstanding National Resource Waters
<u>QLP</u>	Qualifying Local Program (see Section 1.4.5)
<u>SWPPP</u>	Stormwater Pollution Prevention Plan
TDEC	Tennessee Department of Environment and Conservation
TDOT	Tennessee Department of Transportation
<u>TMDL</u>	Total Maximum Daily Load
TMSP	Tennessee Multi-Sector General Permit for the Discharge of Stormwater from an Industrial Activity
TVA	Tennessee Valley Authority
TWQCA	Tennessee Water Quality Control Act
UIC	Underground Injection Control
USGS	United States Geological Survey



10.3. RESOURCES, HYPERLINKS, AND WEB PAGES

Electronic Code of Federal Regulations (eCFR), Title 40 (40 CFR § 1 through § 1099)

<https://www.ecfr.gov/cgi-bin/text-idx?SID=75202eb5d09974cab585afeea981220b&mc=true&tpl=/ecfrbrowse/Title40/40chapter1.tpl>

Electronic Reporting (NetDMR) Waiver Request

https://www.tn.gov/content/dam/tn/environment/water/documents/wr_electronic_reporting_waiver.pdf

Online Forms

[NPDES Electronic Reporting](#)

NPDES Compliance Inspection Manual (EPA)

<https://www.epa.gov/sites/production/files/2017-01/documents/npdesinspect.pdf>

NPDES Electronic Reporting Rule

<https://www.federalregister.gov/documents/2015/10/22/2015-24954/national-pollutant-discharge-elimination-system-npdes-electronic-reporting-rule>

Rules of the TN Department of Environment and Conservation, Chapter 0400-40

<https://publications.tnsosfiles.com/rules/0400/0400-40/0400-40.htm>

TDEC Water Quality Rules, Reports, and Publications

<https://www.tn.gov/environment/program-areas/wr-water-resources/water-quality/water-quality-reports---publications.html>

Technical Support Document for Water Quality-based Toxics Control (EPA)

<https://www3.epa.gov/npdes/pubs/owm0264.pdf>

Tennessee Water Resources Data and Map Viewers

<https://www.tn.gov/environment/program-areas/wr-water-resources/water-quality/water-resources-data-map-viewers.html>

USGS StreamStats

https://www.usgs.gov/mission-areas/water-resources/science/streamstats-streamflow-statistics-and-spatial-analysis-tools?qt-science_center_objects=0#qt-science_center_objects



USGS SWToolbox

<https://www.usgs.gov/software/swtoolbox-software-information>

(End of body of permit; appendices follow.)

APPENDIX A – NOTICE OF INTENT FORM (NOI)

(See Next Page)

**TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION**

Division of Water Resources

William R. Snodgrass Tennessee Tower, 312 Rosa L. Parks Avenue, 11th Floor

Nashville, TN 37243

Toll Free Number: 1-888-891-8332 (TDEC)

**NOTICE OF INTENT (NOI) FOR GENERAL NPDES PERMIT FOR
STORMWATER DISCHARGES FROM CONSTRUCTION ACTIVITIES (TNR100000)**

Site or Project Name:		NPDES Tracking Number: TNR	
Street Address including city or zip code or Location:		Construction Start Date:	
		Estimated End Date:	
Site Description:		Latitude (dd.dddd):	
		Longitude (-dd.dddd):	
County(ies):	MS4 Jurisdiction (if applicable):	Acres Disturbed:	
		Total Acres:	
Are there any streams <input type="checkbox"/> and/or wetlands <input type="checkbox"/> on or adjacent to the construction site? If wetlands are located on-site and may be impacted, attach wetlands delineation report. If an Aquatic Resource Alteration Permit has been obtained for this site, what is the permit number? ARAP Number:			
Receiving waters:			
Include the SWPPP with the NOI <input type="checkbox"/> SWPPP Included		Include a site location <input type="checkbox"/> Map Included map	

Name of Site Owner or Developer (Site-Wide Permittee): (correct legal name of person, company, or entity that has operational or design control over construction plans and specifications)			
For corporate entities only, provide the Tennessee Secretary of State (SOS) Control Number:			
Site Owner or Developer Contact Name: (individual responsible for site)		Title or Position: (the party who signs the certification below):	
Mailing Address:	City:	State:	Zip:
Phone: ()	E-mail:		

Optional Contact Name:		Title or Position:	
Mailing Address:	City:	State:	Zip:
Phone: ()	E-mail:		

Owner or Developer Certification: (must be signed by president, vice-president or equivalent, or ranking elected official) (Primary Permittee)

I certify under penalty of law that this document and all attachments were prepared by me, or under my direction or supervision. The submitted information is to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. As specified in Tennessee Code Annotated Section 39-16-702(a)(4), this declaration is made under penalty of perjury.

Owner or Developer Name: (print or type)	Signature:	Date:

Contractor(s) Certification: (must be signed by president, vice-president or equivalent, or ranking elected official) (Secondary Permittee)

I certify under penalty of law that I have reviewed this document, any attachments, and the SWPPP referenced above. Based on my inquiry of the construction site owner/developer identified above and/or my inquiry of the person directly responsible for assembling this NOI and SWPPP, I believe the information submitted is accurate. I am aware that this NOI, if approved, makes the above-described construction activity subject to NPDES permit number TNR100000, and that certain of my activities on-site are thereby regulated. I am aware that there are significant penalties, including the possibility of fine and imprisonment for knowing violations, and for failure to comply with these permit requirements. As specified in Tennessee Code Annotated Section 39-16-702(a)(4), this declaration is made under penalty of perjury.

Primary contractor name, address, and SOS control number (if applicable): (print or type)	Signature:	Date:
Primary contractor name, address, and SOS control number (if applicable): (print or type)	Signature:	Date:
Primary contractor name, address, and SOS control number (if applicable): (print or type)	Signature:	Date:

NOTICE OF INTENT (NOI) FOR GENERAL NPDES PERMIT FOR STORMWATER DISCHARGES FROM CONSTRUCTION ACTIVITIES (TNR100000)

Purpose of this form: A completed notice of intent (NOI) must be submitted to obtain coverage under the Tennessee General NPDES Permit for Discharges of Stormwater Associated with Construction Activity (permit). **Requesting coverage under this permit means that an applicant has obtained and examined a copy of this permit, and thereby acknowledges applicant's claim of ability to be in compliance with permit terms and conditions.** This permit is required for stormwater discharge(s) from construction activities including clearing, grading, filling and excavating (including borrow pits) of one or more acres of land. This form should be submitted at least 30 days prior to the commencement of land disturbing activities, or no later than 48 hours prior to when a new operator assumes operational control over site specifications or commences work at the site.

The appropriate permit application fee must accompany the NOI and is based on total acreage to be disturbed by an entire project, including any associated construction support activities (e.g., equipment staging yards, material storage areas, excavated material disposal areas, borrow or waste sites):

(i) Projects equal to or greater than 150 acres	\$10,000
(ii) Projects equal to or greater than 50 acres and less than 150 acres	\$6,000
(iii) Projects equal to or greater than 20 acres and less than 50 acres	\$3,000
(iv) Projects equal to or greater than 5 acres and less than 20 acres	\$1,000
(v) Projects equal to or greater than 1 acre and less than 5 acres	\$250
(vi) Projects seeking subsequent coverage under an actively covered larger common plan of development or sale	\$100

There is no fee for sites less than 1 acre. A separate annual maintenance fee is also required for construction activities that exceed 1 year under general permit coverage. Tennessee Rules, Chapter 0400-40-11-.02(b)(12)).

Who must submit the NOI form? Per Section 2 of the permit, all site operators must submit an NOI form. "Operator" for the purpose of this permit and in the context of stormwater associated with construction activity means any person associated with a construction project who meets either or both of the following two criteria: (1) The person has operational or design control over construction plans and specifications, including the ability to make modifications to those plans and specifications. This person is typically the owner or developer of the project or a portion of the project (e.g. subsequent builder), or the person that is the current landowner of the construction site. This person is considered the primary permittee; or (2) The person has day-to-day operational control of those activities at a project which are necessary to ensure compliance with a SWPPP for the site or other permit conditions. This person is typically a contractor or a commercial builder who is hired by the primary permittee and is considered a secondary permittee.

Owners, developers and all contractors that meet the definition of the operator in subsection 2.2 of the permit shall apply for permit coverage on the same NOI, insofar as possible. After permit coverage has been granted to the primary permittee, any separate or subsequent NOI submittals must include the site's previously assigned permit tracking number and the project name. The site-wide site-specific SWPPP shall be prepared in accordance with the requirements of part 5 of the permit and must be submitted with the NOI unless the NOI being submitted is to only add a contractor (secondary permittee) to an existing coverage.

Artificial entities (e.g., corporations or partnerships excluding entities not required to register) must submit the TN Secretary of State, Division of Business Services, control number. The Division reserves the right to deny coverage to artificial entities that are not properly registered and in good standing with the TN Secretary of State.

Notice of Coverage The division will review the NOI for completeness and accuracy and prepare a notice of coverage (NOC). Stormwater discharge from the construction site is authorized as of the effective date of the NOC.

Complete the form Type or print clearly, using ink and not markers or pencil. Answer each item or enter "NA," for not applicable, if a particular item does not fit the circumstances or characteristics of your construction site or activity. If you need additional space, attach a separate piece of paper to the NOI form. **The NOI will be considered incomplete without a permit fee, a map, and the SWPPP.**

Describe and locate the project Use the legal or official name of the construction site. If a construction site lacks street name or route number, give the most accurate geographic information available to describe the location (reference to adjacent highways, roads and structures; e.g. intersection of state highways 70 and 100). Latitude and longitude (expressed in decimal degrees) of the center of the site can be located on USGS quadrangle maps. The maps can be obtained at the USGS World Wide Web site: <http://www.usgs.gov/>; latitude and longitude information can be found at numerous other web sites. Attach a copy of a portion of a 7.5 minute topographic map, a city map, or a county map showing location of site, with boundaries at least one mile outside the site boundaries. Provide estimated starting date of clearing activities and completion date of the project, and an estimate of the number of acres of the site on which soil will be disturbed, including borrow areas, fill areas, stockpiles and the total acres. For linear projects, give location at each end of the construction area.

Give name of the receiving waters Trace the route of stormwater runoff from the construction site and determine the name of the river(s), stream(s), creek(s), wetland(s), lake(s) or any other water course(s) into which the stormwater runoff drains. Note that the receiving water course may or may not be located on the construction site. If the first water body receiving construction site runoff is unnamed ("unnamed tributary"), determine the name of the water body that the unnamed tributary enters.

An ARAP may be required **If your work will disturb or cause alterations of a stream or wetland, you must obtain an appropriate Aquatic Resource Alteration Permit (ARAP).** If you have a question about the ARAP program, contact your local Environmental Field Office (EFO).

Submitting the form and obtaining more information Note that this form must be signed by the company President, Vice-President, or a ranking elected official in the case of a municipality, for details see subpart 2.5. For more information, contact your local EFO at the toll-free number 1-888-891-8332 (TDEC). Submit the completed NOI form (keep a copy for your records) to the appropriate EFO for the county(ies) where the construction activity is located, addressed to **Attention: Stormwater NOI Processing** or use MyTDEC Forms for electronic submittal.

EFO	Street Address	Zip Code	EFO	Street Address	Zip Code
Memphis	8383 Wolf Lake Drive, Bartlett	38133-4119	Cookeville	1221 South Willow Ave.	38506
Jackson	1625 Hollywood Drive	38305-4316	Chattanooga	1301 Riverfront Parkway, Suite 206	37402-2013
Nashville	711 R S Gass Boulevard	37243	Knoxville	3711 Middlebrook Pike	37921
Columbia	1421 Hampshire Pike	38401	Johnson City	2305 Silverdale Road	37601

APPENDIX B – NOTICE OF TERMINATION FORM (NOT)

(See Next Page)

**TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION (TDEC)**

Division of Water Resources (DWR)

William R. Snodgrass Tennessee Tower, 312 Rosa L. Parks Avenue, 11th Floor

Nashville, Tennessee 37243

1-888-891-TDEC (8332)

**Notice of Termination (NOT) for
General NPDES Permit for Stormwater Discharges from Construction Activities (CGP)**

This form is required to be submitted when requesting termination of coverage from the CGP. The purpose of this form is to notify the TDEC that either all stormwater discharges associated with construction activity from the portion of the identified facility where you, as an operator, have ceased or have been eliminated; or you are no longer an operator at the construction site. Specifically, this means that all disturbed soils at the portion of the construction site where the operator had control have been permanently stabilized, the temporary erosion and sediment control measures have been removed, and/or subsequent operators have obtained permit coverage for the site or portions of the site where the operator had control. Submission of this form shall in no way relieve the permittee of permit obligations required prior to submission of this form.

Submit this form to the local DWR Environmental Field Office (EFO) address (see table below) or using MyTDEC Forms electronic submittal process. For more information, contact your local EFO at the toll-free number 1-888-891-8332 (TDEC).

Site or Project Name:	NPDES Tracking Number: TNR
Street Address or Location:	County(ies):

Name of Permittee Requesting Termination of Coverage:			
Permittee Contact Name:		Title or Position:	
Mailing Address:	City:	State:	Zip:
Phone: ()	E-mail:		

Check the reason(s) for termination of permit coverage: (check only one)

<input type="checkbox"/>	Primary permittee termination: all requirements for termination under Permit Part 9.1.1. a) through c) have been met. This includes, but is not limited to, for areas the primary permittee has control all earth-disturbing activities at the site are complete and permanent stabilization as defined in Part 10 of the CGP has been achieved. (attach photo documentation).
<input type="checkbox"/>	When applicable, and you are a primary permittee seeking termination, list who is responsible for ongoing maintenance of stormwater controls left on the site subject for long-term use following termination of coverage:
<input type="checkbox"/>	Secondary permittee termination: all requirements for termination under Permit Part 9.2.1. have been met (no longer an operator at the construction site).

CN-1175 (Rev. 12-21)

RDA 2366

Certification and Signature:

(must be signed by president, vice-president or equivalent ranking elected official)

I certify under penalty of law that either: (a) all stormwater discharges associated with construction activity from the portion of the identified facility where I was an operator have ceased or have been eliminated or (b) I am no longer an operator at the construction site. I understand that by submitting this notice of termination, I am no longer authorized to discharge stormwater associated with construction activity under this general permit, and that discharging pollutants in stormwater associated with construction activity to waters of the state is unlawful under the Tennessee Water Quality Control Act where the discharge is not authorized by a NPDES permit. I also understand that the submittal of this notice of termination does not release an operator from liability for any violations of this permit or the Tennessee Water Quality Control Act. I certify under penalty of law that this document and all attachments were prepared by me, or under my direction or supervision. The submitted information is to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. As specified in Tennessee Code Annotated Section 39-16-702(a)(4), this declaration is made under penalty of perjury.

Permittee name (print or type):

Signature:

Date:

EFO	Address	EFO	Street Address
Memphis	8383 Wolf Lake Drive, Bartlett, TN 38133	Cookeville	1221 South Willow Ave., TN 38506
Jackson	1625 Hollywood Drive, TN 38305	Chattanooga	1301 Riverfront Parkway, Ste. 206, TN 37402
Nashville	711 R S Gass Boulevard, TN 37243	Knoxville	3711 Middlebrook Pike, TN 37921
Columbia	1421 Hampshire Pike, TN 38401	Johnson City	2305 Silverdale Road, TN 37601

APPENDIX C – INSPECTION REPORT FORM

(See Next Page)



TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION (TDEC)

Division of Water Resources (DWR)

William R. Snodgrass Tennessee Tower, 312 Rosa L. Parks Avenue, 11th Floor,

Nashville, Tennessee 37243

1-888-891-8332 (TDEC)

**General NPDES Permit for Stormwater Discharges from Construction Activities (CGP)
Construction Stormwater Inspection Certification (Inspection Form)**

Site or Project Name:		NPDES Tracking Number: TNR
Primary Permittee Name:		Date of Inspection:
Current approximate disturbed acreage:	Has rainfall been checked/documented daily? <input type="checkbox"/> Yes <input type="checkbox"/> No	Name of Inspector:
Current weather/ground conditions:	Rainfall total since last inspection:	Inspector's TNEPSC Certification Number:
Site Assessment <input type="checkbox"/> Yes <input type="checkbox"/> No	Assessor's TN PE registration number:	Assessor's TNEPSC Level II/CPESC number:

Check the box if the following items are on-site:	
<input type="checkbox"/>	Notice of Coverage (NOC)
<input type="checkbox"/>	Stormwater Pollution Prevention Plan (SWPPP)
<input type="checkbox"/>	Weekly inspection documentation
<input type="checkbox"/>	Site contact information
<input type="checkbox"/>	Rain Gage
Off-site Reference Rain Gage Location	

Best Management Practices (BMPs):

Are the Erosion Prevention and Sediment Controls (EPSCs) functioning correctly?				
If "No," describe below in Comment Section				
1.	Are all applicable EPSCs installed and maintained per the SWPPP per the current phase?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
2.	Are EPSCs functioning correctly at all disturbed areas/material storage areas? (permit section 5.5.3)	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
3.	Are EPSCs functioning correctly at outfall/discharge points such that there is no objectionable color contrast in the receiving stream, and no other water quality impacts? (permit section 5.5.3.5 and 6.3.2)	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
4.	Are EPSCs functioning correctly at ingress/egress points such that there is no evidence of track-out? (permit section 5.5.3.1)	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
5.	If applicable, have discharges from dewatering activities been managed by appropriate controls? (permit section 4.1.3) If "No," describe below the measure to be implemented to address deficiencies.	<input type="checkbox"/> N/A	<input type="checkbox"/> Yes	<input type="checkbox"/> No
6.	If construction activity at any location on-site has temporarily/permanently ceased, was the area stabilized within 14 days? (permit section 5.5.3.4) If "No," describe below each location and measures taken to stabilize the area(s).	<input type="checkbox"/> N/A	<input type="checkbox"/> Yes	<input type="checkbox"/> No
7.	Have pollution prevention measures been installed, implemented, and maintained to minimize the discharge of pollutants from wash waters, exposure of materials and discharges from spills and leaks per section 4.1.4? If "No," describe below the measure to be implemented to address deficiencies.	<input type="checkbox"/> N/A	<input type="checkbox"/> Yes	<input type="checkbox"/> No

Site or Project Name:		NPDES Tracking Number: TNR		
Primary Permittee Name:		Date of Inspection:		
8.	If a concrete washout facility is located on site, is it clearly identified on the project and maintained? If "No," describe below the measures to be implemented to address deficiencies. (permit section 1.2.2)	<input type="checkbox"/> N/A	<input type="checkbox"/> Yes	<input type="checkbox"/> No
9.	Have all previous deficiencies been addressed? If "No," describe the remaining deficiencies in the Comments section. <input type="checkbox"/> Check if deficiencies/corrective measures have been reported on a previous form.	<input type="checkbox"/> N/A	<input type="checkbox"/> Yes	<input type="checkbox"/> No
<p>Comment Section. If the answer is "No" for any of the above, describe the problem and summarize corrective actions to be taken. Otherwise, describe any pertinent observations:</p>				
<p>Certification and Signature (must be signed by the certified inspector and the permittee per Sections 5.5.3.11 (g) and 8.7.2 of the CGP)</p> <p>I certify under penalty of law that this document and all attachments were prepared by me, or under my direction or supervision. The submitted information is to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. As specified in Tennessee Code Annotated Section 39-16-702(a)(4), this declaration is made under penalty of perjury.</p>				
Inspector Name and Title :		Signature:		Date:
Primary Permittee Name and Title:		Signature:		Date:

Construction Stormwater Inspection Certification Form (Inspection Form)

Purpose of this form/ Instructions

An inspection, as described in subsection 5.5.3.9. of the General Permit for Stormwater Discharges from Construction Activities ("Permit"), shall be performed at the specified frequency and documented on this form. Inspections shall be performed at least 72 hours apart. Where sites or portion(s) of construction sites have been temporarily stabilized, or runoff is unlikely due to winter conditions (e.g., site covered with snow or ice), such inspection only has to be conducted once per month until thawing results in runoff or construction activity resumes.

Inspections can be performed by:

- a) a person with an valid certification from the "Fundamentals of Erosion Prevention and Sediment Control Level I" course,
- b) a licensed professional engineer or landscape architect,
- c) a Certified Professional in Erosion and Sediment Control (CPESC), or
- d) a person who has successfully completed the "Level II Design Principles for Erosion Prevention and Sediment Control for Construction Sites" course.

Qualified personnel, as defined in subsection 5.5.3.10 of the Permit (provided by the permittee or cooperatively by multiple permittees) shall inspect disturbed areas of the construction site that have not been permanently stabilized, areas used for storage of materials that are exposed to precipitation, structural control measures, locations where vehicles enter or exit the site, and each outfall.

Disturbed areas and areas used for storage of materials that are exposed to precipitation shall be inspected for evidence of, or the potential for, pollutants entering the site's drainage system. Erosion prevention and sediment control measures shall be observed to ensure that they are operating correctly.

Outfall points (where discharges leave the site and/or enter waters of the state) shall be inspected to determine whether erosion prevention and sediment control measures are effective in preventing significant impacts to receiving waters. Where discharge locations are inaccessible, nearby downstream locations shall be inspected. Locations where vehicles enter or exit the site shall be inspected for evidence of offsite sediment tracking.

Based on the results of the inspection, any inadequate control measures or control measures in disrepair shall be replaced or modified, or repaired as necessary, before the next rain event if possible, but in no case more than 7 days after the need is identified.

Based on the results of the inspection, the site description identified in the SWPPP in accordance with section 5.5.1 of the Permit and pollution prevention measures identified in the SWPPP in accordance with section 5.5.2 of the Permit, shall be revised as appropriate, but in no case later than 7 days following the inspection. Such modifications shall provide for timely implementation of any changes to the SWPPP, but in no case later than 14 days following the inspection.

All inspections shall be documented on this Construction Stormwater Inspection Certification form. Alternative inspection forms may be used as long as the form contents and the inspection certification language are, at a minimum, equivalent to the Division's form and the permittee has obtained a written approval from the Division to use the alternative form. Inspection documentation will be maintained on site and made available to the Division upon request. Inspection reports must be submitted to the Division within 10 days of the request.

Trained certified inspectors shall complete inspection documentation to the best of their ability. Falsifying inspection records or other documentation or failure to complete inspection documentation shall result in a violation of this permit and any other applicable acts or rules.