

**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 Resident Project Representative (RPR). The equipment shall not cause damage to the pavement 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, and base material, cables, utility ducts, pipelines, or drainage structures which are to remain under the pavement.

**a. Concrete pavement removal.** Not Used.

**b. Asphalt pavement removal for Point repairs.** 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, and legally dispose of the material.

The pavement shall be removed so the joint for each layer of pavement replacement is offset 1 foot (30 cm) 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 RPR. 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 (25 mm). If extensive vegetation exists, treat the specific area with a concentrated solution of a water-based herbicide approved by the RPR. Fill all cracks greater than 1/4 inch (6 mm) 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 (3 mm), not to exceed 1/4 inch (6 mm). Any excess joint or crack sealer shall be removed from the pavement surface.

Wider cracks (over 1-1/2 inch wide (38 mm)), along with soft or sunken spots, indicate that the pavement or the pavement base should be repaired or replaced as stated below.

Cracks and joints may be filled with a mixture of emulsified asphalt and aggregate. The aggregate shall consist of limestone, volcanic ash, sand, or other material that will cure to form a hard substance. The combined gradation shall be as shown in the following table.

**Gradation**

Sieve Size	Percent Passing
No. 4 (4.75 mm)	100
No. 8 (2.36 mm)	90-100
No. 16 (1.18 mm)	65-90
No. 30 (600 µm)	40-60
No. 50 (300 µm)	25-42
No. 100 (150 µm)	15-30
No. 200 (75 µm)	10-20

Up to 3% cement can be added to accelerate the set time. The mixture shall not contain more than 20% natural sand without approval in writing from the RPR.

The proportions of asphalt emulsion and aggregate shall be determined in the field and may be varied to facilitate construction requirements. Normally, these proportions will be approximately one part asphalt emulsion to five parts aggregate by volume. The material shall be poured or placed into the joints or cracks and compacted to form a voidless mass. The joint or crack shall be filled to within +0 to -1/8 inches (+0 to -3 mm) of the surface. Any material spilled outside the width of the joint shall be removed from the pavement surface prior to constructing the overlay. Where concrete overlays are to be constructed, only the excess joint material on the pavement surface and vegetation in the joints need to be removed.

**101-3.3 Removal of Foreign Substances/contaminates prior to overlay.** 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. Areas that require removal are designated on the plans and as directed by the RPR in the field during construction.

Chemicals, high-pressure water, heater scarifier (asphaltic concrete only), cold milling, rotary grinding, and sandblasting may be used when approved by the Owner's Representative. If chemicals are used, they shall comply with the state's environmental protection regulations. 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 (3 mm) deep. If it is deemed by the RPR 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 RPR.

Removal of foreign substances shall not proceed until approved by the RPR. 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 wastes shall be disposed of in areas indicated in this specification or shown on the plans.

**101-3.5 Cold milling.** Milling shall be performed with a power-operated milling machine or grinder, capable of producing a uniform finished surface with a micro-milling head. 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 RPR shall layout the area to be milled with a straightedge in increments of 1-foot (30 cm) 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 (+0 mm and -6mm) 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 **legally** disposed of ~~in areas designated on the plans~~ **off the airport.**

**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 **legally** disposed ~~in areas designated on the plans~~ **off the airport.**

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**101-3.6. Preparation of asphalt pavement surfaces prior to surface treatment.** Not used.

**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 RPR. 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.** Not used.

**101-3.9 Preparation of Cracks in Flexible Pavement prior to sealing.** Not used.

**101-3.10 Removal of Pipe and Other Structures.**

**a. Removal of Existing Pipe Material.** Remove the types of pipe as indicated on the plans. The pipe material shall be legally disposed of off-site in a timely manner following removal.

**b. Abandonment of Tie-Downs.** The Contractor shall abandon the aircraft tie-downs as detailed on the Plans.

**c. Removal of Tie-Downs.** The Contractor shall remove the aircraft tie-downs as detailed on the Plans. The Contractor shall offer the removed tie-downs to the Owner. If the Owner does not want them, the Contractor shall legally dispose of them off airport property.

## METHOD OF MEASUREMENT

**101-4.1 Cold milling.** The unit of measure for cold milling shall be 2 inches of milling per square yard. The location and average depth of the cold milling shall be as shown on the plans. If the initial cut does not correct the condition, the Contractor shall re-mill the area and will be paid for the total depth of milling.

**101-4.2 Joint and crack repair after milling.** The unit of measurement for joint and crack repair shall be the linear foot of joint.

**101-4.3 Pavement removal.** The unit of measurement for pavement removal shall be the number of square yards removed 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.

**101-4.4a Tie-Down Abandonment.** The unit of measurement for Tie-Down Abandonment shall be per each.

**101-4.4b Tie-Down Removal.** The unit of measurement for Tie-Down Removal shall be per each.

**101-4.5 Tie-Down Replacement.** The unit of measurement for Tie-Down Replacement shall be per each matching the material and construction details in the Plans.

**101-4.6 Removal of Pipe.** The unit of measurement for removal of pipe will be per linear foot. This price shall be full compensation for all labor, equipment, tools, and incidentals necessary to complete this item in accordance with paragraph 101-3.9.4.

### **BASIS OF PAYMENT**

**101-5.1 Payment.** Payment shall be made at 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	Asphalt Milling (2" Depth) - per square yard
Item P 101-5.2	Joint and Crack Repair after Milling – per linear foot
Item P 101-5.3	Full Depth Pavement Removal (Point Repair When Approved By Owner's Representative) – per square yard
Item P-101-5.4a	Tie-Down Abandonment - per each
Item P-101-5.4b	Tie-Down Removal - per each
Item P-101-5.5	Tie-Down Replacement - per each
Item P-101-5.6	Pipe Removal – per linear 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.

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**

**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, 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 and paid for under one of the following items.

**b. 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 outside the airport boundaries.

**152-1.3 Unsuitable excavation.** Unsuitable material shall be disposed in designated waste areas as shown on the plans. Materials containing vegetable or organic matter, such as muck, peat, organic silt, or sod shall be considered unsuitable for use in embankment construction. Material suitable for topsoil may be used on the embankment slope when approved by the RPR. **Unsuitable excavation shall not include the resident overly moist or yielding subgrade materials likely to be encountered under existing turf or pavement areas.**

**CONSTRUCTION METHODS**

**152-2.1 General.** Before beginning excavation, grading, and embankment operations in any area, the area shall be cleared or cleared and grubbed in accordance with Item P-151.

The suitability of material to be placed in embankments shall be subject to approval by the RPR. All unsuitable material shall be disposed of in waste areas as shown on the plans. 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 RPR.

When the Contractor's excavating operations encounter artifacts of historical or archaeological significance, the operations shall be temporarily discontinued and the RPR notified per Section 70, paragraph 70-20. At the direction of the RPR, 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.

Areas outside the limits of the pavement areas where the top layer of soil has become compacted by hauling or other Contractor activities shall be scarified and disked to a depth of 4 inches (100 mm), to loosen and pulverize the soil. Stones or rock fragments larger than 4 inches (100 mm) in their greatest dimension will not be permitted in the top 6 inches (150 mm) of the subgrade.

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 RPR, 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.

**a. Blasting.** Blasting shall not be allowed.

**152-2.2 Excavation.** No excavation shall be started until the work has been staked out by the Contractor and the RPR has obtained from the Contractor, the survey notes of the elevations and measurements of the ground surface. The Contractor and RPR 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.

All areas to be excavated shall be stripped of vegetation and topsoil. Topsoil shall be stockpiled for future use in areas designated on the plans or by the RPR. All suitable excavated material shall be used in the formation of embankment, subgrade, or other purposes as shown on the plans. All unsuitable material shall be disposed of as shown on the plans.

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 RPR. When the volume of excavation is not sufficient for constructing the embankments to the grades indicated, the deficiency shall be obtained from borrow areas.

**a. Selective grading.** When selective grading is indicated on the plans, the more suitable material designated by the RPR 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 (300 mm) below the subgrade or to the depth specified by the RPR. Muck, peat, matted roots, or other yielding material, unsatisfactory for subgrade foundation, shall be removed to the depth specified. Unsuitable materials shall be disposed off the airport. The cost is incidental to this item. This excavated material shall be paid for at the contract unit price per cubic yard for Undercut and Related Backfill. No separate payment shall be made for the necessary refilling of unsuitable areas, but shall constitute a part of Undercut and Related Backfill. 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. Undercutting will be paid as Undercut and Related Backfill. **A material that is high in moisture content and which yields under proof rolling does not classify as unsuitable material** (refer to Section 152-1.3). **Undercutting of suitable but wet material does not constitute unsuitable material. The Contractor is required to manipulate and dry the material unless the material is classified as unsuitable in accordance with Section 152-1.3. The Engineer shall have sole authority on what is classified or deemed "Unsuitable Material".** If the resident subgrade material is classified as unsuitable material, then the Contractor shall remove the material to the depth directed by the Engineer but not greater than 3-feet below subgrade. The backfill of such areas shall not begin until the volume of the excavation is determined by cross sections or other means acceptable to the Engineer. The backfill shall be accomplished in the same manner as other embankment called out in this section with regard to the thickness and compaction requirements. The payment for the backfill and recompaction shall be included in the unit price for "Undercut and Related Backfill". The backfill material may consist of borrow excavation, unclassified excavation or select backfill and may be other materials acceptable to the Engineer. All select backfill shall pass 1-1/2-inch sieve. If deemed necessary by the Engineer, Mirafi HP

370 (or approved equal) geotextile fabric may be used to bridge the unsuitable soils or undercut area utilizing a minimum 12 inch overlap where splices are made. Overlap shall not be measured for separate payment and shall be considered incidental to the construction costs. The payment for the installation of geotextile fabric shall be included in the unit price for pay item "Geotextile Fabric for Undercut Areas".

**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 RPR. All over-break shall be graded or removed by the Contractor and disposed of as directed by the RPR. The RPR 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 RPR 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 (60 cm) below the top of subgrade or as indicated on the plans, and the material disposed of as directed by the RPR. 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.** There are no borrow sources within the boundaries of the airport property. The Contractor shall locate and obtain borrow sources, subject to the approval of the RPR. The Contractor shall notify the RPR at least 15 days prior to beginning the excavation so necessary measurements and tests can be made by the RPR. 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.

For off-site borrow areas obtained by the Contractor, the RPR must determine the acceptability of the borrow material before its use on the project. A clean well graded fill dirt will generally be acceptable for the turf area.

**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 or as directed by the RPR. 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.

**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 12 inches of subgrade shall be compacted to not less than 100% of maximum density for non-cohesive soils, and 95% of maximum density for cohesive soils as determined by ASTM D698. 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.

**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 minimum depth of 6 inches (150 mm) 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 (300 mm) and compacted as specified for the adjacent fill.

No direct payment shall be made for the work performed under this section. The necessary clearing and grubbing and the quantity of excavation removed 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 RPR, 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 (300 mm) upon the Contractor's demonstration that approved equipment and operations will uniformly compact the lift to the specified density. The RPR 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 RPR. 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 RPR.

**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 (150 mm) nor more than 12 inches (300 mm) 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 RPR. Materials such as brush, hedge, roots, stumps, grass and other organic matter, shall not be incorporated or buried in the embankment.

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 Contractor will take samples of excavated materials which will be used in embankment for testing and develop a Moisture-Density Relations of Soils Report (Proctor) in accordance with ASTM D698. A new Proctor shall be developed for each soil type based on visual classification.

Density tests will be taken by the Contractor for every 3,000 square yards of compacted embankment for each lift which is required to be compacted, or other appropriate frequencies as determined by the RPR.

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 to not less than 100% of maximum density for non-cohesive soils, and 95% of maximum density for cohesive soils as determined



by ASTM D698. Under all areas to be paved, the embankments shall be compacted to a depth of 12" and to a density of not less than 100 percent of the maximum density as determined by ASTM D698. 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.

On all areas outside of the pavement areas, no compaction will be required on the top 4 inches which shall be prepared for a seedbed in accordance with Item T-901.

The in-place field density shall be determined in accordance with ASTM D1556 or 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 RPR's presence and provide the test results upon completion to the RPR for acceptance. If the specified density is not attained, the area represented by the test or as designated by the RPR 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.

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 (100 mm) in their greatest dimensions will not be allowed in the top 12 inches (300 mm) of the subgrade. Rockfill shall be brought up in lifts as specified or as directed by the RPR 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 RPR.

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 (60 cm) 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 4 feet (1.2 m) below the finished subgrade.

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.** Not used in turf areas with limited fill on this project.

**152-2.10 Compaction requirements.** The subgrade under areas to be paved shall be compacted to a depth of 12 inches and to a density of not less than 100 percent of the maximum dry density as determined by ASTM D698. 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 95 percent of the maximum density as determined by ASTM D698.

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 D698, procedures in AASHTO T180 Annex for correction of maximum dry density and optimum moisture for oversized

particles. Tests for moisture content and compaction will be taken at a minimum of 3,000 S.Y. of subgrade. All quality assurance testing shall be done by the Contractor's laboratory in the presence of the RPR, and density test results shall be furnished upon completion to the RPR for acceptance determination.

The in-place field density shall be determined in accordance with 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 within 12 months prior to its use on this contract. The gage shall be field standardized daily.

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 reworked 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 RPR and the finished subgrade shall be maintained.

**152-2.11 Finishing and protection of subgrade.** Finishing and protection of the subgrade is incidental to this item. 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 RPR.

**152-2.12 Haul.** All hauling 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.

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 (75 mm), reshaped and re-compacted to grade until the required smoothness and accuracy are obtained and approved by the RPR. The Contractor shall perform all final smoothness and grade checks in the presence of the RPR. 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 +/- 1/2 inch (12 mm) when tested with a 12-foot (3.7-m) 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 (3.7-m) straightedge for the full length of each line on a 50-foot (15-m) grid.

- b. Grade.** The grade and crown shall be measured on a 50-foot (15-m) grid and shall be within +/- 0.05 feet (15 mm) of the specified grade.

On safety areas, turfed areas and other designated areas within the grading limits where no subbase or base is to be placed, grade shall not vary more than 0.10 feet (30 mm) from specified grade. Any deviation in excess of this amount shall be corrected by loosening, adding or removing materials, and reshaping.

**152-2.14 Topsoil.** When topsoil is specified or required as shown on the plans or under Item T-905, it shall be salvaged from stripping or other grading operations. The topsoil shall meet the requirements of Item T-905. If, at the time of excavation or stripping, the topsoil cannot be placed in its final section of finished construction, the material shall be stockpiled at approved locations. Stockpiles shall be located as shown on the plans and the approved CSPP, and shall not be placed on areas that subsequently will require any excavation or embankment fill. If, in the judgment of the RPR, it is practical to place the salvaged topsoil at the time of excavation or stripping, the material shall be placed in its final position without stockpiling or further re-handling.

Upon completion of grading operations, stockpiled topsoil shall be handled and placed as shown on the plans and as required in Item T-905. Topsoil shall be paid for as provided in Item T-905. No direct payment will be made for topsoil under Item P-152.

#### METHOD OF MEASUREMENT

**152-3.1** The quantity of Grading Turf Area (Import Borrow As-Needed) shall be measured per square yard of Turf Area actually graded (excluded areas unnecessarily disturbed by the Contractor) as shown in the plans and details. Sod is not included in this item. Imported borrow material or any unclassified material associated with this work will not be measured for separate payment, so the cost should cost should be included in this pay item.

**152-3.2** The quantity of Undercut and Related Backfill shall be measured as the number of cubic yards excavated when directed by the Engineer in accordance with Section 152-2.2b as measured by cross sectioning or other means acceptable to the Engineer to include the volume of the entire excavation (removal), refilling with suitable material, recompaction, and regrading as necessary to the original elevation.

**152-3.3** Geotextile Fabric for Undercut Areas described in 152-2.2b Undercutting shall be paid for by the number of square yards measured in its final position based upon the necessary area as directed by the Engineer. Any overlap in the geotextile fabric shall not be measured for separate payment; it shall be considered incidental to the construction costs for this pay item.

~~**152-3.5** The quantity of borrow excavation to be paid for shall be the number of cubic yards measured in its final position. Measurement shall not include the quantity of materials placed without authorization beyond normal slope lines, or the quantity of material used for purposes other than those directed.~~

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**152-3.4** Measurement for payment specified by the cubic yard shall be computed by the comparison of digital terrain model (DTM) surfaces provided by the Contractor for computation of neat line design 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 cross-sections shown on the plans, subject to verification by the RPR.

**152-3.5** The quantity of unclassified excavation to be paid for shall be the number of cubic yards measured in its original position. Some of the unclassified excavation will be incorporated into the embankment work in other parts of the work area, and all remaining material shall be legally disposed of off airport. 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.

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**152-3.6** The quantity of Subgrade Preparation to be paid for shall be the number of square yards. Subgrade Preparation shall include all costs for the scarifying, compacting, proof rolling, finish grading, and maintaining the final subgrade elevation until construction of the overlaying base course.

**BASIS OF PAYMENT**

**152-4.1** Grading Turf Area (Import Borrow As-Needed) shall be made at the contract unit price per square yard for filling, grading, and compacting the turf area to plan grades as described in the plans and details. This price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item. Imported borrow material or any unclassified material will not be measured for separate payment.

**152-4.2** For Undercut and Related Backfill, payment shall be made at the contract unit price per cubic yard. This price shall be full compensation for furnishing, hauling, and disposing of all materials, labor, equipment, tools, and incidentals necessary to complete the item.

**152-4.3** For Geotextile Fabric for Undercut Areas, payment shall be made at the contract unit price per square yard for materials and work pertaining to geotextile fabric described in 152-2.2b Undercutting. This price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item.

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**152-4.1** Unclassified excavation 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 including all necessary means of dewatering.

**P-152-4.4** Subgrade Preparation shall be made at the contract unit price per square yard. This price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

- Item P-152-4.1      Grading Turf Area (Import Borrow As-Needed) – per square yard
- Item P-152-4.2      Undercut and Related Backfill (When Approved By Owner's Representative) – per cubic yard
- Item P-152-4.3      Geotextile Fabric for Undercut Areas (When Approved By Owner's Representative) – per square yard
- Item P-152-4.4      Unclassified Excavation – per cubic yard
- Item P-152-4.5      Subgrade Preparation – per square yard

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**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<sup>3</sup> (600 kN-m/m<sup>3</sup>))
- 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<sup>3</sup> (2700 kN-m/m<sup>3</sup>))
- 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**

**ITEM P-207**

**IN-PLACE FULL DEPTH RECLAMATION (FDR) RECYCLED ASPHALT AGGREGATE  
BASE COURSE**

**DESCRIPTION**

**207-1.1** This item consists of a recycled asphalt aggregate base course resulting from the in-place full depth reclamation (FDR) of the existing pavement section (asphalt wearing surface and aggregate base), plus mechanical stabilization with additional aggregate or chemical stabilization with cement, asphalt emulsion or fly ash when required.

**MATERIALS**

**207-2.1 Aggregate.** The FDR shall consist of materials produced by recycling (pulverizing and mixing) the existing asphalt pavement, aggregate base, subgrade, and any additional aggregate as necessary. Material larger than 2 inches in any dimension shall not be permitted in the recycle asphalt aggregate base course.

The FDR shall meet the gradation in the table below.

**FDR Gradation**

Sieve	Minimum Percentage by weight passing sieves
2 inch (51 mm)	100
No. 4 (4.75 mm)	<del>55</del> 80
No. 200 (75 µm)	0

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**a. Deleterious substances.** Materials for aggregate base shall be kept free from weeds, sticks, grass, roots and other foreign matter.

**b. Uniformity.** The materials shall be thoroughly recycled (pulverized and mixed) to ensure a uniform gradation.

**207-2.2 Stabilization.**

**a. Mechanical stabilization.** Addition of corrective aggregate material to adjust gradation shall be equivalent to P-208, or better. ~~Not required.~~

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**b. Chemical Stabilization.** ~~Stabilizing agent is not required.~~ Cement shall meet the requirements of ASTM C150, Type I, IA, II, or IIA or ASTM C595, Type IS, IS(A), IP or IL. Materials shall be handled, stored, and applied in accordance with all federal, state, and local requirements.

**207-2.3 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.

**207-2.4 Quality Control (QC) Sampling and testing.** The Contractor shall take at least two FDR samples per day of production in the presence of the Resident Project Representative (RPR) to check the gradation. Sampling shall be per ASTM D75. Material shall meet the requirements in paragraph 207-2.1.

Samples shall be taken from the in-place, un-compacted material at random sampling locations per ASTM D3665.

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**Pulverized Material Gradation:** The Contractor shall take at least two FDR samples per day of production in the presence of the Resident Project Representative (RPR) to check the gradation. Sampling shall be per ASTM D75. Material shall meet the requirements in paragraph 207-2.1. Samples shall be taken from the in-place, un-compacted material at random sampling locations per ASTM D3665.

**Depth of Pulverization:** The depth of stabilization shall be measured by the Contractor no less than four tests per day of material placed; test shall be witnessed by the RPR. Measurements shall be made in test holes excavated by the Contractor to show the full depth of mixing.

**Cement Application Rate:** The amount of cement applied shall be monitored by the Contractor to assure that no less than the amount of cement required by the mix design is applied. The Contractor shall perform at least four tests per day in the presence of the Resident Project Representative (RPR) to check the cement application rate. Prior to the beginning of each day's work, Contractor shall provide scales capable of measuring the required quantity of cement per square yard and square canvas tarps measuring 1.0 square yard. The scales shall have been calibrated by a qualifying agency within the last six months. Keep equipment on hand to verify the reclaimed material particle size after pulverizing, to calibrate the water meter of the mechanical mixer, and to verify the spread rates of cement and bituminous curing materials.

**Compacted Density & Field Moisture:** One test for density and moisture will be made for each 1,200 square yds, or a minimum of 4 tests per day.

**Thickness:** One test for thickness will be made for each 1,200 square yds, or a minimum of 4 tests per day.

**Smoothness & Grade:** Finished surface will be tested. See 207-3.12 Surface Tolerances.

## CONSTRUCTION METHODS

**207-3.1 Milling.** Milling is not required in FDR areas.

**207-3.2 Mix design.** Before the start of base course construction, the Contractor's laboratory shall collect samples and prepare the FDR mix designs for the soil or soil-aggregate material. A mix design shall be prepared for each existing pavement section/condition. The mix design shall use a cement content that, when tested in the laboratory per ASTM D1633, produces a 7-day compressive strength between 250 pounds per square inch minimum and 350 pounds per square inch maximum, with a target at 300 pounds per square inch. Avoid higher strengths due to potential to cause shrinkage and reflective cracks. Cement shall be added at an application rate of 8 percent of dry unit weight of soil, or more or less as determined by the mix design to produce the specified compressive strength.

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.

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.

**207-3.3 Submittals.** At least 30 days prior to the placement of the cement for FDR mixing, the Contractor shall submit certified test reports to the Resident Project Representative (RPR) for those materials proposed for use during construction, as well as the mix design information for the FDR material. The certification shall show the ASTM 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:

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a. Source(s) of materials, including aggregate, cement, and curing materials.

b. Physical properties of the aggregates, cement, and curing materials.

c. Mix design:

- Mix identification number
- Aggregate gradation
- Cement content
- Water content
- Compaction and unconfined compressive strength results
- Laboratory compaction characteristics (maximum dry density and optimum moisture content)
- Compressive strength at seven (7) days

No cement material shall be placed until the submittal is accepted in writing by the RPR.

**207-3.4 Control Strip.** The first half-day of construction shall be considered the control strip. The Contractor shall demonstrate, in the presence of the RPR, 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 begin until the control strip has been accepted by the RPR. Upon acceptance of the control strip by the RPR, 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 RPR.

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The purpose of the control strip is to establish the target speed and/or revolutions per minute (RPM) of the reclaimer and spreading equipment to assure that the moisture content and stabilized agent (if applicable) spread rates will be acceptable. The mixing machine 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.

**207-3.5 Recycling (Pulverization and mixing).** The asphalt pavement, aggregate base and subgrade shall be recycled (pulverized and mixed) into a uniformly blended mixture with P-208 aggregate base or onsite reclaimed asphalt millings (when required to achieve P-207 gradation) by dry unit weight and water to the depth indicated on the plans. All material over approximately 2 inches (50 mm) shall be removed by the Contractor. The mixture shall be brought to the desired moisture content.

Do not apply cement if the soil moisture content exceeds the optimum moisture content specified for the cement-treated mixture. Cement shall be uniformly spread only over an area where the initial mixing operations and compaction can be completed during the working window. The cement shall not be applied when wind conditions are detrimental to proper application or will blow onto adjacent aircraft or vehicles. A motor grader shall not be used to spread the cement. Adequate moisture shall be added to the cement/asphalt pavement/ aggregate base/subgrade mixture to maintain the proper moisture content. Materials shall be handled, stored, and applied in accordance with all federal, state, and local requirements. After mixing is complete, the proportions of the mixture shall be in accordance with the approved mix design.



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The full depth of the aggregate base shall be mixed with equipment as approved by the RPR. The cement shall not be mixed below the required depth. Cement shall not be left exposed for more than one (1) hour after distribution. Mixing and pulverization shall continue until the soil cement mixture contains no clods greater than 1-1/2 inches (38 mm) in size. Final moisture content of the mix shall be determined by the Contractor immediately prior to compaction in accordance with ASTM D4959.

The maximum lift thickness of the recycled aggregate base course material to be compacted shall be 8 inches.

**207-3.6 Grading and compaction.** Immediately upon completion of recycling (pulverization and mixing), the material shall be shaped and graded in accordance with the project plans. The recycled asphalt aggregate base course shall be compacted within the same day to an in-place density of ~~100% as determined by ASTM D698~~ 98% as determined by ASTM D558. The moisture content of the material during compaction shall be within  $\pm 2\%$  of the optimum moisture content as determined by ASTM D2216 or ASTM D4959. The number, type and weight of rollers shall be sufficient to compact the material to the required density. Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

Initial compaction of the soil/cement mixture 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. After mixing and initial compaction, shape the surface of the reclaimed material to the required lines, grades, and cross-sections using an approved motor grader. Sprinkle the surface until it is damp, but not wet, and clip with a motor grader or other approved method. Dispose of the material removed by clipping. Following shaping, perform intermediate compaction using a pneumatic tire roller and then seal the surface with a self-propelled steel wheel roller in static mode. At no time shall the finish roller be operated in vibratory mode.

The number, type and weight of rollers shall be sufficient to compact the material to the required density. 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. Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

At the beginning of each day's construction, form a straight transverse construction joint by cutting back into the previously completed work a minimum of 5 feet to form a true vertical face, free of loose or shattered material. Straightedge the transverse joints using a 12-foot straightedge during final grading. If longitudinal joints between adjacent stabilization passes are necessary, the joints shall be overlapped 2 to 4 inches in a neat straight line. Pre-determined cut lines shall be marked in a manner visible to the operator. The overlap cut width should be confirmed before starting a new cut sequence. The longitudinal joint shall be offset at least 6 inches with the succeeding layer of HMA.

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**207-3.7 Finishing and Curing.** After the final lift or course of the aggregate base course has been compacted, it shall be brought to the required lines and grades in accordance with the typical sections. The surface of the aggregate base course shall be finished by blading or with automated equipment designed for this purpose. If the top layer is 1/2 inch (12 mm) or more below grade, the top layer shall be scarified to a depth of at least 3 inches (75mm), new material added, and the layer blended and re-compacted to bring it to grade. The addition of layers less than 3 inches (75mm) shall not be allowed.

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, or being kept continuously moist for a period of 7 days with a fog-type water spray. **There will be no separate payment for curing materials or operations.**

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Subsequent asphalt-based layers or surface treatment identified in the plans can be used as a curing material and can be placed any time after finishing, as long as the reclaimed material is sufficiently able to support the required construction equipment without marring or permanent distortion of the surface and as long as Contractor prepared FDR test cylinders demonstrate the design unconfined strength has been met following ASTM D1633 sampling and testing procedures (2 cylinders for each density test taken during acceptance testing). UCS testing is not required if Contractor is not planning to pave prior to seven days curing. Do not operate construction equipment on the new reclaimed material except as necessary to discharge into the asphalt spreader during pavement operations.

Finished portions of aggregate base course shall be protected to prevent equipment from marring, permanently deforming, or damaging completed work. Sufficient protection from freezing shall be provided for at least 7 days after its construction or as approved by the RPR.

**207-3.8 Proof rolling.** Compacted asphalt aggregate base course shall be proof rolled with a tandem axle dual wheel dump truck loaded to the legal limit with tires inflated to 80 psi in the presence of the RPR. Soft areas that deflect greater than 0.5 inch (12 mm) or show permanent deformation greater than 0.5 inch (12 mm) shall be removed and reworked at the Contractor's expense. 100% coverage is required for proof rolling.

**207-3.9 Weather limitations.** When weather conditions detrimentally affect the construction process and/or quality of the materials, the Contractor shall stop construction. Cement or fly ash shall not be applied when wind conditions affect the distribution of the materials. When the aggregates contain frozen materials or when the underlying course is frozen or wet, the construction shall be stopped. Construction shall not be performed unless the atmospheric temperature is above 35°F (2°C) and rising or approved by the RPR. When the temperature falls below 35°F (2°C), protect all completed areas against detrimental effects of freezing by approved methods. Correct completed areas damaged by freezing, rainfall, or other weather conditions to meet specified requirements.

**207-3.10 Maintenance.** The asphalt aggregate base course shall be maintained in a satisfactory condition until the work is accepted by the RPR. Equipment used in the construction of an adjoining section may be routed over completed sections of asphalt aggregate base course, provided that no damage results and equipment is routed over the full width of the completed asphalt aggregate base course. Any damage to the recycled asphalt aggregate base course shall be repaired by the Contractor at the Contractor's expense.

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**207-3.11 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.

Limit the application of cement to an area that will allow for continuous completion of the FDR process, clipping, finishing, and final compaction, within 3 hours from the time the cement is applied. Do not leave any uncompacted reclaimed material undisturbed for more than 30 minutes.

If the uncompacted reclaimed material is wetted by rain and exceeds the average moisture content above the specified tolerance, reconstruct the entire section.

Completed portions may be opened to light traffic, if approved by the RPR, and provided the curing is not impaired.

**207-3.12 Surface tolerances.** The finished surface shall be tested for smoothness and accuracy of grade. Any area failing smoothness or grade shall be scarified to a depth of at least 3 inches (75 mm), reshaped and re-compacted by the Contractor at the Contractor's expense.

**a. Smoothness.** The finished surface shall not vary more than 3/8-inch (9 mm) when tested with a 12-foot (3.7-m) 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 (3.7-m) straightedge for the full length of each line on a 50-foot (15-m) grid matching the Spot Elevation sheets in the plans.

**b. Grade.** The grade shall be measured on a grid matching the Spot Elevation sheets in the plans and shall be within +0 and -1/2 inch (12 mm) of the specified grade.

**207-3.12 Acceptance sampling and testing for density.** FDR base course shall be accepted for density and thickness on an area basis. One (1) test for density and thickness will be made for each 1200 square yds. Sampling locations will be determined on a random basis in accordance with ASTM D3665.

**a. Density.** The Contractor’s laboratory shall perform all density tests in the RPR’s presence and provide the test results upon completion to the RPR for acceptance.

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Each area will be accepted for density when the field density is at least ~~100% of the maximum density of the FDR base course in accordance with ASTM D698~~ 98% of the maximum density of the FDR base course in accordance with ASTM D558. The in-place field density shall be determined in accordance with 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. 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.** The thickness of the base course shall be within +0 and -1/2 inch (12 mm) of the specified thickness as determined by depth tests taken by the Contractor in the presence of the RPR for each area. Where the thickness is deficient by more than 1/2-inch (12 mm), the Contractor shall correct such areas at no additional cost by scarifying to a depth of at least 3 inches (75 mm), adding new material, and recompacted to grade. The Contractor shall replace, at his expense, base material where depth tests have been taken.

**METHOD OF MEASUREMENT**

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**207-4.1** The quantity of FDR asphalt aggregate base course shall be measured by the number of square yards of material in compliance with the plans and specifications (pulverization only areas, or chemically stabilization areas).

**207-4.2** The quantity of cement shall be measured by the ton.

**207-4.3** There will be no separate measurement or payment for curing materials or operations.

**BASIS OF PAYMENT**

**207-5.1** Payment shall be made at the contract unit price per square yard for recycling the existing asphalt pavement, aggregate base course, subgrade and mixing with stabilizing agent, if required, spreading, compacting, and maintaining the recycled material to the compacted thickness as indicated on the drawings. This price shall be full compensation for furnishing all materials, for preparing and placing these materials, and for all labor, equipment tools and incidentals to complete the item.

Payment will be made under:

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Item P-207-5.1 In-place FDR Pulverization (6” Depth) – per square yard

Item P-207-5.2 In-place FDR (8” Depth) (Chemically Stabilized) – per square yard

**207-5.2** Payment shall be made at the contract unit price per ton for the stabilizing agent.

Item P207-5.3 Cement per ton

Item P207-5.4 Cement (When Approved By Owner's Representative to Stabilize Additional Areas) 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 C29	Unit Weight of Aggregate
ASTM C88	Soundness of Aggregates by Use of Sodium or Magnesium Sulfate
ASTM C117	Materials Finer than 75- $\mu\text{m}$ (No. 200) Sieve in Mineral Aggregate by Washing
ASTM C131	Resistance to abrasion of Small Size Coarse Aggregate by Use of Los Angeles Machine
ASTM C136	Sieve or Screen Analysis of Fine and Coarse Aggregate
ASTM C150	Standard Specification for Portland Cement
ASTM C595	Standard Specification for Blended Hydraulic Cements
ASTM C1602	Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete
ASTM D75	Sampling Aggregate
ASTM D558	ASTM D558 Standard Test Methods for Moisture-Density (Unit Weight) Relations of Soil-Cement Mixtures
ASTM D698	Moisture Density Relations of Soils and Aggregate using 5.5 lb Rammer and 12 in drop
ASTM D977	Standard Specification for Emulsified Asphalt
ASTM D1556	Test Method for Density and Unit Weight of Soil in Place by the Sand Cone Method
ASTM D1557	Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort
ASTM D2216	Test Methods for Laboratory Determination of Water (Moisture) Soil and Rock by Mass
ASTM D2419	Test Method for Sand Equivalent Value of Soils and Fine Aggregate
ASTM D2487	Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
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
ASTM D4751	Standard Test Methods for Determining Apparent Opening Size of a Geotextile
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)

American Association of State Highway and Transportation Officials (AASHTO)

M288                                Standard Specification for Geosynthetic Specification for Highway  
Applications

**END OF ITEM P-207**

**ITEM P-208****AGGREGATE BASE COURSE****DESCRIPTION**

**208-1.1** This item shall consist of a base course composed of course aggregate bonded with fine aggregate base. It shall be constructed on a prepared subgrade or subbase course per these specifications and shall conform to the dimensions and typical cross-section shown on the plans.

**MATERIALS**

**208-2.1 Aggregate base.** The aggregate base material shall consist of both fine and coarse aggregate. Material shall be clean, sound, durable particles and fragments of stone or gravel, crushed stone, crushed slag, or crushed gravel mixed or blended with sand, screenings, or other materials. Materials shall be handled and stored in accordance with all federal, state, and local requirements. The aggregate shall be free from clay lumps, organic matter, 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 nearly constant and uniform as practicable. The fine aggregate portion, defined as the portion passing the No. 4 (4.75 mm) sieve produced in crushing operations, shall be incorporated in the base material to the extent permitted by the gradation requirements. Aggregate base material requirements are listed in the following table.

### Aggregate Base Material Requirements

Material Test	Requirement	Standard
<b>Coarse Aggregate</b>		
Resistance to Degradation	Loss: 50% maximum	ASTM C131
Soundness of Aggregates by Use of Sodium Sulfate <b>or</b> Magnesium Sulfate	Loss after 5 cycles: 12% maximum using Sodium sulfate - or - 18% maximum using magnesium sulfate	ASTM C88
Percentage of Fractured Particles	Minimum 60% by weight of particles with at least two fractured faces and 75% with at least one fractured face <sup>1</sup>	ASTM D5821
Flat Particles, Elongated Particles, or Flat and Elongated Particles	10% maximum, by weight, of flat, elongated, or flat and elongated particles <sup>2</sup>	ASTM D4791
Bulk density of slag	Weigh not less than 70 pounds per cubic foot (1.12 Mg/cubic meter)	ASTM C29
Clay lumps and friable particles (if using slag)	Less than or equal to 3 percent	ASTM C142
<b>Fine Aggregate</b>		
Liquid limit	Less than or equal to 25	ASTM D4318
Plasticity Index	Not more than five (5)	ASTM D4318

<sup>1</sup> 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.

<sup>2</sup> 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).

**208-2.2 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 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 for Contractor's Final Gradation <sup>1</sup>  Percent
2 inch (50 mm)	1" maximum		±0
1-1/2 inch (37.5 mm)	--		±5
1 inch (25.0 mm)	--		±8
3/4 inch (19.0 mm)	100		±8
No. 4 (4.75 mm)	70-100		±8
No. 40 (425 μm)	35-65		±5
No. 200 (75 μm)	10-25		±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.

#### 208-2.3 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 208-2.1 and 208-2.2. 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 Resident Project Representative (RPR) to check the final gradation. Sampling shall be per ASTM D75. Material shall meet the requirements in paragraph 208-2.2. The samples shall be taken from the in-place, un-compacted material at sampling points and intervals designated by the RPR.

**208-2.4 Separation Geotextile.** Not used.

## CONSTRUCTION METHODS

**208-3.1 Control strip.** The first half-day of construction shall be considered the control strip. The Contractor shall demonstrate, in the presence of the RPR, 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 (300 mm) upon the Contractor's demonstration that approved equipment and operations will uniformly compact the lift to the specified density. The RPR 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 RPR. 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 RPR.

**208-3.2 Preparing underlying subgrade and/or subbase.** The underlying subgrade and/or subbase shall be checked and accepted by the RPR 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 RPR 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.

**208-3.3 Production.** The aggregate shall be uniformly blended and, when at a satisfactory moisture content per paragraph 208-3.5, the approved material may be transported directly to the placement.

**208-3.4 Placement.** The aggregate shall be placed and spread on the prepared underlying layer by spreader boxes or other devices as approved by the RPR, 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 layer shall be constructed in lifts as established in the control strip, but not less than 4 inches (100 mm) nor more than 12 inches (300 mm) 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.

**208-3.5 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 base material delivered to the jobsite. The laboratory specimens shall be compacted and tested in accordance with ASTM D698. The moisture content of the material during placing operations shall be within  $\pm 2$  percentage points of the optimum moisture content as determined by ASTM D698. Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

**208-3.6 Weather limitations.** Material shall not be placed unless the ambient air temperature is at least 40°F (4°C) 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.

**208-3.7 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 their expense.

**208-3.8 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 (75 mm), reshaped and recompact to grade until the required smoothness and accuracy are obtained and approved by the RPR. 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 (9 mm) when tested with a 12-foot (3.7-m) 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 (3.7-m) straightedge for the full length of each line on a 50-foot (15-m) grid.

**b. Grade.** The grade and crown shall be measured on a grid matching the Spot Elevation sheets in the plans, and shall be within +0 and -1/2 inch (12 mm) of the specified grade.

**208-3.9 Acceptance sampling and testing.** Aggregate base course shall be accepted for density and thickness on an area basis. Two tests will be made for density and thickness for each 1200 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 RPR's presence and provide the test results upon completion to the RPR 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 D698. 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. 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.** Since the grade correction depth is variable, thickness will not be tested by coring. However, the volume of the material required to perform the grade correction shall be determined by survey before and after the P-208 base work as discussed in Technical Supplement TS-130.

#### METHOD OF MEASUREMENT

**208-4.1** The quantity of aggregate base course for point repairs shall be measured by the number of square yards of material actually constructed and accepted by the RPR as complying with the plans and specifications. Base materials shall not be included in any other excavation quantities.

~~**208-4.2** The quantity of aggregate base course for grade correction shall be measured by the number of cubic yards of material actually constructed and accepted by the RPR as complying with the plans and specifications. Base materials shall not be included in any other excavation quantities. Volume quantities will be based on compacted in-place measurements based on pre- and post-survey performed by the contractor. Volume quantities will not be based on loose vehicular measurements.~~

**208-4.2** The quantity of aggregate base course shall be measured by the ton of material actually constructed and accepted by the RPR as complying with the plans and specifications. Base materials shall not be included in any other excavation quantities.

#### BASIS OF PAYMENT

**208-5.1** Payment shall be made at the contract unit price per square yard for aggregate base course used in point repairs. This price shall be full compensation for furnishing all materials and for all operations, hauling, placing, and compacting of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

~~**208-5.2** Payment shall be made at the contract unit price per cubic yard for aggregate base course used in grade correction. This price shall be full compensation for furnishing all materials and for all operations,~~

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~~hauling, placing, and compacting of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.~~

**208-5.2** Payment shall be made at the contract unit price per ton for aggregate base course. This price shall be full compensation for furnishing all materials and for all operations, hauling, placing, and compacting of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item P-208-5.1	Crushed Aggregate Base Course (7" Thickness) (Point Repair When Approved By Owner's Representative) - per square yard
Item P-208-5.2	Crushed Aggregate Base Course (7" Thickness) - 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 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- $\mu\text{m}$ (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 <sup>3</sup> (600 kN-m/m <sup>3</sup> ))
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 <sup>3</sup> (2700 kN-m/m <sup>3</sup> ))
ASTM D2167	Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method
ASTM D2487	Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
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
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-208**

## DESCRIPTION

**131-1.1** The Contractor shall perform all necessary surveying required to construct all elements of the work as shown on the Contract Drawings and specified in the proposal and specifications. This shall include but not be limited to stakeout, layout, and elevations for pavements, structures, forms and appurtenances as shown and required, consistent with the current practices and shall be performed by qualified personnel acceptable to the Engineer. All survey work shall be provided under the direction of a land surveyor licensed in the State of Tennessee.

**131-2.2** The Contractor must give weekly copies of the survey notes to the Engineer so that the Engineer may check them as to accuracy and method of staking. The Engineer may make periodic checks of the grades and alignment set by the Contractor. In case of error on the part of the Contractor, or his/her employees, resulting in establishing grades and/or alignment that are not in accordance with the plans or established by the Engineer, all construction not in accordance with the established grades and/or alignment shall be replaced without additional cost to the Owner.

No direct payment will be made, unless otherwise specified in contract documents, for this labor, materials, or other expenses therewith. The cost thereof shall be included in the price of the bid for the various items of the Contract.

The Contractor shall be required to provide, at a minimum, the following:

1. Verify survey existing control points and elevations as shown in the plans prior to construction. Adjudicate any differences with Engineer prior to commencement of construction operations.

2. Survey the existing pavement surface on the grid matching the spot elevation plans. Data to be submitted to Engineer in AutoCAD version 2012 or higher prior to construction for verification / validation of information drawings. Adjudicate any differences with Engineer prior to commencement of construction operations.

3. In Mill and Overlay areas (with and without asphalt leveling) (Typical Sections 1 & 2 areas), survey the milled pavement surface on the grid matching the spot elevation plans. Provide elevation and "fill" heights for bituminous surface course construction. Delineate areas to receive leveling course prior to nominal 2" overlay in CAD for layout in the field. Data to be submitted to Engineer in AutoCAD version 2012 or higher at least 48 hours prior to paving operations.

~~4. In Full Depth Reclamation areas (after pulverization, compaction, and grading but prior to import of P-208 Base Course material), survey the FDR base course surface elevation on the grid matching the spot elevation plans. Provide elevation and "fill" heights for P-208 Base Course construction, as well as planned volume of imported fill. Delineate areas to receive P-208 Base Course in CAD for layout in the field. Data to be submitted to Engineer in AutoCAD version 2012 or higher at least 48 hours prior to paving operations.~~

~~5. In Full Depth Reclamation areas (after filling to grade with P-208 Base Course material), survey the FDR/P-208 Base Course surface elevation on the grid matching the spot elevation plans. Provide elevation and "fill" heights for P-401 Surface Course construction and provide computed volume of P-208 constructed. Data to be submitted to Engineer in AutoCAD version 2012 or higher at least 48 hours prior to paving operations.~~

4. In Typical Section 3 areas (minor grade change areas where FDR cement stabilization is planned) after pulverization, compaction, and grading), survey the FDR base course surface elevation on the grid matching the spot elevation plans. Compute the volume of unclassified excavation (cut) that was performed between the existing asphalt grade and the FDR finished grade. Provide elevation and "fill" heights for P-401 Surface Course construction on the grid matching the spot elevation plans. Data to be submitted to Engineer in AutoCAD version 2012 or higher at least 48 hours prior to paving operations.

5. In Typical Section 4 areas (moderate grade change areas where traditional reconstruction methods with a uniform P-208 base course is planned and unclassified excavation (cut) is expected), survey the

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subgrade elevation after unclassified excavation (cut) has been completed on the grid matching the spot elevation plans, and compute the volume of unclassified excavation (cut) that was performed. Then survey the P-208 base course surface elevation on the grid matching the spot elevation plans. Provide elevation and “fill” heights for P-401 Surface Course construction and provide P-208 thickness constructed, all on the grid matching the spot elevation plans. Data to be submitted to Engineer in AutoCAD version 2012 or higher at least 48 hours prior to paving operations.

6. In Typical Section 5 areas (moderate grade change areas where traditional reconstruction methods with a uniform P-208 base course is planned and unclassified excavation (fill) is expected), survey the subgrade elevation prior to performing unclassified excavation (fill) on the grid matching the spot elevation plans, calculate fill heights for the unclassified excavation (fill) that are required, and stake fills in the field. After the unclassified excavation (fill) is complete, survey the finished subgrade elevation on the grid matching the spot elevation plans, and compute the volume of unclassified excavation (fill) that was performed. Then survey the P-208 base course surface elevation on the grid matching the spot elevation plans. Provide elevation and “fill” heights for P-401 Surface Course construction and provide P-208 thickness constructed, all on the grid matching the spot elevation plans. Data to be submitted to Engineer in AutoCAD version 2012 or higher at least 48 hours prior to paving operations.

7. Provide survey of as-constructed elevations for all finished pavements on the grid matching the spot elevation plans. Data to be submitted to Engineer in AutoCAD version 2012 or higher.

#### **METHOD OF MEASUREMENT**

**131-3.1** Project Survey and Stakeout and all associated work shall not be measured for separate payment.

#### **BASIS OF PAYMENT**

**131-4.1** Payment for Project Survey and Stakeout and all associated work is incidental to the construction activity pay items to which it pertains and shall be compensated under Specification C-105 Mobilization.

#### **TESTING REQUIREMENTS**

**131-5.1** None.

#### **END OF ITEM TS-131**