Memphis
INTERNATIONAL AIRPORT

Movement Area Driver Training Program

Study Guide and Information Booklet

Presented by Airport Operations

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Introduction

This study guide has been developed by and provided to you by the Airport Operations Department of the Memphis-Shelby County Airport Authority (MSCAA). Our goals are to operate a safe and efficient airport in compliance with Title 14, Code of Federal Regulations, Part 139, *Certification of Airports* (14 CFR 139), as well as prevent any Runway Incursions and Surface Incidents in the Movement Area and Safety Area. The procedures, guidelines and airport specific information contained within this guide, when combined with practical training from your organization, will provide you with the basic knowledge needed to meet these goals.

This guide provides an overview of safe operating procedures for operating on the Movement Area and Safety Area at MEM. If there are questions about differences between this guide and local procedures, contact the Airport Operations Office at (901) 922-0162 or 922-8117.

The Movement Area Driver Study Guide, the AAAE IET computer training, and the training provided by your employer are intended to work together as a comprehensive training program. Employers are responsible for ensuring their employees are prepared before requesting a driving practical exam. Failure to ensure readiness may delay the process of obtaining a Class 3 License.

Why do we require this training?

The FAA requires all Airport Operating Certificate holders to limit access to the movement areas to only those ground vehicles necessary for airport operations. An aircraft not intended for flight is considered a ground vehicle. Airport Operators are also required by the FAA to ensure that vehicle operators with access to the Movement Area and Safety Area are familiar with our procedures for the operation of ground vehicles and the consequences of non-compliance. The movement area must never be used for convenience.

Possible consequences of non-compliance and violations include:
- A Notice of Violation (NOV).
- Suspension and/or Permanent Revocation of Movement Area and Safety Area driving privileges.
- Criminal penalties and/or civil fines issued by the FAA and MSCAA.

Who is eligible for a Class 3 License?

Only authorized personnel with a defined operational need that occurs on a regular basis are eligible for a Class 3 license.

Authorized personnel include: Airport Operations, Airport Maintenance, Airport Development, Aircraft Rescue and Fire Fighting (ARFF), FAA, contractors and certain aviation personnel including airline mechanics and specially trained tug and tow teams.

Individuals must successfully complete the applicable computer-based training before taking the driving practical exam. Students may schedule a practical exam by logging onto QLess (https://kiosk.na8.qless.com/kiosk/app/home/191), or by contacting Airport Operations at 901-922-0162 or via email at dmcneil@flymemphis.com. Individuals who pass the driving practical exam will be issued a Class 3 License by having the endorsement added to their SIDA badge.

How long is the license valid?

A Class 3 Movement Area and Safety Area License is valid for 12 consecutive calendar months from an individual's previous training. The badge expiration will be set to the end of the month in which it expires. Employees are responsible for keeping their license updated. If your Class 3 License expires, you are no longer authorized to enter the movement area and will be required to complete additional training and testing.

Who is required to have a Class 3 license?

Any person that has a need to enter the Movement Area and Safety Area on foot or in a ground vehicle (truck, aircraft, etc.) must have a valid Class 3 License or be escorted by an individual with a current Class 3 License.

Any person, on the movement area, who is in direct control of a taxiing aircraft (left seat) or communicating with ATCT are required to have a Class 3 License, excluding those employed as pilots for their respective aircraft owner/operator. Aircraft accessing the movement area under tow requires one person of the specially trained tug and tow team to have a Class 3 License. There must be continuous two-way verbal communication between the aircraft and tug to share information. Tow and taxi support vehicles not necessary for making mechanical observations are required to use the vehicle service/perimeter roadways which requires a Non-Movement License. Vehicles that are "in tow" of an aircraft being taxied or towed must have continuous contact with the person talking to ATCT. The person with the Class 3 License is responsible for the operation.

Any person accessing a "temporary non-movement area" adjacent to a runway or an airfield closure for construction or deicing operations must have a Class 3 License or be escorted by someone with Class 3 License at all times. It is the responsibility of the Class 3 driver to ensure that all personnel and equipment are following proper procedures to give way to taxiing aircraft and are not left unattended in the temporary non-movement area or airfield closure. This rule is in place to prevent any runway incursions from happening.

What are the differences between a Class 2 (Non-Movement) and Class 3 (Movement) License?

There are two different types of licenses an Aircraft Operating Area (AOA) driver at MEM can possess. The Authorized Signatory should determine the appropriate license when signing off on the application. The Director of Operations or his designee reserves the right to review and determine the appropriate license class based on the employee's operational need. A description of the licenses are listed below.

Class 2 (Non-Movement)
Allows an operator to access the vehicle service roads and ramp areas. *

Class 3 (Movement)
Permits the operation of vehicles and taxiing aircraft (by maintenance personnel) in all areas, movement and non-movement*. When an operational need exists, the Class 3 License enables the operator to traverse taxiways, runways and safety areas under the control of an FAA Air Traffic Controller via VHF radio.

* Employees without a work-related operational need are not permitted to access the MEM air carrier terminal ramp (ex. FedEx, UPS, etc.)

What is the Application Process?

Persons employed at Memphis International Airport may apply for a Class 3 (Movement Area) License by submitting a completed ID badge application to the Airport ID Office.

Only those designated as an Authorized Signatory are permitted to sign off on applications.

Applications, visual aids, and study materials for the airfield driver's license test may be obtained at the ID Office located on the baggage level of the B-Terminal building (901-922-8005), online at https://flymemphis.com/badging/, or by calling the MSCAA Operations Training Office (901-922-0162).

Are there any prerequisites for obtaining a Class 3 License?

Applicant drivers must meet the following **prerequisites**:

- ✈ Be at least 18 years of age.
- ✈ Possess and present a current, valid State license to operate a motor vehicle. (Both the Class 3 License and a valid state driver's license are required to operate a motorized vehicle on the AMA)
- ✈ Have a defined operational need that occurs on a regular basis.
- ✈ Have received training from your employer prior to any testing.

What are the training/testing requirements for a Class 3?

New Employees:

- ✈ Successfully pass the computer-based training (AAAE IET)
  - o At minimum this includes two courses: (1) Initial Driver Training – Non-Movement Area Driver and (2) Initial Movement Area Driver.
- ✈ Pass a driving practical exam with designated member of Airport Operations.
  - o **Initial practical exams** must be completed within 30 days of computer-based training.
  - o Failure to meet any requirements may result in cancellation.

Recurrent:

- ✈ Successfully pass the computer-based training (AAAE IET) within the- same month your current badge expires.
  - o At minimum this includes two courses: (1) Driver Training – Non-Movement Area Driver and (2) Movement Area Driver.
  - o **Required every 12 consecutive calendar months.**
- ✈ Pass a driving practical exam with a designated member of Airport-Operations, in the month your current badge expires.
  - o **Practical exams are required every 24 consecutive calendar months**.

Testing Failures:

Computer-based Training
- ✈ Initial and recurrent applicants who fail the computer-based training must retest. Applicants are required to wait 24 hours before retesting.

Practical Testing
- ✈ Initial and recurrent applicants who fail the driving practical exam must retake the computer-based training and sign up for another practical exam. Applicants must wait a minimum of 48 hours from the date/time of the failure.
- ✈ Initial and recurrent applicants who fail the practical exam (2) times must wait a total of 30 days before retaking the computer training or another practical exam.
- ✈ Employees who fail a recurrent practical exam will have their Class 3 License suspended and will be issued a standard SIDA badge or if able, a Class 2 License until they successfully complete the requirements.

MEM – OPS

Definitions

Aircraft Movement Area (AMA) – The runways, taxiways, and safety areas, as well as other areas used for taxiing, takeoff, and landing of aircraft, exclusive of loading ramps and aircraft parking areas.

Hot Spot - a location on an airport movement area with a history or potential risk of collision or runway incursion, and where heightened attention by pilots and drivers is necessary.

Non-Movement Area - Aprons, roadways, taxilanes, and other areas not under the control of air traffic that are used by aircraft to park, load, and/or unload.

Runway (RWY) – A defined rectangular area on a land airport prepared for the landing and take-off of aircraft.

Runway Safety Area – A defined surface (250 feet off the runway centerline and 1,000 feet off each end or as required) surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an excursion, over or under shoot from the runway.

Taxiway (TWY) – A paved surface designed for the movement of aircraft from one part of an airport to another.

Taxilane (TXL) – The portion of the aircraft parking area used for access between taxiways and aircraft parking positions.

Acronyms:

AOA – Aircraft Operating Area
AMA – Aircraft Movement Area
ATC or ATCT – Air Traffic Control Tower
CDF – Centralized De-icing Facility
EMAS - Engineered Material Arresting System
FAA – Federal Aviation Administration
FBO – Fixed Based Operator
FOD – Foreign Object Debris/Damage
GA – General Aviation
ICAO – International Civil Aviation Organization
IET – Interactive Employee Training
ILS - Instrument Landing System
MEM – Three letter identifier for the Memphis International Airport
MSCAA – Memphis-Shelby County Airport Authority
NOTAM – Notice to Air Missions
RSA – Runway Safety Area
RVR – Runway Visual Range
RWY – Abbreviation for Runway
SMGCS – Surface Movement Guidance and Control System
TXL – Abbreviation for Taxilane
TWY – Abbreviation for Taxiway

What are the training/testing objectives?

Upon completion of the Class 3 training and testing, an applicant should be able to:

- ✈ Define runway incursions and surface incidents as well as understand the importance of preventing them.
- ✈ Identify runways and hold positions on the movement area.
- ✈ Identify what side of the runway hold bar you stop on.
- ✈ At minimum, label all 4 runways and 18 core taxiways on a blank airport diagram.
- ✈ Identify a runway and know the color of the lights and markings, understand why they are designated with numbers and letters.
- ✈ Identify a taxiway and know the colors of the lights and markings.
- ✈ Understand what a runway safety area is and why it's important to remain clear of them.
- ✈ Understand what the different types of airfield signs and markings mean and why it's important to be able to read them.
- ✈ Know your limitations during a low-visibility or SMGCS operation.
- ✈ Understand the Airport Rules and Regulations and how to comply with them.
- ✈ Know and demonstrate the use of the proper radio procedures using correct phonetic alphabet, basic aviation terminology, and providing required mandatory read backs.
- ✈ Understand the importance of giving way to aircraft and how to do so safely.
- ✈ Discern between a north and south operation.
- ✈ Know how to request light gun signals and what their meanings are.

Section 1 – Runway Incursions and Surface Incidents

Runway Incursions

On October 1, 2007, the FAA adopted the ICAO definition of a runway incursion. It states:

Any occurrence at an aerodrome involving the incorrect presence of an aircraft, vehicle or person on the protected area of a surface designated for the landing and take-off of aircraft.

Runway incursions are broken down into three categories.

1. **Operational Incident (OI):** An error is made by an air traffic controller.
2. **Pilot Deviation (PD):** When a pilot enters the runway without permission.
3. **Vehicle/Pedestrian Deviation (V/PD):** When a person or vehicle enters the runway without permission.

Runway Incursions are assigned a category based off of severity. The facts and descriptions considered for determining the category are shown below in Figure 1.

Available Reaction Time	Evasive of Corrective Action	Environmental Conditions	Speed of Aircraft and/or Vehicle	Proximity of Aircraft and/or Vehicle
Increasing Severity				
Runway Incursion categories				
Category D	Category C	Category B	Category A	Accident
Incident that meets the definition of runway incursion such as incorrect presence of a single vehicle/person/aircraft on the protected area of a surface designated for the landing and take-off of aircraft but with no immediate safety consequences.	An incident characterized by ample time and/or distance to avoid a collision.	An incident in which separation decreases and there is a significant potential for collision, which may result in a time critical corrective/ evasive response to avoid a collision.	A serious incident in which a collision was narrowly avoided.	An incursion that resulted in a collision

Figure 1 – Runway Incursion Severity

Some **common causes** for runway incursions are miscommunications, unfamiliarity with surroundings, poor weather conditions, complacency, or loss of situational awareness.

Runway Incursions are a major concern at MEM. Safety is the primary goal when entering the AMA. We must always stay alert and be aware of the other aircraft around us. There should be no distractions, such as listening to music, talking on a cell phone or company radio, or conversing about non-AMA related topics with someone else in the cockpit/vehicle while operating on the AMA.

When operating on the AMA, it's important to listen closely to radio calls from ATC. The frequency can become very congested, especially during the peak arrival/departure times. It's important to make sure the call you heard was for you. If you are unsure, or did not hear your call sign, ask ATC to repeat the instructions or verify who they were for.

In order to keep from becoming lost on the AMA, you should always carry a current airfield diagram (Jeppesen, Leido, FAA, airport-provided, etc.). A diagram should be used for occasional reference only and not entirely depended on for navigating as this takes away from situational awareness. If you are unsure on the route ATC has given, you may request "progressive taxi" instructions. This will alert ATC that you are unfamiliar with the route given and will need turn-by-turn instructions.

Airports require a lot of maintenance and upkeep. There is always some component that needs attention, like grass cutting, lights, signs, markings, pavement repairs, etc. Because of this, it's important to avoid complacency while operating on the AMA. Just because you've always taken the same route to reach your location, doesn't mean the same route will be available forever. It's important to know what areas are under construction or may be closed for routine maintenance. Prior to entering the AMA, you should always listen to the ATIS frequency to get up-to-date airfield information.

Surface Incidents

A surface incident is an unauthorized or unapproved movement within the designated movement area (excluding runway incursions) or an occurrence in that same area associated with the operation of an aircraft that affects or could affect the safety of flight.

It is required to call for clearance before entering the movement area. It is important to make sure your intentions are clear, and you only go where you have been given clearance.

Section 2 – Understanding the Airfield

Familiarity with the airfield layout, operations, signs and markings will enhance your situational awareness and ability to react when traversing on movement area.

Airfield Familiarization

The airfield at MEM can be viewed or thought of in three distinct complexes (see **Figure 2**):

- ✈ **North Complex:** includes taxiways and a runway from Taxiway Alpha north.
- ✈ **East Complex:** includes taxiways and runways south of Taxiway Alpha and east of Taxiway Juliet to Cargo Central Ramp.
- ✈ **West Complex:** includes taxiways, a runway, the CDF, and the Main Terminal Ramp west of Taxiway Juliet and south of Taxiway Alpha.
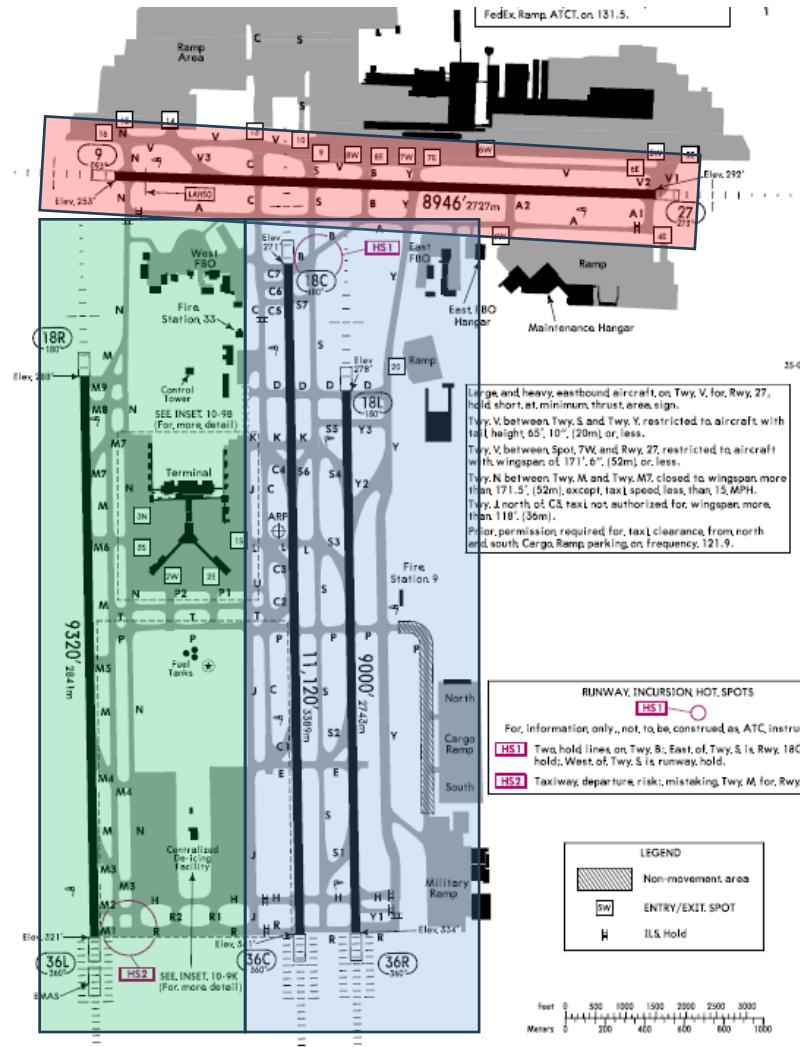

Figure 2 – Airfield Complex Map

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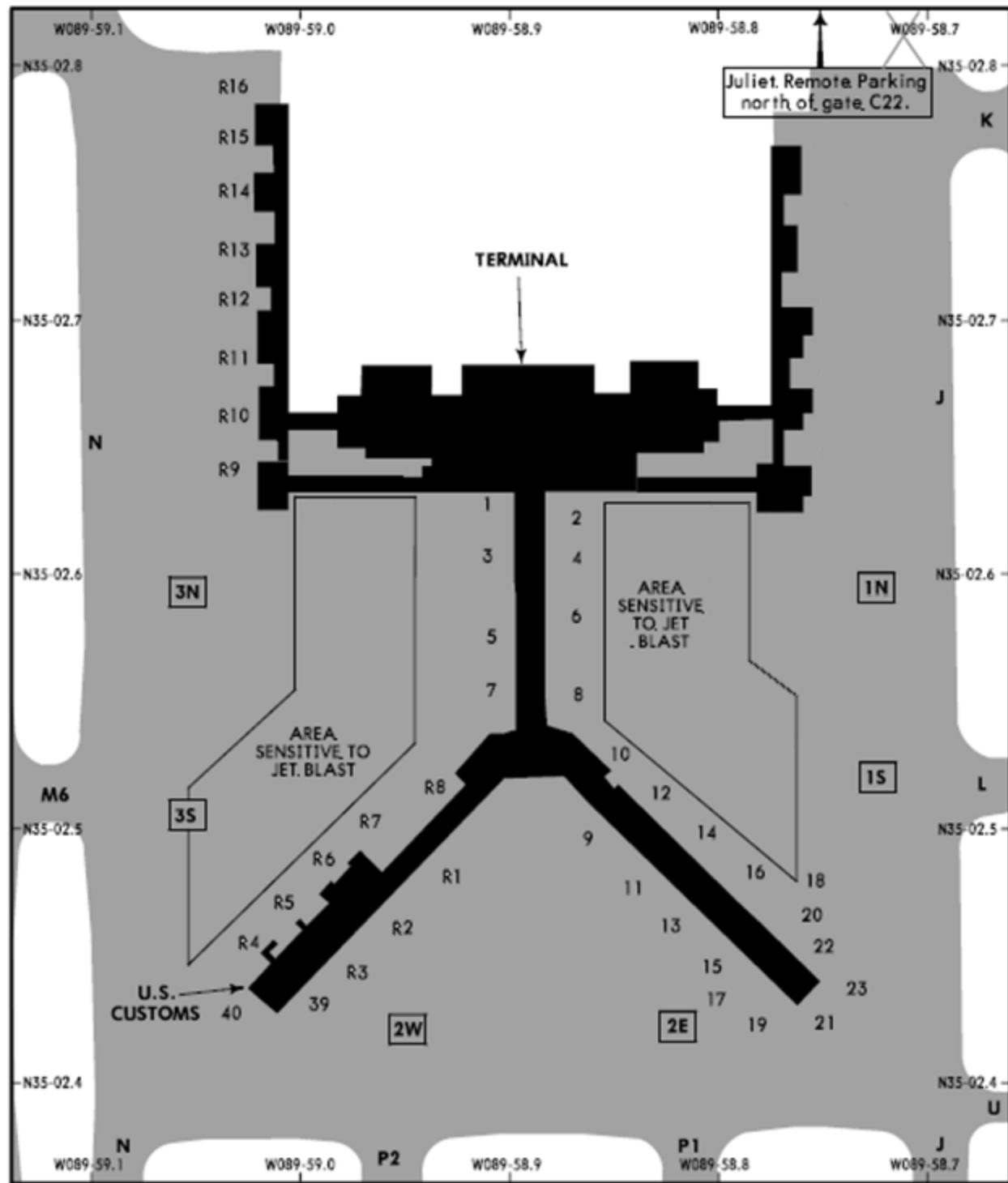
Figure 3 – MEM Terminal Ramp and Gate Chart

Runways

MEM has four runways that are each 150' wide. There are three north/south parallel runways (18R/36L, 18C/36C, and 18L/36R) and one east/west runway (9/27) which are depicted in blue on Figure 4. Each runway has at least one parallel taxiway and one or more high speed taxiway turnoffs.
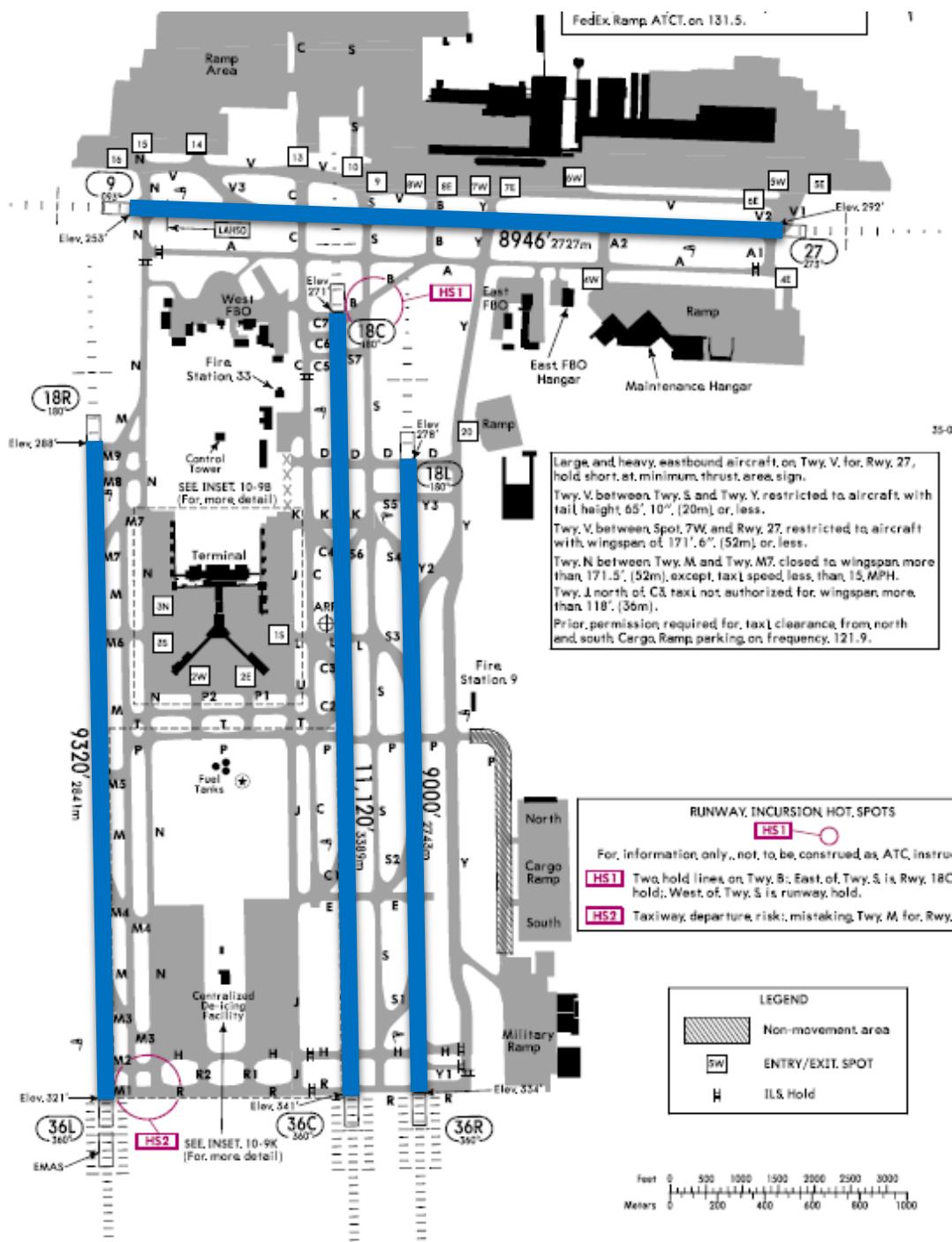

Figure 4 – MEM Runways

All runways at MEM have:

➤ White painted markings that include edge lines and centerlines, precision approach markings, and runway designator markings (see **Figure 5**).

➤ White centerline lights that change to alternating red/white at 3,000' remaining and solid red with 1,000' remaining.

➤ White edge line lights that change to yellow with 2,000' remaining.
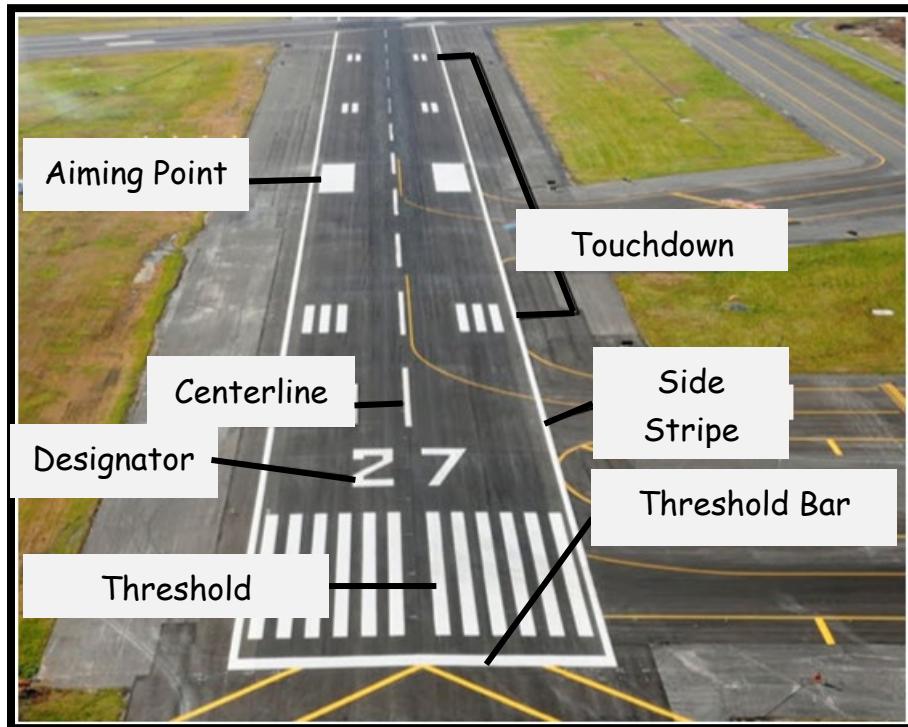
Figure 5 – Runway Markings

A runway designator is determined by the runways magnetic heading. Think of an aircraft sitting on a runway and visualize where its nose would be pointing on a compass. For example, if an aircraft was sitting on RWY 27, awaiting departure, its nose would be pointing to the West (or 270 degrees). The zero is dropped from the heading giving you your runway designator of RWY 27 (see Figure 7).

Since we have three north/south parallel runways, an "L" for left, "R" for right, or "C" for center will follow the designator based on the pilot's point of view. For example, if a pilot is approaching from the south towards three RWY 36's, the left would be RWY 36L, the middle RWY 36C and the right RWY 36R (see Figure 6).

It is important to understand these delineations and how they differ depending on which direction a runway is in use. For example, the opposite end of 36R is 18L.

While working at MEM, you may hear the term "north flow" or "south flow". This term is in reference to the flow of air traffic in and out of the airport. Aircraft always flow in the same direction. For instance, you should never see an aircraft departing 18C while another is landing 36R.

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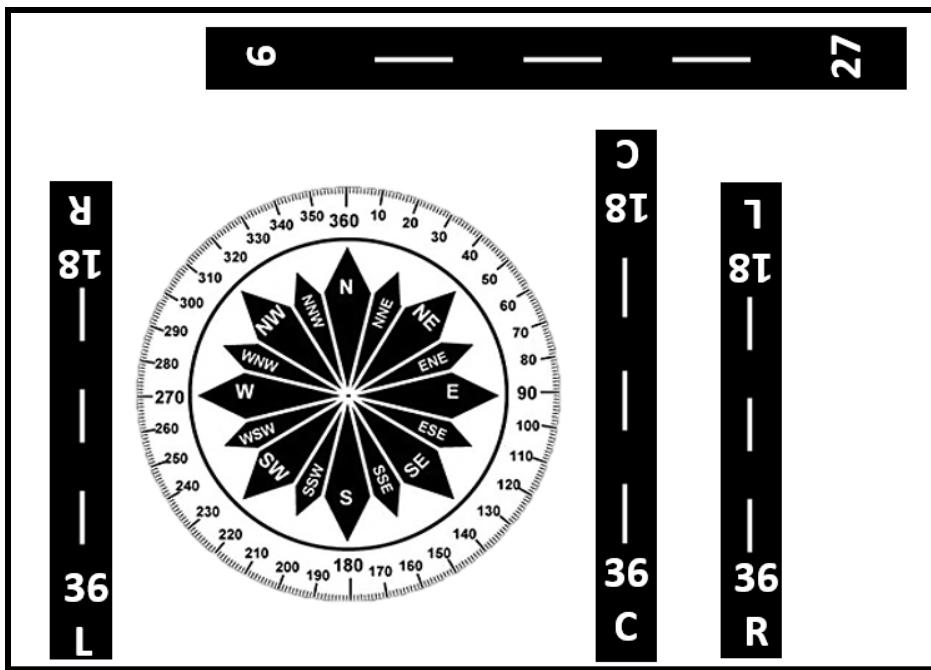
Figure 6 – Runway Desinator and Approach

Runways should always be identified by the active runway approach. Using this consistent terminology reduces any confusion between you, ATCT, and any other users on the movement area. The active runway approach is usually based off wind because aircraft normally land and take off into the wind. The active runway approach and flow information can be obtained by tuning into ATIS or visually watching air traffic.

Runways have two ends, the approach end and departure end. These ends are always opposite of each other and vary depending on which direction or approach of the runway is in use (see Figure 7).

Runway crossings should be minimized as much as possible and take place at the **departure** end of the runway in use to provide the greatest distance of separation in the event of a mishap involving a landing or departing aircraft.


9 Approach End / 27 Departure End   9 Departure End / 27 Approach End
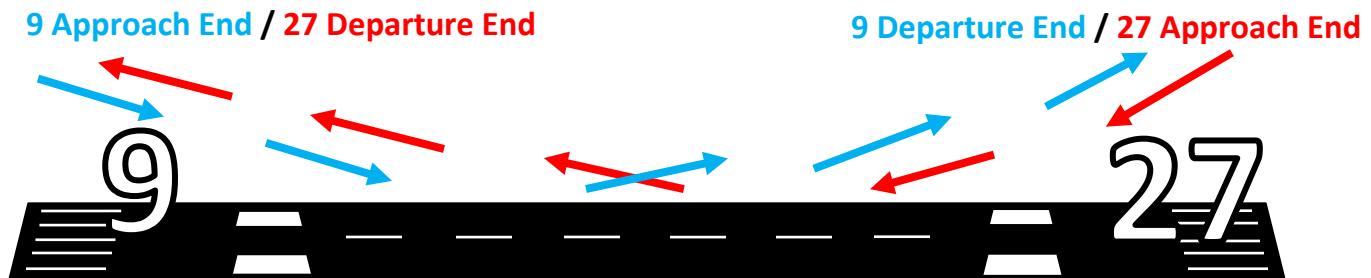
Figure 7 – Approach End vs Departure End of RWYs

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Runway Safety Areas

Runways have protective space that surrounds them known as a Runway Safety Area (RSA). A Runway Safety Area exists in the event of a runway excursion, where an aircraft intentionally or unintentionally exits the runway surface. These safety areas must be maintained to strict standards and free of any objects or structures that could cause damage to an aircraft. A runway safety area is normally 1000' feet off each end and 500' feet wide, centered over the runway (250' each side). **Figure 8** depicts the RSA dimensions. MEM does have two runways that are unique and vary slightly. The runway safety areas for MEM are listed below:

- ✈ **Runway 18R/36L** – 500 feet in width centered about the runway centerline and extending 1,000 feet beyond the north end of the runway threshold. The south end of the runway has an EMAS installed with the dimensions of 316 feet long by 178 feet wide reducing the safety area to 865 feet from the threshold of the runway.
- ✈ **Runway 18C/36C** – 500 feet in width centered about the runway centerline and extending 1,000 feet at the Runway 18C departure end. The Runway 36C ILS Localizer has been surveyed and is 596 feet from the runway threshold, therefore declared distance is used on the north 405 feet of Runway 18C/36C to provide a 1,000 feet safety area at the north end of the runway.
- ✈ **Runway 18L/36R** – 500 feet in width centered about the runway centerline and extending 1,000 feet beyond each end of the runway threshold.
- ✈ **Runway 9/27** – 500 feet in width centered about the runway centerline and extending 1,000 feet beyond each end of the runway threshold.
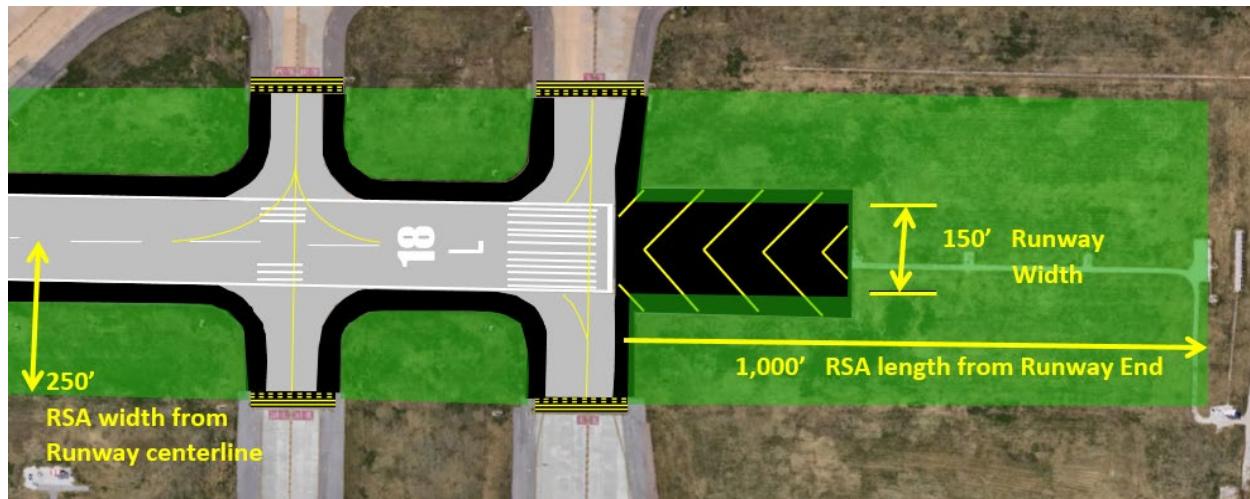
Figure 8 – Runway Safety Area Dimensions

Canted Runway Holding Position Markings

When holding short of, or working near a canted runway holding position marking, it is important to hold short at the taxiway centerline. Some holding position markings will not fully protect the runway safety area at the closest point to the runway. Because of this, holding or working at the incorrect position could result in a runway incursion. If work needs to be done inside the RSA at these canted holding position markings, ATC approval will be required.
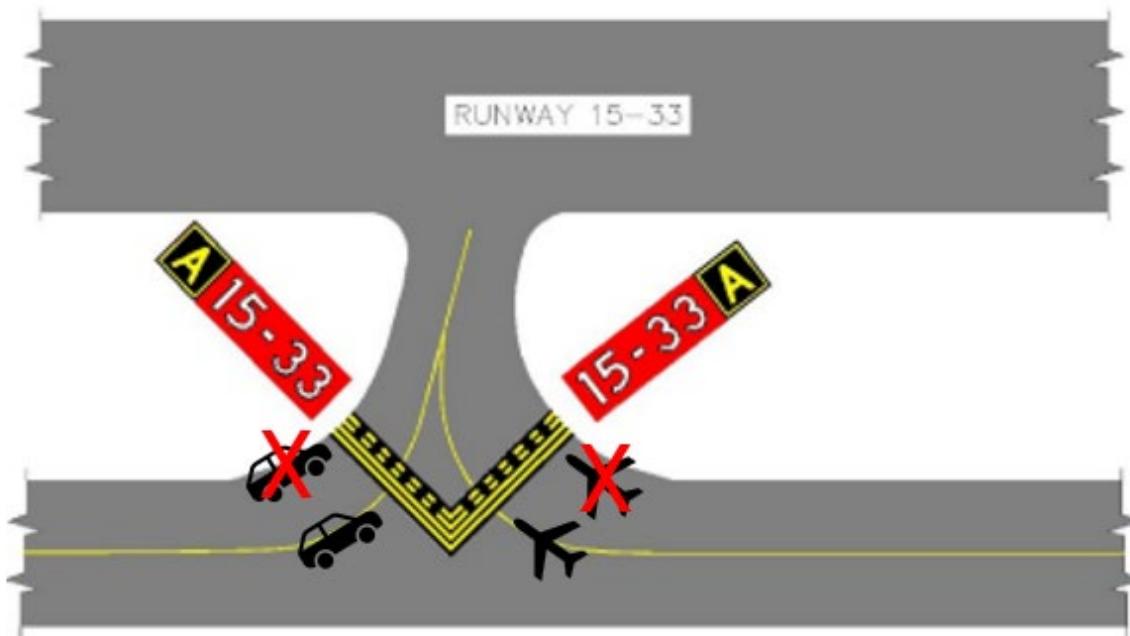
Figure 9 – Canted RWY Hold Position Markings

Taxiways

MEM has 18 primary taxiways and numerous taxiway connectors. Taxiway widths vary from 75' to 150', with a typical width of 100'. Taxiways are shown as grey on Figure 4.

Primary taxiways at MEM are designated by a single letter of the alphabet (A, B, C, etc.). Taxiway connectors associated with a primary taxiway are designated by the primary taxiway's letter and a number (C1, C2, C3, etc.). The taxiway connector's layout is a unique system with lower numbers starting at the South and East portion of the airfield and increase as they go North and West.

All taxiways have:

- ✈ Yellow pavement markings (edge lines/center lines)
- ✈ Blue edge lights
- ✈ Green centerline lights

__Areas of Concern on Taxiways__

TWY A between TWY C and TWY S for the RWY 18C approach/36C departure (see **Figure 10**)

Hot Spot # 1, TWY B and S intersection (see **Figure 11**).

Hot Spot # 2, TWY M and M1 (see **Figure 12**).

RWY 18C Approach and 36C Departure Airspace

The RWY 18C approach and 36C departure airspace starts at ground level, and slopes upward to the north extending over Taxiway A. To prevent any vehicles or aircraft from penetrating this protected imaginary surface, Air Traffic Controllers may instruct vehicles and aircraft to hold short of certain locations; On TWY A (west bound) hold short of the 18C APCH hold short sign and holding position marking just prior to TWY S; on TWY A (east bound) hold short of the 18C APCH hold short sign and holding position marking just prior to TWY C; on TWY C (north bound) hold short of the 18C APCH hold short sign and ILS critical area marking; on TWY S (north bound) hold short of ILS hold position sign and ILS critical area marking south of TWY B; on TWY B (southwest bound) hold short of the 18C APCH hold short sign and holding position marking just prior to TWY S. See **Figure 10** for a depiction of these signs and markings. **Figure 11** depicts the 18C Approach and 36C Departure airspace going over an aircraft and vehicle with examples of penetration points.
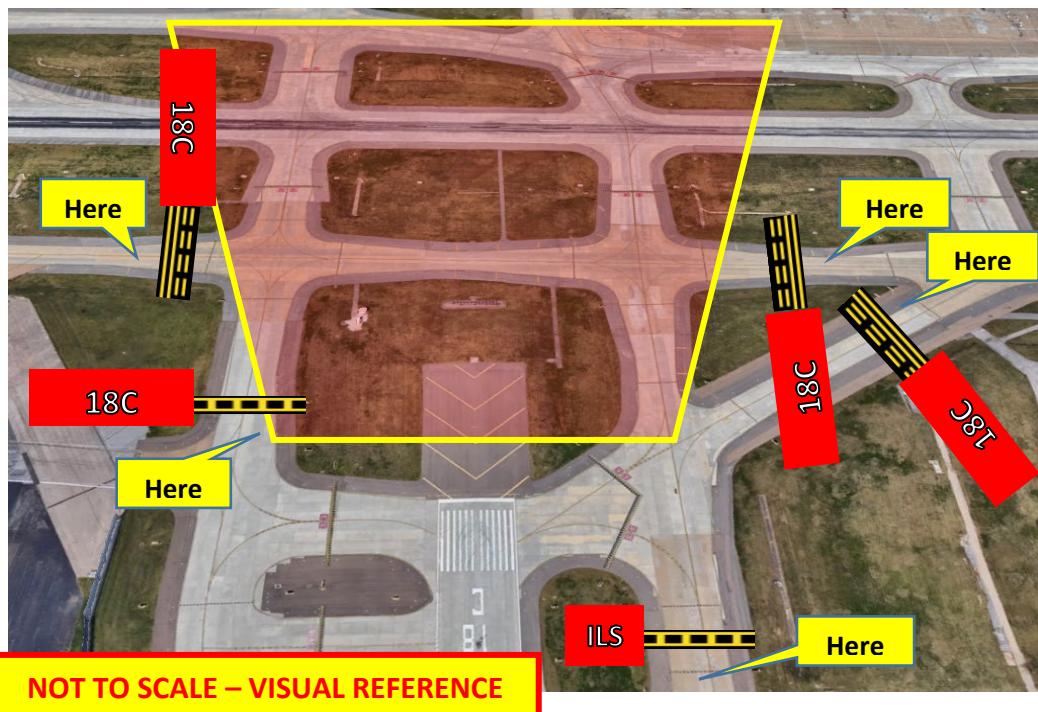

Figure 10 – TWY Hold Short Positions for 18C Approach / 36C Departure Airspace
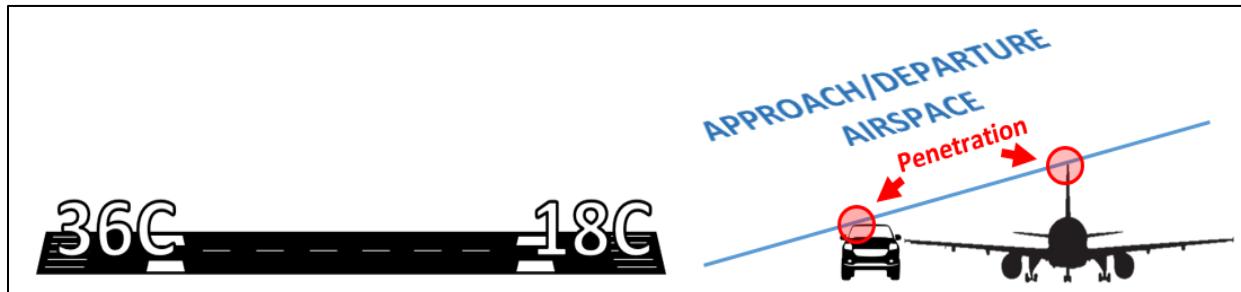

Figure 11 – Approach/Departure Airspace Penetration

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Hot Spots

A hotspot is defined by the FAA as a location on an airport movement area with a history or potential risk of collision or runway incursion, and where heightened attention by pilots, drivers, and pedestrians is necessary. MEM has two hot spots.
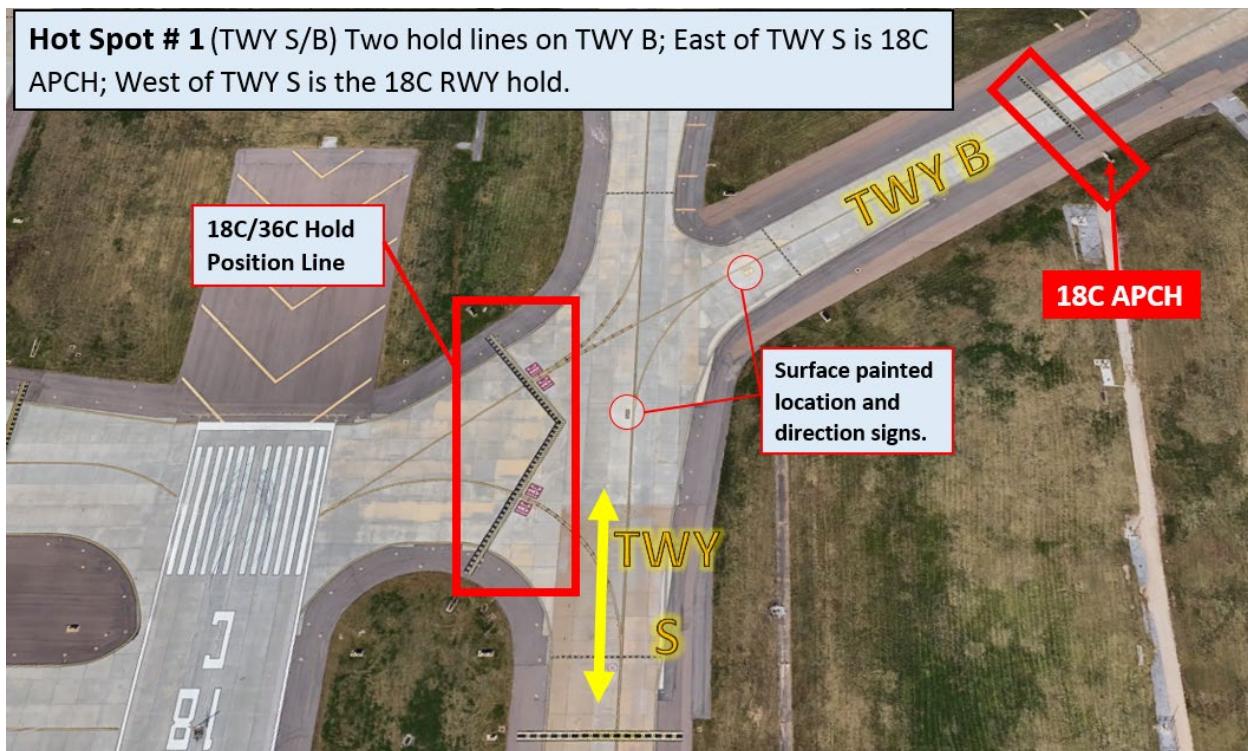
Figure 12 – Hot Spot # 1

On Taxiway Bravo east of Taxiway Sierra, there is a red and white mandatory sign labeled, 18C APCH (Runway 18 Center Approach) co-located with a mandatory hold short line. This marking and sign are sometimes mistaken as the actual 18C hold position marking which is on Taxiway Bravo west of Taxiway Sierra. The approach hold short marking is used to protect the approach and departure surfaces for RWY 18C/36C and during ILS conditions. Surface painted taxiway location and directional sign markings have been added at the TWYs Sierra and Bravo intersection to help increase awareness in this area.
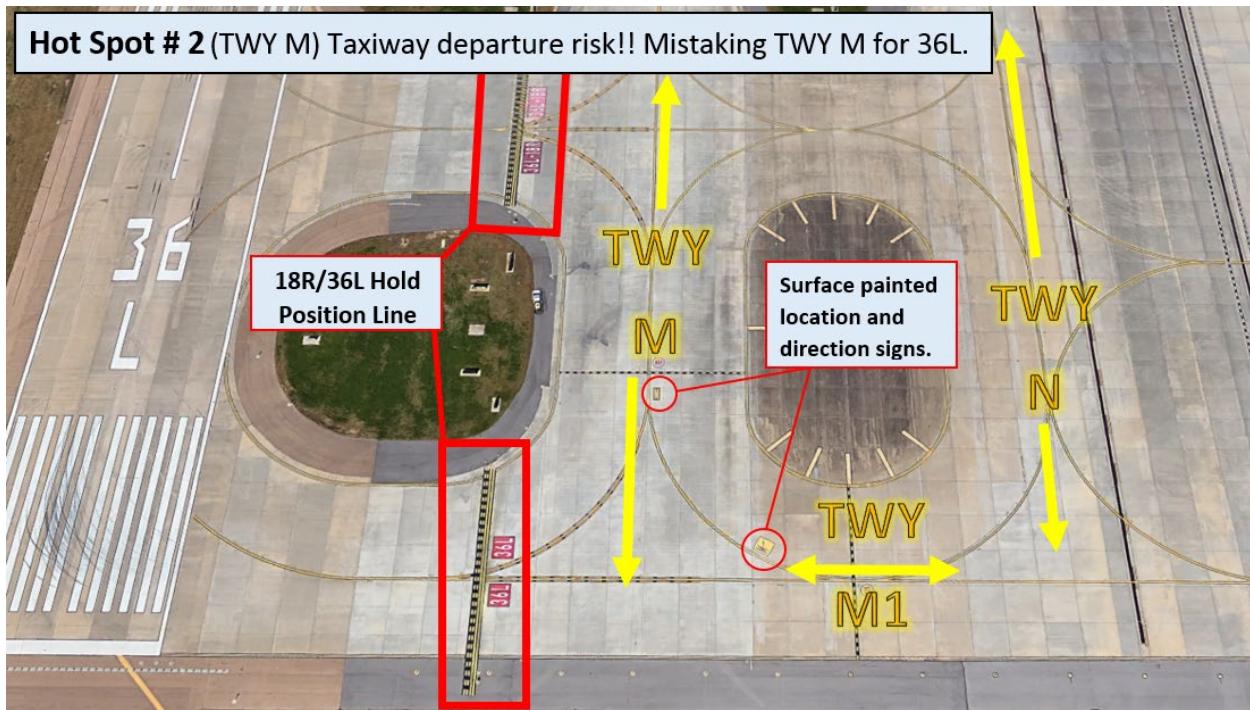
Figure 13 – Hot Spot # 2

Taxiway Mike was previously used as a runway when 18R/36L was undergoing repairs. Taxiway Mike still has some runway characteristics (grooved pavement, above average width) which is why it could be mistaken for a runway. Surface painted taxiway location and directional sign markings have been added at the Taxiway Mike/M1 intersection to help increase awareness in this area.

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Airfield Markings

Pavement markings on **taxiways** consist of taxiway/taxilane centerline markings, enhanced taxiway centerline markings, taxiway edge markings, holding position markings, surface painted signs (e.g., direction, location, hold position, etc.), and geographical hold position markings. All taxiway markings are yellow. Pavement markings are reflective and can be seen at nighttime. Some examples and explanations can be seen in **Figure 14**.
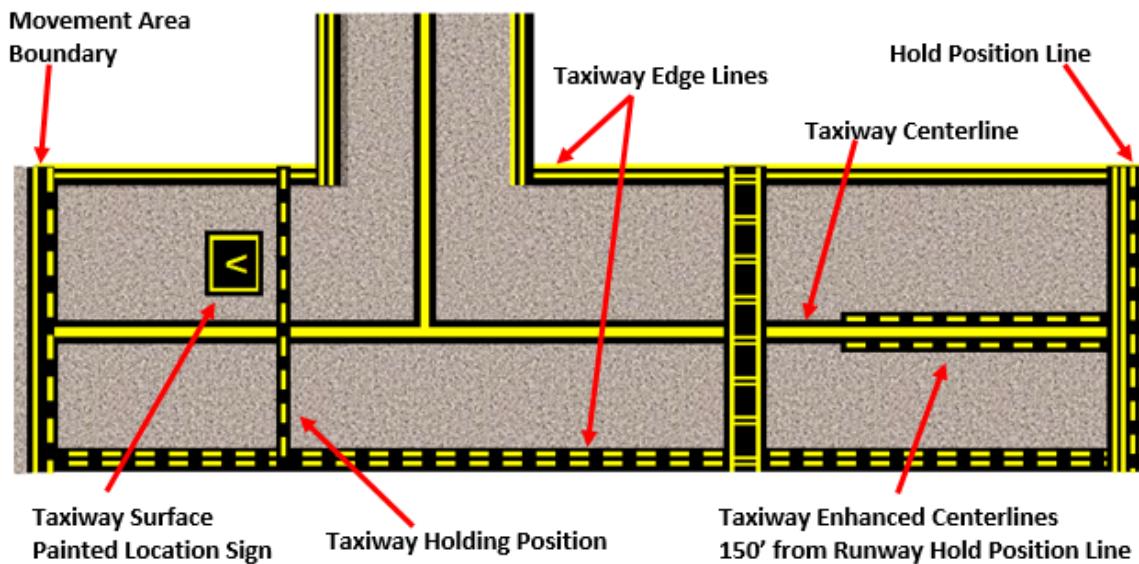
Figure 14 – Taxiway Markings

- ✈ **Runway Holding Position –** Hold Short of intersecting runway, also Land and Hold Short (LAHSO) Marking.
- ✈ **ILS Holding Position Marking (ILS Critical Area) –** Hold Short location during Instrument Meteorlogical Conditions (IMC).
- ✈ **Intermediate Holding Position Marking –** Also refered to as Taxiway Holding Position Marking. Used to manage taxiing aircraft traffic through congested taxiway intersections. Provides wingtip clearance for perpendicular taxiway.
- ✈ **Movement/Non-Movement Area Boundary –** Defines boundary of movement area and non-movement area.
- ✈ **Taxiway Edge Lines –** Defines edge of usable full strength taxiway pavement, adjoining pavement not usable.
- ✈ **Dashed Taxiway Edge Lines –** Defines edge of taxiway where adjoining pavement or apron is available for taxi.
- ✈ **Enhanced Taxiway Centerlines –** depicted by a parallel line of yellow dashes on either side of the normal taxiway centerline and begins 150' from the runway holding position marking.

Some taxiways have surface painted signs. These are painted markings that look just like the actual location or directional signs from a sign array located along the side of a taxiway. They are used in areas where there may not be enough room to have a standard sign or bring higher attention or awareness to your location (see **Figure 14**).

Mandatory Holding Position

The **runway holding position marking (or hold bar)** is the most important marking on the airfield. The hold bar is made up of two solid yellow lines and two dashed yellow lines. This marking holds you short of the runway and runway safety area by stopping short of the two solid lines. You must always remember; you cannot cross a runway hold bar without permission from ATC under any circumstance. All hold bars at MEM have in-pavement runway guard lights in front of them (except for some along RWY 18C/36C). Runway guard lights are alternating yellow flashing lights (**Figure 15**).
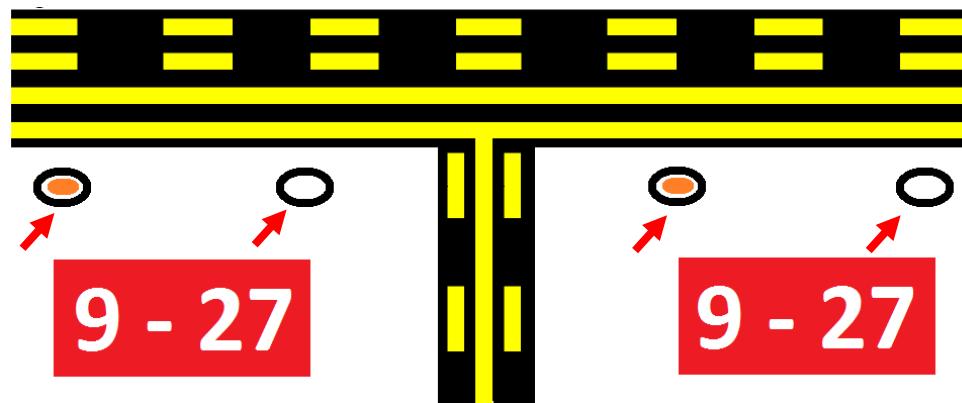
Figure 15 – Runway Guard Lights

There are multiple other visual cues other than the In-Pavement Guard Lights and the Hold Bar to indicate you are at or approaching a runway hold position. See **Figure 16** on the next page.
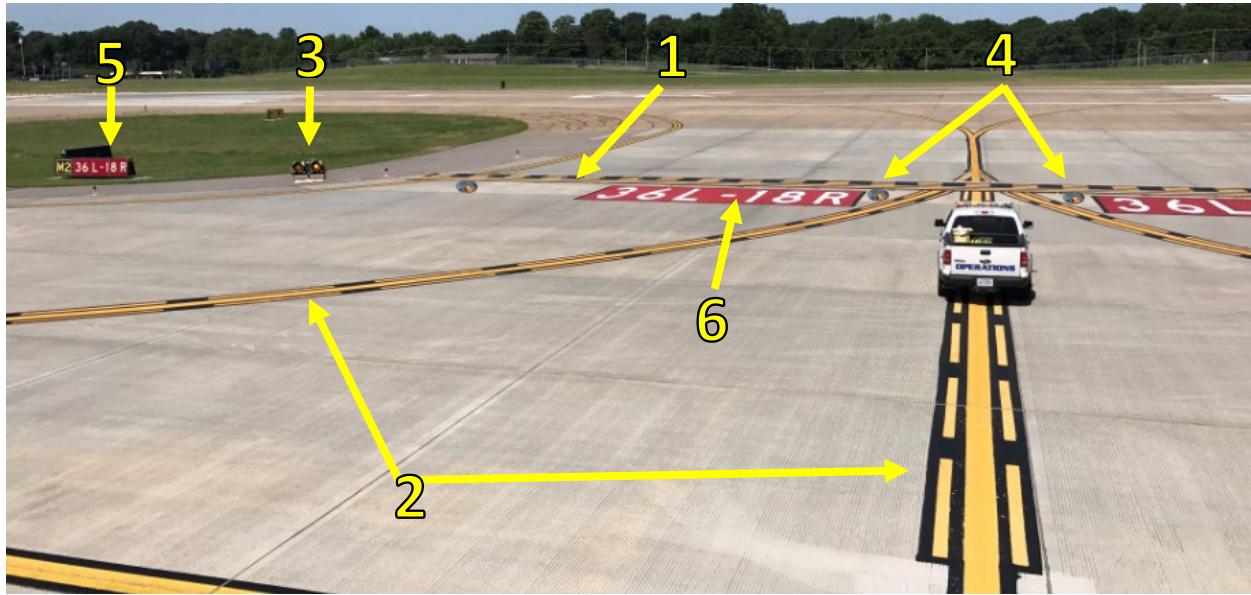
Figure 16 – Visual Indicators of Runway Hold Short Position

6 Visual Indicators of a Runway/Taxiway Intersection Holding Position

1. Runway Holding Position a.k.a. "Hold Short Bar"
2. Enhanced Taxiway Centerline
3. Elevated Guard Lights
4. Runway Surface Guard Lights "In Pavement Guard Lights"
5. Runway Holding Position Sign
6. Runway Surface Painted Hold Position Sign

Airfield Signage

There are several different types of signs located on the airfield. They include but are not limited to, the following:

- ✈ **Mandatory Instruction:** Red background with white letters
    - ○ *Holds you short of a runway or critical area*
   - ○ *Also called "runway holding position" sign*

- ✈ **Directional Sign:** Yellow background with black letters and arrows
    - ○ *Indicates directions of other taxiways leading out of an intersection*
    - ○ *Always turn after the sign*
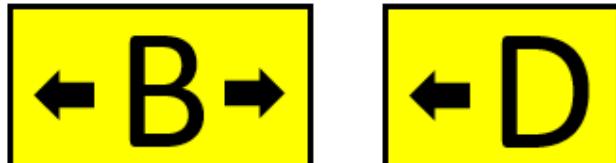
- ✈ **Inbound Destination Sign:** Yellow background with black letters and arrows
    - ○ *Indicates direction to a major destination*
    - ○ *Turn after sign*

- ✈ **Location Sign:** Black background with a yellow border, letters and/or numbers
    - ○ *Identifies the taxiway or runway you are located on*
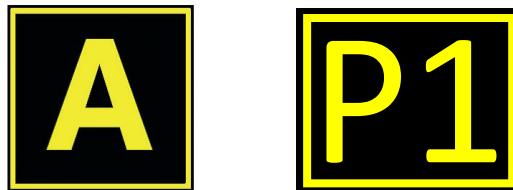
Figure 16 below depicts illustrations and explanations of some of the signs you may see on the airfield. For example, you will always see a runway holding position sign where a taxiway intersects a runway. Runway holding position signs normally have a "runway boundary" sign on the back of them. This helps identify whether you are on or off of the runway.

(Below) Runway Holding Position Sign faces taxiway

(Above) Runway Boundary Sign
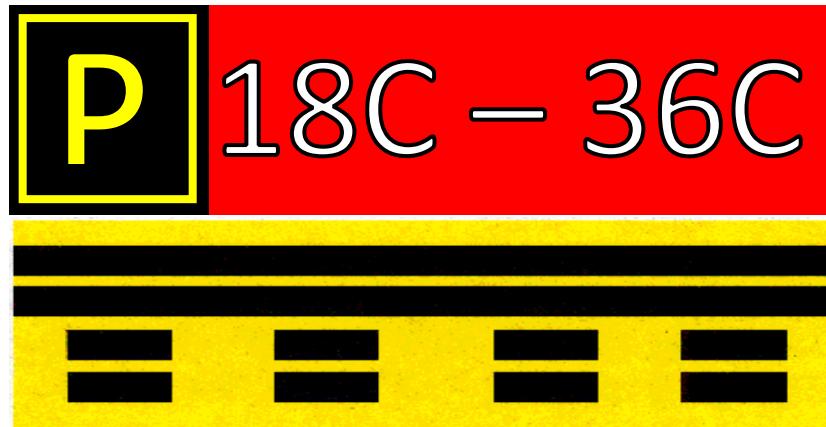
Sign	Meaning	Sign	Meaning
B 4-22	**TWY/RWY HOLDING POSITION:** Hold short of intersecting runway	(runway boundary marking)	**RUNWAY BOUNDARY:** Exit boundary from rwy protected area
25-7	**RWY/RWY HOLD POSITION:** Hold short of intersecting runway	(ILS critical area marking)	**ILS CRITICAL AREA BOUNDARY:** Exit boundary of ILS critical area
8-APCH	**RWY APCH HOLD POSITION:** Hold short of protected area when instructed by ATC	L→	**RUNWAY EXIT:** Defines direction & designation of exit twy from rwy
ILS	**ILS HOLD POSITION:** Hold short of ILS critical area when instructed by ATC	↖J	**TWY DIRECTION:** Defines direction & designation of intersecting taxiway(s)
⊖	**NO ENTRY:** Identifies paved areas where <u>aircraft</u> entry is prohibited	22↑	**OUTBOUND DESTINATION:** Defines direction to take-off runway
B	**TAXIWAY LOCATION:** Identifies taxiway on which aircraft is located	↖TERM	**INBOUND DESTINATION:** Indicates direction of destination, i.e. terminal or military area
22	**RUNWAY LOCATION:** Identifies runway on which aircraft is located	(hatched marking)	**TAXIWAY ENDING MARKER:** Indicates that twy does not continue beyond this point
4	**RUNWAY DISTANCE REMAINING:** Identifies runway length remaining	↙A G L→	**DIRECTION SIGN ARRAY:** Identifies location in conjunction with multiple intersecting taxiways

Figure 17 - Common Signs on the Airfield

Nighttime Operations

There is a distinct difference between operating on the movement area at night and during the day. At night, depth perception diminishes, and the airfield lighting can be very disorienting to a vehicle operator. Aircraft have a green light on the right wing, and a red light on the left wing. If an airplane is coming towards you, the red light will appear on your right side.

ILS Critical Area

Weather conditions at MEM can change how we operate on the AMA. ILS Critical Areas must be "protected" when the ceiling is less than 800' and/or the visibility is less than 2 miles. The ceiling is defined as the lowest layer of clouds reported as broken or overcast. This information can be obtained from the ATIS frequency. It is your responsibility, while on the AMA, to know when we should or shouldn't stop at the ILS critical area marking. It is important to remain clear of this so that we don't interrupt the glideslope signal that an inbound aircraft may be using to land. **Figure 17** illustrates the RWY 36C and 36R glide slope critical area. When in doubt, ask ATC if the critical area is being protected.
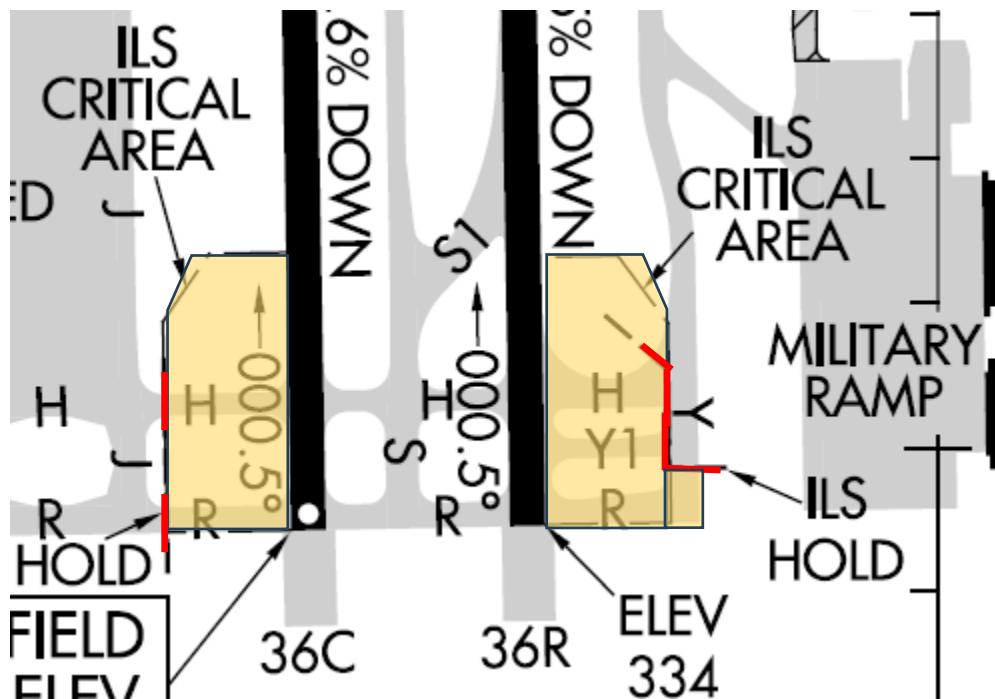
Figure 18 – ILS Critical Area Example of RWYs 36C and 36R

The glideslope antenna (bottom left) is located near the approach end of a runway and projects radio frequencies toward an approaching aircraft indicating vertical guidance. The localizer antenna (bottom right) is located beyond the end of the runway furthest from the approaching aircraft and projects frequencies indicating horizontal guidance. The ILS critical area marking (ladder) is used to protect the glideslope antenna.

Surface Movement Guidance Control System

During periods of low visibility due to fog, rain or snow, MEM will implement its SMGCS plan. Once the RVR readings drop below 600', landing traffic will be sent to 36L, 36C or 36R (Category IIIb) and a follow me truck will be deployed, as needed, to escort aircraft into the gate areas. It's important to know that when the SMGCS plan is initiated, ground vehicle operations on the movement area will not be authorized. This includes run-ups and aircraft repositioning.

Foreign Objects Debris (FOD)

FOD, which stands for Foreign Object Debris or Foreign Object Damage, is a major concern at MEM. Foreign Object Debris is any object located in an inappropriate location in the airport environment that has the capacity to injure airport or air carrier personnel and damage aircraft. Foreign Object Damage is any damage attributed to a foreign object. It is the responsibility of all airport personnel to reduce FOD. Report all unresolved FOD concerns to Airport Operations at 901-922-8117.

Vehicles Giving Way to Aircraft

For vehicle operators, giving way to an aircraft on a taxiway can be a significant challenge, which is why situational awareness is so important. There is no one size fits all approach when it comes to giving way to an aircraft. If you are adjacent to a non-movement area, like a ramp or service/access road, you should exit the taxiway entirely. It is important to look for and follow instructions of any signage on service roads that may lead into a protected area. Once the aircraft has safely passed, you may resume following a controllers most recent instructions. If one of these areas are unavailable, or you are unable to give way at your current location, you should contact the controller and await further instructions. The taxiway shoulder area outside of the edge lines and grassy areas beyond the shoulder are not a preferred location to give way. In the event you must use one of these areas, exercise extreme caution with regards to aircraft size and wing tip clearance as well as terrain and surface conditions (i.e. – grade/slope, water saturated ground, etc.). See **Figures 18 and 19** for examples of giving way to taxiing aircraft.
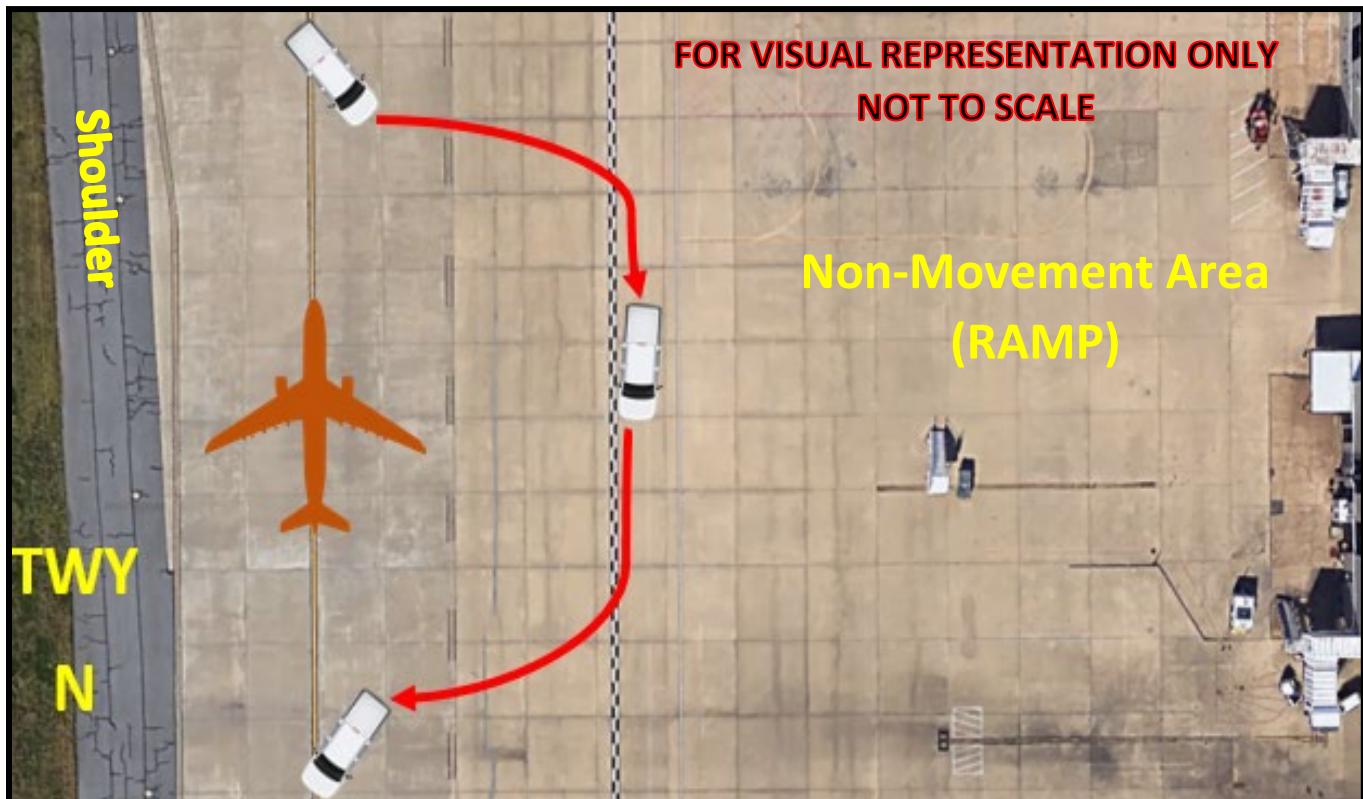
Figure 19 – Giving Way on a Ramp

MEM – OPS MEM Class 3 Study Guide
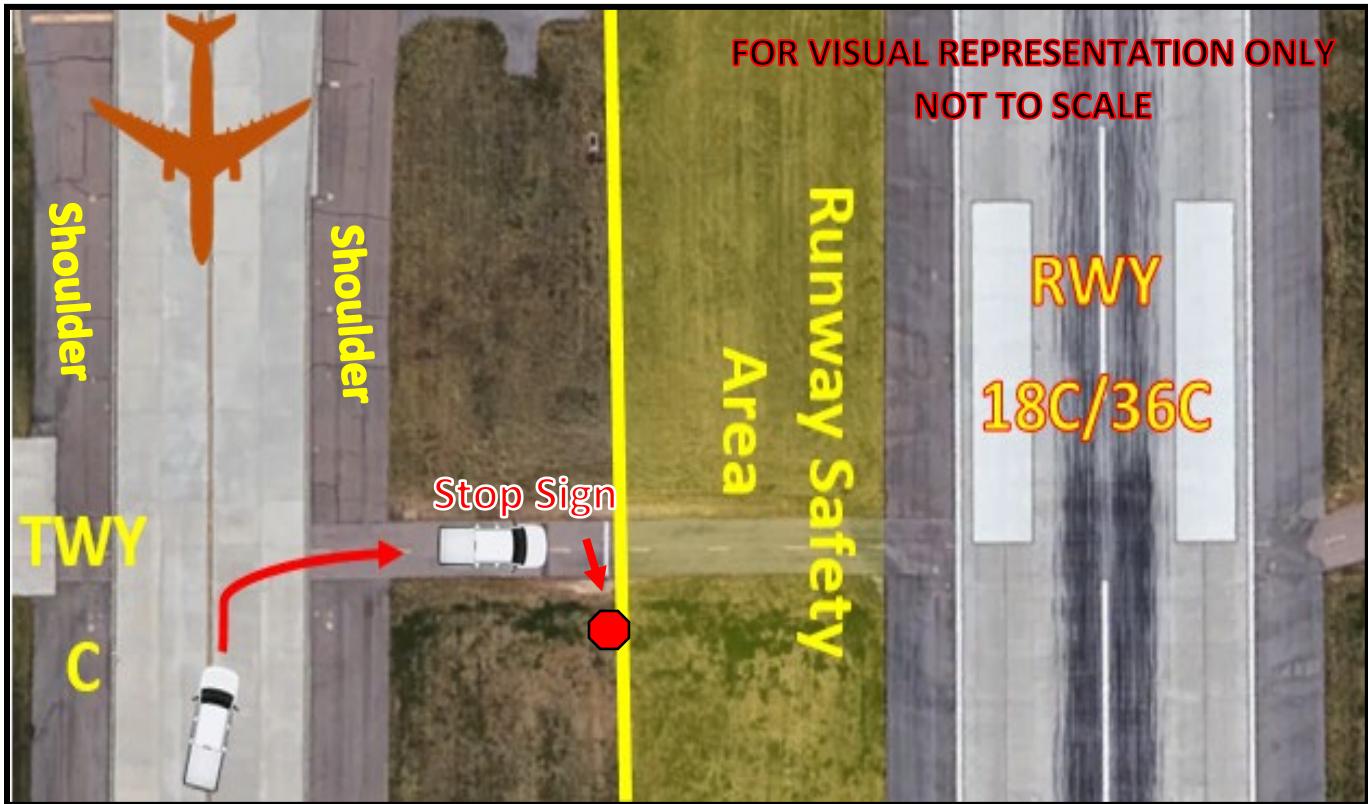
Figure 20 – Giving Way on a Service Road/Protected Area

Aircraft Repositioning and Disabled Aircraft

For airline personnel, a MEM Class 3 License grants you permission to relocate aircraft for maintenance, parking, or run-ups ONLY. You may not use your license to enter the movement area for any other reason (i.e. – disabled aircraft). Tugs, baggage carts, and ground servicing equipment are strictly prohibited from entering the movement area.

Consequently, airline personnel and ground handlers are not authorized to respond to a disabled aircraft on the movement area. You must first coordinate with Airport Operations for an escort. Airport Ops is available twenty-four (24) hours a day, including weekends and holidays and can be reached via 901-922-8117 or through Airport Communications at 901-922-8298.

If an aircraft needs to push back or relocate from gates adjacent to TWY J, TWY N, or TWY P, the pilot or Class 3 holder will need to contact ground control.

Section 3 – Communications

It is essential to use proper aviation terminology when talking with ATC while accessing the movement area. As always, safety is the top priority. The use of CB radio (Citizen's Band) jargon or 10-codes is strictly prohibited. It is imperative that all personnel responsible for aircraft or vehicle movements be thoroughly familiar with ATC procedures and radio phraseology. Use of correct radio techniques will reduce frequency congestion, allow for a more efficient flow of aircraft movements, reduce miscommunications, and reduce the risk of a runway incursion.

Talking to the "Tower"

"Tower" is a term sometimes used broadly. There are two positions in the tower that you may talk to; "ground" and "tower". Ground is the primary frequency used for communicating with ATC while on the movement area and will always be your first point of contact. Each subsequent frequency will be provided by the controller you are talking to, via a frequency change instruction.

When communicating on the FAA frequencies, it's important to keep your transmissions short and to the point. During peak times, there can be numerous aircraft on the movement area. This equates to congested frequencies which can in turn lead to many pilots trying to key their radios at once. Always listen before you speak. Never speak until you know what you want to say. Never take more time transmitting than necessary as you never know when ATC may need to stop someone from crossing a runway.

Phonetic Alphabet

Sometimes information transmitted over a radio can sound the same as something else or different than intended. Therefore, MEM requires the use of the ICAO standard phonetic alphabet. Refrain from using police terms, such as "Adam" and "baker", the proper phonetic would be "Alpha" and "Bravo". The chart in this section provides a listing of the phonetic alphabet and a guide to proper pronunciation of letters and numbers.

Runway identifiers should be pronounced individually, not together. For example, Runway 18R should be pronounced one-eight right (wun-ait-right) instead of eighteen right.

MEM – OPS

Character	Word	Pronunciation
A	Alpha	ALFAH
B	Bravo	BRAHVOH
C	Charlie	CHARLEE
D	Delta	DEL TA
E	Echo	ECK OH
F	Foxtrot	FOKSTROT
G	Golf	GOLF
H	Hotel	HOHTELL
I	India	INDEE AH
J	Juliet	JEWLEE ETT
K	Kilo	KEYLOH
L	Lima	LEEMAH
M	Mike	MIKE
N	November	NOVEMBER
O	Oscar	OSSCAH
P	Papa	PAHPAH
Q	Quebec	KEHBECK
R	Romeo	ROWME OH
S	Sierra	SEEAIRAH

Character	Word	Pronunciation
T	Tango	TANGGO
U	Uniform	YOUNEE FORM
V	Victor	VIKTAH
W	Whiskey	WISSKEY
X	X-ray	ECKSRAY
Y	Yankee	YANGKEY
Z	Zulu	ZOOLOO
Numbers		
0	Zero	ZE-RO
1	One	WUN
2	Two	TOO
3	Three	TREE
4	Four	FOW-ER
5	Five	FIFE
6	Six	SIX
7	Seven	SEV-EN
8	Eight	AIT
9	Nine	NIN-ER

Figure 21 – Phonetic Alphabet Pronunciations

ATC Frequencies

The **primary** frequency used for **Ground** is **121.900** and **Tower** is **119.700**. This is subject to change as needed depending on the volume of traffic at or coming into MEM.

Frequencies that you may communicate on while operating on the movement area are listed below:

North Complex
Ground 121.00
Tower 118.300
ATIS (airfield wide) 127.750

West Complex
Ground 121.65
Tower 128.425

East Complex
Ground 121.900
Tower 119.700

All Class 3 License holders should tune into ATIS for the latest airfield conditions prior to entering the movement area. These conditions include current weather, active arriving and departing runways, and NOTAMs. This practice reduces the workload for ATC.

Aviation Terminology

Listed below are some of the common terms you may here while accessing the movement area, along with an explanation.

- ✈ **Acknowledge**: Let me know that you have received and understood my message.
- ✈ **Affirmative**: Yes.
- ✈ **Clear**: Avoid using this phrase, use "off" or "exiting" instead.
- ✈ **Expedite**: Used by ATC when prompt compliance is required to avoid an imminent situation.
- ✈ **Go Ahead**: Proceed with your message – does not mean approved.
- ✈ **Hold Short**: Stop at the location assigned until given further instructions.
- ✈ **Immediately**: Compliance with instruction is required to avoid an imminent situation.
- ✈ **Negative**: No.
- ✈ **Proceed**: Authorization to begin/continue on authorized routes.
- ✈ **Roger**: I have received all of your last transmission **(not yes)**.
- ✈ **Say Again**: use to request a repeat of the last transmission.
- ✈ **Stand By**: Means the controller or pilot must pause for a few seconds, usually to attend other duties of a higher priority (no response necessary).
- ✈ **Unable**: Indicates inability to comply with a specific instruction, request or clearance. Request is denied.
- ✈ **Verify**: Request confirmation of information.
- ✈ **Wilco**: Will comply. I have received your message, understand it, and will comply with it.
- ✈ **Without Delay**: With a sense of urgency, proceed with approved instructions in a rapid manner.

Initial Call to ATC

When making your **initial call** to ATC, you should always use the who/who/where format. This is done to ensure we don't convey too much information to ATC until we have their attention and they are ready.

- ✈ **Who** you are calling
  - ○ *Memphis Ground*

- ✈ **Who** you are
  - ○ *"Ops 3" or "Tug 1"*

- ✈ **Where** you are located
  - ○ *Spot 1*

Example: "Memphis Ground, Ops 3 is at Spot 1"

Only after being recognized or acknowledged from ATC should you continue with your "request to access the movement area".

Request to Access the Aircraft Movement Area

Once the controller has acknowledged you and asked for your request, your next transmission, at minimum should also be in the who/who/where/where format. There may be instances where you need to include a preferred route and your intentions.
- ✈ **Who** you are calling,
- ✈ **Who** you are,
- ✈ **Where** you are, and
- ✈ **Where** you would like to go

Example: "Memphis Ground, Ops 3 is at Spot 1, requesting permission to relocate (reposition) to the Juliet run-up pad."

Now listen for the controller to give your clearance instructions. These will include routing and other mandatory read back instructions. It may be helpful to write down shorthand notes to reference when giving read backs and following instructions. If you are **uncertain of any instruction**, ask to have it repeated using proper terminology.

Explicit Runway Instructions

You need explicit permission to cross a RWY from ATCT that requires a word-for-word readback to allow the controller to catch a mistake before it happens. Remember the word "Runway" is a trigger word.

Example: 1

Memphis Ground "Ops 3, Hold Short of RWY 27"
Ops 3 "Hold Short of RWY 27, Ops 3"

Example: 2

Memphis Ground "Ops 3, Cross RWY 27"
Ops 3 "Cross RWY 27, Ops 3"

Never cross a holding position marking, including hold lines for **active, inactive, or closed** runways without explicit ATCT instructions.

WARNING!!!

"**Proceed As Requested**" is **NOT** permission to cross or enter a runway. Driver's must receive explicit permission from ATCT and read back all runway instructions ("Hold short", "cross", "enter", "join" etc.).

When in doubt, **STOP** and ask for clarification from ATCT.

WARNING!!!

After receiving ATCT permission to cross/enter a runway and after providing ATCT with the mandatory readback, **LOOK BOTH WAYS** to prevent a conflict with aircraft or other ground vehicles.

Mandatory Read Backs

Some instructions given by ATC are required to be read back word for word. This ensures to ATC knows you heard them correctly. If the read back is incorrect, this gives ATC a chance to correct you. The required read backs for MEM are listed below:

✈ **Runway Instructions**
- ○ "Runway" is a trigger word (remain clear of all **runways**)
- ○ Cross "runway" 27 at Yankee or join "runway" 27 at Yankee

✈ **Hold Short Instructions**
- ○ "Hold short" is a trigger word
- ○ "Hold short" of a taxiway, runway, or ILS

✈ **Frequency Change Instructions**
- ○ Change instruction and the frequency, read back both.

✈ **New Route Instructions**
- ○ Any new route instruction (ex. initial route given by a controller or a route change)

✈ **Special Instructions**
- ○ Usually something in addition to and part of your clearance instructions
- ○ Give way to a taxiing aircraft (broad or specific instruction)
- ○ Proceed without delay, expedite (crossing runway), keep your speed up
- ○ Report when holding short or when ready to move

Situational Awareness

One common cause of accidents is the loss of "Situational Awareness". Situational Awareness is defined as, "The mental representation and understanding of objects, events, people, system states, interactions, environmental conditions, and other situation specific factors affecting human performance in complex tasks." Simply put, it means, knowing what is going on so you can figure out what to do, and the minimizing of distractions (cell phones, AM/FM radio, etc.).

One way to help maintain your situational awareness is to actively monitor ATC's transmissions and being familiar with the airfield. Paying attention to what controllers and pilots are saying, you'll be aware of aircraft routes, timing of movements, and situations as they develop.

When you maintain Situational Awareness, you should be able to recognize what is developing and instinctively answer questions like: What is happening? Why is it happening? What will happen next? and, What can I do about it?.

Best Practices and Rules to Follow While on the Movement Area

Ensure that you have the latest airport information obtained from the ATIS frequency. It is important to be aware of areas that are closed, know the active arriving and departing runways, and know the current weather conditions (ceiling and visibility). Even though you may anticipate the route ATC will give you, it's important to listen to the actual instructions given by the controller. Other best practices and rules to follow are listed below.

- ✈ **Always read back mandatory read back instructions, including your call sign.**
- ✈ Use the correct phraseology, including the phonetic alphabet. Remember, no 10 codes, slang, or CB jargon.
- ✈ Speak clearly.
- ✈ Maintain a sterile cockpit. Do not allow other passengers to distract you. Refrain from conversations unless they apply to the task at hand.
- ✈ Ensure that you are on the correct frequency, and continuously monitor.
- ✈ If you are unsure of your location, or get lost, stop and advise ATC.
- ✈ Advise ATC or Ops of FOD or any other abnormalities on the movement area.
- ✈ If an instruction wasn't understood, ask ATC to "say again".
- ✈ If your taxi route takes you to an unfamiliar location on the airfield, ask ATC for "progressive instructions". You will be given turn by turn directions.
- ✈ Drive in the center of the taxiway for maximum visibility and always **give way** to aircraft unless instructed otherwise.

Radio Communications Failure

If your radio was to fail while operating on the movement area:

- ✈ Turn your vehicle toward the tower
- ✈ Flash your lights on and off repeatedly
- ✈ Wait for the controller to signal you with the light gun
- ✈ DO NOT proceed until cleared by the tower

OR

- ✈ Call Airport Ops for an escort at 901-922-8117

Light Gun Signals

Steady Green — Go, proceed, cross the Rwy or Twy

Steady Red — Stop

Flashing Red — Clear the Rwy or Twy

Alternating Red/Green — Exercise extreme caution

Flashing White — Return to starting point on airport

Section 4 – Self Assessment

1. **What color are the markings painted on a runway?**
   A. Red
   B. White
   C. Yellow

2. **A black sign with a yellow letter indicates what information?**
   A. The upcoming taxiway
   B. The upcoming runway
   C. The taxiway you are currently on

3. **A Runway Incursion is defined as any occurrence at an aerodrome involving the incorrect presence of an aircraft, vehicle or person on the protected area of a surface designated for the landing and takeoff of aircraft.**
   A. True
   B. False

4. **"Give way to all taxiing aircraft" is an example of what type of mandatory read back instruction?**
   A. Special instruction
   B. Aircraft right of way instruction
   C. Hold short instruction

5. **If an aircraft is landing on RWY 27, the aircraft is approaching MEM from which direction?**
   A. North
   B. West
   C. East

6. **"Mental readiness" simply means, knowing what is going on so you can figure out what to do.**
   A. True
   B. False

7. **What does this sign indicate?**
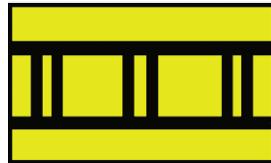
    A. You are approaching a runway hold short area.
    B. Identifies the boundary of the ILS Critical Area which you must drive beyond to clear the area.
    C. ILS Critical Area ahead.
    D. None of the above

8. **You are driving in a vehicle designated as OPS-1 awaiting clearance to cross Runway 27, and you hear ATC say "OPS cross Runway 27". What will you do?**
    A. Give a runway crossing read back and proceed across runway 27.
    B. Continue holding and call ATC to clarify if the instruction to cross Runway 27 was for OPS-1.
    C. Wait for light gun signals.

9. **Before accessing the movement area, you should listen to this source to obtain current information about airfield conditions?**
    A. AFIS
    B. ATC Ground
    C. ATC Tower
    D. ATIS

10. **In low light conditions or at night, taxiways will have what color lights on the edge lines and center line?**
    A. Yellow and blue
    B. Blue and green
    C. White and blue
    D. Amber and white

11. **A runway should always be identified by what terminology?**
    A. The active or in use approach
    B. The portion you are located or intending to cross at
    C. Phrasing such as "The active" or "the runway"

12. **When communicating with ATC, your initial call should be?**
    A. Who you are, who your calling
    B. Who your calling, who you are and where you are
    C. Who you are, where you're at, where you're going, and preferred route.

13. **A Class 3 License is valid for two years and movement area training is regulated by TSA.**
    A. True
    B. False

14. **Unless contrary instructions have been received from ATC, a vehicle should always yield to an aircraft.**
    A. True
    B. False

15. **What does this sign indicate?**

    A. Location Sign
    B. Directional Sign
    C. Mandatory Instruction Sign

16. **What is the location called on the movement area with a history or potential risk of collision or runway incursion and requires heightened awareness.**
    A. Critical Risk Area
    B. Hotspot
    C. Danger Zone

17. **At night, if you are approaching an aircraft and you see a green light to the left and a red light to the right, which direction is the aircraft traveling?**
    A. Away from you.
    B. Toward you.
    C. Not enough information to make a determination.

18. What is the area called that surrounds a runway and is available for aircraft in the event they leave the paved surface?
   A. Runway Safety Area.
   B. Runway Protection Area.
   C. Runway Clear Space Area.

19. What color(s) are mandatory instruction signs?
   A. Yellow background, red letters.
   B. Black background, white letters.
   C. Red background, white letters.

20. If you are told to standby after making your initial request, you should?
   A. Respond, "standing by".
   B. Click or key the mic two times.
   C. Say nothing and listen to be acknowledged.

21. Before accessing the movement area, what are the two best methods to find out the traffic flow or active Runways (18 vs. 36)?
   A. Ground Frequency and windsock.
   B. Call ATC on phone or frequency and lights.
   C. ATIS and visually watching aircraft.
   D. None of the above.

22. Access to the movement area must be limited to only those who have an immediate operational need and never used for convenience.
   A. True
   B. False

23. If radio contact is lost and the tower signals with a flashing white light, I should?
   A. Pull over and wait
   B. Continue
   C. Go back to where I started or my point of origin
   D. None of the above

24. Which of the following is a visual indicator of a runway hold short position?
   A. Surface guard lights
   B. Enhanced centerline
   C. Elevated guard lights
   D. All of the above

25. **Movement area computer training is required initially and how frequent there after?**
    A. Every 24 months
    B. Every 12 consecutive calendar months
    C. Every calendar year

26. **MEM has two hotspots. Where are they located?**
    A. TWY M/M1 Intersection
    B. TWY M/M9 Intersection
    C. TWY Y/A Intersection
    D. TWY B/S Intersection
    E. Answers A and D
    F. Answers B and C

27. **The numbers used to identify a runway are based on what?**
    A. Airport's choice
    B. Magnetic headings
    C. Longitude and Latitude
    D. Runway Length

28. **If possible, runway crossings should occur at the approach end.**
    A. True
    B. False

29. **The ILS Critical Area must be protected if what conditions exist?**
    A. Ceiling less than 800'
    B. Visibility is less than two miles
    C. Wildlife in the area
    D. Braking action nil
    E. Only A and B

30. **A Class 3 License can be used to respond to a disabled aircraft in the movement area.**
   A. True
    B. False

31. **While everyone shares the responsibility of removing FOD, who is specifically responsible for FOD on the movement area?**
    A. Airfield Maintenance
    B. Airport Police
    C. FAA
    D. Airport Operations

32. **If you are approaching the taxiway sign array pictured below, and intend to turn on the upcoming taxiway, you should turn before the sign.**

    A. True
    B. False

33. **What is the primary ground frequency, also assigned to the East complex of the airfield?**
    A. 128.90
    B. 121.90
    C. 118.30

34. **The proper phonetic for I is Indigo.**
    A. True
    B. False

35. **A runway safety area normally extends out _____ feet from the runway center line and _____ feet on each end of the runway?**
    A. 500 and 1,200
    B. 125 and 865
    C. 250 and 1,000

36. **What is the name of the equipment located near the approach end of a runway, used during ILS, and transmits a signal to an aircraft indicating vertical position?**
    A. Slope Signal Tower
    B. Localizer Antenna
    C. Glideslope Antenna

37. **What marking extends 150 feet from a hold short bar and is one of the visual indicators of a runway hold short position?**
    A. ILS critical area marking
    B. Threshold Bar
    C. Enhanced Centerline

38. **What aviation term means, "I have received all of your last transmission"?**
    A. Roger
    B. Affirmative
    C. WILCO

39. **What plan is put in place during temporary periods of low visibility that restricts access to the movement area, specifically ground vehicle and aircraft run-ups?**
    A. Low-Vis Plan (Low Visibility)
    B. SMGCS (Surface Movement Guidance and Control System)
    C. Ground Stop
    D. None of the above

40. **Runway edge lights change from white to yellow at how many feet remaining on a runway?**
    A. 1,000
    B. 3,500
    C. 2,000

Class 3 applicants should be familiar enough with the airfield to label at least the core taxiways and runway approaches. This map is provided for practice.

♪MEM – OPS
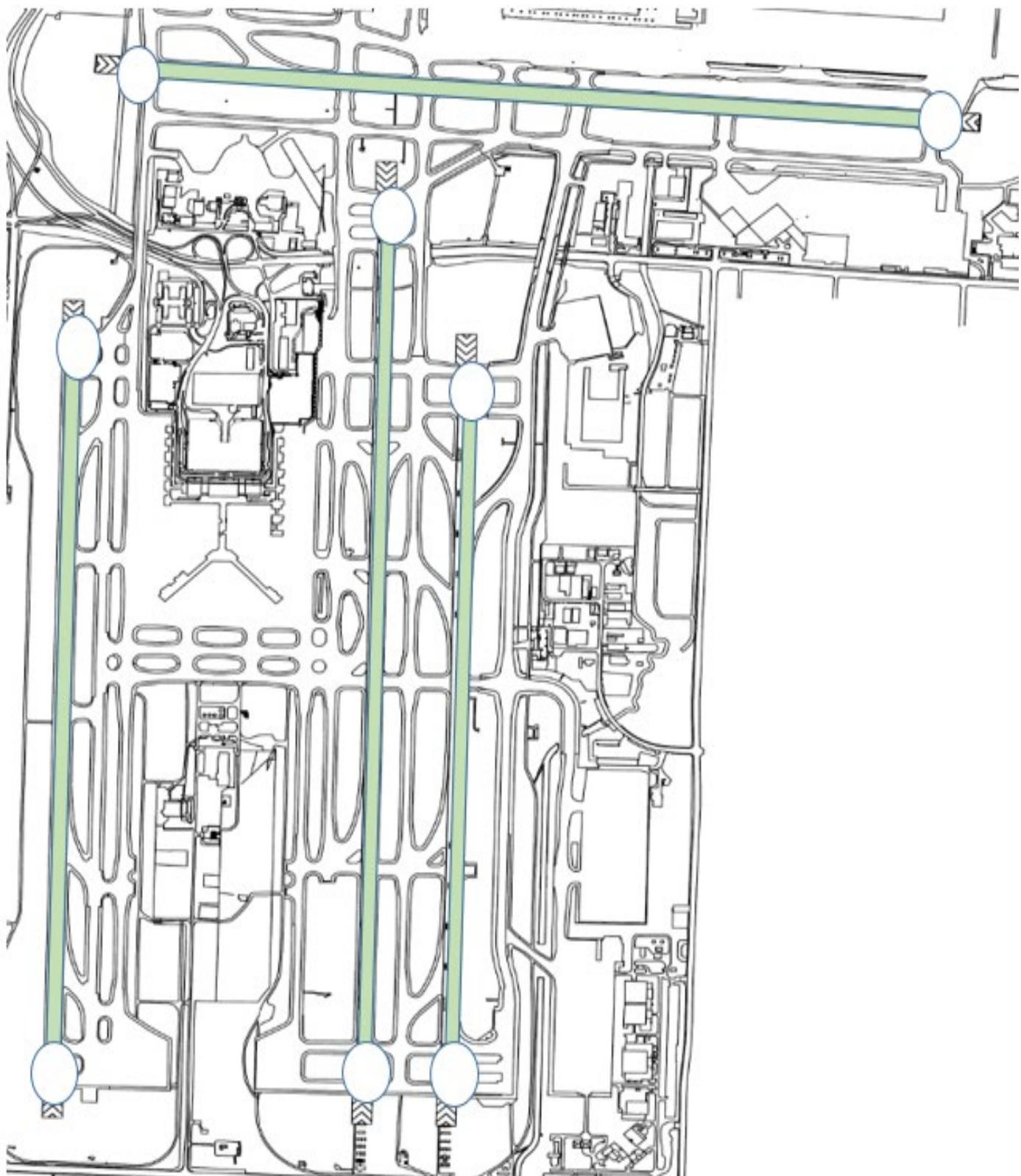
Self-Assessment Answers and References

No.	Answer
1.	B
2.	C
3.	A
4.	A
5.	C
6.	B
7.	B
8.	B
9.	D
10.	B
11.	A
12.	B
13.	B
14.	A
15.	A
16.	B
17.	B
18.	A
19.	C
20.	C
21.	C
22.	A
23.	C
24.	D
25.	B
26.	E
27.	B
28.	B
29.	E
30.	B
31.	D
32.	B
33.	B
34.	B
35.	C
36.	C
37.	C
38.	A
39.	B
40.	C

MEM − OPS

MEM Class 3 Study Guide

The Memphis-Shelby County Airport Authority is the owner and operator of Memphis International Airport. The Airport Operations Department is tasked with the responsibility for the safe and efficient operations of the airport. The department operates 24 hours a day, 7 days a week, 365 days a year. Any request for Engine Run-ups, airfield debris, or any other assistance, contact Airport Operations at 901-922-8117.

For movement area driver training questions, contact Dalton McNeil at 901-922-0162 or dmcneil@flymemphis.com.

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Questions or comments on any information listed in this guide can be addressed by contacting Dalton McNeil, at 901-922-0162 or dmcneil@flymemphis.com.

Questions regarding Airport Operations can be directed to the Manager of Airport Operations, Robert Jacobs, at rjacobs@flymemphis.com.

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