U.S. Department
of Transportation

**Federal Aviation
Administration**

Advisory Circular

Subject: Standards for Airport Markings	**Date: DRAFT** **Initiated by:** AAS-100	**AC No:** 150/5340-1K **Change:**

1. PURPOSE. This advisory circular (AC) contains the Federal Aviation Administration (FAA) standards for markings used on airport runways, taxiways, and aprons.

2. CANCELLATION. This AC cancels AC 150/5340-1J, Standards for Airport Markings, dated April 29, 2005, and subsequent changes, dated March 31, 2008, and June 6, 2008. This AC also cancels the Signs and Marking Supplement (SAMS).

3. EXPLANATION OF PRINCIPAL CHANGES. This AC incorporates new surface marking criteria, extensive text and format changes, and new and revised figures, as described below:

a. Adds color-coded text boxes to emphasize safety initiatives, solutions to painting difficulties, and general remarks.

- Green (Painting) – explains painting precautions and solutions, such as when proportioning is permissible for runway surface markings.
- Red (Safety) – emphasizes safety initiatives.
- Gray (General) – contains general remarks.

b. Incorporates all applicable surface marking supplements from the FAA Signs and Marking Supplement (SAMS)**.**

c. Adds new definitions (paragraph 1.2).

d. Adds new warning box about dispensing glass bead during painting applications and, in particular, when painting surface painted holding position signs (paragraph 1.4(b)).

e. Revises table 1 criteria (paragraph 2.1).

f. Deletes all text related to the former FAA threshold marking scheme. This revision promulgates the standards and recommended practice contained in International Civil Aviation Organization (ICAO) Annex 14, Volume I, Aerodrome Design and Operations. Adds new table 2 showing number of symmetrical runway threshold stripes required for standard runway widths and new text for painting non-standard runway widths (paragraph 2.5(d)).

g. Adds new text to emphasize the co-located relationship between the aiming point marking and PAPI and other NAVAIDs (paragraphs 2.2 and 2.6).

h. Adds new table 3 and new text for table 4 about painting touchdown zone markings for runways ends having single or dual precision approaches.

i. Adds new criteria for the width of and separation between aiming point markings in accordance to various standard runway widths (paragraph 2.6(d)).

j. Clarifies text for marking runways with and without aligned taxiway (paragraph 2.9).

k. Adds EMAS to blast pads and stopways as facilities to be marked with chevrons (paragraph 2.10). Adds new painting criteria for stopways for Airplane Design Group I – exclusively small airplane runways (paragraph 2.10(d)).

l. Includes new Chapter 3 that consolidates the six different applications of holding position markings and different painting schemes, with a new pattern designation, i.e., Pattern A, B, C, and D surface markings for holding positions. The pattern designation is more in line with the standards and recommended practices contained in International Civil Aviation Organization (ICAO) Annex 14, Volume I, Aerodrome Design and Operations.

m. Adds new and revised text for painting the enhanced taxiway centerline marking (paragraph 4.3).

n. Adds new criteria for painting NO-TAXI islands with continuous taxiway edge markings for wide taxiway entrances (paragraph 4.4).

o. Adds new criteria and revised text for surface painted holding position signs (paragraph 4.5). New criteria applies to Airplane Design Groups I and II to paint a single, centered, over-the-taxiway centerline surface painted holding position sign instead of a single to the left-of-centerline or dual surface markings (paragraph 4.5 (b)(4) and new figure C-15).

p. Adds new table 5 painting criteria for placement of the surface painted holding position signs along taxiway entrances of over 200 feet (61 m) in width (paragraph 4.5).

q. Adds new criteria for the minimum height of surface painted holding position signs for Airplane Design Groups III –VI and for Airplane Design Groups I – II (paragraph 4.5(d) and figures C-5, C-6, C-7, and C-8).

r. Adds new green-colored box explaining when to stack surface painted holding position signs on narrow taxiways widths (paragraph 4.5(d) and new figure C-15).

s. Adds new and revised text about the geographic position marking (paragraph 4.11).

t. Adds a new surface marking for areas designated by the Transportation Security Administration (TSA) and airport operator as a security and identification area (SIDA) (paragraph 5.15 and new figure C-14).

u. Revises figures 1 and 2 to show only one threshold marking scheme (formerly referred to as Configuration B) and drops painting method Configuration A per paragraph 2.5. The single marking scheme conforms with International Civil Aviation Organization (ICAO) Annex 14, Volume I, Aerodrome Design and Operations.

v. Adds new text to figure 8 emphasizing that the width of a stopway only equals the runway width but the width of a blast pad includes both the runway width and the shoulders.

w. Adds new figure 12b showing that the Pattern C-POFZ holding position marking differs from the Pattern B ILS/MLS holding position marking by turning 90 degrees on certain taxiway geometries.

x. Adds new figures C-2 and C-3 from the Signs and Marking Supplement (SAMS).

4. METRIC UNITS. To promote an orderly transition to metric units, the text and figures include both English and metric dimensions. The metric conversions are based on operational significance and may not be exact equivalents of the English dimensions. Until there is an official changeover to the metric system, the English dimensions govern.

5. APPLICATION. The FAA recommends the guidelines and standards contained herein for the marking of airport runways, taxiways, and aprons. The use of these standards is the only method of compliance with the marking of runways, taxiways, and aprons for airports certificated under Title 14 Code of Federal Regulations Part 139. These standards are to be used on all new airport projects that are under development and are to be implemented at all Part 139 certificated airports. Further, use of this AC is mandatory for all projects funded with federal grant monies through the Airport Improvement Program (AIP) and with revenue from the Passenger Facility Charge (PFC) Program. See Grant Assurance No. 34, "Policies, Standards, and Specifications," and PFC Assurance No. 9, "Standards and Specifications."

6. AC AND ORDER REFERENCES. All references to FAA ACs and Orders are to the most recent versions, which are available from the FAA website at http://www.faa.gov.

Michael J. O'Donnell
Director, Airport Safety and Standards

This page intentionally left blank.

TABLE OF CONTENTS

FIGURES

TABLES

CHAPTER 1. SURFACE MARKINGS FOR AIRFIELD PAVEMENTS AND PAVED AIRFIELD ROADWAYS.

1.1. GENERAL. Chapter 1 provides the standards for surface markings used on paved airfield pavements (runways, taxiways, aprons) and paved airfield roadways. The promulgated standards for the surface markings assume that runways, taxiways, and aprons are built in accordance to the dimensions and layouts (e.g., clearances, fillets) in Advisory Circular (AC) 150/5300-13, Airport Design. Otherwise, the airport operator should expect difficulties when painting surface markings on non-standard infrastructure, such as a runway with a non-standard width. To offer assistance to airport operators, this advisory circular offers workable solutions for a few situations. Surface markings for large airplane parking positions and surface markings for unpaved airfield runways will be addressed in additional chapters at a future date.

NOTE: All figures in this AC are reduced versions of DWG files compatible with MS Word. Use the zoom feature in MS Word or Adobe Reader to view detail in any figure.

1.2. DEFINITIONS. The following definitions apply to terms used in this AC.

a. Certificated Airport. An airport that has been issued an Airport Operating Certificate by the FAA under the authority of 14 CFR Part 139, Certification of Airports, or its subsequent revisions.

b. Commercial Service Airports and Passenger Enplanements. These terms are defined in FAA Order 5100.38, Airport Improvement Program Handbook.

c. Displaced Threshold. A threshold that is located at a point on the runway other than the designated beginning of the runway.

d. GPS Runway. A runway end having a precision or non-precision approach procedure that uses GPS navigational guidance with or without vertical guidance.

e. Movement Area. The runways, taxiways, and other areas of an airport that are used for taxiing or hover taxiing, air taxiing, takeoff, and landing of aircraft, exclusive of loading ramps and aircraft parking areas (reference 14 CFR Part 139).

f. Non-precision Runway. A runway end having an instrument approach procedure that provides course guidance without vertical path guidance. See Appendix 16, *New Instrument Approach Procedures,* in AC 150/5300-13, Airport Design, for additional information.

g. Precision Runway. A runway end having an instrument approach procedure that provides course and vertical path guidance conforming to Instrument Landing System (ILS) or Microwave Landing System (MLS) precision approach standards in International Civil Aviation Organization (ICAO) Annex 10, Compliance Statement, Aeronautical Telecommunications. See AC 150/5300-13 for additional information about precision approaches.

h. Threshold. The beginning of that portion of the runway that is available for landing. In some instances, the landing threshold may need to be displaced to a new location, referred to as a displaced threshold.

i. Visual Runway. A runway end without an existing or planned straight-in instrument approach procedure.

1.3. SURFACE MARKING PRACTICES. The following subparagraphs address common practices used in airport markings.

a. Increasing the Friction Coefficient of Surface Markings. AC 150/5370-10, Standard for Specifying Construction on Airports, Item P-620, *Runway and Taxiway Painting*, provides airport operators information to increase the friction coefficient of surface markings. Common practices include the spreading of silica sand on the marked surface immediately after painting and the use of glass beads in the marking materials. Glass beads or silica sand are required when durable markings (epoxy based and methylacrylate based paints) are used. These paints are usually applied at 18 – 30 mils in dry thickness.

b. Paint Color Specifications, Requirements for Surface Preparation, Paint Application Rates, and Methods. AC 150/5370-10 provides the paint color specifications, requirements for surface preparation and paint application rates, and the various methods for applying paint.

c. Striated Markings. Striated markings, which may be used in areas subject to frost heave, consist of painted stripes 4 inches (10 cm) to 8 inches (20 cm) in width that are separated by unpainted stripes. The width of the unpainted stripe may not exceed the width of the painted stripe. The predetermined width of the painted and unpainted stripes must be the same throughout the specific marking. That is, a painted stripe is to begin and end within the width of the markings. Because striated markings as compared to non-striated markings offer reduced visibility, more frequent maintenance is required to maintain an acceptable level of visibility. Striated markings are never used on Category II and Category III runways.

d. Temporary Markings. When selecting a material for temporary markings, consider the difficulty of removing the temporary marking when it is no longer needed. Some airports have had some success using water-based paint. Striated markings may also be used for temporary markings, but they are never used to denote a closed runway or other pavement or for Category II or Category III runways.

e. Removal of Markings. Pavement markings that are no longer needed are *not to be painted over* but instead are to be physically removed. Removal of markings is achieved by sand blasting, chemical removal, or other acceptable means that do not harm the pavement. Painting over the old markings is not endorsed because this practice merely preserves the old marking, will require additional maintenance, and in certain conditions, can mislead pilots.

1.4. TECHNIQUES FOR ENHANCED CONSPICUITY OF SURFACE MARKINGS. Surface markings that cannot be seen by pilots and others individuals operating on paved airfield surfaces are useless. The following two proven techniques, outing surface markings with black borders and the use of glass beads, help airport operators to enhance the conspicuity of surface markings. Glass beads, however, should not be used in black paint.

a. Technique 1 – Outlining Surface Markings with Black Borders. The degree of contrast (conspicuity) between surface markings on light-color pavements, in particular on concrete pavements, can be increased by outlining all edges of the surface marking with a black border. Appendix B provides illustrations of recommended patterns for various surface markings outlined in black. Black borders, except for enhanced taxiway centerline applications, should be at least 6 inches (15 cm) or greater in width to enhance the conspicuity of certain painted surface markings on light-color pavements. The

borders for the outside dashes of the enhanced taxiway centerline can range from 3 to 6 inches (7.5 – 15 cm).

(1) Surface Markings that Require Black Borders.

(i) All holding position markings for runways, taxiways, ILS/MLS, and precision obstacle free zone (POFZ) (per paragraphs 3.2, 3.3, 3.4, and 3.5) and non-movement area boundary markings (per paragraph 5.4).

(ii) Intermediate holding position marking for taxiway/taxiway intersections (per paragraph 3.6).

(iii) All taxiway centerline markings for surface movement guidance and control system (SMGCS) (per paragraph 4.2).

(iv) Enhanced taxiway centerline marking (per paragraph 4.3).

(v) Surface painted holding position sign marking (per paragraph 4.5).

(vi) Geographic position marking (per paragraph 4.11).

(2) Surface Markings Recommended for Black Borders. This advisory circular highly recommends outlining all other markings not listed in paragraph 1.4(a)(1), particularly for taxiway centerlines per paragraph 4.2.

b. Technique 2 – Use of Glass Beads. Glass beads identified in Item P-620 of AC 150/5370-10 are an effective means for enhancing the conspicuity of surface markings when aircraft and vehicles operate at night, during low-visibility conditions, or when the pavement surface is wet. Due to the additional increase in marking conspicuity caused by certain glass beads, the FAA recommends that runway holding position markings contain either Type III or Type IV glass beads. As previously stated, glass beads should not be used in black paint.

Glass Bead Requirement Paragraph 620.3.5, *Application*, per AC 150/5370-10
Glass beads shall be distributed upon the marked areas at the locations shown on the plans to receive glass beads immediately after application of the paint. A dispenser shall be furnished which is properly designed for attachment to the marking machine and suitable for dispensing glass beads. Glass beads shall be applied at the rate(s) shown in Table 1. Glass beads shall not be applied to black paint. Glass beads shall adhere to the cured paint or all marking operations shall cease until corrections are made.

(1) Surface Markings that Require Glass Beads.

(i) All holding position markings for runways, taxiways, ILS/MLS critical areas, and POFZ (per paragraphs 3.2, 3.3, 3.4, and 3.5).

(ii) Runway threshold marking (per paragraph 2.5).

(iii) Runway threshold bar marking (per paragraph 2.9(a)).

(iv) Runway aiming point marking (per paragraph 2.6).

(v) Runway landing designator marking (per paragraph 2.3).

(vi) Runway touchdown zone marking (per paragraph 2.7).

(vii) Runway centerline marking (per paragraph 2.4).

(viii) Taxiway centerline marking (per paragraph 4.2).

(ix) Enhanced Taxiway Centerline Marking (per paragraph 4.3).

(x) Geographical position marking (per paragraph 4.11).

(xi) Surface painted signs for Pattern A runway holding position signs, taxiway direction signs, taxiway location signs, gate identification signs, and apron entrance signs (per paragraphs 4.5, 4.6, 4.7, 4.8, and 4.9).

(xii) Non-movement area boundary marking (per paragraph 5.4).

(2) Surface Markings Recommended for Glass Beads.

(i) Runway side stripe marking (per paragraph 2.8).

(ii) Taxiway edge marking (per paragraph 4.4).

(iii) Displaced threshold marking (per paragraph 2.9).

(iv) Runway demarcation bar marking (per paragraph 2.9(c)).

CHAPTER 2. SURFACE MARKINGS FOR RUNWAYS.

2.1. APPLICATION. The minimum requirement for surface marking schemes used for runways are a direct function of the approach category for each runway threshold and the existence of displaced thresholds, stopways, blast pads, or extra wide shoulders. Runways having the same approach category off both runway thresholds will show the same surface marking scheme from threshold to threshold (with some exceptions, such as the runway designator.) In comparison, runways with different approach categories will show two different surface marking schemes. The complete runway surface marking schemes required by a runway combines table 1 requirements with the physical structure and usage of the runway.

a. Table 1 identifies the minimum required surface marking schemes for paved runways according to their threshold approach category. Figures 1, 2, 3, and 5 provide the dimensional standards for the surface marking schemes. An airport operator may paint a runway with additional surface marking schemes, such as a visual runway with runway side stripes or the aiming point marking, if deemed necessary. Furthermore, surface markings beyond those described in table 1 are required to support particular operations, such as a displaced threshold, or to identify runway related features, such as blast pads or stopways.

Table 1. Minimum Required Runway Surface Marking Schemes for Paved Runways

	Threshold Approach Category		
Runway Surface Marking Scheme	**Visual Approach**	**Non-precision Approach (Approaches with vertical guidance not lower than ¾ -statute mile visibility)**	**Precision Approach (Approaches with vertical guidance lower than ¾ -statute mile visibility)**
Landing Designator (par. 2.3)	X	X	X
Centerline (par. 2.4)	X	X	X
Threshold (par. 2.5)	Note 1	X	X
Aiming Point (par. 2.6)	Note 2	Note 3	X
Touchdown Zone (par. 2.7)			X
Side Stripes (par. 2.8)	Note 4	Note 4	X

Note 1: Required on runways serving approach categories C and D airplanes and for runways used, or intended to be used, by international commercial air transport.
Note 2: Required on 4,200-foot (1,280 m) or longer runways serving approach categories C and D airplanes.
Note 3: Required on 4,200-foot (1,280 m) or longer instrumented runways.
Note 4: Used when the full runway pavement width may not be available for use as a runway.

b. Runways with a displaced threshold, blast pad, stopway, or extra wide shoulders require additional marking schemes not identified in table 1. These surface marking schemes and others not in

table 1 are discussed separately in this advisory circular. See AC 150/5300-13 for detailed information about the location of displaced thresholds, blast pads, and stopways.

Application of Proportioning Runway Markings for Non-Standard Runway Widths (Painting)
The dimensional size for the runway surface marking promulgated by this advisory circular is based on the assumption that the runway has a standard runway width as prescribed by AC 150/5300-13. For convenience, the standard widths are shown in table 2 below. Airport operators with non-standard runway widths may, *for specified surface markings*, proportionally adjust the marking's width to be less than the standard scheme. Under substandard conditions, the width of marking is in direct proportion to the available runway width. However, the corresponding length for the marking is never reduced. Subsequent paragraphs in this advisory circular will specify, via a green-shaded, solution box, those runway surface markings that may be proportioned. The absence of a green-shaded, solution box in a subsequent paragraph implies that that runway surface marking, such as the runway centerline, is not to be decreased in width even if other nearby runway surface markings are proportionally adjusted.

2.2. INTERRUPTION OF RUNWAY SURFACE MARKINGS. At the intersection of two runways, the surface markings of one runway are, with the possible exception of runway side stripes, fully displayed through the intersection while the surface markings of the other runway are completely interrupted. This process of removing runway surface markings from one runway establishes an order of precedence among the different runways.

a. Order of Precedence. The order of precedence for displaying the runway surface marking schemes of one runway over the other runway at the intersection of these runways should follow this order:

(1) Precision approach runway, Category III

(2) Precision approach runway, Category II

(3) Precision approach runway, Category I

(4) Non-precision approach runway

(5) Visual runway

For an intersection of runways of the same precedence, the preferred higher precedence runway is the one having the lowest approach minimums or the runway end most often used.

b. Lesser Precedence Runways. The manner in which a lesser precedence runway intersects a higher precedence runway may require the shifting or complete removal of certain surface markings that fall within the intersection. As shown in figure 4, the most affected surface markings are the runway centerline, runway side stripes, aiming point markings, and runway touchdown zone markings. The latter two runway markings may have implications when shifted or removed. See paragraphs 2.2(c) and 2.6 for shifting an aiming point marking, and see paragraph 2.7 for removing touchdown zone markings.

c. Consequences When Shifting the Aiming Point Markings. Figure 4 shows one possible conflict that could occur when the aiming point markings is relocated.

(1) When the aiming point markings in the intersection of two runways need to be moved more than 200 feet (61 m) away from the existing threshold, the airport operator will have to displace the existing threshold or designate a new runway end (threshold) in order to retain the distance between the threshold and the aiming point marking as illustrated in the bottom illustration of figure 4. The *preferred* distance to be maintained between the final threshold and the shifted aiming point marking is 1,020 feet (311 m); see paragraph 2.6.

(2) Runways with an approach landing aid, such as Precision Approach Path Indicators (PAPIs), Visual Approach Slope Indicators (VASIs), which are co-located with the aiming point markings, can be negatively affected when an excessive shifting of the aiming point marking occurs. The consequence is a non-compatible threshold crossing height for landing airplanes. When the aiming point markings are shifted more than 60 feet (18 m), the co-located PAPI, VASI must also be relocated to provide a correct vertical guidance to pilots. See paragraph 7.5, *Design (of Economy Approach Aids)* and table 7.1, *Threshold Crossing Heights*, of AC 150/5340-30, Design and Installation Details for Airport Visual Aids, to determine if the impact of shifted aiming point markings warrants a relocation of the co-located PAPI (or other runway approach aids that require relocation.)

(3) For landing safety, it is recommended whenever the distance between the threshold and aiming point markings is 1,200 feet (366 m) or more that the airport operator place a note in the Airport/Facility Directory (A/FD) to inform pilots about the increased distance existing between the threshold and the aiming point markings.

d. Closed V-Shaped Runway Ends Configuration. The closed V-shaped runway ends configuration is a pavement geometry where two runways ends commence from the same location but proceed in different directions. This undesirable geometry requires a special shifting procedure of the runway landing designator marking of the lesser precedence runway further down the runway than prescribed by paragraph 2.3. The special procedure is as follows. On the lesser order runway, locate the point on its runway centerline that is perpendicular to the inside common corner of the two intersecting runways. Once this base point is located, move this base point 20 feet (6.5 m) down the runway centerline to relocate the bottom of the letter or number(s) used for the runway landing designator. For an intersection of runways of the same precedence, the preferred higher precedence runway is the one having the lowest approach minimums or the runway end most often used.

Wrong-Runway Takeoffs Mitigation (Safety)
In an effort to eliminate the possibility for a “wrong-runway” operation by pilots, the airport operator should reconstruct closed V-shaped runway geometries to another geometry, possibly an X-shaped geometry.

2.3. RUNWAY LANDING DESIGNATOR MARKING.

a. Purpose. The runway landing designator marking identifies a runway end.

b. Location. Runway landing designator markings must be located from the runway threshold per figures 1, 2, and 3 or from the displaced threshold per figure 6. All these figures show the start location for both types of thresholds.

c. Color. Runway landing designator markings are white. See paragraph 1.4, *Techniques for Enhanced Conspicuity of Surface Markings*, for required and recommended techniques to enhance this surface marking.

d. Characteristics.

(1) A runway landing designator marking consists of a single number or two numbers. When parallel runways exist, the number(s) are further supplemented with a letter.

(2) A single-digit runway landing designation number is never preceded by a zero.

(3) For single runways, dual parallel runways, and triple parallel runways, the designator number is the whole number nearest the one-tenth of the magnetic azimuth along the runway centerline when viewed from the direction of approach. For example, where the magnetic azimuth along the runway centerline is 183 degrees, the runway designator marking would be 18; for a magnetic azimuth of 87 degrees, the runway designation marking would be 9. For a magnetic azimuth ending in the number "5," such as 185 degrees, the runway designator marking can be either 18 or 19.

(4) On four or more parallel runways, one set of adjacent runways is numbered to the nearest one-tenth of the magnetic azimuth and the other set of adjacent runways is numbered to the *next* nearest one-tenth of the magnetic azimuth.

(5) For parallel runways, each runway landing designator number must be supplemented by a letter, in the order shown from left to right when viewed from the direction of approach as prescribed by the following marking criteria. Different labeling patterns than those prescribed below are permissible under certain circumstances as identified in subparagraph 2.3(d)(6).

(i) Two parallel runways having a magnetic azimuth of 182 degrees – the runways would be designated "18L," "18R."

(ii) Three parallel runways having a magnetic azimuth of 87 degrees – the runways would be designated "9L," "9C," "9R."

(iii) Four parallel runways having a magnetic azimuth of 324 degrees – the runways would be designated "32L," "32R," "33L," "33R."

(iv) Five parallel runways having a magnetic azimuth of 138 degrees – the runways would be designated "13L," "13R," "14L," "14C," "14R" or "14L," "14R," "13L," "13C," "13R." Other combinations exist for this case.

(v) Six parallel runways having a magnetic azimuth of 83 degrees – the runways would be designated "8L," "8C," "8R," "9L," "9C," "9R." Other combinations exist for this case.

(vi) **S**even parallel runways having a magnetic azimuth of 85 degrees – the runways would be designated "8L," "8C," "8R," "9L," "9C," "9R," "10." Other combinations exist for this case.

(6) There are certain runway placements where the surface marking schemes for parallel runways provided in subparagraph 2.3(d)(5) may not be appropriate because their orientation may lead to pilot confusion. For example, the marking scheme recommended for parallel runways on the same side of

a terminal is to follow subparagraph 2.3(d)(5). However, when two parallel runways are separated by a large terminal or a several terminals, it would be preferable that the runways be designated as non-parallel runways to avoid pilot confusion. Another case that may cause pilot confusion is a turf runway that is parallel to paved visual runway but at a great distance from a higher precedence paved runway. In general, the airport operator should carefully choose how to mark parallel runways to eliminate pilot confusion.

(7) The appearance of the letters and numbers used for runway landing designator markings are in the form and proportion as shown in figure 5. The spacing between numbers and letters are as shown in figures 1, 2, 3, and 5. However, with the exception of the numerals 6 and 9, all numerals and the letters L, C, and R are 60 feet (18 m) in height. In comparison, numerals 6 and 9 are 63 feet (18.9 m). Although the numerals 6 and 9 are taller, their separations from the threshold markings, the letters L-C-R, the first runway centerline, and the start of the runway threshold remain as shown in figures 1, 2, and 3.

Application of Proportioning Runway Markings for Non-Standard Runway Widths (Painting)
The numbers and letters may be proportioned only for non-standard runways whose widths are less then 150 feet (46 m). In additional, the inscription should be no closer than 2 feet (0.6 m) from the physical runway edge or, when present, the runway side stripe markings.

2.4. RUNWAY CENTERLINE MARKING.

a. Purpose. The runway centerline marking identifies the physical center of the runway width and provides alignment guidance to pilots during takeoff and landing operations. For lighting provisions, see AC 150/5340-30.

b. Location. A runway centerline marking is located along the physical center of the runway width and spaced between the runway landing designation markings as shown in figures 1, 2, and 3.

c. Color. The runway centerline marking is white. See paragraph 1.4 for required and recommended techniques to enhance this surface marking.

d. Characteristics. A runway centerline marking consists of a line of uniformly spaced stripes and gaps.

(1) The stripes are 120 feet (36 m) in length and the gaps are 80 feet (24 m) in length.

(2) The minimum width of the stripes is:

- 36 inches (90 cm) for precision runways.
- 18 inches (45 cm) for non-precision runways.
- 12 inches (30 cm) for visual runways.

(3) To accommodate varying runway lengths, all adjustments to the pattern of runway centerline stripes and gaps are made near the runway midpoint (defined as the distance between the two thresholds or displaced thresholds). Under such cases, the length of the stripe is at least equal to the length of the gap or 100 feet (30 m), whichever is greater.

2.5. RUNWAY THRESHOLD MARKING.

a. Purpose. A runway threshold marking, which commences 20 feet (6 m) from the actual runway threshold, closely identifies the actual beginning point of the runway threshold used for landings. For lighting provisions, see AC 150/5340-30.

b. Location. The runway threshold marking starts 20 feet (6 m) from the actual beginning point of the runway threshold as shown in figures 1, 2, and 3. When there is a displaced threshold, the 20-foot (6-m) dimension is increased to 30 feet (9 m) to accommodate the required runway threshold bar as shown in figures 6 and 7. However, if a runway threshold bar is added after the runway threshold markings are in place, it is temporarily acceptable to leave the runway threshold markings to preclude shifting the other various runway markings. When the runway is completely re-marked, the 20-foot (6-m) spacing must be maintained.

c. Color. The components of a runway threshold marking are white. See paragraph 1.4 for required and recommended techniques to enhance this surface marking.

d. Characteristics. The runway threshold marking consists of a pattern of longitudinal stripes of uniform dimensions spaced symmetrically about the runway centerline. The number of longitudinal stripes and their spacing is determined by the runway width.

(1) Table 2 provides the number of longitudinal stripes for runways having standard runway widths as defined by AC 150/5300-13. Figure 1 illustrates the pattern for a 150-foot (45-m) wide runway. See paragraph 2.6(d)(4) for painting guidance applicable to non-standard runway widths.

Table 2. Number of Runway Threshold Stripes for Standard Runway Widths

Standard runway widths	Number of symmetrical stripes
60 feet (18 m)	4
75 feet (23 m)	6
100 feet (30 m)	8
150 feet (45 m)	12
200 feet (60 m)	16

(2) For standard runway widths, the longitudinal stripes are 150 feet (46 m) long and 5.75 feet (1.75 m) wide with the outer edges spaced 5.75 feet (1.75 m) apart. However, the two longitudinal stripes nearest the runway centerline are doubled spaced, i.e., outer edges of the near most pair are 11.5 feet (3.5 m) apart. Figure 1 illustrates the stripe-gap pattern for 150-foot (45 m) wide runways. The stripe-gap pattern allows sufficient room to paint runway side stripes without interfering with the outermost longitudinal stripes.

(3) For non-standard runway widths, the same stripe-gap pattern is continued from the runway centerline until the outermost longitudinal stripe is not closer than 4 feet (1.2 m) from the runway edge. For example, for a non-standard 125-foot (38 m) wide runway, the stripe-gap pattern yields a total of 10 longitudinal stripes symmetrical about the runway centerline. In no case should the stripe-gap

pattern exceed 92 feet (27 m) on either side of the runway centerline. The value of 92 feet (27 m) is the pattern width for the standard 200-foot (61 m) wide runways.

(4) When there is pavement in excess of five feet (1.5 m) prior to the actual start of the runway threshold and (a) pilots may confuse the pavement as part of the actual runway or (b) the pavement does not have the same weight bearing capacity as the runway, then painting of a runway threshold bar per paragraph 2.9 is required. In contrast, if the installation of landing threshold lights requires pavement support and this supportive pavement abuts the runway threshold, then the supportive pavement should not be considered a part of the runway. In this instance, the painting of a runway threshold bar is not required unless the airport operator deems it necessary.

Application of Proportioning Runway Markings for Non-Standard Runway Widths (Painting)
With the exception of 75-foot (23 m) wide runways, no width proportioning is allowed for runway threshold markings. For 75-foot (23 m) wide runways that use 36-inch (90 cm) wide runway side stripes, the stripe-gap pattern of 5.75 feet (1.75 m) is reduced to 5.50 feet (1.68 m).

2.6. RUNWAY AIMING POINT MARKING.

a. Purpose. A runway aiming point marking provides a visual aiming point for landing operations.

b. Location. The *preferred* beginning of the aiming point marking starts 1,020 feet (311 m) from the runway threshold as shown in figures 1, 2, and 3. However, this *preferred* separation is not adequate for all cases as partially discussed below.

Note: The term *preferred* assumes the following conditions: standard visual glide slope of 3 degrees; no obstacle in the approach area affecting the obstacle clearance surface of the PAPI; standard threshold crossing heights per table 7-1, *Threshold Crossing Heights*, of AC 150/5340-30; sufficient runway length so not to force the placement of the aiming point marking; no rapid terrain drop off near the approach threshold that encounters severe turbulence; no elevation differences between the threshold and the installation zone of the PAPI.

(1) Intersecting Runways. A separation tolerance of plus or minus 200 feet (61 m) is allowed when it is necessary to shift the aiming point marking to avoid a runway intersection as shown in figure 4 and discussed in paragraph 2.2(c). However, depending on the threshold crossing heights and the available runway approach aids, the shifting of the aiming point markings can negatively impact the threshold crossing heights for approaching airplanes. The greatest impact of the shift is to the co-located runway approach aids, such as the PAPI, in which the previously vertical guidance to pilots is now incompatible to the threshold crossing height. Under such conditions, adjustment in the location of the affected runway approach aid is necessary so the co-located relationship between the PAPI (and other approach aids) and the shifted aiming point markings permits an acceptable landing operation.

(2) Compatible Threshold Crossing Heights. See paragraph 7.5, *Design (of Economy Approach Aids)* and table 7.1, *Threshold Crossing Heights*, of AC 150/5340-30 to determine if the impact of a relocated aiming point marking warrants relocating the co-located PAPI (or other runway approach aids).

c. Color. The runway aiming point marking is white. See paragraph 1.4 for required and recommended techniques to enhance this surface marking.

d. Characteristics.

(1) The runway aiming point marking consists of two conspicuous rectangular markings, 150 feet (46 m) in length for runways of at least 4,200 feet (1,280 m) in length between the thresholds (or a displaced threshold(s)) and 100 feet (30 m) in length for lesser lengths between the thresholds (or a displaced threshold(s)), that are located symmetrically on each side of the runway centerline as shown in figures 1, 2, and 3. See table 2 for the dimensions of standard runway widths per AC 150/5300-13.

(2) The width of each rectangular marking is as follows:

(i) 30 feet (9.1 m) for standard runway widths of 150 feet (46 m) or greater.

(ii) 20 feet (6 m) for standard runway widths of 75 and 100 feet (23 and 30 m).

(iii) 14 feet (4.3 m) for a standard runway width of 60 feet (18 m).

(3) The lateral spacing between the inner sides of the runway aiming point markings is as follows:

(i) For runways of 150 feet (46 m) or more in width, the lateral spacing between the inner sides of the rectangular bars centered on the runway centerline is 72 feet (21.6 m).

(ii) For runways of 100 feet (30 m) in width, the lateral spacing between the inner sides of the rectangular bars centered on the runway centerline is 55 feet (16.5 m).

(iii) For runways of 75 feet (23 m) in width, the lateral spacing between the inner sides of the rectangular bars centered on the runway centerline is 30 feet (9 m).

(iv) For runways of 60 feet (18 m) in width, the lateral spacing between the inner sides of the rectangular bars centered on the runway centerline is 27 feet (8.2 m).

Application of Proportioning Runway Markings for Non-Standard Runway Widths (Painting)
For runways with non-standard widths below 150 feet (46 m), the width of the rectangular bars and their lateral spacing between the inner sides of the rectangular bars are adjusted in proportion to the available runway width. If runway side stripes are also painted, then the adjustment should add the width of the corresponding runway side stripes plus a minimum 1-foot (0.3 m) clearance between the outer edge of the aiming point marking and the runway side stripe. **Lateral spacing** – in no case is the lateral spacing less than 30 feet (9 m) except for runways less than 75 feet (23 m). **Lengths** – in all cases, the length of the aiming point marking remains unchanged.

2.7. RUNWAY TOUCHDOWN ZONE MARKING.

a. Purpose. For landing operations, the touchdown zone marking identifies the touchdown zone along the runway in 500-foot (152-m) increments. For lighting provisions, see AC 150/5340-30.

b. Location. The touchdown zone marking consists of symmetrically arranged pairs of rectangular bars in groups of one, two, and three along the runway centerline as shown in figure 1. As shown, there are five groupings with the aiming point marking serving as an independent, sixth pair.

(1) The touchdown zone marking scheme maintains a 900-foot (275 m) "no-marking zone" from the midpoint of the runway. That is, those pairs of surface markings that extend within 900 feet (275 m) of the runway midpoint are eliminated. The intent of this painting practice is to preserve a 1,800-foot (550-m) unmarked area so pilots to not confuse the surface markings during a landing with the surface markings for the other approach procedure. The same practice applies equally to a displaced threshold, i.e., the midpoint is located between the thresholds or displaced thresholds and not the runway ends. Taking this into consideration, the painted pattern for the runway touchdown zone marking depends on the (a) authorized approach off each runway and (b) the available length between the runway thresholds or displaced threshold, i.e., the midpoint. The surface marking patterns for the two possible cases are provided in table 3 (case #1) and table 4 (case #2).

Case #1 – Only one runway end requires the runway touchdown zone marking scheme. Apply table 3 criteria, which take into account the "no-marking zone" of 900 feet (275 m) from the threshold-to-threshold midpoint.

Table 3. Pairs of Touchdown Zone Markings Required When Installed on One Threshold

Distance Between Thresholds (or displaced thresholds)	Markings for Precision Approach End (includes displaced threshold)	Other Runway End Visual or Non-precision
6,065 ft (1849 m) or greater[1]	Full set of markings	Aiming point marking
5,565 ft (1697 m) to 6,064 ft (1848 m)	Less one pair of rectangular bar markings[2]	Aiming point marking
5,065 ft (1544 m) to 5,564 ft (1696 m)	Less two pairs of rectangular bar markings	Aiming point marking
4,565 ft (1391 m) to 5,064 ft (1543 m)	Less three pairs of rectangular bar markings	Aiming point marking

Note 1: The value of 5,565 feet is derived as follows. For the non-precision or visual runway end, the table assumes the 900-foot "no-marking zone" criterion plus the length of a *preferred* aiming point marking, which starts 1,020 feet from the threshold to obtain a length of 1,920 feet. Add to this the length of the aiming point marking. Per paragraph 2.6(d)(1), the length of the aiming point marking is either 150 feet or 100 feet. This table uses a length of 150 feet because all the entries in column #1 are greater than 4,200 feet. Therefore, adding 150 feet to 1,920 feet obtains a length of 2,070 feet. For the precision end, which equals 3,995 feet, it assumes the 900-foot "no-marking zone" followed by the standard 75-foot long rectangular bar for a total length of 975 feet. Add to this value the full 3,000-foot touchdown zone marking scheme and the 20-foot separation between the actual starting point of the runway threshold (or displaced threshold) and the bottom edge of threshold marking to obtain 3,995 feet. Summing the values 3,995 and 2,070 yields 6,065 feet.

Note 2: Each reduction in a pair of rectangular bar markings from the precision end equates to a 500-foot (152 m) reduction between the thresholds.

The painting rationale for this table is to ignore the midpoint between the thresholds so the precision instrumented landing is favored over non-precision or visual landings. That is, the length of the non-precision/visual side of the runways always remains at 2,070 feet in length to promote the painting of a full set of touchdown zone markings.

Case #2 – Both runway ends require runway touch down zone markings. Apply table 4 criteria, which take into account the "no-marking zones" of 1,800 feet (550 m) from the threshold-to-threshold midpoint.

Table 4. Pairs of Touchdown Zone Markings Required When Installed on Both Thresholds

Distance Between Thresholds (or displaced thresholds)	Markings for Each Threshold (or displaced threshold)
7,990 ft (2436 m) or greater[1]	Full set of markings
6,990 ft (2130 m) to 7,989 ft (2435 m)	Less one pair of rectangular bars from each side nearest to the runway midpoint[2]
5,990 ft (1826 m) to 6,989 ft (2129 m)	Less two pairs of rectangular bars from each side nearest to the runway midpoint[2]
4,990 ft (1521 m) to 5,989 ft (1825 m)	Less three pairs of rectangular bars from each side nearest to the runway midpoint[2]

Note 1: The value of 7,990 feet is derived as follows. Proceed from the runway midpoint in one direction you will have the 900-foot "no-marking zone" criterion followed by the standard 75-foot long rectangular bar for a total length of 975 feet. Add to this value the full 3,000-foot touchdown zone marking scheme plus the 20-foot separation between the actual starting point of the runway threshold (or displaced threshold) and the edge of threshold marking to obtain 3,995 feet. Double this value for both directions to obtain 7,990 feet.

Note 2: Each reduction in a pair of rectangular bar markings from both sides equates to a 1,000-foot (305 m) reduction between the thresholds.

The painting rationale for this table is to preserve the midpoint between the thresholds, thereby promoting an equal treatment of painting pairs of rectangular bar markings for both sides.

(2) Because the location of the aiming point marking may be adjusted from the threshold to accommodate different approach slopes and/or heights over the threshold and to possibly take into account non-zero runway gradients, the location of an adjusted aiming point marking will vary. Please see AC 150/5340-30. Under such conditions, an adjusted aiming point will, in most cases, continue to be located between the first and the second touchdown zone markings. However, when the accumulative effect of the adjustments is severe (defined as when a touchdown zone marking coincides with or is within 160 feet (50 m) of the adjusted aiming point marking), that touchdown zone marking must not be painted. For the pilot community, this practice permits the aiming point marking to retain its prominent visual landing aid as compared to a touchdown zone marking.

c. Color. All rectangular bars are white. See paragraph 1.4 for required and recommended techniques to enhance this marking.

d. Characteristics.

(1) Each rectangular bar is 75 feet (22.5 m) long and 6 feet (1.8 m) wide.

(2) The lateral spacing between the inner sides of the rectangular bars on the same side of the runway centerline is 5 feet (1.5 m).

(3) The lateral spacing between the inner sides of the rectangular bars centered along the runway centerline is equal to that of the aiming point marking (criteria repeated below from paragraph 2.6(d)(3)). In all cases, the length of the rectangular bars (and the aiming point markings) remains unchanged. See table 2 for the dimensions of standard runway widths.

(v) For runways of 150 feet (46 m) or more in width, the lateral spacing between the inner sides of the rectangular bars centered on the runway centerline is 72 feet (21.6 m).

(vi) For runways of 100 feet (30 m) in width, the lateral spacing between the inner sides of the rectangular bars centered on the runway centerline is 55 feet (16.5 m).

(vii) For runways of 75 feet (23 m) in width, the lateral spacing between the inner sides of the rectangular bars centered on the runway centerline is 30 feet (9 m).

(viii) For runways of 60 feet (18 m) in width, the lateral spacing between the inner sides of the rectangular bars centered on the runway centerline is 27 feet (8.2 m).

Application of Proportioning Runway Markings for Non-Standard Runway Widths (Painting)
For runways with non-standard widths below 150 feet (46 m), the width of the rectangular bars and their lateral spacing between the inner sides of the rectangular bars are adjusted in proportion to the available runway width. This adjustment must be such that the inner sides of the innermost rectangular bars to the runway centerline align themselves with the inner side of the aiming point marking. If runway side stripes are additionally painted, then the adjustment should be the width of the corresponding runway side stripes plus a minimum 1-foot (0.3 m) clearance between the outer edge of the three-bar grouping and the runway side stripe. In no case should the three-bar group be painted further out from the runway centerline than the aiming point marking.

2.8. RUNWAY SIDE STRIPE MARKING.

a. Purpose. The runway side stripe marking provides enhanced visual contrast between the runway edge and the surrounding terrain or runway shoulders and delineates the width of suitable paved area for runway operations. For lighting provisions, see AC 150/5340-30.

b. Location. The runway side stripe marking consist of two parallel stripes, one placed along each edge of the usable runway with the outer edge of each stripe approximately on the edge of the paved useable runway. For extra wide runways, such as military runways converted for public use, the maximum distance between the outer edges of the parallel stripes is 200 feet (61m). Figure 1 illustrates the runway side stripe marking.

c. Color. The stripes of the runway side stripe marking are white. See paragraph 1.4 for required and recommended techniques to enhance this marking.

d. Characteristics. The side stripes of the runway side stripe marking have a minimum width of 36 inches (90 cm) for runways that are over 100 feet (30 m) in width and at least 18 inches (45 cm) on smaller width runways (see table 2 for standard runway widths.)

(1) For runways with a displaced threshold, the side stripes continue through the paved area prior to the displaced threshold as shown in figure 6. This continuation of the side stripes is required because this paved area is used for takeoffs and landing rollouts from the other direction.

(2) Where an aligned taxiway, as shown in figures 7 and 9, precedes a runway threshold, both side stripes will terminate. The point of termination of the side stripes is determined by the taxiway geometry. It is recommended that airport operators not construct new aligned taxiways. It is further recommended that existing aligned taxiways be removed or reconfigured into usable runwaysas shown, for example, in figures 6 and 10.

(3) Where an entrance taxiway, bypass taxiways, high-speed exit taxiways, runway turn pads or runway turnarounds are provided, the runway side stripe marking remains continuous between the runway and these infrastructures.

(4) For intersecting runways, see guidance in paragraph 2.2, *Interruption of Runway Markings.*

2.9. RUNWAY DISPLACED THRESHOLD MARKING. The marking scheme for a runway with a displaced threshold includes the requirements in paragraph 2.1 as well as a runway threshold bar and arrows. Figures 6 and 9 illustrate the additional marking scheme requirementss. For lighting provisions, see AC 150/5340-30.

a. Runway Threshold Bar Marking.

(1) Purpose. The runway threshold bar marking delineates the beginning section of the runway that is available for landing from the section on the approach side of the displaced threshold.

(2) Location. The runway threshold bar marking is an elongated rectangular bar that is located perpendicular to the runway centerline and on the landing portion of runway. The outboard edge of the marking is aligned with the location labeled “start of runway displaced threshold” in figure 6.

(3) Color. The runway threshold bar marking is white. See paragraph 1.4 for required and recommended techniques to enhance this marking.

(4) Characteristics. The runway threshold bar marking is 10 feet (3 m) in width and extends between the runway edges or between the runway side stripe markings.

b. Arrow Marking. The arrow marking performs three possible functions. When used with a displaced threshold, it consists of two components as shown in figure 6 (function one). When an aligned taxiway precedes a runway, the arrow marking consists of a single component as shown in figure 7 (function two). In rare instances, when a runway with an aligned taxiway also has a displaced threshold, both components are used, as shown in figure 9 (function three).

(1) Purposes.

(i) Figure 6 illustrates the first function in which two components, arrow shafts and arrow heads, are required to identify the portion of the ***runway*** before a displaced threshold to provide centerline guidance for pilots during approaches, takeoffs, and landing rollouts from the opposite direction.

(ii) Figure 7 illustrates the second function in which a single component, arrow heads, are required to emphasizes the location of a runway threshold from an ***aligned taxiway***. In figure 7, where a runway end does not have a displaced threshold, arrow heads are used in conjunction with a runway threshold bar marking.

(iii) Figure 9 illustrates function three, where arrow shafts and arrow heads are required within the runway portion and arrows alone are required on the aligned taxiway portion. In this case, two different demarcation bars are required, one white and one yellow to accompany their corresponding set of arrow heads.

(2) Locations.

(i) For the first function, arrow shafts and arrow heads are located on the portion of the ***runway*** before the displaced threshold.

(ii) For the second and third functions, only arrow heads are used on the portion of the ***aligned taxiway*** before the threshold bar marking or the demarcation bar marking.

(3) Colors.

(i) For the first function, the arrow shaft and arrow head are white. See paragraph 1.4 for required and recommended techniques to enhance these markings.

(ii) For the second and third functions, the arrow head is yellow.

(4) Characteristics. The dimensions and spacing requirements for arrow shafts and arrow heads are as shown in figure 6 (function one), figure 7 (function two), and figure 9 (function three).

c. Runway Demarcation Bar Marking.

(1) Purpose. A demarcation bar delineates a runway with a displaced threshold from a blast pad, stopway, or an aligned taxiway that precedes the runway.

(2) Location. The demarcation bar is an elongated rectangular bar on a blast pad, stopway, or an aligned taxiway that is perpendicular to the runway centerline at the point of intersection with the runway. As shown in figure 9, the portion of pavement before the demarcation bar is not part of the usable runway.

(3) Color. The demarcation bar marking is yellow. See paragraph 1.4 for required and recommended techniques to enhance this marking.

(4) Characteristics. The demarcation bar marking is 3 feet (0.9 m) wide and extends across the entire width of the blast pad, stopway, or aligned taxiway.

2.10. CHEVRON MARKINGS FOR BLAST PADS, STOPWAYS, AND EMAS.

a. Purposes. The chevron marking identifies paved blast pads, stopways, and EMAS (engineered materials arresting systems) in relation to the end of the runway. For lighting provisions, see AC 150/5340-30, and for EMAS design, see AC 150/5220-22, Engineered Materials Arresting Systems for Aircraft Overruns.

b. Location. The chevron marking is located on the blast pad and stopway that are aligned with and contiguous to the runway end as shown in figures 8 and 10. The chevron scheme for an EMAS installation is also centered along the extended runway centerline (not shown in figures 8 and 10.)

c. Color. Chevron markings are yellow. See paragraph 1.4 for required and recommended techniques to enhance this marking.

d. Characteristics. Dimensionally, stopways equal the width of the runway while blast pads equal the runway width plus the shoulder widths (see AC 150/5300-13.) The dimensions and spacing requirements for chevron markings are shown in figure 8. The recommended minimum length for a stopway is 150 feet (46 m) to allow for at least two chevron stripes. For cases where (1) standard length blast pads, per AC 150/5300-13, are installed off runway ends used exclusive by small airplanes (Airplane Design Group I – small) or (2) existing stopways are less than 150 feet (46 m) in length on runway widths of 75 feet (23 m) or less, the chevron dimensions shown in figure 8 can be reduced by two-thirds. The intent of the reduction in dimensions is to provide pilots with at least two visible chevrons.

2.11. RUNWAY SHOULDER MARKING.

a. Purpose. The runway shoulder marking is used to further delineate a paved runway shoulder that pilots have mistaken or are likely to mistake as usable runway. This marking is used only in conjunction with the runway side stripe marking.

b. Location. The runway shoulder marking is located between the runway side stripe and the outer edge of the paved shoulder as shown in figure 11.

c. Color. Runway shoulder markings are yellow. See paragraph 1.4 for required and recommended techniques to enhance this marking.

d. Characteristics. The runway shoulder marking consists of stripes 3 feet (0.9 m) in width and spaced 100 feet (30 m) apart. The stripes start at the runway midpoint, are slanted at an angle of 45 degrees to the runway centerline, and are oriented as shown in figure 11.

Blank Page

CHAPTER 3. SURFACE MARKINGS FOR HOLDING POSITIONS.

3.1. APPLICATIONS OF SURFACE PAINTED HOLDING POSITION MARKINGS. Holding taxiing or landing aircraft from entering critical areas associated with a runway or navigational aids or at the intersection of taxiways occurs for various reasons. The most important reasons for controlling aircraft to hold short at a point are as follows:

- **Case 1:** In terms of taxiing on a runway, an aircraft will need to hold short of an intersecting runway (see paragraph 3.2).
- **Case 2:** In terms of landing on a runway used for land and hold short operations (LAHSO), the aircraft will need to hold short of an intersecting runway or, in some rare cases, at a specified hold spot on the landing runway (see paragraph 3.2).
- **Case 3:** In terms of taxiing on a taxiway, an aircraft will need to hold short prior to entering a runway (see paragraph 3.2).
- **Case 4:** In terms of taxiing on a taxiway, an aircraft will need to hold short before entering the critical area of an Instrument Landing System (ILS)/Microwave Landing System (MLS) (see paragraph 3.2).
- **Case 5:** In terms of taxiing on a taxiway, an aircraft will need to hold short before entering the critical area of a Precision Obstacle Free Zone (POFZ) (see paragraph 3.2).
- **Case 6:** In terms of taxiing on a taxiway, an aircraft will need to hold short of an intersecting taxiway (see paragraph 3.2).

These operational situations use different holding position marking schemes. Cases 1, 2, and 3 use the marking scheme referred to as Pattern A – runway holding position marking. Case 4 uses a unique marking scheme referred to as Pattern B – ILS/MLS holding position marking. Case 5 uses a unique marking scheme referred to as Pattern C – POFZ holding position marking. Case 6 uses a unique marking scheme referred to as Pattern D – intermediate holding position marking for taxiway/taxiway intersections.

3.2 CASE 1 AND CASE 2 – APPLICATIONS OF PATTERN A FOR THE RUNWAY HOLDING POSITION MARKING ON RUNWAYS.

a. Purpose. Pattern A for the runway holding position marking installed *on a runway* identifies the location where a pilot is to stop and hold when (1) the runway is operationally closed for an interval of time to permit taxiing operations or (2) the runway is used for land and hold short operations (LAHSO). For signage and lighting provisions, see AC 150/5340-18, Standards for Airport Sign Systems, and AC 150/5340-30.

Safety Initiatives (Safety)
Note 1: Land and hold short operations (LAHSO) require a letter of agreement between the airport operator and the airport traffic control tower.
Note 2: Paragraph 405 of AC 150/5300-13 states that a *basic airport* consists of a runway with a full-length parallel taxiway. Since the design standard for a full-length parallel taxiway

reduces both wrong-runway takeoffs and runway incursions, the use of an operationally closed runway as a taxiway is not recommended, especially when a parallel taxiway exists. Such an operation can potentially confuse pilots because this taxiing operation introduces yellow surface markings associated with taxiways onto the runway. Hence, to avoid the potential for future operational errors by pilots, the airport operator should take measures to meet the full-length parallel taxiway design standard. In some cases, the operational capacity for a given runway could indicate the need for an additional, dual parallel taxiway to avoid this operation.
Note 3: To avoid a runway incursion event at runway/runway intersections where only a section of an operationally closed runway is used as a taxiway and where pilots are not to taxi through the runway/runway intersection, the runway holding position marking must be painted for the runway/runway intersection.

b. Location. The location of the runway holding position marking for runway applications depends on several factors.

(1) Operationally Closed Runways for Taxiing Operations. The location of the runway holding position marking is in accordance with the runway holding position criteria per table 2-1 or table 2-2 of AC 150/5300-13. These distances assume the centerlines of the intersecting runways are perpendicular. For non-perpendicular runway intersections, additional separation may be required to ensure all airplane features, such as wingtips, remain beyond the runway holding position criteria.

(2) Active Runway Used for LAHSO Operations.

(i) The location of the runway holding position marking for LAHSO involving an *intersection of runways* or an *intersection of a runway and a taxiway* is in accordance with table 2-1 or table 2-2 of AC 150/5300-13. These distances assume the centerlines of the intersecting runways are perpendicular. For non-perpendicular runway intersections, additional separation may be required to ensure all airplane features, such as wingtips, remain beyond the runway holding position criteria. In no case should the predetermined hold-short point be closer than the criteria in table 2-1 or table 2-2 of AC 150/5300-13.

(ii) The location of the runway holding position marking for LAHSO based on a *predetermined hold-short point* along the runway or to protect an approach/departure flight path is located at the predetermined hold-short point. In no case should the predetermined location contradict the criteria in table 2-1 or table 2-2 of AC 150/5300-13**.**

(iii) Certain airfield geometries relating to runways and crossing taxiways do affect the placement of the runway holding position marking and necessary signage. For example, one such geometry is when the location where a crossing taxiway or its fillets intersects the runway happens to be the same location indicated by table 2-1 or table 2-2 in AC 150/5300-13 for the placement of the runway holding position marking (and necessary signage). One solution is for the hold-short point to be moved just enough from the runway/runway intersection so both the marking and the installed signage clears the crossing taxiway and its fillets. Under this solution, the LAHSO still relates to an intersecting runway and not an intersecting taxiway. That is, the necessary signage would retain the runway designation. Another solution is for the hold-short point to be moved much further from the runway intersection so the LAHSO is now considered as an intersection of a runway and a taxiway. Under this solution, the setback for the hold-short point must comply with table 2-1 or table 2-2 of AC 150/5300-13. Any reduction to the minimum distances required in AC 150/5300-13 must be coordinated with the regional Airport Division

and Flight Standards Division before placement of the runway holding position marking and necessary signage**.**

c. Color. Pattern A for the runway holding position marking painted on runways is yellow and is outlined in black when painted on light-colored pavements. See paragraph 1.4 for required and recommended techniques to enhance this surface marking.

d. Characteristics.

(1) The marking is identical to runway holding position markings installed ***on a taxiway*** as described in paragraph 3.3 and shown in figure 12. The solid lines as compared to the dash lines are always on the side where the aircraft is to hold.

(2) The marking is installed perpendicular to the runway centerline and interrupts all runway markings except for the runway designation marking. In the latter case, the runway holding position marking and related signs must be adjusted along the runway so they do not interrupt the runway designation marking.

(3) The runway holding position marking extends across the full width of the runway but not onto runway shoulders or onto any intersecting taxiway fillet.

3.3. CASE 3 – APPLICATIONS OF PATTERN A FOR THE RUNWAY HOLDING POSITION MARKING ON TAXIWAYS.

a. Purposes. Pattern A for the runway holding position marking serves several roles depending on whether the taxiway intersects a runway. For a taxiway that intersects a runway at an airport with an operating airport traffic control tower, the Pattern A marking scheme identifies the location on a taxiway where a pilot is to stop when no clearance has been issued by the airport traffic control tower to proceed onto the runway. Under this role, Pattern A may be supplemented with the Geographic Position Marking as part of the airport's Surface Movement Guidance Control System Plan (see paragraph 4.11.) For a taxiway that intersects a runway at an airport without an operating airport traffic control tower, Pattern A identifies the location where a pilot should stop to ensure there is adequate separation with other aircraft before proceeding onto the runway. For a taxiway that does not intersect a runway but crosses through a runway approach area, the Pattern A marking scheme identifies the location on a taxiway where a pilot is to stop to receive clearance from the airport traffic control tower before proceeding through the protected area. This application serves to eliminate aircraft penetrating a surface used to locate the runway threshold, inner approach obstacle free zone, and inner transitional obstacle free zone. If the marking is located closer than prescribed by AC 150/5300-13, such as when the taxiing aircraft penetrates a Terminal Instrument Procedures (TERPS) surface, then the airport operator can expect higher approach minimums to that runway end. A discussion of these surfaces is contained in AC 150/5300-13. Except as specified in paragraph 3.2, the runway holding position marking must not be used for any other situation other than the roles described in this paragraph. For signage and lighting provisions, see AC 150/5340-18 and AC 150/5340-30.

b. Location. Pattern A for the runway holding position marking is located as follows.

(1) For a taxiway that intersects a runway, the Pattern A runway holding position markings must be located on all such taxiways in accordance with table 2-1 or table 2-2 of AC 150/5300-13. Since the location is based on the approach visibility minimums, approach category, and airplane design group, the airport operator should use the lowest approach visibility minima and critical aircraft intended to use

the runway. Locating a runway holding position marking other than what is required by this paragraph must be approved by the FAA. Pattern A is also used on turnarounds and holding bays, as shown in figures 4-8 and 4-9 of AC 150/5300-13, especially for airports with an airport traffic control tower or for runways used at night and in low-visibility conditions.

(2) For a taxiway not intersecting a runway but crossing through a runway approach surface, the Pattern A runway holding position markings must be located on all such taxiways in accordance with AC 150/5300-13. The Pattern A marking must extend across the entire width of the taxiway. Locating a Pattern A runway holding position marking other than what is required by this paragraph must be approved by the FAA

(3) The Pattern A marking must extend across the entire width of the taxiway except for taxiways that serve Airplane Design Groups V or VI airplanes as defined by AC 150/5300-13. In the latter case, the marking is enhanced by extending the Pattern A marking onto both paved shoulders as shown in figure C-4. For both airplane design groups, the length of the enhancement from the taxiway centerline onto the paved shoulder measures 62.5 ft. (19 m). For taxiways with widths greater than 75 feet (23 m), the runway holding position marking is extended 25 feet (7.5 m) onto the paved taxiway shoulders. This measurement takes into account the downward viewing angle from the cockpit while the pilots are seated in the normal position as well as safety factors, such as aircraft wander from the taxiway centerline. Only those taxiway entrances to a runway that serve these airplane design groups are to be enhanced. Typical Airplane Design Groups (ADGs) V and VI airplane models include the Airbus 330-200/-300, A-340-200/-300/-500/-600, A-380, Boeing-747-100/-200/-400, B-777-200/-300, and B-787-8/-9.

14 Code of Federal Regulation (CFR) Part 139 Certificated Airports **Runway Incursion Mitigation Requirement** (Safety)
The extended runway holding position marking, as illustrated in figure C-4, is mandatory and is the only acceptable means of compliance for 14 CFR Part 139 certificated airports serving ADGs V and VI airplanes. The enhanced runway holding position marking applies only to those taxiway entrances for a given runway that serve these airplane design groups. Since the compliance date of June 30, 2008, has passed, all new taxiway entrances serving ADGs V and VI airplanes must be painted accordingly prior to opening the taxiway. Finally, this surface painted marking is part of the taxiway centerline marking standard under 14 CFR Part 139.311(a)(2).

c. Color. The Pattern A marking scheme is yellow and, when painted on light-colored pavements**,** outlined in black. See paragraph 1.4 for required and recommended techniques to enhance this surface marking.

d. Characteristics. Pattern A for the runway holding position marking consists of a set of two continuous lines, two dashed lines, and three spaces that are all parallel and measure 12 inches (30 cm) in width and separation as shown in figure 12. At airports that do not have an operating airport traffic control tower and are not certificated under 14 CFR Part 139, the width and separation measurement may be reduced from 12 inches (30 cm) to 6 inches (15 cm).

(1) The orientation of the Pattern A marking is for the solid continuous lines to be painted on the side where the aircraft will hold before proceeding to the runway. That is, the dashed lines are closer to the runway.

(2) The Pattern A runway holding position marking is painted perpendicular to the taxiway centerline but may be canted from the perpendicular in unique situations, such as a very acute, angled taxiway as shown in figure 15. For unique situations, it may be necessary to install additional runway holding position signs, runway guard lights, or stop bars to emphasize the location of the surface painted runway holding position marking.

(3) Pattern A of the runway holding position markings on taxiways may be angled as needed where two or more taxiways intersect at the runway hold line. On any angled taxiway to the runway, consideration must be given to locate the runway holding position marking so no portion of an aircraft, e.g., wing tip or tail, penetrates the runway safety area or any protected surface. See AC 150/5300-13 for detailed requirements and information about clearance requirements aircraft on taxi routes.

(4) For taxiways with taxiway edge markings, taxiway edge markings must be removed for the width of the extended holding position marking.

(i) If the runway holding position marking is outlined in black, then the taxiway edge markings abut the black outline on both sides of this marking. That is, it abuts the black boarder of the solid yellow line on one side and abuts the black boarder of the dashed yellow line on the other side.

(ii) If the runway holding position marking is not outlined in black, then the taxiway edge markings abut the holding position marking on both sides. That is, it abuts the solid yellow line on one side and abuts the dashed yellow line on the other side.

(5) If a light fixture or sign is located on the taxiway shoulder and is aligned with the extended runway holding position marking, the extended runway holding position marking should extend no closer than 5 feet (1.5 m) to the edge of the light fixture or sign.

(6) For taxiways with taxiway shoulder markings and where the extended runway holding position marking will be located within 10 feet (3 m) of the taxiway shoulder marking, the extended runway holding position marking must replace the taxiway shoulder marking, i.e., the taxiway shoulder marking must be omitted in that location.

3.4. CASE 4 – APPLICATIONS OF PATTERN B FOR THE ILS/MLS HOLDING POSITION MARKING.

a. Purposes. Pattern B for the ILS/MLS holding position marking identifies the location on a taxiway or holding bay where a pilot is to stop when no clearance has been received from the airport traffic control tower to enter an ILS/MLS critical area. The intent of the marking is to protect the signal of the ILS/MLS navigational aid by identifying the holding position for CAT I operations and protecting the approved TERPS for CAT II/III operations. See AC 150/5300-13 for detailed information about the ILS/MLS critical areas. For signage and lighting provisions, see AC 150/5340-18 and AC 150/5340-30.

b. Location. Pattern B for the ILS/MLS holding position marking is located on the taxiway or holding bay at the boundary of the ILS/MLS critical area and, as appropriate, at the holding position for CAT I and CAT II/III operations.

(1) Where the distance between the Pattern A marking scheme on a taxiway and the Pattern B marking scheme is 50 feet (15 m) or less, one pattern may be installed, provided it will not adversely affect capacity. In this case, the Pattern A marking scheme is moved back to the Pattern B location where only the Pattern A scheme is painted.

(2) If a taxiway or holding bay penetrates both an ILS/MLS critical area and the POFZ critical area, only one pattern instead of two patterns is installed to delineate the ILS/MLS and POFZ critical areas. The pattern used is the one with the location with the most conservative boundary (farthest from the runway) of the two critical areas. In this instance, the Pattern B ILS/MLS or Pattern C POFZ holding position marking cannot be replaced with, or used in lieu of, a Pattern A runway holding position marking.

(3) The FAA Airports Regional Office or Airports District Office will designate the ILS/MLS critical area and POFZ boundaries and, as appropriate, determine the correct holding position location for CAT II/III operations for the airport operator.

(4) The extent of the Pattern B marking over taxiways and holding bays depends on its application.

(i) The Pattern B marking for ILS/MLS applications must extend across the entire width of the taxiway or holding bay as shown in figure 12.

(ii) Taxiways and holding bays that serve Airplane Design Groups V or VI airplanes, as defined by AC 150/5300-13, are to have the Pattern B marking enhanced by extending the marking onto both paved shoulders as was shown for Pattern A in figure C-4. Typical Airplane Design Group V and VI airplane models include the Airbus 330-200/-300, A-340-200/-300/-500/-600, A-380, Boeing-747-100/-200/-400, B-777-200/-300, and B-787-8/-9. For both airplane design groups, the length of the enhancement from a taxiway centerline onto the paved shoulder measures 62.5 ft. (19 m). For taxiway with widths greater than 75 feet (23 m), the Pattern B marking is extended 25 feet (7.5 m) onto the paved taxiway/holding bay shoulders. This measurement takes into account the downward viewing angle from the cockpit while the pilots are seated in the normal position plus safety factors, such as aircraft wander from the taxiway centerline. Only those taxiways or holding bays that serve these airplane design groups are to be enhanced.

14 Code of Federal Regulation (CFR) Part 139 Certificated Airports **Runway Incursion Mitigation Requirement** (Safety)
The extended ILS/MLS holding position marking is mandatory and is the only acceptable means of compliance for 14 CFR Part 139 certificated airports serving ADGs V and VI airplanes. The enhanced ILS/MLS holding position marking applies only to those taxiway entrances for a given runway that serve these airplane design groups. Since the compliance date of June 30, 2008, has passed, all new taxiway entrances serving ADGs V and VI airplanes must be painted accordingly prior to opening the taxiway. Finally, this surface painted marking is part of the taxiway centerline marking standard under 14 CFR Part 139.311(a)(2).

c. Color. The Pattern B marking scheme is yellow and, when used on light-colored pavements, outlined in black. See paragraph 1.4 for required and recommended techniques to enhance this surface marking.

d. Characteristics. Pattern B for the ILS/MLS holding position marking consists of a set of two parallel lines that are 2 feet (0.6 m) wide and spaced 4 feet (1.2 m) apart. These parallel lines are connected by perpendicular sets of two lines that are 1 foot (0.3 m) wide and spaced 1 foot (0.3 m) apart. Figure 12 illustrates the Pattern B marking and its separation from an intersecting taxiway centerline. At airports that do not have an airport traffic control tower and are not certificated under 14 CFR Part 139, the airport operator may reduce the dimension for the width of the

parallel yellow lines and spaces from 2 feet (0.6 m) to 1 foot (0.3 m) and from 4 feet (1.2 m) to 2 feet (0.6 m).

3.5. CASE 5 – APPLICATIONS OF PATTERN C FOR PRECISION OBSTACLE FREE ZONES (POFZ) HOLDING POSITION MARKING.

a. Purposes. Pattern C for the POFZ holding position marking identifies the location on a taxiway or holding bay where a pilot is to stop when no clearance has been received from the airport traffic control tower to enter the POFZ critical area. The intent of the marking is to protect the authorized landing minima (TERPS) for a given runway end. See AC 150/5300-13 for detailed information about the POFZ critical area. For signage and lighting provisions, see AC 150/5340-18 and AC 150/5340-30.

b. Location. Pattern C for the POFZ holding position marking is located on the taxiway or holding bay at the boundary of the POFZ critical area and, as appropriate, at the holding position for CAT I and CAT II/III operations.

(1) If a taxiway or holding bay penetrates an ILS/MLS critical area and the POFZ critical area, only one pattern instead of two patterns is installed to delineate the ILS/MLS and POFZ critical areas. The pattern used is the one with the location with the most conservative boundary of the two critical areas (farthest from the runway centerline)**.**

(2) The FAA Airports Regional Office or Airports District Office will designate the ILS/MLS critical area and POFZ boundaries and, as appropriate, determine the correct holding position location for CAT II/III operations for the airport operator.

(3) The extent of the Pattern C over taxiways and holding bays depends on its application.

(i) The Pattern C marking for POFZ applications must extend across only those portions of a taxiway or holding bays that run along the boundary of the POFZ as shown in figures 12a and 15.

(ii) For both applications, taxiways and holding bays that serve Airplane Design Groups V or VI airplanes, as defined by AC 150/5300-13, are to have the Pattern C marking enhanced by extending the marking as appropriate onto one or both paved shoulders as shown for Pattern A in figure C-4. Typical Airplane Design Groups V and VI airplane models include the Airbus 330-200/-300, A-340-200/-300/-500/-600, A-380, Boeing-747-100/-200/-400, B-777-200/-300, and B-787-8/-9. For both airplane design groups, the length of the enhancement from the taxiway centerline onto the paved shoulder measures 62.5 ft. (19 m). For taxiway whose widths are greater than 75 feet (23 m), the Pattern C marking is extended 25 feet (7.5 m) onto the paved taxiway/holding bay shoulders. This measurement takes into account the downward viewing angle from the cockpit while the pilots are seated in the normal position as well as safety factors, such as aircraft wander from the taxiway centerline. Only those taxiways or holding bays that serve these airplane design groups are to be enhanced.

14 Code of Federal Regulation (CFR) Part 139 Certificated Airports **Runway Incursion Mitigation Requirement** (Safety)
The extended POFZ holding position marking, as illustrated in figure C-4, is mandatory and is the only acceptable means of compliance for 14 CFR Part 139 certificated airports serving ADGs V and VI airplanes. The enhanced POFZ holding position marking applies only to those taxiway entrances for a given runway that serve these airplane design groups. Since the

compliance date of June 30, 2008, has passed, all new taxiway entrances serving ADGs V and VI airplanes must be painted accordingly prior to opening the taxiway. Finally, this surface painted marking is part of the taxiway centerline marking standard under 14 CFR Part 139.311(a)(2).

c. Color. The Pattern C marking scheme is yellow and, when used on light-colored pavements, outlined in black. See paragraph 1.4 for required and recommended techniques to enhance this surface marking.

d. Characteristics. Pattern C for the POFZ holding position marking consists of a set of two parallel lines that are 2 feet (0.6 m) wide and spaced 4 feet (1.2 m) apart. These parallel lines are connected by perpendicular sets of two lines that are 1 foot (0.3 m) wide and spaced 1 foot (0.3 m) apart. Figures 12a and 15 illustrate the Pattern C marking and its separation from an entrance taxiway to a runway. At airports that do not have an airport traffic control tower and are not certificated under 14 CFR Part 139, the airport operator may reduce the dimension for the width of the parallel yellow lines and spaces from 2 feet (.6 m) to 1 foot (0.3 m) and from 4 feet (1.2 m) to 2 feet (0.6 m).

3.6. CASE 6 – APPLICATIONS FOR PATTERN D FOR THE TAXIWAY/TAXIWAY INTERSECTION INTERMEDIATE HOLDING POSITION MARKING.

a. Purpose. The intermediate holding position marking for taxiway/taxiway intersections is used to support the operational need by the airport traffic control tower to manage taxiing aircraft through a congested intersection or for other reasons deemed necessary. Pilots when instructed by the airport traffic control tower to "hold short of (taxiway designation)" must stop so no part of the aircraft extends beyond the intermediate holding position marking. For signage and lighting provisions, see AC 150/5340-18 and AC 150/5340-30.

b. Location. The intermediate holding position marking for taxiway/taxiway intersections are located according to the most demanding airplane design group as defined in AC 150/5300-13 and table 2-3 in AC 150/5300-13.

c. Color. The intermediate holding position marking is yellow and, when used on light-colored pavements, outlined in black. See paragraph 1.4 for required and recommended techniques to enhance this surface marking.

d. Characteristics. The intermediate holding position marking for taxiway/taxiway intersections consist of a single dashed line extending across the width of the taxiway per figure 12a and figure B-7. The single dash lines are 1 foot (0.3 m) wide, 3 feet (0.9 m) long, and spaced 3 feet (0.9 m) apart. As shown in figure 12a, all intersecting taxiway centerlines are spaced 6 to 12 inches (15 cm to 30 cm) on either side of this marking.

CHAPTER 4. SURFACE MARKINGS FOR TAXIWAYS.

4.1. APPLICATION. All taxiways should have centerline markings, and whenever a taxiway intersects a runway, the taxiway should have a surface painted runway holding position marking. For 14 CFR Part 139 certificate airports, all such taxiways must have a surface painted runway holding position marking. Taxiway edge markings should be installed wherever there is a need to separate the taxiway from a pavement that is not intended for aircraft use or to delineate the edge of the taxiway that is not otherwise clearly visible. Examples of other taxiway surface markings that should be installed when appropriate and deemed necessary by the airport operator (in some cases, with input from the tower manager of the airport traffic control tower) includes the Pattern A – C holding position markings, the intermediate holding position markings for taxiway/taxiway intersections, geographic position marking, and taxiway shoulder markings.

4.2. TAXIWAY CENTERLINE MARKINGS.

a. Purpose. The taxiway centerline marking provides pilots a continuous visual guidance to permit taxiing along a designated path. For lighting provisions, see AC 150/5340-30.

b. Location. On a straight section of a taxiway, the taxiway centerline marking is located along the physical centerline of the paved taxiway. On curved sections of a taxiway, the taxiway centerline marking continues from the centerline marling of the straight portion of the taxiway at a constant distance from the inner paved edge of the curved taxiway.

(1) For taxiways that intersect other taxiways, the adequacy of the fillet design determines the centerline painting scheme.

(i) At taxiway intersections with fillets that do not meet the fillet design standards of AC 150/5300-13—that is, judgmental over steering is performed by pilots—the centerline marking continues straight through the intersection as shown at the top of figure 16.

(ii) Where adequate fillets exist—that is, fillets are designed to the most demanding aircraft—the taxiway centerline marking follows the taxiway curve as shown on the bottom of figure 16 to permit cockpit-over-centerline steering operations.

> **Note:** AC 150/5300-13 states that cockpit-over-centerline steering as compared to judgmental over steering is the preferred methodology for painting taxiway centerlines in taxiway intersections. To reduce taxiway excursions on turns, airport operators are encouraged to paint taxiway centerlines according to cockpit-over-centerline design.

(2) For taxiways that intersect runways, different painting restrictions exist.

(i) For a taxiway that intersects a runway ***at a runway end,*** the taxiway centerline is terminated either at the runway edge or at the outer edge of the runway side stripe. However, the taxiway centerline (lead-in and lead-off) will continue onto the runway under the following conditions:

(1) Where there is a displaced threshold, the taxiway centerline marking continues onto the displaced area of the runway and extends parallel to the runway centerline marking for a distance of 200 feet (61 m) beyond the point of tangency or terminates at the displaced threshold bar, whichever is less. As shown in figures 6, 14, and 15, the lead-in and lead-off taxiway centerlines are 3 feet (1 m) from

the runway centerline measured near-edge to near-edge. This lead-on or lead-off taxiway centerline line is interrupted for all runway markings.

(2) For low-visibility taxiing operations–that is, when the runway visual range (RVR) is below 1,200 feet (366 m) –the taxiway centerline marking continues across all runway markings with the exception of the runway designation marking and the threshold marking.

(ii) For taxiways that intersect a runway at any ***other locations than at the runway end***, the taxiway centerline marking curves onto the runway and extends parallel to the runway centerline marking for a distance of 200 feet (61 m) beyond the point of tangency or terminates at the displaced threshold bar, whichever is less. As shown in figures 6, 14, and 15, these lead-in and lead-off taxiway centerlines are 3 feet (0.9 m) from the runway centerline when measured near-edge to near-edge.

(1) For taxiways that cross a runway, which are either perpendicular to or non-perpendicular to the runway centerline, and are normally used as crossing taxi routes, the taxiway centerline marking may continue across the runway but is interrupted for any runway markings.

(2) For low-visibility taxiing operations, when the runway visual range (RVR) is below 1,200 feet (366 m), the taxiway centerline marking continues across all runway markings with the exception of the runway designation marking, the threshold marking, aiming point marking, and the touchdown zone markings.

c. Color. The taxiway centerline marking is yellow. See paragraph 1.4 for required and recommended techniques to enhance this marking.

Painting Notice: Over the years, some airport operators have installed other colors to denote various taxiing routes on the movement areas. These surface markings are non-standard. In an attempt to circumvent the yellow color standard, these different colored centerline markings have sometimes been referred to as supplemental markings or some other ambiguous term. Regardless of what they are called, these surface markings are non-standard and require specific approval by the FAA Director of the Office of Airport Safety and Standards.

d. Characteristics.

(1) Width. The taxiway centerline marking width, which ranges from 6 inches (15 cm) to 12 inches (30 cm), is based on the type of taxiing operation as described below. Uniform width must be maintained for the entire length of the taxiway except for the following conditions.

(i) The taxiway or part of the taxiway is designated as a surface movement guidance and control system (SMGCS) taxi route. Under this designation, the width of the taxiway centerline must be 12 inches (30 cm) wide and, on light-colored pavement, further outlined in black. The taxiway centerline width of any remaining section of the taxiway that is ***not part of the designated SMGCS taxi route*** may change abruptly at that point or at the intersection with other taxiway centerline markings, for example, reduced from 12 inches (30 cm) to 6 inches (15 cm).

(ii) A confusing intersection of taxiways is better served by the designation of a preferred taxi routing through the confused intersection by painting a wider centerline width. It is recommended that airport operators take measures to realign or reconstruct confusing taxiway intersections.

(2) Discontinuity of the Taxiway Centerline Marking Along the Taxiway. The taxiway centerline marking of a taxiway remains continuous except when it intersects (1) a runway holding position marking (the taxiway enters a runway), (2) an intermediate holding position marking (intersection of taxiways), or (3) an ILS/MLS holding position marking. Figure 12 illustrates the marking details for these conditions.

4.3. ENHANCED TAXIWAY CENTERLINE MARKING.

a. Purposes. The enhanced taxiway centerline marking provides supplemental visual cues to alert pilots of an upcoming Pattern A – runway holding position marking and to help minimize the potential for runway incursions.

14 Code of Federal Regulation (CFR) Part 139 Certificated Airports Runway Incursion Mitigation Requirement (Safety)
The enhanced taxiway centerline marking, as illustrated in figure C-1, is mandatory and the only acceptable means of compliance for all 14 CFR Part 139 certificated airports. All runway holding positions for any runway are to have the enhanced taxiway centerline marking. Painting of this safety enhancement should be completed in the shortest period of time, preferably concurrent for all taxiway entrances to a given runway. The intent of this action is to eliminate erratic application of the safety enhancement, thereby avoiding pilot confusion and reducing the potential for runway incursions. Compliance dates vary as follows: (1) for commercial service airports with annual passenger enplanements of 1.5 million or more, June 30, 2008. Beyond this deadline, all new taxiway entrances must be painted accordingly prior to opening the taxiway; (2) for commercial service airports with less than 1.5 million annual passenger enplanements but more than 370,000 annual passenger enplanements, December 31, 2009; (3) for all other commercial service airports certificated under 14 CFR Part 139, December 31, 2010. This surface painted marking is part of the taxiway centerline marking standard under 14 CFR Part 139.311(a)(2).

b. Location. Taxiway centerlines are enhanced for 150 feet (46 m) prior to a Pattern A – runway holding position marking, as shown in figure C-1, except for the situations described in paragraph 4.3d. The portion of the taxiway centerline between the runway holding position marking and the runway itself is not enhanced. If the location of taxiway centerline lights and their housings interfere with the painting of the enhanced taxiway centerline, then lights and their housing can be covered up temporarily during the painting process, i.e., lights need not be relocated or housing painted to accommodate this requirement.

c. Color. The enhanced taxiway centerline marking is yellow and must use glass beads. See paragraph 1.4 for required and recommended techniques to enhance this marking. If a black border is required, the border on the outside of the dashes can be 3 to 6 inches (7.5 – 15 cm) in width.

d. Characteristics. The standard painted enhanced taxiway centerline marking consists of two parallel lines of yellow dashes one on each side of the existing taxiway centerline as shown in figure C-1. The first dashes start 6 to 12 inches (15–30 cm) from the runway holding position marking and run for a length of 9 feet (2.75 m) with a 6-inch (15-cm) width and are followed with a gap of 3 feet (0.9 m) between the dashes. The standard painted pattern consists of 12 sets of 9-foot (2.75 m) dashes plus 3-

foot (1 m) spaces and ends with a 6-foot (1.8 m) dash for a total length of 150 feet (46 m). However, because of the varieties of existing taxiway geometries and the placement of a runway holding position marking, the standard painted pattern is not always painted. The painting patterns for the most common taxiway geometries are described below.

(1) Taxiway/Taxiway Intersections and Merging Intersections. Figures C-11 (Note 2), C-12 (Note 1), and C-14 illustrate that if the taxiway centerline to be enhanced intersects another straight taxiway (taxiway/taxiway intersection) that is located within 150 feet (46 m) of a runway holding position marking, the enhancement must terminate 5 feet (1.5 m) prior to the point where the other taxiway centerline crosses the taxiway centerline that is being enhanced. In comparison, on a taxiway, as shown in figures C-11 (Note 1) and C-13, where the enhancement is 150 feet (46 m) or less and emerges with a straight or curved taxiway centerline, the enhancement terminates at the point of tangency with the other taxiway centerline.

(2) Single, Straight-In, Enhanced Taxiway Centerline Marking Intersecting a Running Holding Position Marking at Angles of 90 Degrees. Figures C-10 and C-12 (Note 3) show the standard painted patterns, i.e., the enhanced taxiway centerline measures 150 feet (46 m) in length. In comparison, figure C-13 shows a non-standard painted pattern for Runway 16/34 because the enhancement terminates at the point of tangency with the other taxiway centerline marking.

(3) Straight-In, Enhanced Taxiway Centerline Markings Intersecting a Running Holding Position Marking at Angles Other than 90 Degrees. Figures C-3 (details A – D) and C-7 show standard painted patterns. When a straight-in enhancement intersects the runway holding position marking at an angle other than 90 degrees, the first dashes of the enhancement on either side of the taxiway centerline will start and stop at different locations. In this case, use the taxiway centerline as a guide to paint the enhancements as shown in details A – D of figure C-3. This painting pattern will show both dashes starting 6 to 12 inches (15 to 30 cm) from the first solid bar of the runway holding position marking and ending at the same location. The finished pattern will show for the first set of dashes, one dash longer than 9 feet (2.75 m) and the other dash shorter than 9 feet (2.75 m).

(4) Single Taxiway Centerline Serving Two Runway Holding Position Markings. If a taxiway centerline intersects two runway holding position markings as shown in figure C-12 (Note 2) and measures less than 150 feet (46 m) in length, then the entire taxiway centerline is enhanced only between the two runway holding position markings. In no case will the lacking length of the enhancement be painted between the runway itself and the runway holding position markings. To paint this enhancement, start with the 9-foot (2.75 m) dashes from each runway holding position marking (see paragraph 4.3d(6)(ii) for painting practice). Next, continue painting the pattern from each starting point until both enhancements meet at the midpoint of the curved taxiway centerline. It is okay if the dashes or the spaces at the midpoint are less than the length specified in the standard. The intent here is to maintain the pattern of long dashes and shorter spaces on each side of the centerline.

(5) Dual Holding Position Markings. If an ILS/MLS (Pattern B) or a POFZ (Pattern C) holding position marking is within 150 feet (46 m) of a runway holding position marking (Pattern A), the enhanced taxiway centerline remains within the confines of the two holding position markings, i.e., the enhancement does not proceed beyond the ILS/MLS or the POFZ holding position marking. Under this situation, the enhanced taxiway centerline terminates 3 feet (0.9 m) before the ILS/MLS and the POFZ holding position markings.

(6) Curved and Multiple Taxiway Centerlines Converging Prior to or Intersecting a Runway Holding Position Marking. Various geometries exist such as shown in figures C-9, C-10, C-11, and C-12. Below are the most common geometries and the recommended painting patterns.

(i) Intersecting and Convergent Taxiway Centerlines. As shown in figures C-2 and C-3 (Detail B), where two taxiway centerlines intersect or converge before or at the runway holding position marking, the outside dashes continue, with the possible exception of the first set of dashes, to maintain the 9-foot (2.75-m) pattern along the point of convergence. Depending on the geometry, the first inside dashes may be less than 9 feet (2.75 m) but must be aligned with the outside dashes, i.e., the inside dashes stop with and possibly start with the outside dashes. As noted in figure C-3 (Detail B), it is permissible to omit inside dashes that measure less than 5 feet (1.5 m). Detail B also illustrates that the inside dashes can overlap each other.

(ii) Curved Taxiway Centerlines Intersecting a Runway Holding Position Marking. As shown in figure C-3 (Detail D), when a taxiway centerline is curved, the dashes on either side of the taxiway centerline would start and stop at different locations when maintaining the 9-foot (2.75 m) length. Therefore, in order to correct this mismatch, apply the following painting practice, which takes all measurements from the taxiway centerline:

(A) Each dash in the first set of dashes along with the taxiway centerline will always start at the same distance, 6 to 12 inches (15 to 30 cm) from the first solid bar of the running holding position marking.

(B) To locate the end point of the first set of dashes, first measure 9 feet (2.75 m) along the taxiway centerline. Next, draw an imaginary line that is perpendicular to the tangent of the taxiway centerline and mark the ends of the first dashes on each side of the taxiway centerline.

(C) Measure an additional 3 feet (0.9 m) along the curved taxiway centerline. Next draw an imaginary line perpendicular to the tangent of the curve and mark the starting point for the second set of dashes. The ending point for this set is found by measuring 9 feet (2.75 m) along the center of the curved taxiway centerline. An imaginary line perpendicular to the tangent at this point will mark the end of the second set of dashes.

(D) Repeat the procedure for the remaining curved portion of the taxiway centerline, remembering that the last set of dashes only measure 6 feet (1.8 m)**.**

4.4. TAXIWAY EDGE MARKING.

a. Purposes. The taxiway edge marking, a continuous marking or a dashed marking, is used along a taxi route when it is deemed necessary to (1) alert pilots where the demarcation line exists between usable pavement for taxi operations and a NO-TAXI zone and (2) identify the edge(s) of a taxi route located on sizeable paved areas that can be crossed by the pilot. Two marking schemes for the taxiway edge marking are available to the airport operator to indicate whether the pilot is allowed to cross the taxiway edge. Figures 13, B-3, and B-4 illustrate both marking variations. For lighting provisions, see AC 150/5340-30.

(1) Continuous Taxiway Edge Marking. The continuous taxiway edge marking is used to delineate the taxiway edge from the shoulder or some other contiguous paved surface that is not intended for use by pilots. Continuous taxiway edge markings are never used in any operational situation that permits a pilot to cross this surface marking.

(2) Dashed Taxiway Edge Marking. The dashed taxiway edge marking is used where there is an operational need to define the edge(s) of a taxi route on or contiguous to a sizeable paved area but permits pilots to cross this surface marking. A common application for this surface marking is a taxi route along the outer edge of a terminal apron. Regardless of the taxi route's site, the location for painting the dashed taxi edge marking must be in accordance with table 4-1 of AC 150/5300-13 for standard taxiway widths. These dashed taxiway edge marking (the stripe pattern) are never used to provide wing tip clearances for moving or parked airplanes, such as on aprons. For this situation, the airport operator should use clearances provided by table 2-3 of AC 150/5300-13 or use the clearance for the non-movement area boundary marking.

b. Location. The taxiway edge marking is located such that the outer edge of the continuous line or dashed stripe defines the edge of the usable pavement.

c. Color. Both taxiway edge marking schemes are yellow.

d. Characteristics.

(1) The outer most edge of either marking scheme as measured from the taxiway centerline must be painted at a distance equal to one-half the taxiway width per table 4-1 of AC 150/5300-13.

(2) The continuous taxiway edge marking consists of dual, continuous lines with each line being at least 6 inches (15 cm) in width and spaced 6 inches (15 cm) apart (edge to edge) as shown in figure B-3. This marking must be used to designate NO-TAXI islands as shown in figure 17. Although it is preferable for the inner portion of NO-TAXI islands to be unpaved, for example grass covered, the inner area may be painted green or painted with striated yellow markings.

(3) The dashed taxiway edge marking consists of dual, dashed yellow stripes that are at least 6 inches (15 cm) in width and spaced 6 inches (15 cm) apart (edge to edge) as shown in figure B-4. The dashed stripes are 15 feet (4.5 m) in length with 25-foot (7.5-m) gaps as shown in figure 13. This marking is never used to designate NO-TAXI islands.

Runway Incursion Mitigation Requirement (Safety)
All designs for a direct entrance to a runway that uses two or more taxiway entrances must use "NO-TAXI islands" denoted only by the continuous taxiway edge marking. Designs that do not use "NO-TAXI islands" between adjacent taxiway entrances have experienced a higher rate of recorded runway incursions.

(4) If a holding position marking is outlined in black, the taxiway edge markings should abut the black outlines on both sides of the holding position marking, i.e., the borders for the yellow dash and yellow solid line.

(5) If a holding position marking is not outlined in black, the taxiway edge markings should abut the yellow holding position marking on both sides, i.e., the yellow dash and yellow solid line.

4.5. SURFACE PAINTED HOLDING POSITION SIGNS.

a. Purposes. The surface painted marking provides supplemental visual cues to alert pilots of an upcoming holding position marking (Patterns A, B, and C) to help minimize the potential for runway incursions; identifies the location a runway, ILS/MLS, or POFZ holding position; and confirms the

runway landing designator(s) of the runway(s) immediately beyond this surface marking. The surface marking, as illustrated in figures C-5 or C-6, serves as a supplement to the signs, lighting, and other markings used to identify the location of the holding position marking.

14 Code of Federal Regulation (CFR) Part 139 Certificated Airports Runway Incursion Mitigation (Safety)
The surface painted holding position sign, as illustrated in figures C-5 or C-6, is mandatory and the only means of compliance for all 14 CFR Part 139 certificated airports regardless of the number of runways at the airport. The intent of this requirement is to eliminate the various practices among 14 CFR Part 139 certificated airports in which pilots would (1) see the surface painted holding position sign at all taxiway entrances to a runway, (2) only see the marking on extra wide taxiway entrances over 200 feet (61 m) in width, or (3) see none at all. In turn, this all-inclusive application will reduce human confusion among pilots and drivers that may lead to runway incursions. This surface marking is mandatory on the left side of the taxiway centerline for ADGs III–VI and centered over the taxiway centerline for ADGs I and II even if a vertical runway holding position sign exists. For ADGs III–VI, the surface painted sign for the right side of the taxiway centerline, which is highly recommended for taxiway entrances serving airplane operations that require two person crews, may be eliminated when a taxiway centerline is closer than 45 feet (13.7 m) from the edge of the taxiway ***and*** a mandatory vertical runway holding position sign is in clear view (either left or right of the taxiway centerline). The surface painted holding position sign is part of the standard signage requirements under 14 CFR Part 139.311(b)(1)(ii) with a compliance date as follows. For 14 CFR Part 139 certificated airports with two or more runways, December 31, 2010 (unchanged per Change 1 of AC 150/5340-1J, dated March 31, 2008). For 14 CFR Part 139 certificated airports with one runway, ***effective 2 years from the issue date of this AC.***

b. Location. The location of the surface painted holding position sign is tied to the location of the holding position marking (Patterns A, B, and C) and the number of taxiway centerlines intersecting the holding position marking.

(1) The surface painted holding position sign must not be painted on a runway, including runways that are temporarily used by the airport traffic control tower as a taxiway.

(2) In all cases, the surface painted holding position sign is never painted onto the taxiway shoulders.

(3) In reference to the holding position marking (Patterns A, B and C), the surface painted holding position sign is always painted prior to and runs parallel to the holding position marking at a distance of 2 to 4 feet (0.6 to 1.2 m) as shown in figures C-5, C-6, and C-7. The location takes into account the direction of taxiing and should allow sufficient clearance for in-pavement runway guard lights and/or stop bars.

(4) In reference to a single taxiway centerline intersecting the holding position marking (Patterns A, B and C), the surface painted holding position sign is located as follows:

(i) For taxiway widths that are greater than 35 feet (ADGs III – VI), placement is one or two surface markings each being 3 to 10 feet (0.9 to 3.0 m) from the center of the taxiway centerline. With a few exceptions, one surface marking must be painted on the left side of the taxiway centerline. The left side rather than the right side is used since not all aircraft that may use this entrance require two-person crews. The surface painted sign for the right side of the taxiway centerline, which is highly recommended for taxiway entrances serving airplane operations that require two-person crews, may be eliminated when a taxiway centerline is closer than 40 feet (12 m) from the edge of the taxiway and a mandatory vertical runway holding position sign is in clear view (from either left or right of the taxiway centerline.) Any airport with a taxiway entrance to a runway with ***insufficient lead-in length*** to the runway holding position marking, such as figure C-14, must have two surface painted holding position signs, one on each side of the taxiway centerline marking. Because of the variety in taxiway geometries, such as shown in figures C-9 through C-12 and C-14, the taxiway centerline may or may not be perpendicular to the holding position marking. If the taxiway centerline is perpendicular, then placement of the surface painted holding position sign is in accordance with figure C-5. If the taxiway centerline is not perpendicular, then placement is in accordance with figure C-7.

(ii) For taxiways widths of 35 feet or less (ADGs I and II), one surface marking is centered directly over the taxiway center. If the taxiway centerline is perpendicular, then placement of the surface painted holding position sign is as shown in figure C-6. If the taxiway centerline is not perpendicular, then placement is still centered over the taxiway centerline, but oriented to run parallel to the holding position marking (see figure C-7 for orientation in relation to the holding position marking, not the centerline.

(5) When two or more taxiway centerlines intersect or converge within 15 feet (4.5 m) of the holding position marking (Patterns A, B, and C), there might not be enough space for two or more surface painted holding position signs. Figures C-3 and C-12 are examples of layouts where it is not possible to paint all the required surface painted holding position signs for each converging taxiway centerline. In these cases, a surface painted holding position sign may be omitted on one side of the taxiway centerline as shown in figures C-9 and C-12 for ADGs III–VI taxiways. In the case of ADGs I–II taxiways, a single surface painted holding position sign can be centered over the two converging taxiways where separate surface markings would have overlapped each other. These and other types of geometries will require individual site assessment by the airport operator to determine the number of surface painted holding position signs required by this advisory circular and that still fit properly into the available space. In terms of proper spacing between two taxiway centerlines, a surface painted holding position sign should be approximately equidistant from both taxiway centerlines at a distance of no less then 3 feet (0.9 m) or more than 10 feet (3.0 m) from either taxiway centerline as measured from the center of the taxiway centerlines to the nearest border of the surface painted holding position sign. For difficult taxiway geometries, the airport operator should consult their FAA Regional Airports Division Office or the Airport District Office (ADO) before painting any markings. For such requests, the airport operator should provide information about the rate of usage by each taxiway centerline, aircraft types, and the available space for painting.

Wrong-Runway Takeoff Mitigation (Safety)
Any airport having a taxiway entrance that simultaneously serves two or more runways requires that the surface painted holding position sign show all runway designators plus directional arrows. The directional arrows must approximate the orientation of the runways. The surface painted holding position sign is part of the standard signage requirements under 14 CFR Part 139.311(b)(1)(ii) with a compliance date as follows. For 14 CFR Part 139

certificated airports with two or more runways, December 31, 2010 (unchanged per Change 1 of AC 150/5340-1J, dated March 31 2008).

Runway Incursion Mitigation
Extra Wide Taxiway Entances
(Safety)

Condition 1.
Any airport with a taxiway entrance to a runway with a width measured along the runway holding position marking greater than 200 feet (61 m) requires this surface marking on the left side of the taxiway centerline. Secondly, depending on how excessive the width, several other surface painted holding position signs are required. This second requirement for painting a repetitive pattern of this surface marking is in direct response to documented runway incursions on extra-wide taxiway entrances to a runway.

This advisory circular defines the phrase "repetitive pattern" by relating the pattern of repetitive surface markings to pilot viewing angles along standardized parallel taxiways per airplane design groups (ADGs) in AC 150/5300-13. This painting practice places just one surface painted holding position sign within the proper distance from a future parallel taxiway centerline(s) and one surface painted marking at their midpoint. That is, every "even-numbered" surface marking should line up just left of (ADGs III–VI) or directly over (ADGs I–II) the taxiway centerline of a future parallel taxiway. For added safety enhancement, the airport operator may replace an "odd-numbered" surface marking, this midpoint marking, with a "NO-TAXI" island as shown in figure 17. See paragraph 4.4d for marking "NO-TAXI" islands.

Table 5. Placement of Repetitive Surface Painted Holding Position Signs on Taxiway Entrances of over 200 feet (61 m) in Width

Airplane Design Group (ADG) Category[1]	Distance between adjacent surface painted holding position signs[2] as measured from the same outer edge[3] Feet (meters)
ADG I	34.5 (10.5)
ADG II	52.5 (16)
ADG III	76 (23)
ADG IV	107.5 (32.8)
ADG V	133.5 (40.7)
ADG VI	162 (49.4)

Note 1: The term Airplane Design Group Category is defined in AC 150/5300-13.
Note 2: Each value is half of the taxiway centerline to parallel taxiway centerline value listed in table 2-3 of AC 150/5300-13.
Note 3: The listed value assumes that the existing surface painted holding position sign used as the starting point to paint additional surface markings is either on the left side of the taxiway centerline (figure C-5) or directly centered over the taxiway centerline (figure C-6). For taxiways with dual surface markings, such as shown in figure C-5, the measurement should still

be from the left-side surface marking. If there is no left-side surface marking, use the center of the taxiway centerline and add 3 to 10 feet (0.9 – 3.0 m) to the listed value in table 5. This numeric range is legend B used in figure C-5.

Condition 2.

Any ADGs III–VI airport with a taxiway entrance to a runway with ***insufficient lead-in length*** to the runway holding position marking must have two surface painted holding position signs, one on each side of the taxiway centerline marking.

The term "insufficient lead-in-length" is defined as when the fuselage of the design airplane for that runway is unable to line up completely straight and perpendicular to the runway holding position marking. For the non-perpendicular case, as shown in figure C-7, the qualifier is that the design airplane for that runway is unable to line up its fuselage completely straight with the entrance taxiway centerline while holding at the runway holding position marking.

Three quick, visual indications of this undesirable condition are (1) taxiway centerlines, such as shown in figure C-9, that only curve into the runway holding position marking; (2) painted holding position markings, such as shown in figure C-14, that are painted on or close to taxiway fillets; and (3) an enhanced taxiway centerline that measure far less than 150 feet (46 m).

Some examples on how to include figures C-9, C-10, and C-12 that show examples of how to paint the two surface markings both a left-of-centerline and a right-of-centerline surface painted holding position signs.

The surface painted holding position sign is part of the standard signage requirements under 14 CFR Part 139.311(b)(1)(ii) with compliance dates as follows. For 14 CFR Part 139 certificated airports with two or more runways, December 31, 2010 (unchanged per Change 1, dated March 31 2008). For 14 CFR Part 139 certificated airports with one runway, ***effective 2 years from the issue date of this AC***.

c. Color. The surface painted holding position sign has a red background with a white inscription and, for light-colored pavements, is outlined in black. Although this marking is a supplement to the mandatory runway holding position sign, the black outline that surrounds the white inscription on the signs is not required for the surface painted holding position sign**.**

d. Characteristics.

(1) The standard height of the inscription is as follows:

(i) For taxiway widths that are greater than 35 feet (ADGs III – VI), the inscription is 12 feet (3.7 m), but may be reduced in accordance with the criteria in figure C-5.

(ii) For taxiways widths of 35 feet or less (ADGs I and II), the inscription is in accordance with the criteria in figure C-6.

Solutions for Difficult Placements
Stacked Surface Painted Holding Position Signs
(Painting)

For very narrow or complex taxiway entrance geometries that require a lengthy inscription (a

single marking) for two or more runways and that will not fit properly between the existing taxiway centerline and the taxiway edge, the airport operator should reduce the legend height. Under this solution, the lowest allowable height for the legend for ADGs III–VI is 6 feet (2 m) and for ADGs I–II is 3 feet (0.9 m). This solution may be necessary for a very narrow entrance taxiway that feeds two runway ends. If this solution fails, the single marking may then be broken into two separate markings, one marking per runway, but stacked one above the other as shown in figure C-16. Under this solution, the airport operator should fit the stacked markings such that (1) the height of the legend is increased toward the standard height and (2) the separation between the stacked inscriptions is 2 to 4 feet (0.6 to 1.2 m).

Note: All other unaffected runway holding positions that do not require a reduced legend height must use the standard legend height. The intent of this note is to maintain uniformity in visual cues on a national level.

(2) The inscription must be identical to the runway holding position sign by containing numbers and possibly letters and arrows. The appearance of the letters, numbers, and symbols must be per Appendix A.

(3) The background is rectangular and extends a minimum of 7.5 inches (19 cm) for ADGs I–II and 15 inches (38 cm) for ADGs III–VI horizontally and vertically beyond the extremities of the inscription.

(4) The surface painted holding position sign is at least 2 feet (0.61 m) from the edge of the inside taxiway edge marking or from the edge of the paved taxiway when there are no taxiway edge markings.

4.6. SURFACE PAINTED TAXIWAY DIRECTION SIGNS.

a. Purpose. The surface painted taxiway direction sign is used with an arrow to provide directional guidance at an intersection when it is not possible to provide a taxiway direction sign in accordance with AC 150/5340-18. Additionally, the marking should be used where operational experience has indicated the addition of the surface painted taxiway direction sign can assist flight crew ground navigation. For signage provisions, see AC 150/5340-18.

b. Location. The border of the surface painted taxiway direction sign is 3 feet (0.9 m) from the taxiway centerline and is located on the side of the taxiway centerline in which the aircraft will travel. That is, markings that indicate left turns are located on the left-hand side of the taxiway centerline while markings indicating right turns are located on the right-hand side of the taxiway centerline, as shown in figure 17. For crisscrossing taxiways, such as two taxiways crisscrossing at 90 degrees to each other, a single surface painted taxiway direction sign is used that combines the appropriate number of individual surface painted taxiway direction signs for the number of taxiways crisscrossing through the intersection. Under this application, the single marking is located on the left side of the taxiway centerline.

(1) The surface painted taxiway direction sign is never painted on runways, between the runway holding position marking and the runway, or on runways that are operationally used as a taxiway.

(2) When it is not practicable to install a taxiway direction sign along the side of the taxiway, a surface painted taxiway direction sign is painted at the same distance from the intersection per guidance in AC 150/5300-13, table 2-3.

(3) When a surface painted taxiway direction sign supplements a taxiway direction sign installed along the side of the taxiway, the surface painted direction sign may be located at or anywhere between the distances specified in AC 150/5300-13, table 2-3, and the point of divergence of the painted taxiway centerlines.

c. Color. The surface painted taxiway direction sign has a yellow background with a black inscription that includes an arrow(s). See paragraph 1.4 for required and recommended techniques to enhance this marking.

d. Characteristics.

(1) The inscription is 12 feet (3.7 m) in height. However, the height may be reduced if necessary to the minimum height of 9 feet (2.75 m).

(2) Each inscription must be accompanied by an oriented arrow(s) that shows the approximate direction of a turn(s). Please see AC 150/5340-18 for additional information about arrow orientation.

(3) The yellow background is rectangular and extends a minimum of 15 inches (38 cm) horizontally and vertically beyond the extremities of the black inscription including the arrow head(s).

(4) A message separator made up of 6-inch (15 cm) wide vertical black stripes is used to separate two taxiway designation inscriptions when more than one inscription is included on either side of the centerline.

(5) A surface painted taxiway direction sign is not to be co-located with a surface painted holding position sign.

(6) The inscription that contains an arrow(s) must conform in appearance to the letters, numbers, and symbols in Appendix A.

4.7. SURFACE PAINTED TAXIWAY LOCATION SIGNS.

a. Purposes. The surface painted taxiway location sign identifies the taxiway upon which the aircraft is located and, when deemed necessary, used to supplement a vertical sign or a surface painted taxiway direction sign. Additionally, the surface marking should be used where operational experience has indicated the addition of the surface painted taxiway location sign can assist flight crew in ground navigation. For signage provisions, see AC 150/5340-18.

b. Location. The surface painted taxiway location sign is located, whenever practicable, on the right side of the taxiway centerline as shown in figure 17. The edge of the surface painted taxiway location sign should be 3 feet (0.9 m) from the edge of the taxiway centerline.

(1) When adequate pavement width exists, a surface painted taxiway location sign may be located on the left side of the taxiway centerline if it is co-located with a surface painted taxiway holding position sign. In this case, the surface painted signs will mimic the mandatory vertical hold position sign. Under this application, if the co-located surface painted taxiway location sign and the mandatory vertical hold position sign serve two converging taxiways, then the surface painted taxiway location sign should be located to the left of the surface painted holding position sign (in the direction of taxiing).

(2) The surface painted taxiway location sign is never painted on runways or between a taxiway/runway holding position and a runway.

c. Color. The surface painted taxiway location sign has a black background with a yellow inscription and, for asphalt pavements, a 6-inch (15 cm) yellow border around its perimeter. See paragraph 1.4 for required and recommended techniques to enhance this marking.

d. Characteristics.

(1) The yellow inscription is 12 feet (3.7 m) in height. However, the height may be reduced if necessary to the minimum height of 9 feet (2.75 m).

(2) The inscription, which never contains an arrow, must confirm in appearance to the letters, numbers, and symbols in Appendix A.

(3) The background is rectangular and extends a minimum of 15 inches (38 cm) beyond the extremities of the inscription.

4.8. SURFACE PAINTED GATE DESTINATION SIGNS.

a. Purpose. The surface painted gate destination sign is used, when necessary, to assist pilots in locating their assigned terminal gate. The marking is especially useful for low-visibility operations.

b. Location. The surface painted gate destination sign may be installed in non-movement areas or movement areas that are in the proximity of terminal building(s) per the examples in figures 18 and 19. The markings are located adjacent to taxiway centerlines on the same side in which a turn will be made to travel toward the assigned gate.

c. Color. The surface painted gate destination sign has a solid yellow background with a black inscription**.** For light-colored pavements, a 6-inch (15 cm) black border may be used.

d. Characteristics.

(1) For surface painted gate destination signs containing only a single row of several gate designations, as shown in figure 18, the black inscriptions must have a maximum height of 4 feet (1.2 m).

(2) For surface painted gate destination signs containing more than one row of gate designations, shown as an option in figure 19, the inscriptions must have a minimum height of 3 feet (0.9 m). There is no maximum size in the height for a surface painted gate destination sign containing more than one row of inscriptions.

(3) The background of the marking is rectangular and extends a minimum of 15 inches (38 cm) in the horizontal and vertical directions beyond the extremities of the inscriptions.

(4) The inscription must conform in appearance to the letters, numbers, and other symbols in Appendix A.

(5) A range of gates that are sequential should be indicated with a single “dash”. For example, a series of gates A1 through A4 are indicated as “A1 - A4”.

(6) A range of gates that are non-sequential should be separated by commas. For example, the gates B1, B3, B6 are indicated as "B1, B3, B5".

4.9. SURFACE PAINTED APRON ENTRANCE POINT SIGNS.

a. Purpose. The surface painted apron entrance point sign is used, when necessary, to assist pilots in locating their position along the edges of a large, continuous apron serving the terminal gates. The marking is especially useful for identifying both the entrances and exits in the terminal complex.

b. Location. The surface painted apron entrance point sign may be painted in non-movement areas or movement areas that are in the proximity of an apron leading to the concourses or terminal buildings as shown in figure 20. The marking, located 7 feet (2 m) from taxiway centerline(s), is on the same side of the centerline to which a turn will be made to travel toward the assigned gate.

c. Color. The surface painted apron entrance point sign has a yellow background with a black inscription. The color of the border depends on the pavement color. Concrete or light-colored pavement should use a black border, while dark pavements should use a white border.

d. Characteristics.

(1) The surface painted apron entrance point sign consists of three 9-foot (2.75 m) diameter circles each located 7 feet (2 m) from the associated taxiway/apron centerline. Two circles are located on entrance taxiway centerline(s) which then leads toward the gate and the third circle.

(2) Each circle is comprosed of an inner 8-foot (2.7 m) diameter yellow circle with a 6-inch (15 cm) outer ring that is black in color for concrete and light-colored pavements and is white in color for asphalt pavements.

(3) The numeric inscription for gate designation within each of the three circles should match.

(4) The black inscription inside each circle should only be a number, black in color and 4 feet (1.2 m) in height.

(4) The appearance of the inscription numbers must confirm to the scale of letters, numbers, and other symbols in Appendix A.

4.10. TAXIWAY SHOULDER MARKINGS.

a. Purpose. Aprons, holding bays, and taxiways are sometimes provided with shoulder stabilization to prevent ground erosion attributed to jet blast or water runoff or to minimize engine damage caused by foreign object debris. Although the stabilized shoulder is not intended for use by aircraft, conditions may exist along a taxi route that may confusion pilots. For example, the presence of a stabilized "island" along the taxi route or a particular taxiway curve may confuse pilots as to which side of the taxiway edge marking stripe is intended for use. Where such a condition exists, the taxiway shoulder marking should be used to indicate the non-usable area to pilots.

b. Location. The taxiway shoulder marking is painted perpendicular to the abutting pavement or edge marking stripe as shown in figure 21. On straight sections, the taxiway shoulder marking has a maximum spacing of 100 feet (30 m). On curves, the taxiway shoulders mark has a maximum spacing 50 feet (15 m) between the closest tips of adjacent taxiway shoulder markings.

c. Color. The taxiway shoulder marking is yellow. For islands with stabilized interior areas, it is acceptable to paint the stabilized interior area green in lieu of using yellow taxiway shoulder markings.

d. Characteristics. The stabilized area is marked with 3-foot (1 m) wide yellow stripes perpendicular to the edge stripe or abutting the pavement edge. The stripes extend to within 5 feet (1.5 m) of the edge of the stabilized area or are 25 feet (7.5 m) in length, whichever is less.

4.11. GEOGRAPHIC POSITION MARKINGS.

a. Purpose. When deemed necessary, the geographic position marking is repeated along a designated taxi route to serve as an indicator of location (*a spot*) so pilots can confirm holding points or reporting points while taxiing during periods of low-visibility operations. The referred to low-visibility operations are those taxiing operations prior to takeoff or after landing that occur when the runway visual range (RVR) is below 1,200 feet (366 m). Operationally, holding points differ from a reporting point. For example, one of the repeated markings (*the spot*) may be used only as a reporting point when the airport traffic control tower (ATCT) is sequencing airplanes along the Surface Movement Guidance and Control System (SMGCS) route—when the first airplane reports to ATCT passing spot #3, ATCT would then clear the next airplane up to the next open spot. Note: see AC 120-57, *Surface Movement Guidance and Control System*, and AC 150/5340-18 for signage and lighting provisions.

b. Location. The repeated marking is located along a low-visibility taxi route identified by the airport's SMGCS Plan. Each marking is positioned to the left of the taxiway centerline in the direction of taxi.

(1) All geographic position markings used operationally by the airport air traffic control tower to designate a specific hold point along the low-visibility taxi route are co-located with the intermediate holding position marking for taxiway/taxiway intersections as shown in figure 22. For a taxi route designated for use in visibilities below 600 RVR, the geographic position marking must be collocated with the intermediate holding position marking as well as a clearance bar consisting of three yellow lights. When the geographic position marking is not used operationally for hold points, i.e., the spot is always used as a reporting point for sequencing operations, the painting of an intermediate holding position marking and the installation of the clearance bar are optional.

(2) The geographic position marking is never located at a runway holding position location that immediately enters the runway used for the departure. However, the geographic position marking may be located at a runway holding position for other runway(s) that the designated low-visibility taxi route happens to cross prior to arriving to the departure runway.

(3) A taxiway/taxiway intermediate holding position marking should be used with the geographic position marking, except for a geographic position marking that is located at a runway holding position for the runway that will not be used for takeoff.

(4) The airport operator in coordination with the FAA Regional Airports Division Office or the Airports District Office will determine where the geographic position markings are deemed necessary.

c. Color. The geographic position marking, as shown in figure 22, is a 7-foot (2.1 m) diameter pink circle with a black inscription surrounded by two 6-inch (15 cm) wide rings, one white and one black. When the geographic position marking is painted on concrete or other light-colored pavements, the white ring is inside the black outer ring. When the geographic position marking is installed on asphalt

or other dark-colored pavements, the white ring becomes the outer ring and the black ring becomes the inner ring. See paragraph 1.4 for required and recommended techniques to enhance this marking.

d. Characteristics. The geographic position marking is designated with a black inscription that may be a single number or a number-plus-letter combination. Since the basic marking reappears along the designated low-visibility SMGCS taxi route, each inscription must corresponds to the sequential position identified by the SMGCS Plan. The sequential process for inscriptions is as follows.

(1) The number used for the inscription must correspond to its sequential position along the SMGCS taxi route, i.e., 1, 2, 3, etc.

(2) When a number plus a letter combination is used for the inscription, the letter indicates the taxiway's letter designation on which the marking is located. For example, the inscription 2B, implies the second marking along Taxiway B. Additionally, the number always precedes the letter for all inscriptions.

(3) If a geographic position marking is located on a taxiway with an alphanumeric designation, only the letter portion of the taxiway designation is used for all the inscriptions. For example, if the fourth location on the SMGCS taxi route is located on Taxiway A7, the inscription for this location would read "4A" .

(4) The inscription inside the geographic position marking is centered within the circle.

(5) The inscription has a height of 4 feet (1.2 m).

(6) The numbers and letters used in the inscription are scaled to those in Appendix A.

Blank page

CHAPTER 5. OTHER SURFACE MARKINGS.

5.1. APPLICATION. The markings in this section are used, as appropriate, on airports.

5.2. VEHICLE ROADWAY MARKINGS.

a. Purpose. The three vehicle roadway markings contained in this paragraph are used to delineate roadways located on or that cross paved areas used by aircraft (aircraft maneuvering areas) so collisions and other mishaps are averted. Markings for roadways not located on aircraft maneuvering areas should conform, whenever possible, to the U.S. Department of Transportation's Manual on Uniform Traffic Control Devices. For roadway signage provisions, see AC 150/5340-18.

b. Location. Vehicle roadways are delineated on aircraft maneuvering areas where there is a need to define a pathway for vehicle operations. A minimum separation of 2 feet (0.67 m) must be maintained between the roadway edge marking described below and the non-movement area boundary marking (see paragraph 5.4). All vehicle roadway markings are interrupted when crossing any taxiway and runway markings**.**

c. Color. Vehicle roadway markings are white.

d. Characteristics.

(1) Vehicle roadway markings consist of roadway edge lines to delineate each edge of the roadway, a dashed line to separate lanes within the edges of the roadway, and, where appropriate, roadway stop line (bar). The roadway edge lines, which are either continuous or zipper-style, and the dashed lines are all 6 inches (15 cm) wide, except that zipper-style edges are 12 inches (30 cm) wide and 4 feet (1.2 m) long. See figure 13 for details of the zipper-style marking. The dashed line for lane separation is 15 feet (4.5 m) in length and spaced 25 feet (7.5 m) apart. The roadway stop line (bar) is 2 feet (0.67 m) wide and extends across its appropriate lane. See figure 23 for illustrations and details.

(2) In lieu of the solid continuous roadway edge lines, zipper-style markings may be used to delineate the edges of the vehicle roadway wherever the airport's SMGCS working group or the airport operator determines the roadway edges need enhanced delineation.

(3) Every roadway lane that feeds vehicle traffic across a taxi route must have a solid roadway stop line (bar). The placement of the stop line (bar) is in accordance with fixed/movable criteria of table 2-3 of AC 150/5300-13. This placement generally ensures adequate vehicle clearance from taxiing aircraft. However, the airport operators should evaluate if jet blast effects on vehicle traffic require a larger setback.

5.3. VOR RECEIVER CHECKPOINT MARKING.

a. Purpose. The VOR receiver checkpoint marking is used by pilots to check their aircraft instruments with navigational aid signals. It consists of a painted circle with a painted directional arrow that is aligned toward the azimuth of the VOR facility. The marking indicates a point on the airport where sufficient signal strength from a VOR facility exists so a pilot can check the aircraft VOR equipment against the radial azimuth indicated by the painted directional arrow. For signage provisions, see AC 150/5340-18.

b. Location. FAA Flight Inspection personnel determine the location for the VOR receiver checkpoint marking(s) and issue information for checkpoint descriptions in flight publications. In general, the VOR receiver checkpoint marking is preferably located on an airport apron but could be on a taxiway; it is never on a runway. The location(s) should also allow easy access to align the aircraft with the marking without unduly obstructing other airport traffic. VOR receiver checkpoint markings normally should not be established at distances less than one-half mile (0.8 km) from the facility, nor on unpaved areas.

c. Color. The VOR receiver checkpoint marking is a painted circle of the size and colors per figure 24.

d. Characteristics. The VOR receiver checkpoint marking is a painted circle with an arrow that is accompanied with an associated information sign.

(1) The VOR receiver checkpoint is a circle 10 feet (3 m) in diameter with a yellow arrow aligned toward the azimuth of the VOR facility.

(2) The arrow should extend to the full width of the inner circle.

(3) The black interior of the circle is surrounded by a 6 inch (15 cm) wide yellow ring contiguous to a 6 inch (15 cm) wide white outer ring per figure 24.

(4) When installed on concrete or other light-colored pavements, the interior of the circle is painted black.

5.4. NON-MOVEMENT AREA BOUNDARY MARKING.

a. Purpose. The non-movement area boundary marking is used to delineate the movement areas under direct control by the airport traffic control tower from the non-movement areas that are not under their control. This marking should be used only when there is a need for such delineation. Prior to its implementation, a letter of agreement should be formalized between the airport operator and airport traffic control tower that specifies the boundaries.

b. Location. A non-movement area boundary marking is located on the boundary between the movement and non-movement area. To provide adequate clearance for the wings of taxiing aircraft, the marking should never coincide with the edge of a taxiway. In this regard, the non-movement area boundary marking is setback in accordance with fixed/movable criteria of table 2-3 of AC 150/5300-13.

c. Color. The non-movement area boundary marking is yellow and will be outlined in black on light-colored pavements.

d. Characteristics.

(1) The non-movement area boundary marking consists of two yellow lines, one solid and one dashed as shown in figure 13. As shown in figure 13, the solid line is located on the non-movement area side while the dashed line is located on the movement area side.

(2) Each line is 6 inches (15 cm) in width with 6-inch (15-cm) spacing between lines. The use of this wider marking is strongly encouraged at locations where pilots may have difficulty discerning the edge of the movement area. Under this application, the width of the lines and spaces may be doubled

to 12 inches (30 cm) while the dashes are 3 feet (0.9 m) in length with 3-foot (1 m) spacing between dashes.

(3) If a taxiway centerline intersects a non-movement area boundary marking, the boundary marking is 6 inches (15 cm) from the taxiway centerline on the aircraft holding side (dashed yellow lines) and 3 feet (0.9 m) from the taxiway centerline on the movement area side (solid yellow lines).

5.5. MARKINGS FOR THRESHOLDS TEMPORARILY RELOCATED DURING CONSTRUCTION. See AC 150/5370-2, Operational Safety on Airports During Construction, for provisions for marking and lighting a threshold temporarily relocated during construction.

5.6. MARKING AND LIGHTING OF PERMANENTLY CLOSED RUNWAYS AND TAXIWAYS.

a. For runways and taxiways that are permanently closed, the lighting circuits are disconnected. For closed runways, all markings for runway thresholds, runway designations, touchdown aiming points, and touchdown zones are obliterated.

b. For closed runways, only solid yellow "X" markings are painted (never striated "X" markings) at each end of the runway and at 1,000-foot (300 m) intervals.

c. For a closed runway that intersects an open runway, a solid yellow "X" marking should be placed on the closed runway near the sides of the open intersecting runway. In most cases, two "X" markings are required, i.e., one "X" per each side of the open intersecting runway.

d. For closed taxiways, a yellow "X" marking is placed at each entrance.

e. Figure 25 provides the detail criteria for the "X" marking. For closed runways, Pattern A is preferable over Pattern B because this pattern is more readily seen from aircraft on final approach. For closed taxiways, Pattern C is preferable over Pattern D unless taxiing pilots have difficulty seeing the marking and are entering the closed taxiway or pilots have reported near landings on the closed taxiway.

5.7. TEMPORARILY CLOSED RUNWAYS AND TAXIWAYS. The following procedures are to be followed when it is necessary to temporarily close a runway or a taxiway. See AC 150/5370-2 for requirements and guidelines.

a. For temporarily closed runways, the airport operator has two options when it is necessary to provide a visual indication that a runway is temporarily closed.

(1) Option 1. The airport operator places an "X" only at each end of the runway over the runway designation markings or, when required by construction activity, just off the runway end. The "X"s are yellow in color and conform to the dimensions specified in figure 25. Since the "X"s are used temporarily, they are usually made of some easily removable material, such as plywood or fabric rather than painted on the pavement surface. Any materials used for a temporary "X" should provide a solid appearance, for example, something that does flap with the wind. Since these "X"s will usually be placed over white runway markings, their visibility can be enhanced by a 6-inch (15 cm) black border.

(2) Option 2. The airport operator uses a raised-lighted "X" on each runway end in lieu of the Option 1 markings to indicate the runway is temporarily closed. The preferred location of the raised-

lighted "X" is within 250 feet (76 m) of the runway end. However, it may be located in the safety area on the extended runway centerline.

b. For temporarily closed taxiways, the airport operator has two options when it is necessary to provide a visual indication that a taxiway is temporarily closed.

(1) Option 1. Usually this type of closure is treated as a hazardous area so the guidance in paragraph 5.14 applies.

(2) Option 2. As an alternative, the airport operator may install the same yellow "X" shown in figure 25 for those entrances leading into the temporarily closed taxiway.

c. If the runway or taxiway will be closed during the nighttime, the runway and taxiway lights will normally be disconnected so they can not be illuminated unless such illumination is needed to perform maintenance operations on or adjacent to the runway, e.g., snow removal.

NOTE: The airport operator is responsible for determining (1) the need for a visual indication that a runway or taxiway is temporarily closed and (2) the safest place to put the "X" or "X"s or other indicators per paragraph 5.14. In making these determinations, the airport operator should consider such things as the reason for the closure, duration of the closure, airfield configuration, and the existence and hours of operation of the airport traffic control tower and construction crews.

5.8. CONVERTING A RUNWAY TO A TAXIWAY. The following actions are necessary to convert a runway permanently to a taxiway. Operationally, once this conversion is invoked, aircraft are not permitted to land or take off from the taxiway.

c. All runway markings found on the runway are obliterated or replaced with the appropriate taxiway markings. For example, the runway landing designation numbers are obliterated, and the white runway centerline is converted to a yellow taxiway centerline.

d. All runway related signage and lighting fixtures found on or along the runway must be removed and/or replaced with the appropriate taxiway signage and lighting to indicate the existence of the converted taxiway. For example, runway edge lights are converted to blue edge lights, and runway centerline lighting fixtures are converted to green (it may be possible to do both actions by changing the lens color.) See AC 150/5345-46, **Specification for L-890 Airport Lighting Control and Monitoring System (ALCMS)**, for information about taxiway edge lights; *Specification for L-853 Runway and Taxiway Retroreflective Markers* in AC 150/5345-53, **Airport Lighting Equipment Certification Program**, for retroreflectors; and AC 150/5340-30 for information about taxiway centerline lighting requirements.

e. All markings associated with the converted runway but not painted on the runway, such as the runway holding position markings found on entrance taxiways, are obliterated and replaced with the appropriate taxiway markings. Additionally runway related signage and lighting fixtures found off the runway must be removed and/or replaced with the appropriate taxiway signage and lighting to indicate the existence of the converted taxiway.

f. In terms of documentation, airport operators must update their Airport Layout Plan as well as other appropriate documents to indicate the presence of the new taxiway and the permanent closure of the runway. Both the Airport/Facility Directory (A/FD) and the Airport Master Record (FAA Form 5010)

need to indicate the conversion to a permanent taxiway.

> **NOTE:** The "X" closure marking is never used on this type of conversion since the converted pavement is intended to be an active, new taxiway.

5.9. INTERMITTENT USE OF A TAXIWAY AS A RUNWAY. The intermittent use of a taxiway as a runway is a type of conversion where the converted taxiway is either used only as a runway or used as a runway for a specified time of the day or night. In either of these applications, the airport operator must properly re-mark affected pavements (including provisions for signage and lighting). One required action for any conversions is that the converted pavement cannot be marked simultaneously with a yellow taxiway centerline and a white runway designation number. Other remarking actions are listed below.

> **NOTE**: For airports subject to National Environmental Policy Act (NEPA) requirements, any proposal to use a taxiway as a runway should include a review of the potential environmental consequences of such an action. The airport operator should contact the FAA Airports Regional Office or Airports District Office for NEPA guidance.

a. Pavement used as a runway during the day should at a minimum be painted with the visual runway markings identified in table 1, i.e., the white landing designation number(s) and a white centerline. Furthermore, converted pavement used as a runway at night that is to be lighted should have runway lighting installed per AC 150/5345-30, Design and Installation Details for Airport Visual Aids.

b. If the pavement is to be used ONLY as a taxiway at night, blue edge lights should be installed per AC 150/5340-30.

c. In terms of documentation, airport operators must update their Airport Layout Plan as well as other appropriate documents to indicate the presence of the new runway. If the runway is to be used ONLY as a taxiway at night and has blue edge lighting, this runway must be listed as unlighted along with an appropriate annotation in both the Airport/Facility Directory (A/FD) and the Airport Master Record (FAA Form 5010) indicating the runway is closed to nighttime operations and that the blue lights are provided for taxiing aircraft.

d. Since the pavement is now considered a runway, any taxiways intersecting the designated runway must have appropriate runway holding position markings (including provisions for signage and lighting) painted per this AC and AC 150/5340-18 and AC 150/5340-30.

5.10. CLOSED OR ABANDONED AIRPORTS. When all runways are closed temporarily, the airport beacon is turned off and the runways are marked per paragraph 5.7. When an airport is abandoned and all runways are closed permanently, the runways are marked per paragraph 5.6, the airport beacon is disconnected, and an "X" is placed in the segmented circle or at a central location if no segmented circle exists. For additional details, see AC 150/5370-2.

5.11. HELIPORT MARKING. Information on marking for heliports is in AC 150/5390-2, Heliport Design.

5.12. VERTIPORT MARKING. Information on marking for vertiports is in AC 150/5390-3, Vertiport Design.

5.13. MARKING FOR ARRESTING GEAR. Information on marking for arresting gear is in AC 150/5220-9, Aircraft Arresting Systems on Civil Airports.

5.14. HAZARDOUS CONSTRUCTION AREAS. Marking of hazardous areas due to construction, in which no part of an aircraft may enter, are marked in accordance with AC 150/5370-2.

5.15. SECURITY IDENTIFICATION AND DISPLAY AREA (SIDA) MARKING. This marking is part of the airport operator's security program per Title 49 CFR 1542.205. See also the Transportation Security Administration Handbook, *Recommended Security Guidelines for Airport Planning, Design, and Construction,* for detailed guidance.

a. Purpose. The Security Identification Display Area (SIDA) marking is a boundary that prohibits the entry of unauthorized vehicles or personnel within the secured area. The SIDA boundary marking should be held to the smallest possible manageable size to provide the level of protection desired for the protected area or facility.

b. Location. The airport operator will determine the need for and the location(s) of the SIDA boundary marking. For example, the SIDA marking is necessary on an apron that is adjacent to air cargo areas.

c. Color. The SIDA marking is a rectangular stripe with white legends that are centered within a red background. Paint colors are per AC 150/5370-2, Item P-620, *Runway and Taxiway Painting.*

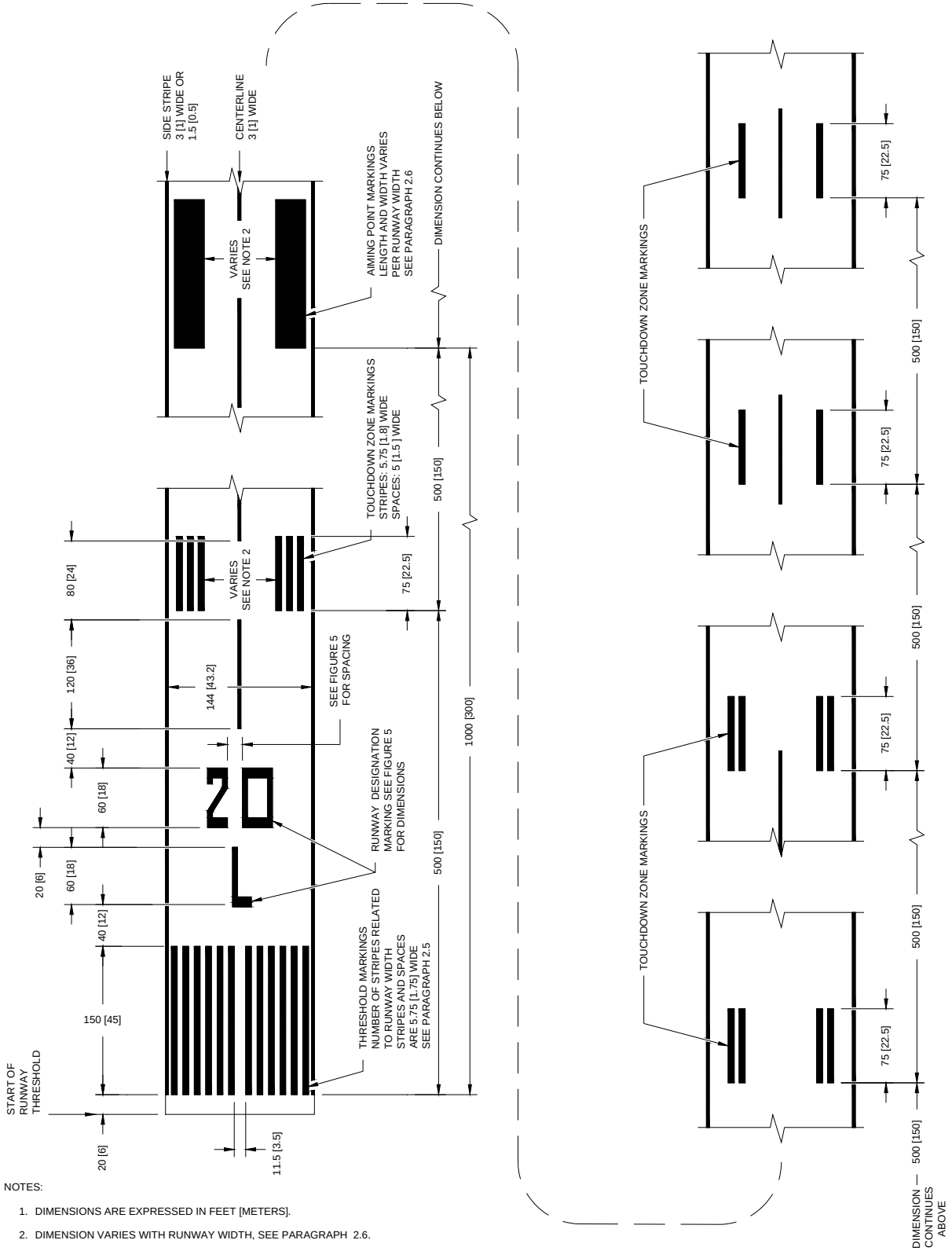
d. Characteristics. See figure C-15. The SIDA boundary stripe is 12 inches (30 cm) wide with 6-inch (15 cm) tall legends. The legend is centered within the boundary stripe so there is a 3- inch (8 cm) boundary between the top and bottom of the legend to the edges of the boundary stripe. The legend characters are to be scaled versions of the font in Appendix A.

(1) The legend message should read "**TSA RESTRICTED AREA**".

(2) The message along the SIDA boundary stripe should repeat at a minimum every 50 feet (15 m).

(3) For dark-colored pavements, the red stripe should be enhanced with a 6-inch (15 cm) white outline.

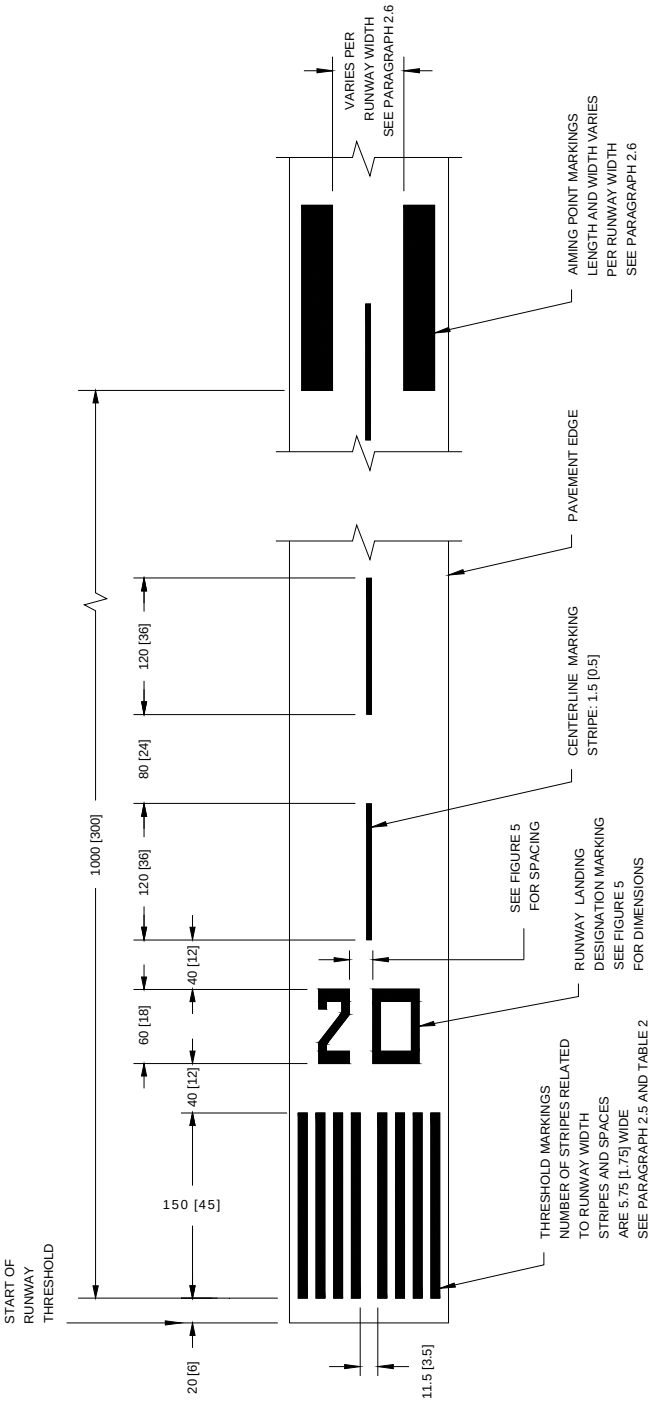
All drawings in the following figures are AUTOCAD drawings that can be viewed as scaled versions in Microsoft Word or Acrobat Reader. In some figures, details may appear to be missing when viewed on a computer screen. To view the details of these figures, use the appropriate zoom function in Microsoft Word or your Acrobat Reader.



NOTES:

1. DIMENSIONS ARE EXPRESSED IN FEET [METERS].
2. DIMENSION VARIES WITH RUNWAY WIDTH, SEE PARAGRAPH 2.6.

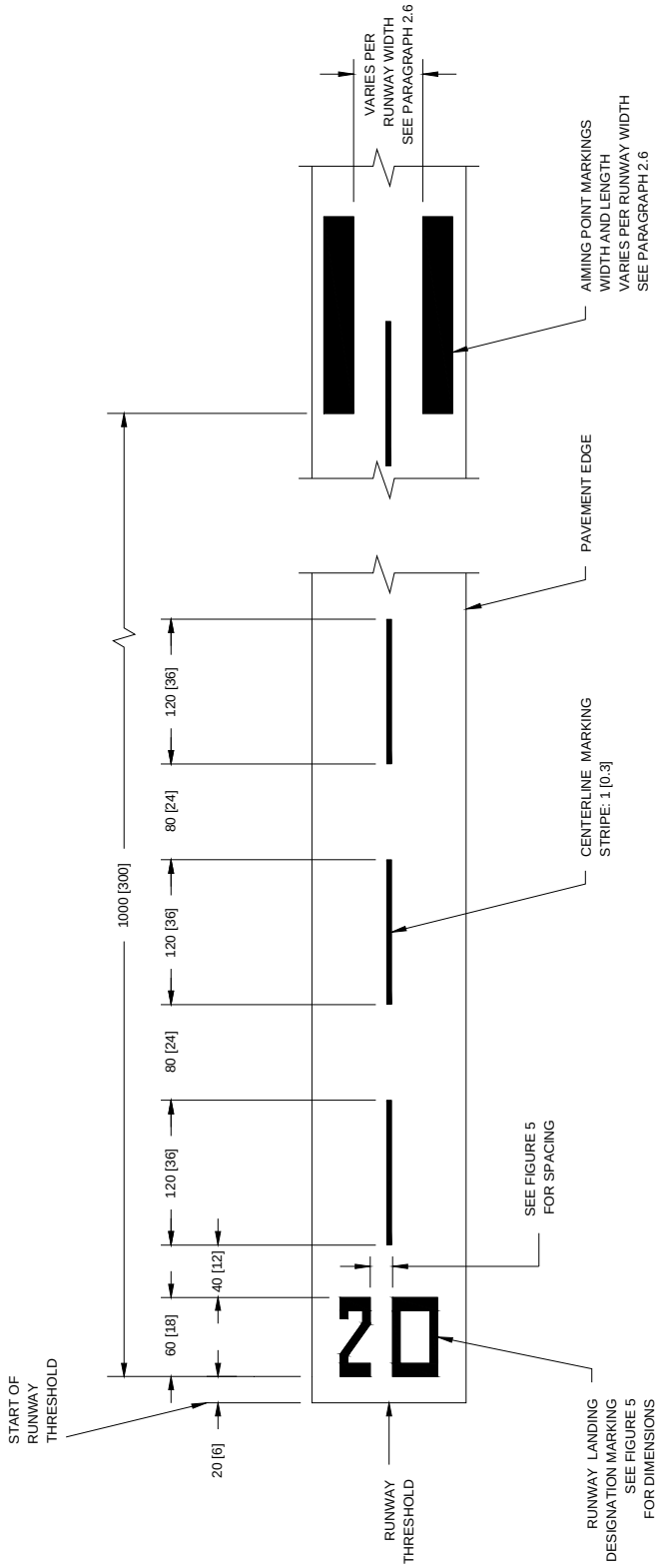
Figure 1. Precision Runway Markings



NOTES:

1. DIMENSIONS ARE EXPRESSED IN FEET [METERS].

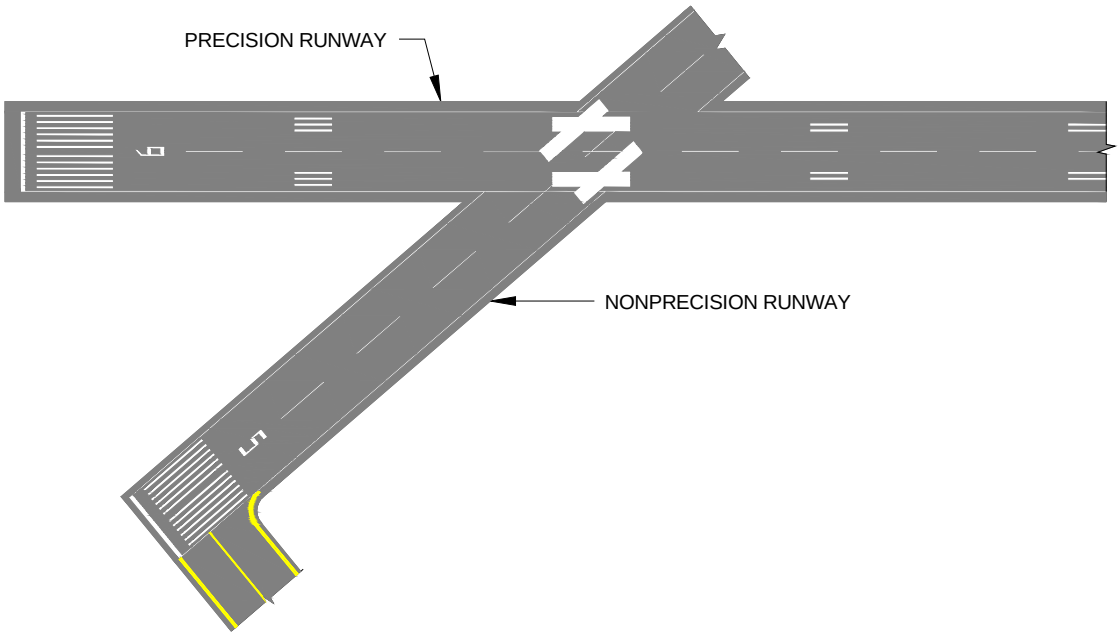
Figure 2. Non-precision Runway



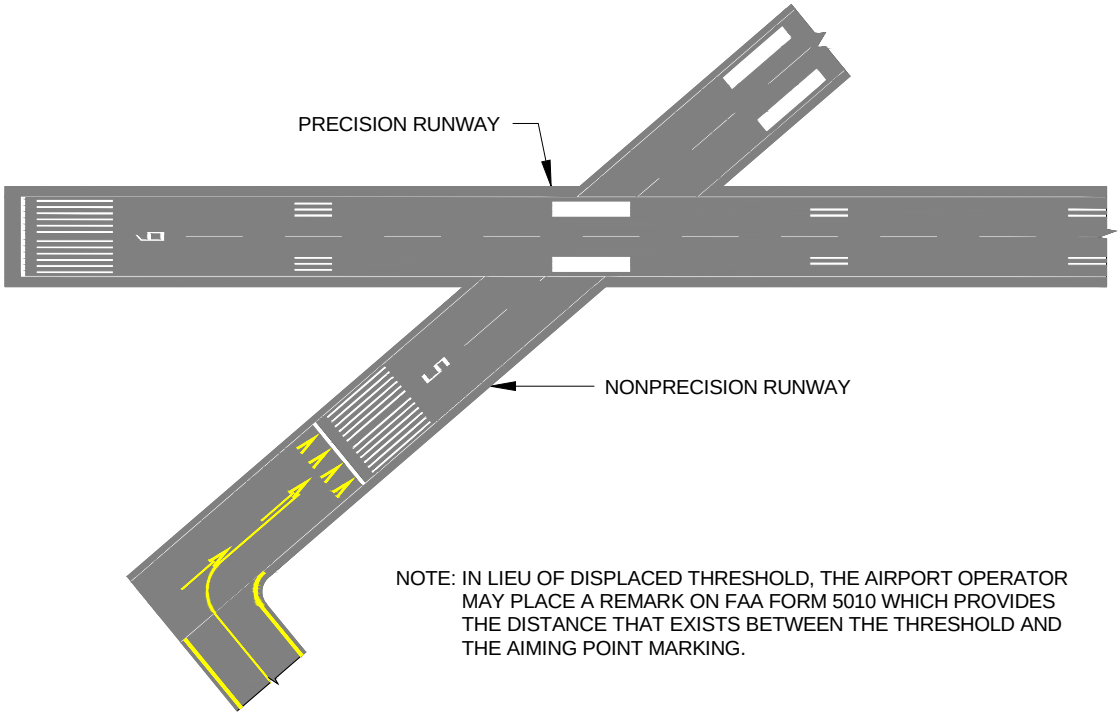
NOTES:

1. DIMENSIONS ARE EXPRESSED IN FEET [METERS].

Figure 3. Visual Runway Markings

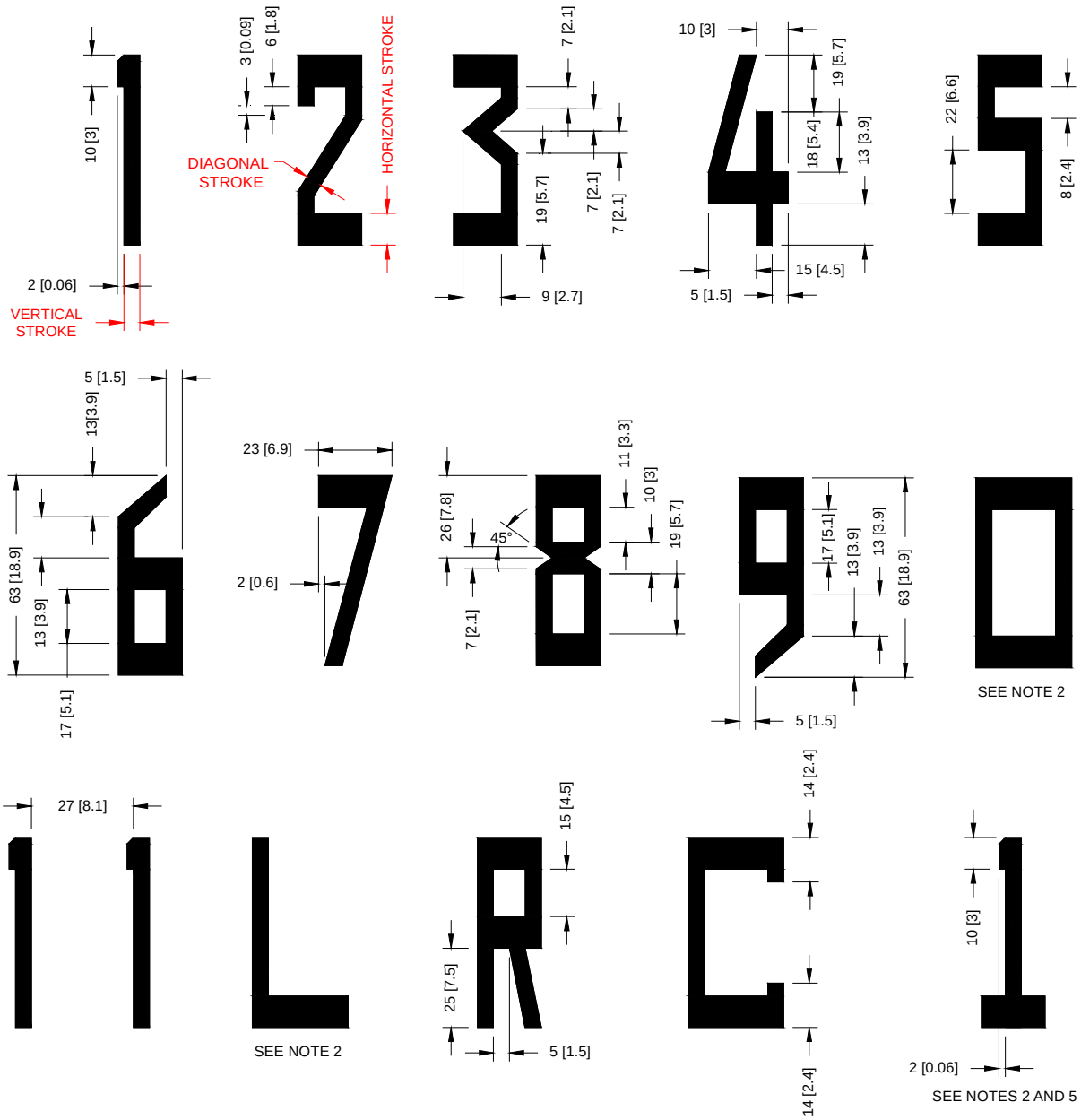


EXAMPLE OF CONFLICTING RUNWAY MARKINGS



ONE SOLUTION:
THRESHOLD AND AIMING POINT OF THE LOWER PRECEDENCE RUNWAY DISPLACED TO MAINTAIN THE REQUIRED DISTANCE FROM THE AIMING MARKING TO THE THRESHOLD

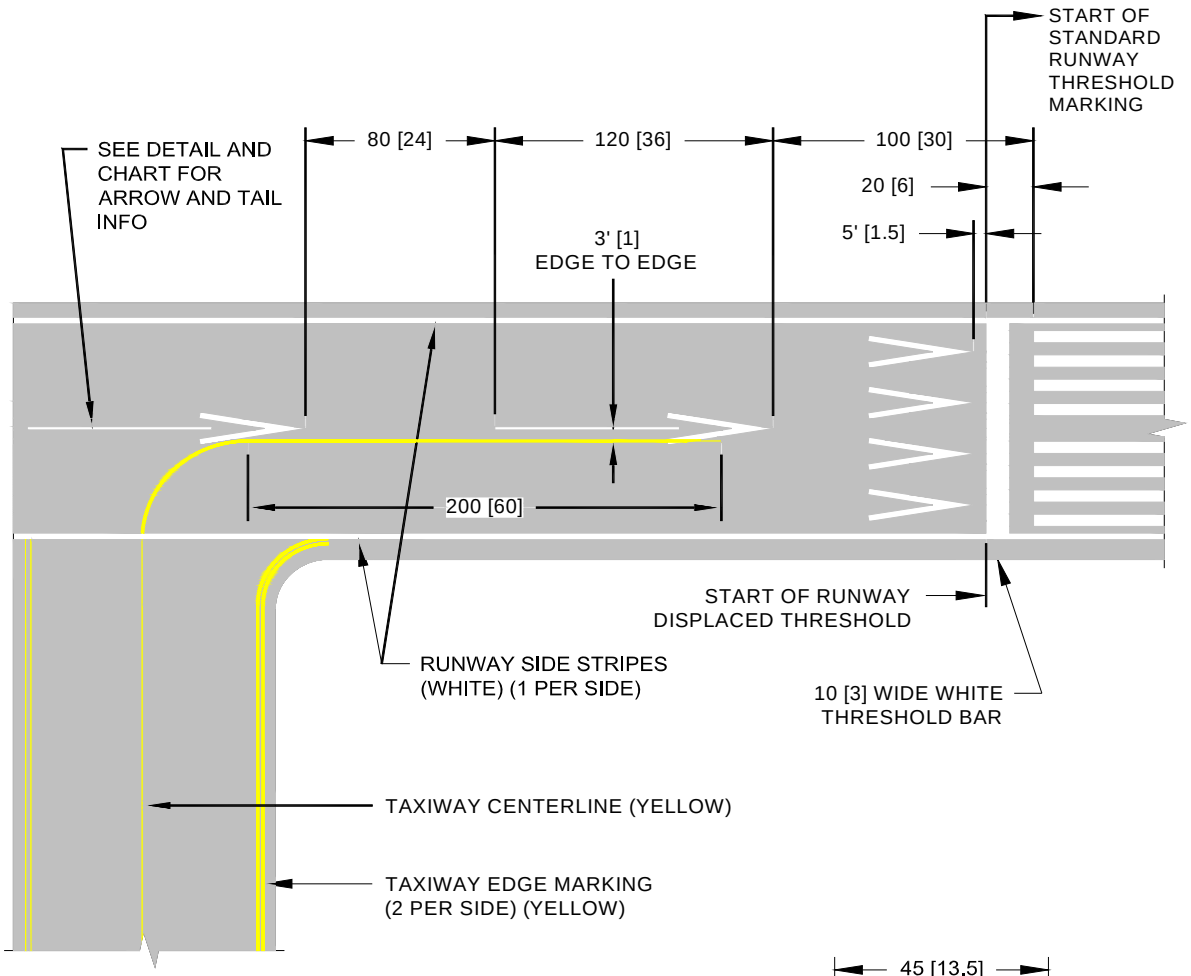
Figure 4. Example of Conflicting Markings on Crossing Runways

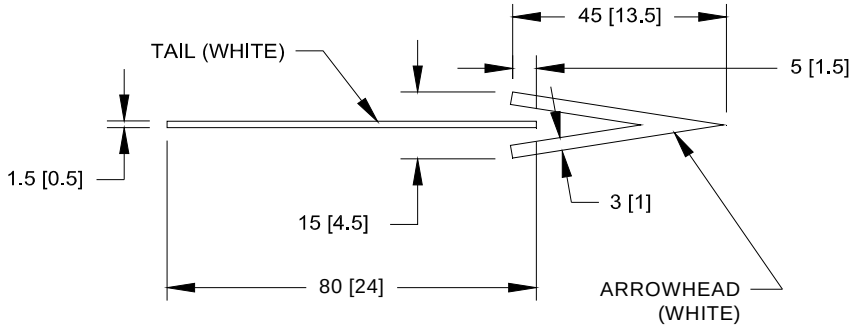


NOTES :

1. DIMENSIONS ARE EXPRESSED: FEET [METERS].
2. ALL CHARACTERS SHALL HAVE THESE CHARACTERISTICS (UNLESS OTHERWISE SPECIFIED):
   60 [18] HIGH
   20 [6] WIDE
   VERTICAL STROKE OF 5 [1.5]
   HORIZONTAL STROKE OF 10 [30]
   DIAGONAL STROKE OF 5 [1.5]
3. ALL NUMERALS EXCEPT THE NUMBER ELEVEN AS SHOWN ARE HORIZONTALLY SPACED 15 [4.5] APART.
4. SINGLE DIGITS MUST NOT BE PRECEDED BY A ZERO.
5. THE NUMERAL "1", WHEN USED ALONE, CONTAINS A HORIZONTAL STROKE AS SHOWN TO DIFFERENTIATE IT FROM THE RUNWAY CENTERLINE MARKING.
6. SINGLE DESIGNATIONS ARE CENTERED ON THE RUNWAY PAVEMENT CENTERLINE. FOR DOUBLE DESIGNATIONS, THE CENTER OF THE OUTER EDGES OF THE TWO NUMERALS IS IS CENTERED ON THE RUNWAY PAVEMENT CENTERLINE.
7. WHERE THE RUNWAY DESIGNATION CONSISTS OF A NUMBER AND A LETTER, THE NUMBER AND LETTER ARE LOCATED ON THE RUNWAY CENTERLINE IN A STACKED ARRANGEMENT AS SHOWN IN FIGURE 1.

Figure 5. Runway Designation Numerals and Letters



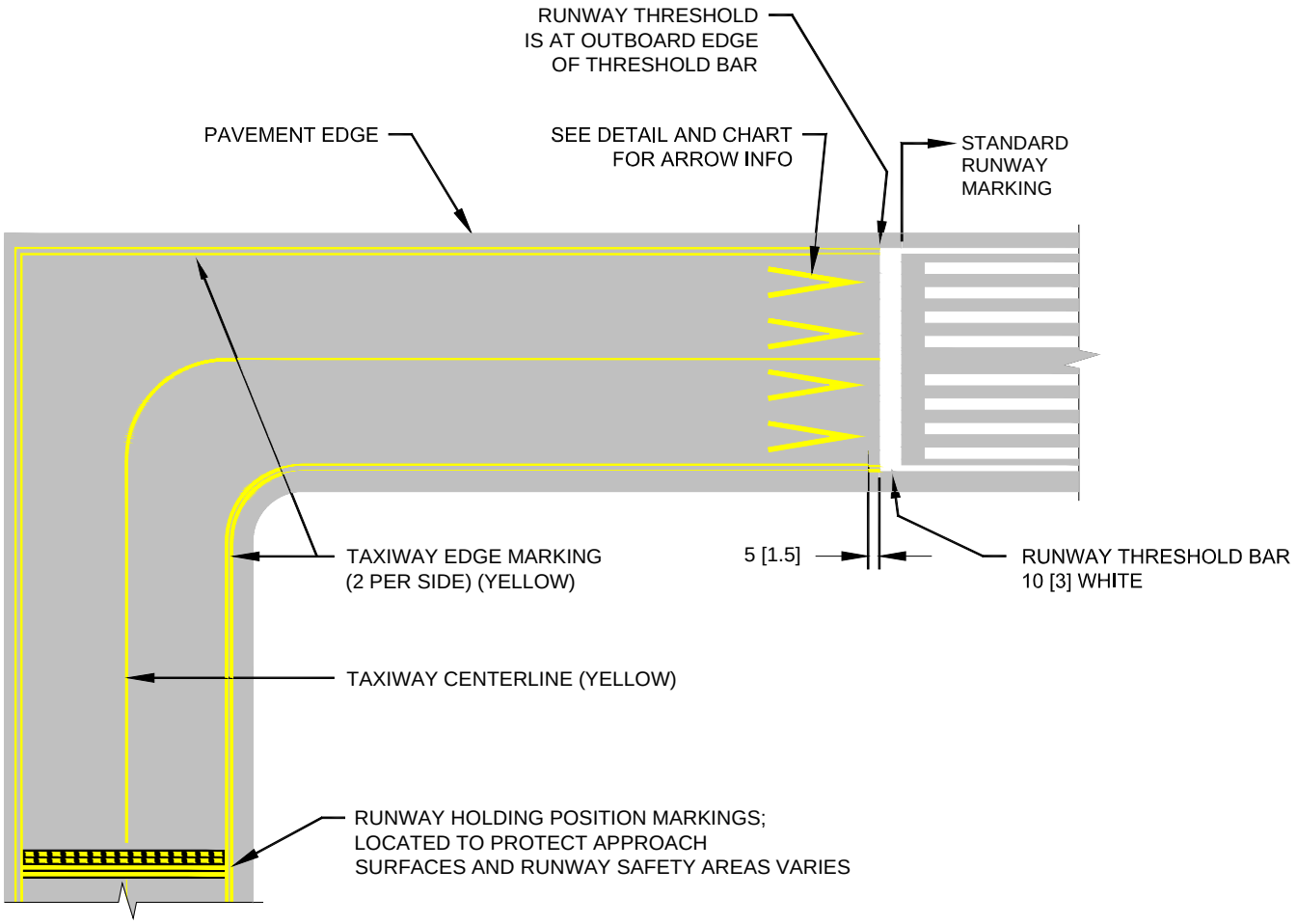


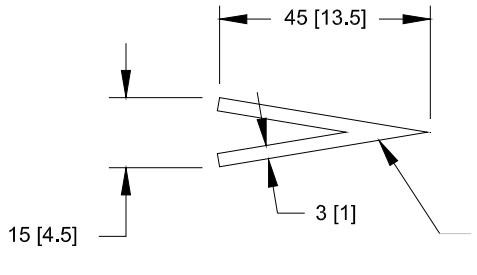
NOTES:

1. DIMENSIONS ARE IN: FEET [METERS]
2. RUNWAY SIDE STRIPES, WHEN USED ON THE RUNWAY, EXTEND INTO THE DISPLACED AREA.
3. RUNWAY MARKINGS (EXCEPT HOLDING POSITION MARKINGS) INCLUDING THOSE IN THE DISPLACED THRESHOLD ARE WHITE.

RUNWAY WIDTH	NUMBER OF ARROWHEADS	SPACING BETWEEN ARROWHEADS (W = RUNWAY WIDTH)	SPACING TO RUNWAY EDGE
≥ 100 [30]	4	W/4	W/8
< 100 [30]	3	W/3	W/6
< 60 [18]	2	W/2	W/4

Figure 6. Displaced Threshold Markings



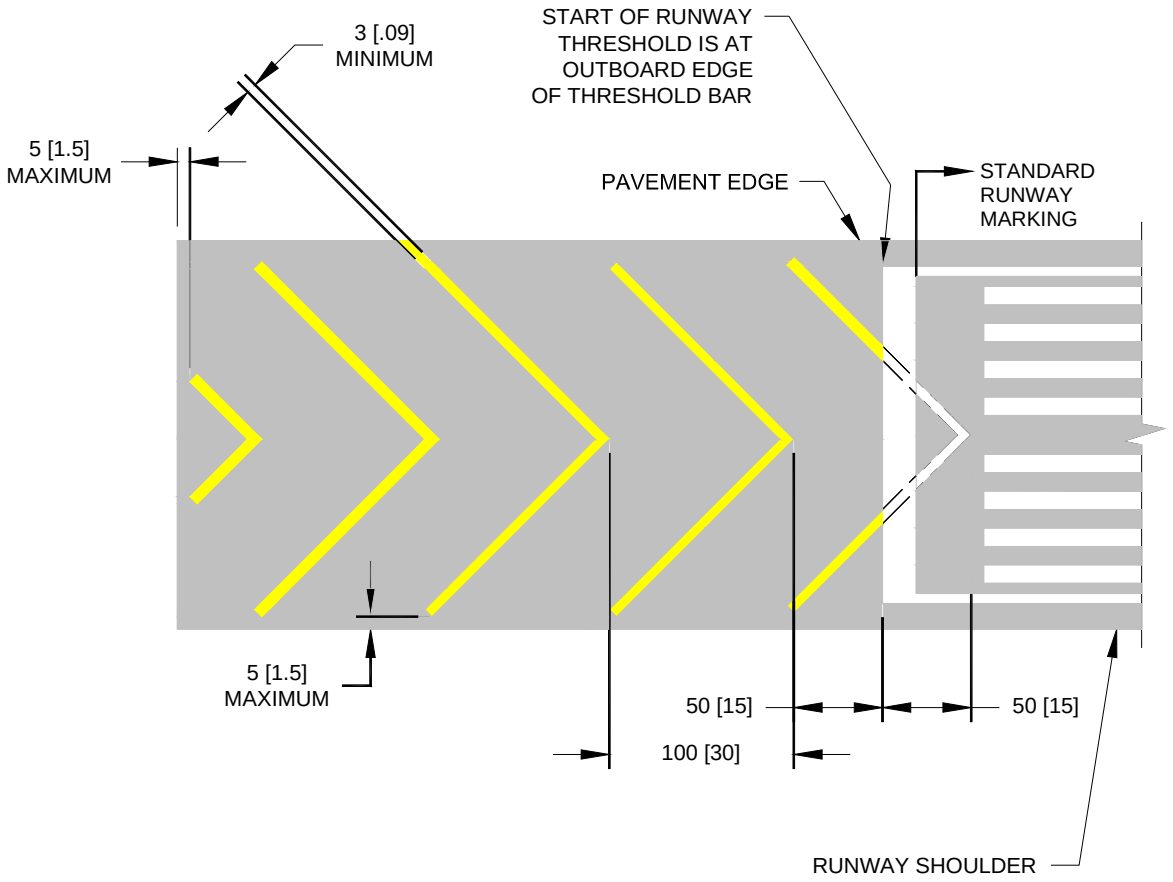


NOTES:

1. DIMENSIONS ARE IN:
   FEET [METERS]

RUNWAY WIDTH	NUMBER OF ARROWHEADS	SPACING BETWEEN ARROWHEADS (W = RUWNAY WIDTH)	SPACING TO RUNWAY EDGE
≥ 100 [30]	4	W/4	W/8
< 100 [30]	3	W/3	W/6
< 60 [18]	2	W/2	W/4

Figure 7. Marking for Aligned Taxiway with Runway without a Displaced Threshold



NOTES:

1. DIMENSIONS ARE IN: FEET [METERS].

2. THE WIDTHS OF THE STOPWAYS AND BLAST PADS ARE NOT THE SAME. STOPWAYS EQUAL RUNWAY WIDTH. BLAST PADS EQUAL RUNWAY WIDTH PLUS RUNWAY SHOULDERS. SEE AC 150/5300-13

3. 50 FT [15M] SPACING MAY BE USED WHEN LENGTH OF AREA IS LESS THAN 250 FT [7.5M] IN WHICH CASE THE FIRST FULL CHEVRON STARTS AT THE INDEX POINT (INTERSECTION OF RUNWAY CENTERLINE AND RUNWAY THRESHOLD).

4. CHEVRONS ARE PAINTED YELLOW AND AT AN ANGLE OF 45° TO THE RUNWAY CENTERLINE.

5. CHEVRON SPACING MAY BE DOUBLED IF LENGTH OF AREA EXCEEDS 1000 FT [300M]

Figure 8. Markings for Blast Pads and Stopways

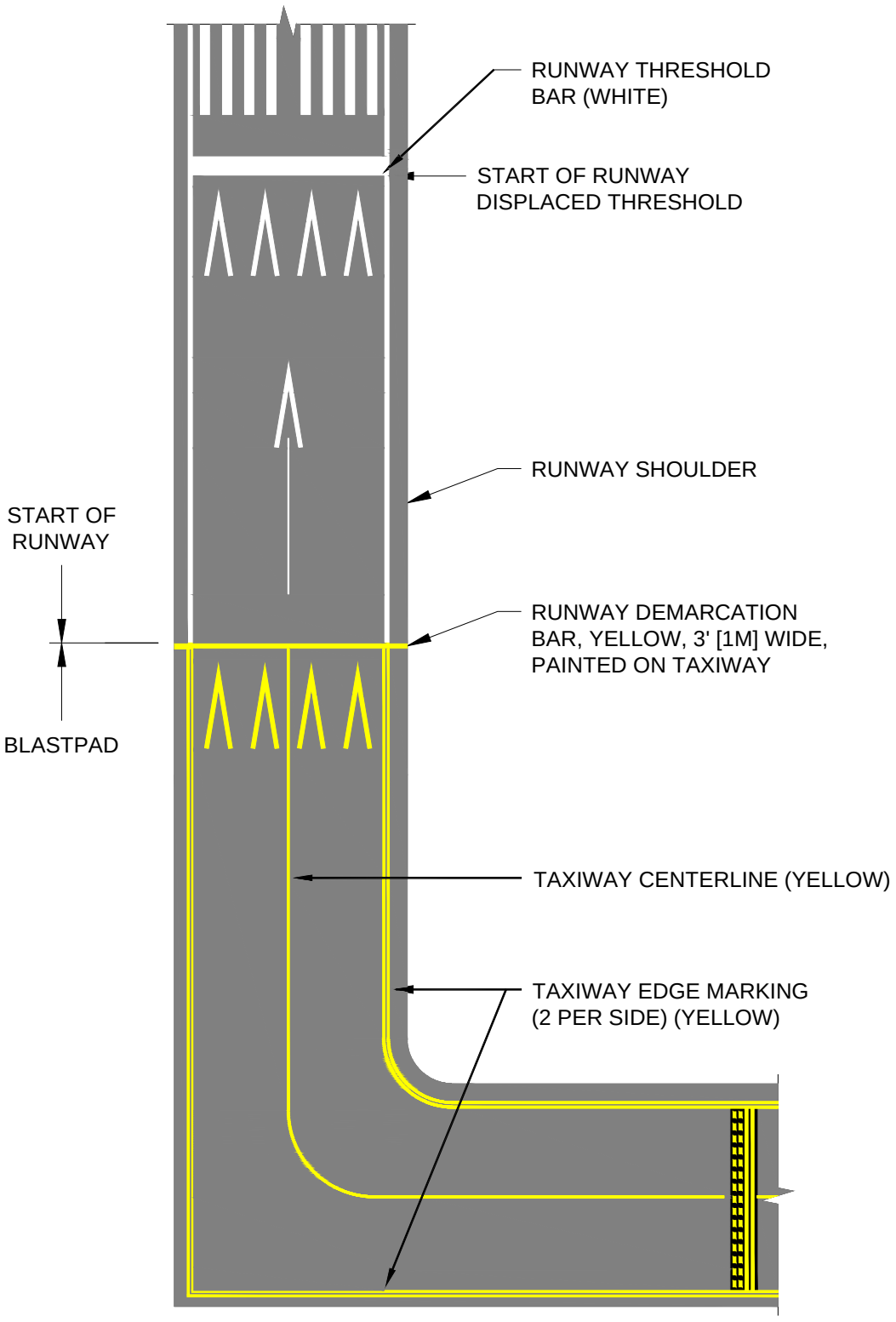
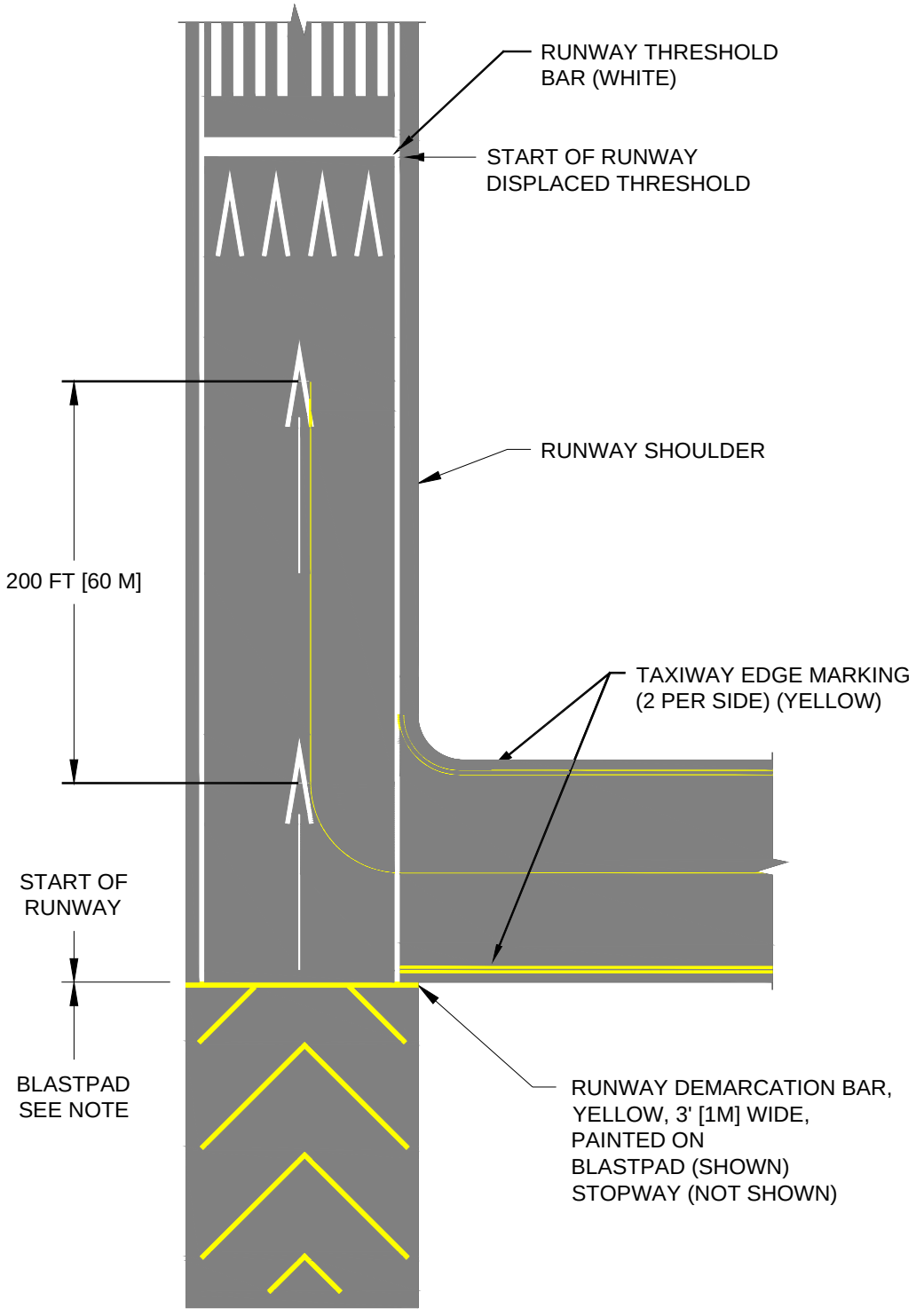


Figure 9. Markings for Aligned Taxiway Preceding a Displaced Threshold



NOTE: STOPWAY WIDTH EQUALS RUNWAY WIDTH.
BLASTPAD WIDTH EQUALS RUNWAY WIDTH PLUS RUNWAY SHOULDERS.

Figure 10. Markings for Blast Pad Preceding a Displaced Threshold

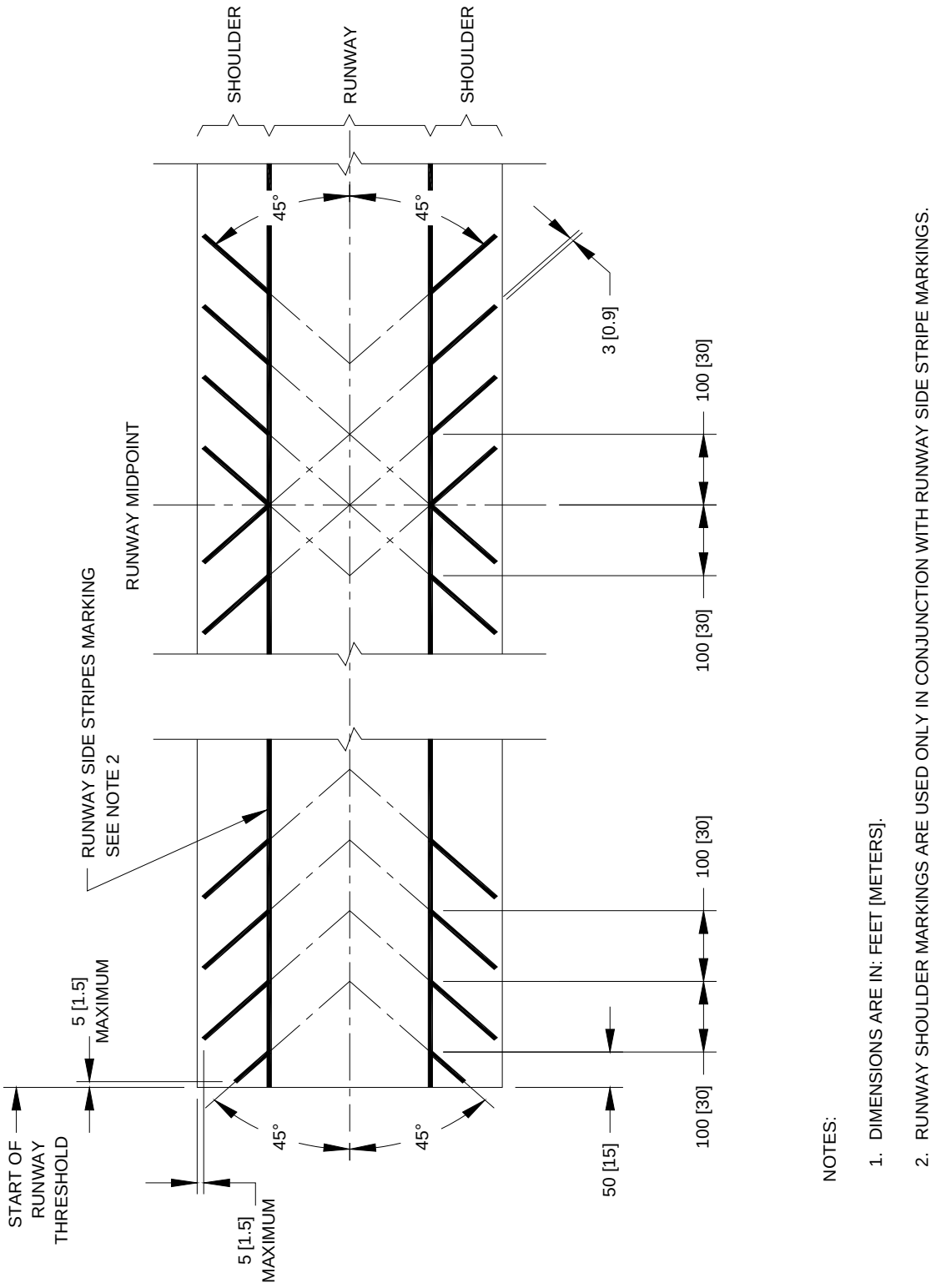
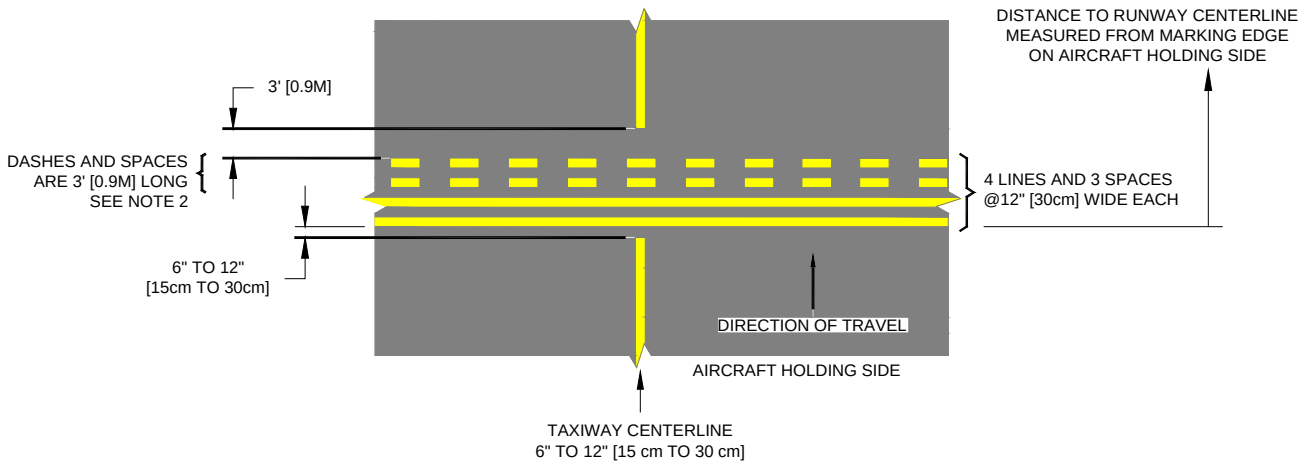
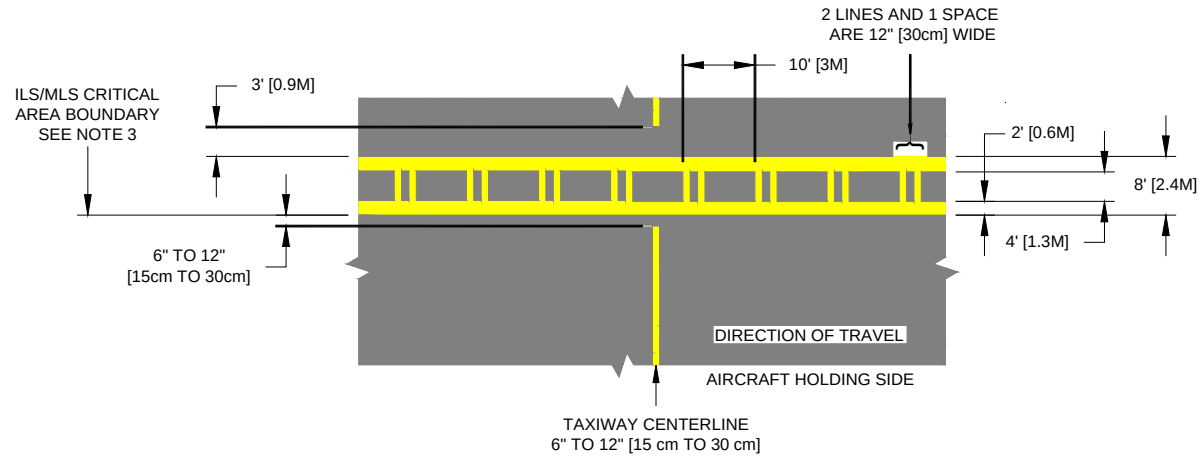


Figure 11. Runway Shoulder Markings



PATTERN A - RUNWAY HOLDING POSITION MARKING

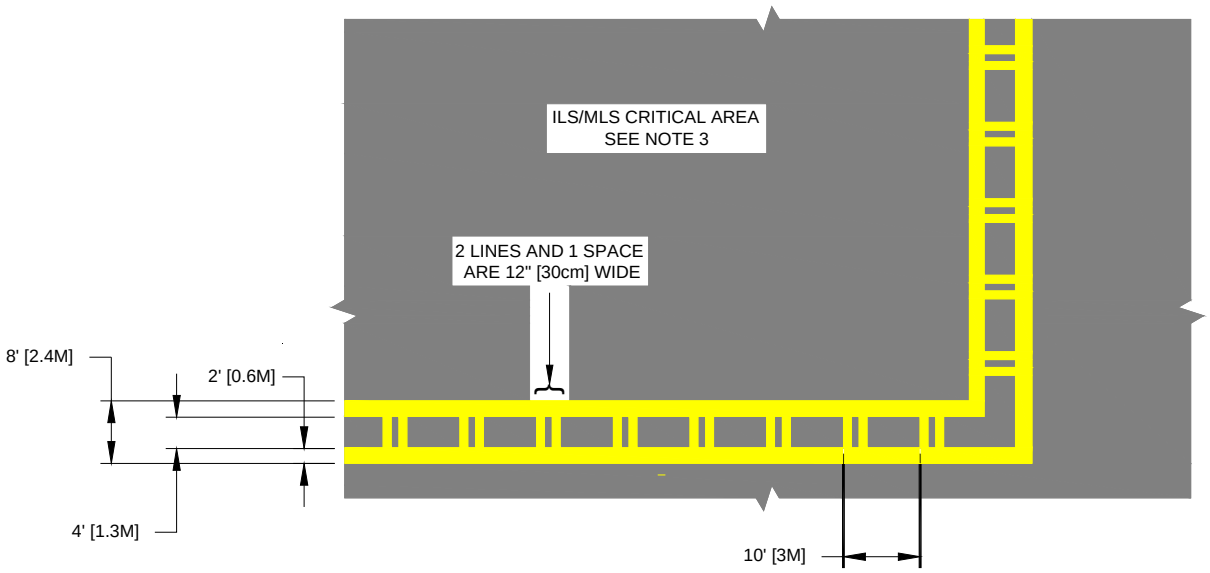


PATTERN B - ILS/MLS HOLDING POSITION MARKING

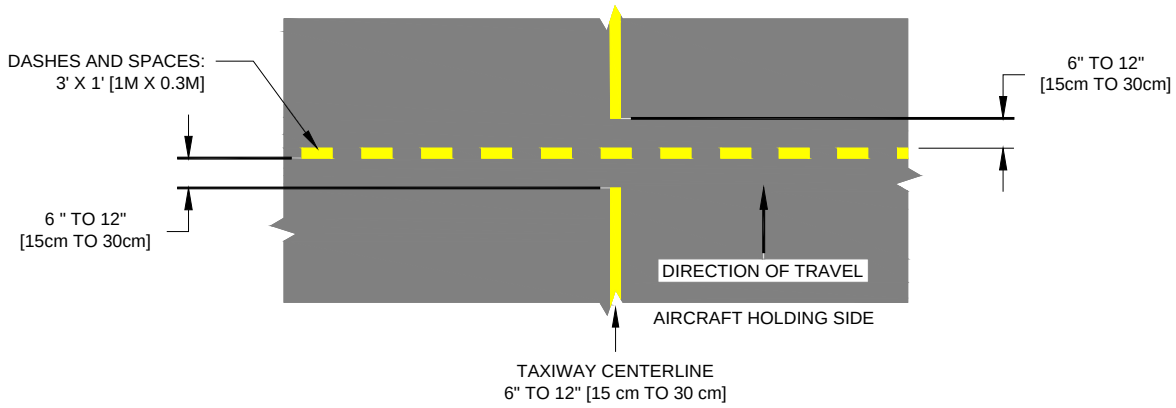
NOTES:

1. UNLESS OTHERWISE NOTED ALL LINES ARE YELLOW.
2. SEE PARAGRAPH 3.3 FOR REDUCTIONS.
3. SEE PARAGRAPH 3.4 FOR REDUCTIONS.
4. DIMENSIONS SHOWN DO NOT ACCOUNT FOR OUTLINE MARKING IN BLACK PAINT WHEN ON LIGHT-COLORED PAVEMENT. SEE PARAGRAPH 1.4 AND APPENDIX B.

Figure 12. Holding Position Marking Details



PATTERN C - POFZ MARKING

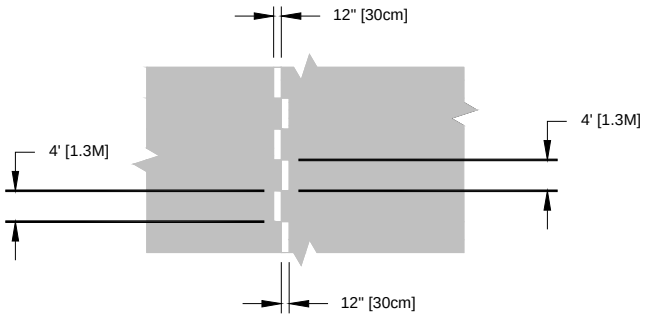


PATTERN D - INTERMEDIATE HOLDING POSITION MARKING FOR TAXIWAY/TAXIWAY INTERSECTIONS

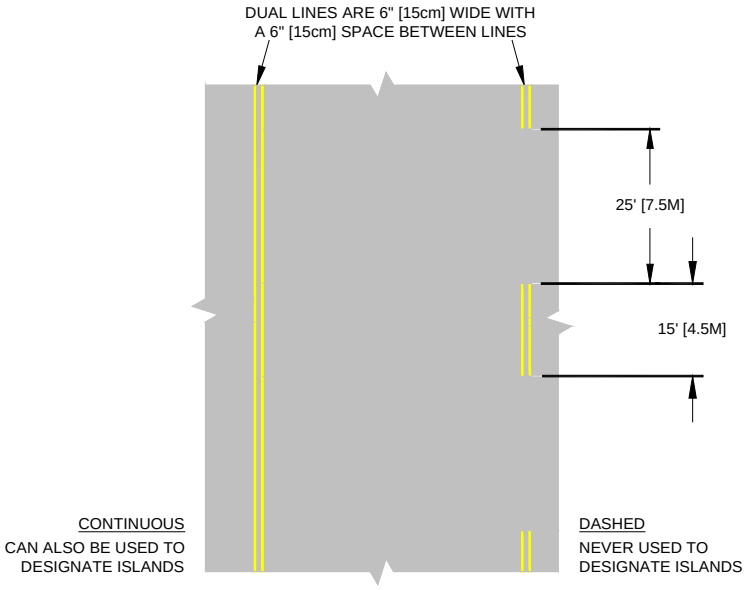
NOTES:

1. UNLESS OTHERWISE NOTED ALL LINES ARE YELLOW.
2. DIMENSIONS SHOWN DO NOT ACCOUNT FOR OUTLINE MARKING IN BLACK PAINT WHEN ON LIGHT-COLORED PAVEMENT. SEE PARAGRAPH 1.4 AND APPENDIX B.

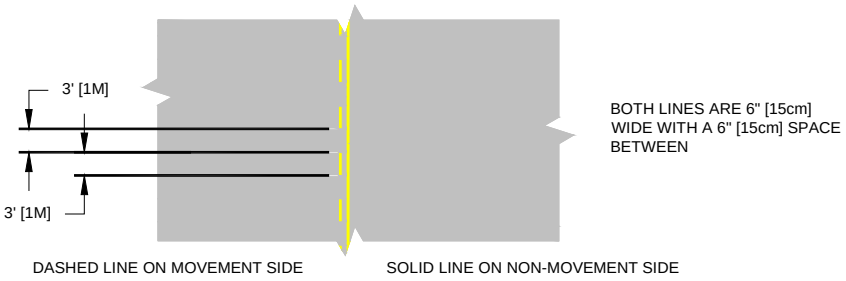
Figure 12a. Holding Position Marking Details



ROADWAY EDGE STRIPES, WHITE, ZIPPER STYLE



TAXIWAY EDGE MARKINGS - 2 CASES



NON-MOVEMENT AREA MARKINGS

NOTES:

1. UNLESS OTHERWISE NOTED ALL LINES ARE YELLOW.

2. DIMENSIONS SHOWN DO NOT ACCOUNT FOR BLACK OUTLINE OF ENHANCED TAXIWAY MARKING. SEE PARAGRAPH 1.4 AND APPENDIX B.

Figure 13. Taxiway Markings

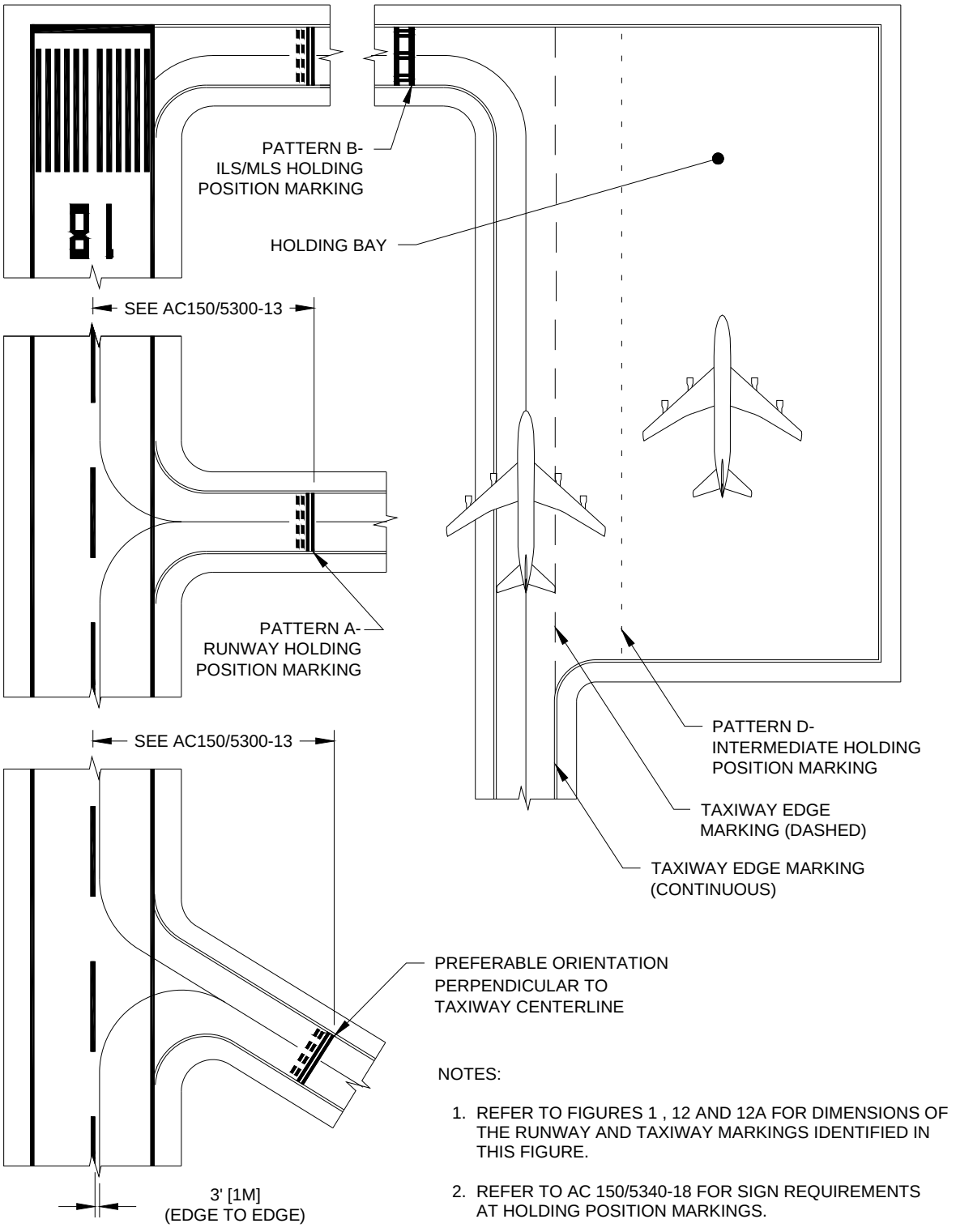
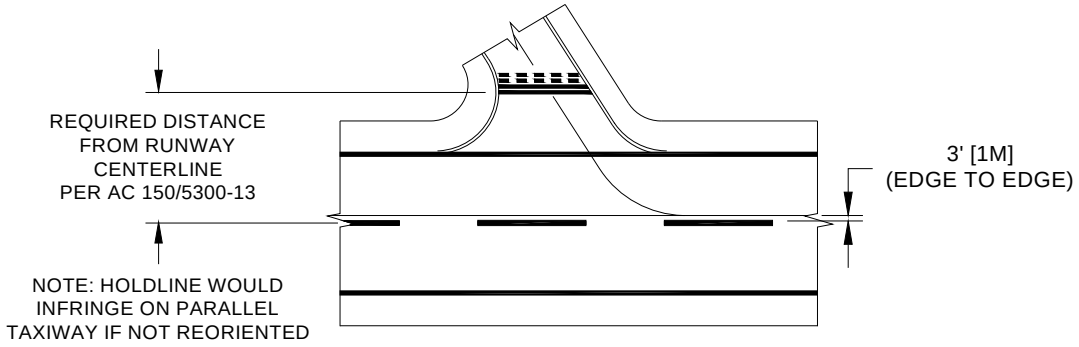
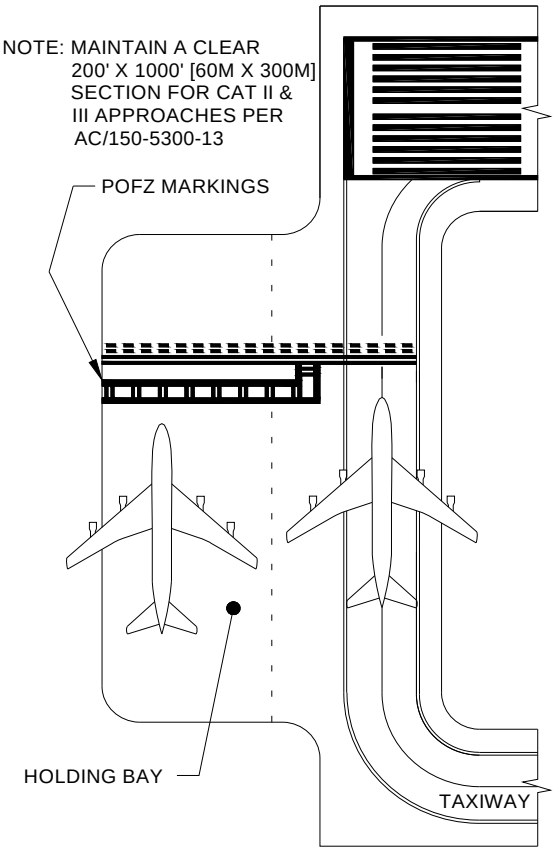


Figure 14. Taxiway Markings



EXAMPLE OF PATTERN A HOLDING POSITION MARKINGS NOT AT RIGHT ANGLE TO TAXIWAY CENTERLINE. THE PREFERABLE ORIENTATION (FIGURE 14) IS TO BE PERPENDICULAR TO THE TAXIWAY CENTERLINE. HOWEVER, WHEN THE ANGLE IS VERY ACUTE, AND PART OF THE AIRCRAFT IS IN THE RUNWAY SAFETY AREA, USE THIS METHOD

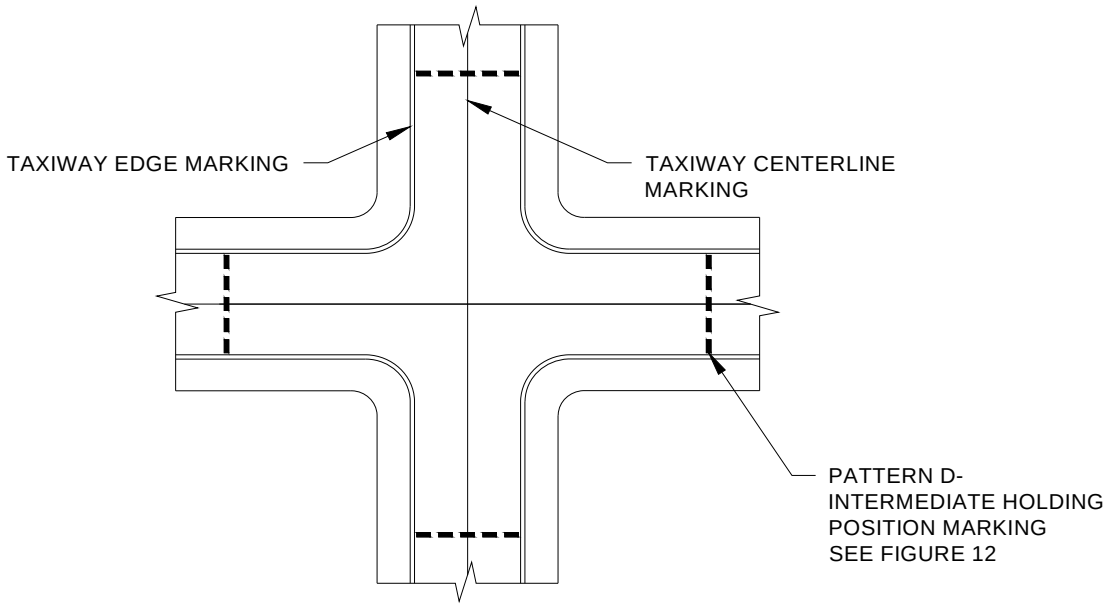


NOTES:

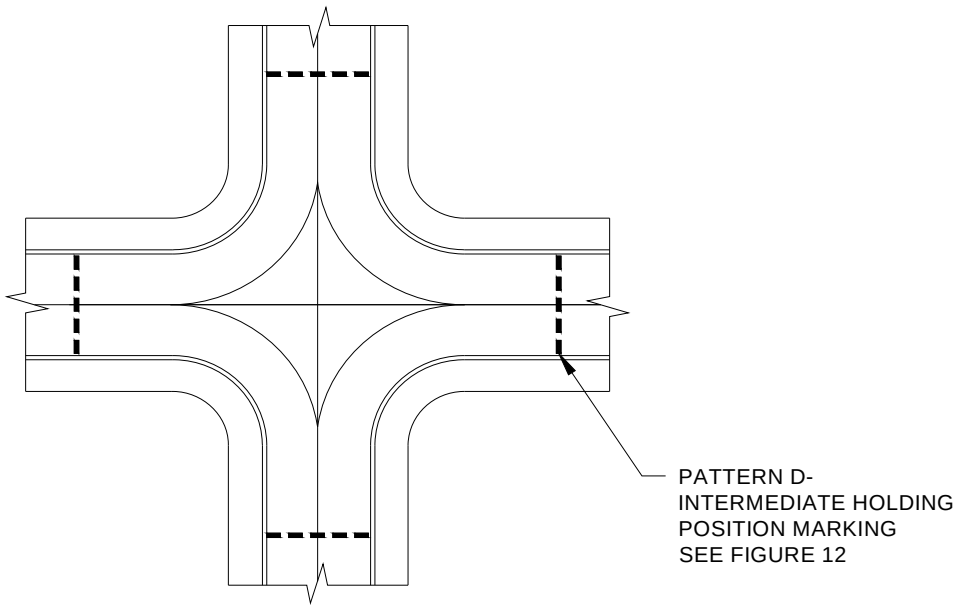
1. REFER TO FIGURES 1, 12 AND 12A FOR DIMENSIONS OF THE RUNWAY AND TAXIWAY MARKINGS IDENTIFIED IN THIS FIGURE.
2. REFER TO AC 150/5340-18 FOR SIGN REQUIREMENTS AT HOLDING POSITION MARKINGS.

EXAMPLE WHERE PATTERN C POFZ HOLDING POSITION MARKINGS EXTENDING ACROSS HOLDING BAY

Figure 15. Taxiway Markings



TAXIWAY CENTERLINE MARKING AT INTERSECTION HAVING LESS THAN STANDARD FILLETS AND REQUIRING JUDGMENTAL OVERSTEERING



TAXIWAY CENTERLINE MARKING AT INTERSECTION HAVING STANDARD FILLETS PERMITTING COCKPIT-OVER-CENTERLINE STEERING (RECOMMENDED)

NOTE: REFER TO FIGURE 11 and 12 FOR DIMENSIONS OF THE TAXIWAY MARKING IDENTIFIED IN THIS FIGURE.

Figure 16. Methods for Taxiway Centerline Marking

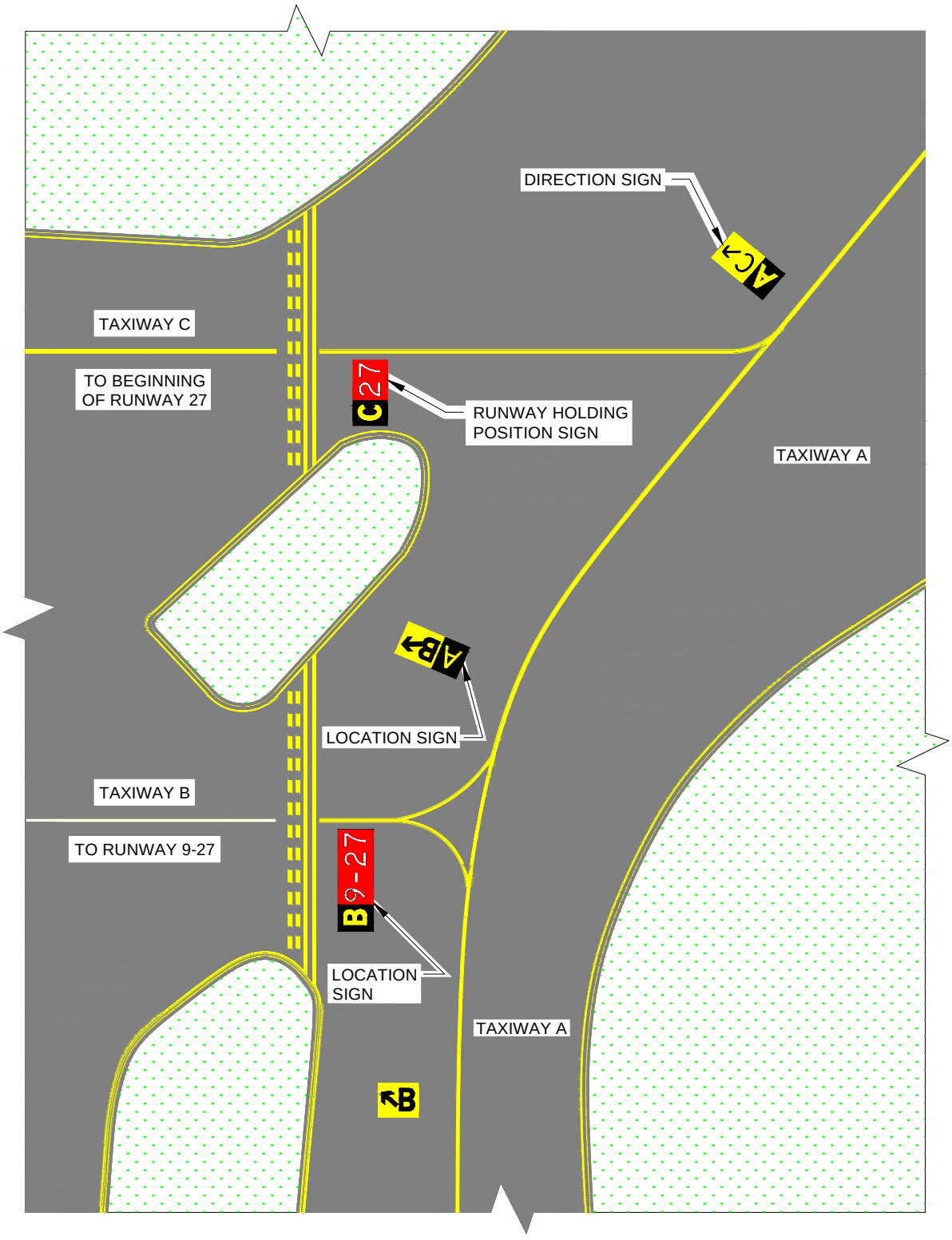


Figure 17. Surface Painted Signs

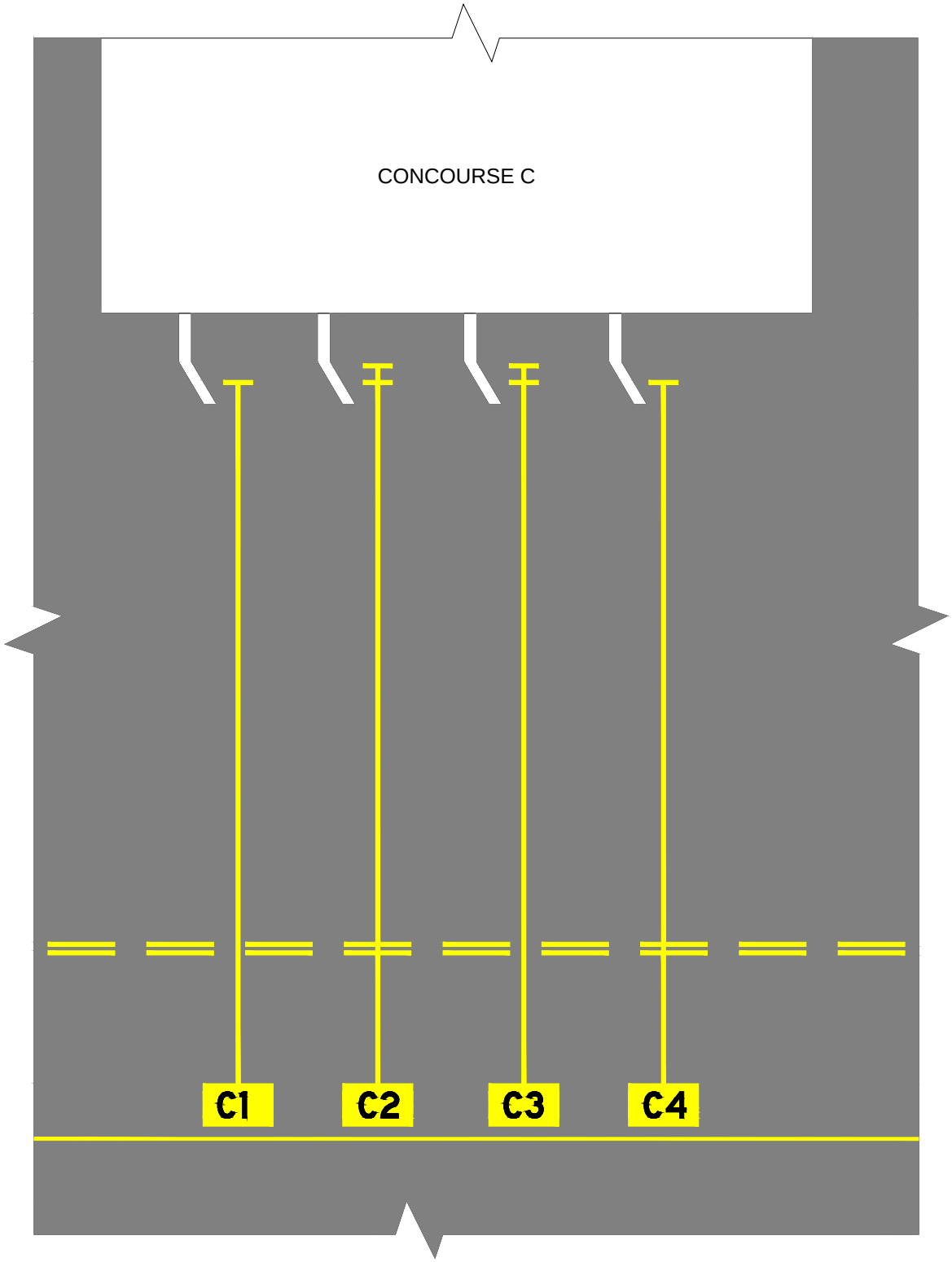


Figure 18. Surface Painted Gate Identification Signs

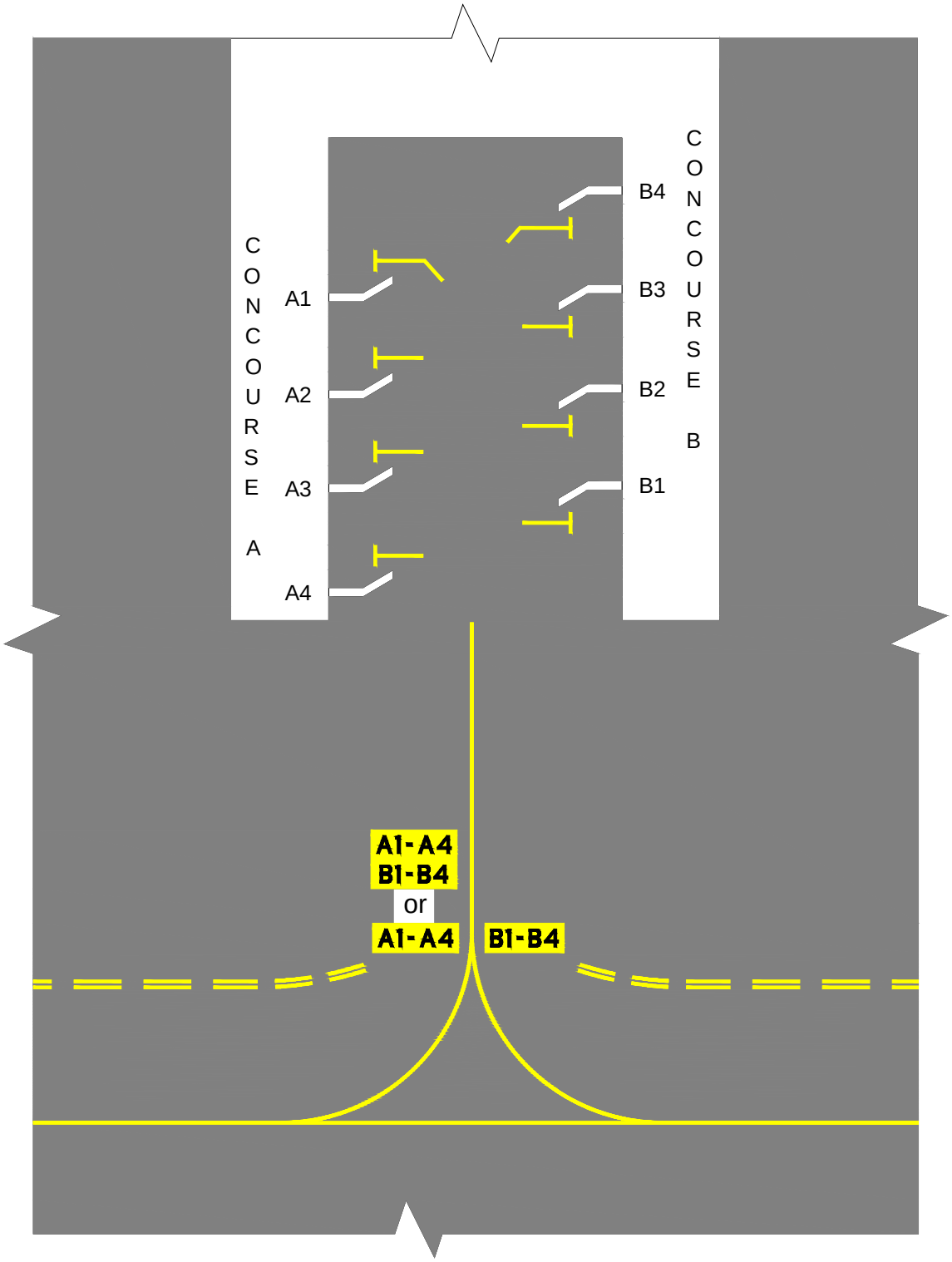
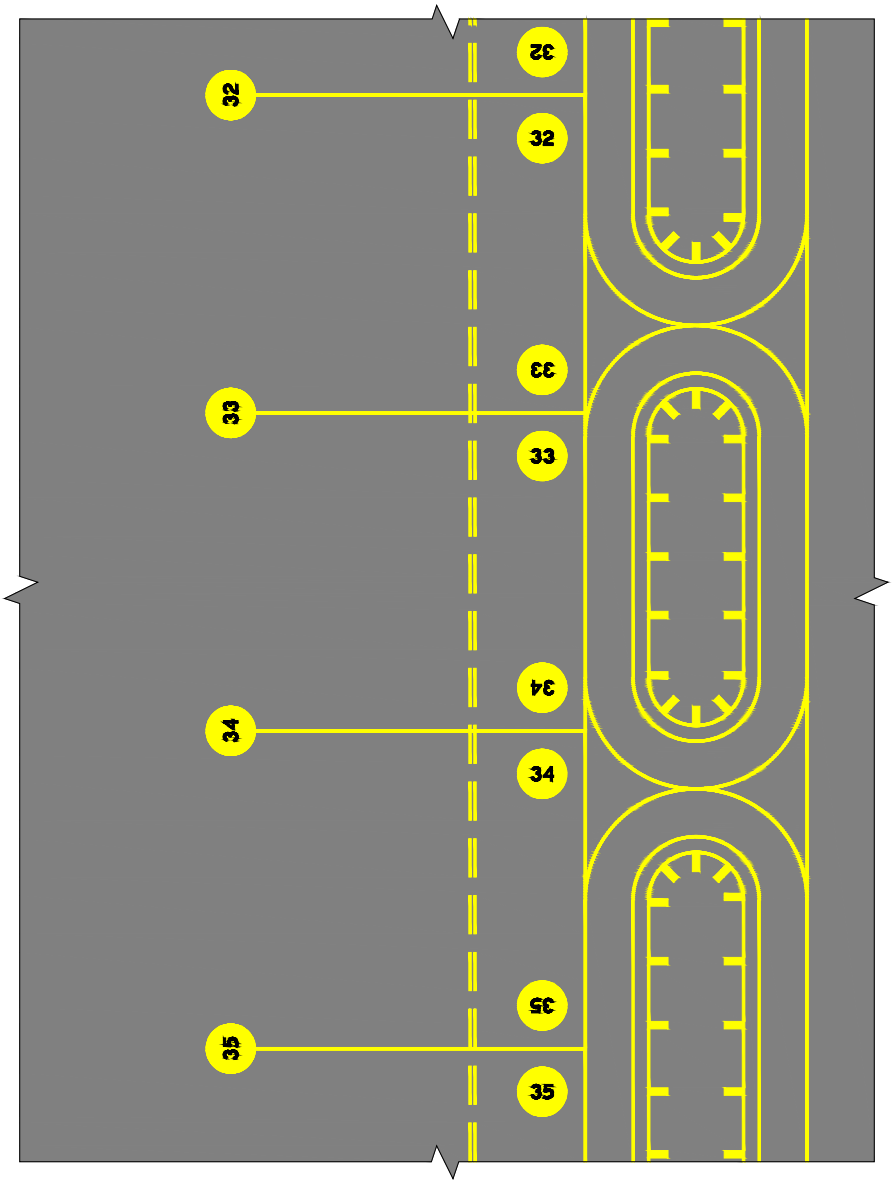
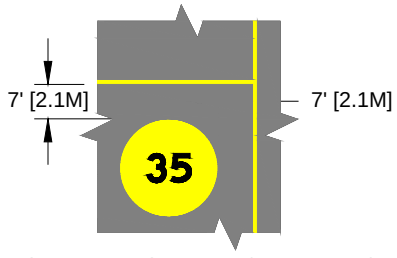


Figure 19. Multiple Gate Signs



NOTE:
CENTERLINE AT APRON ENTRANCE POINT LOCATIONS MAY BE MARKED WITH A RADIUS MARKING RATHER WITH A "T" CONFIGURATION AS SHOWN.



MEASUREMENTS ARE FROM THE EDGE OF CENTERLINE TO EDGE OF SIGN.

Figure 20. Surface Painted Apron Entrance Point Signs

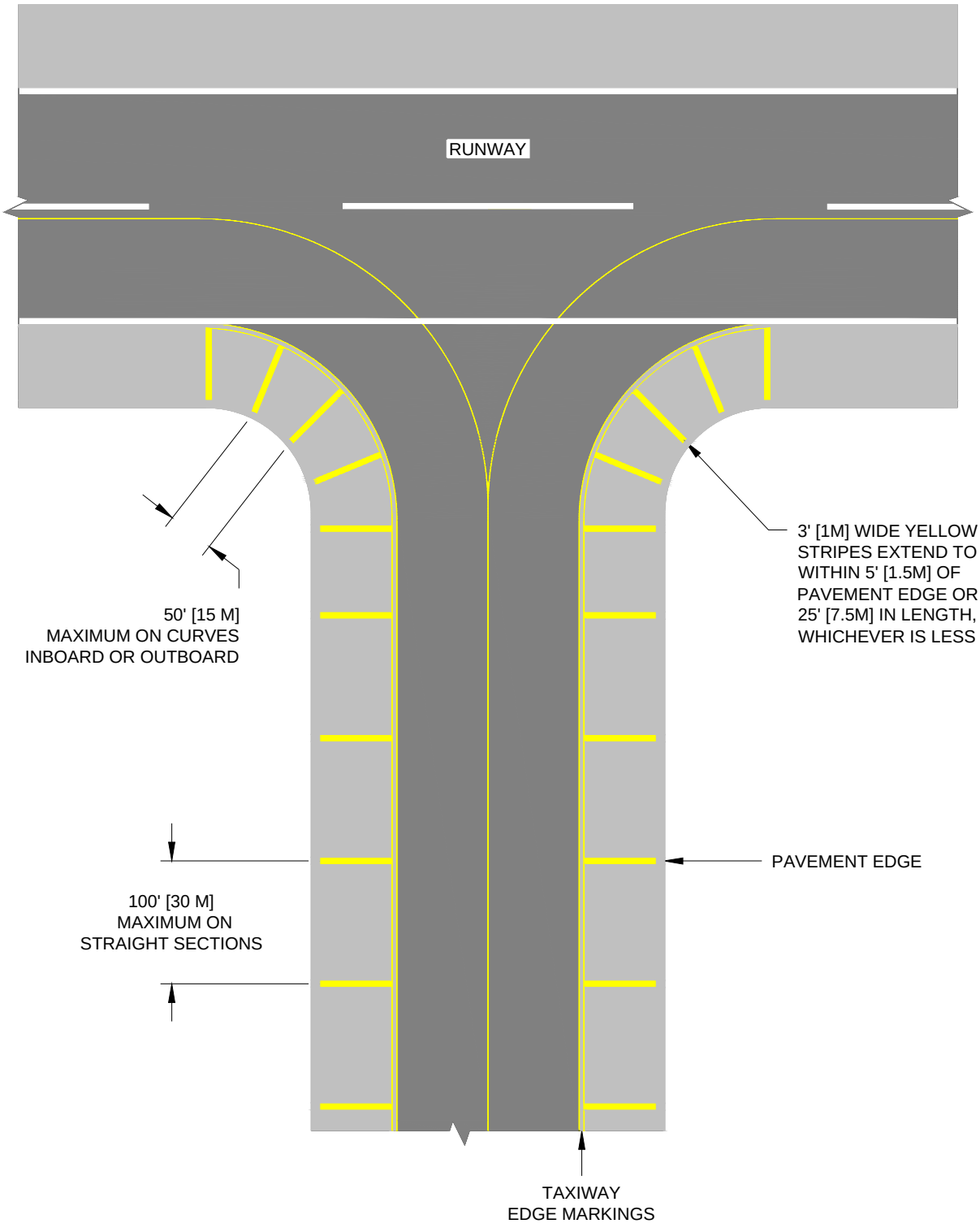


Figure 21. Taxiway Shoulder Markings

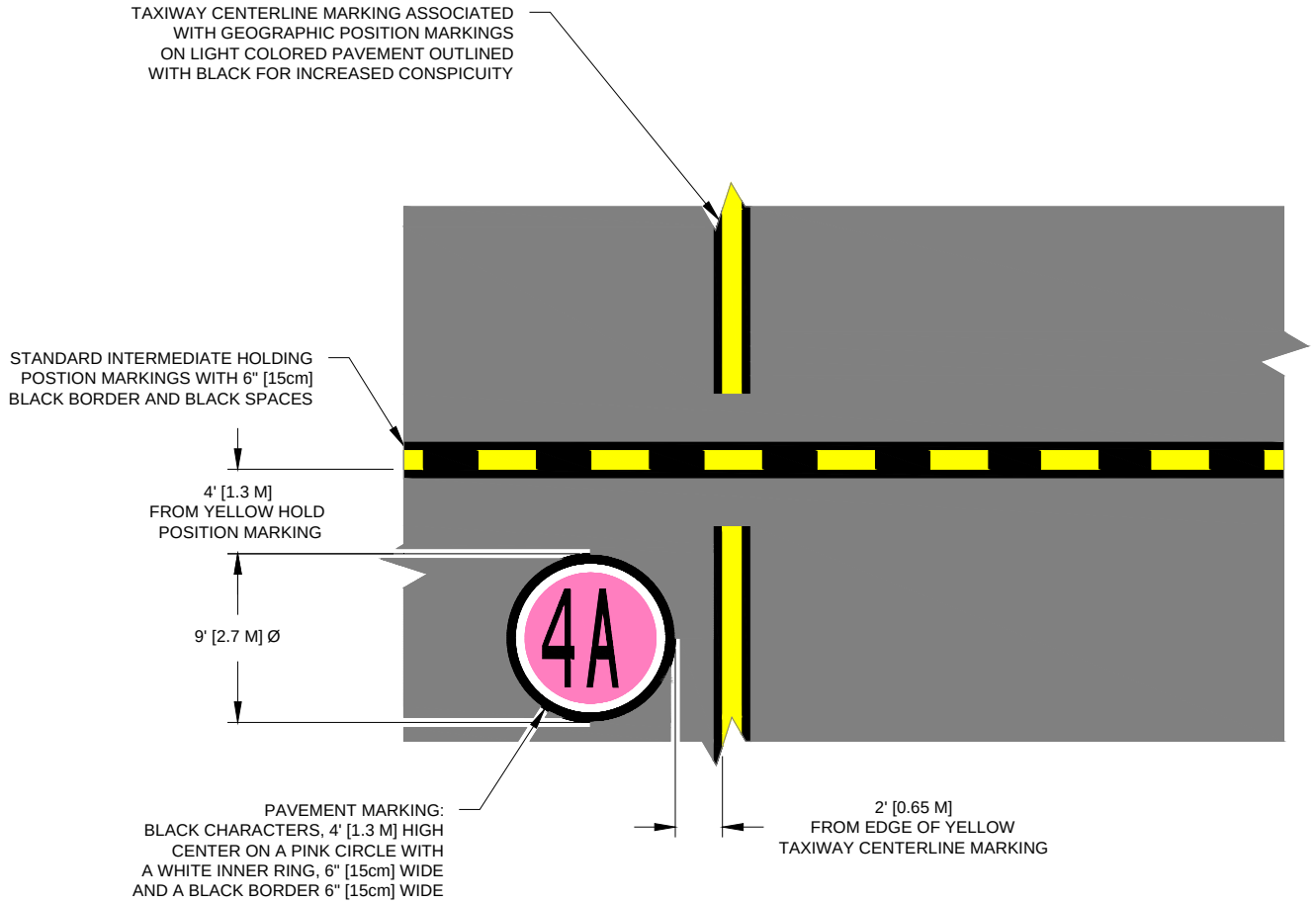


Figure 22. Geographic Position Markings

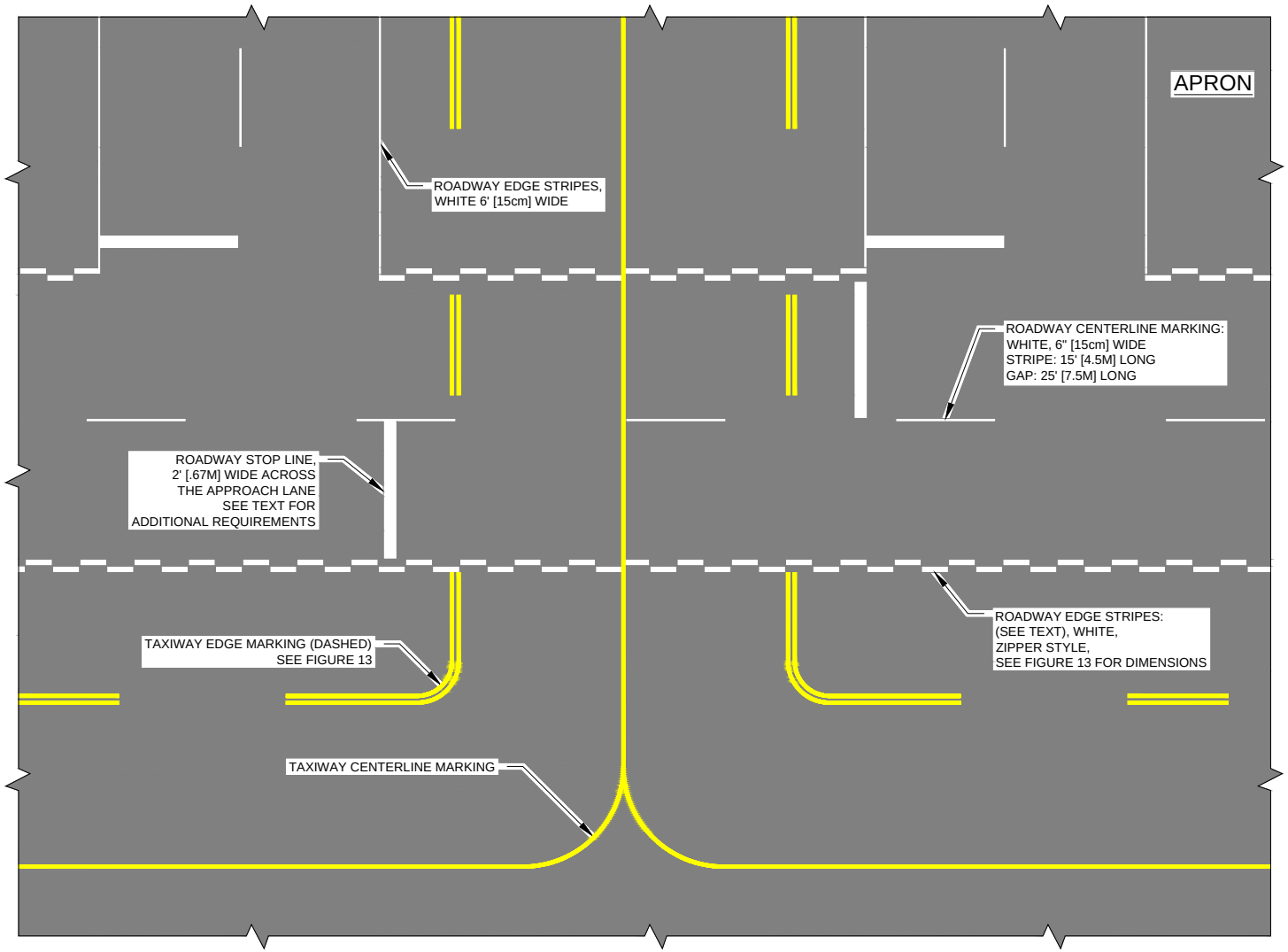
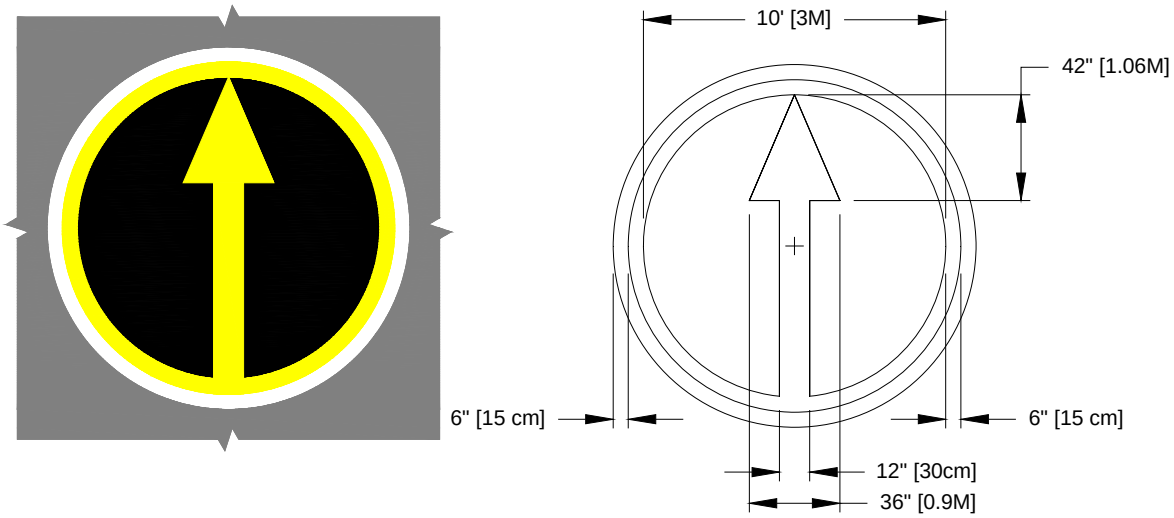


Figure 23. Vehicle Roadway Markings

DRAFT

75



NOTES:

1. ARROW IS TO BE ALIGNED TOWARD THE FACILITY.
2. INTERIOR OF CIRCLE IS TO BE PAINTED BLACK ON CONCRETE SURFACES ONLY.
3. CIRCLE MAY BE BORDERED ON INSIDE AND OUTSIDE WITH A 6" [15cm] BLACK BAND IF NECESSARY FOR CONTRAST.

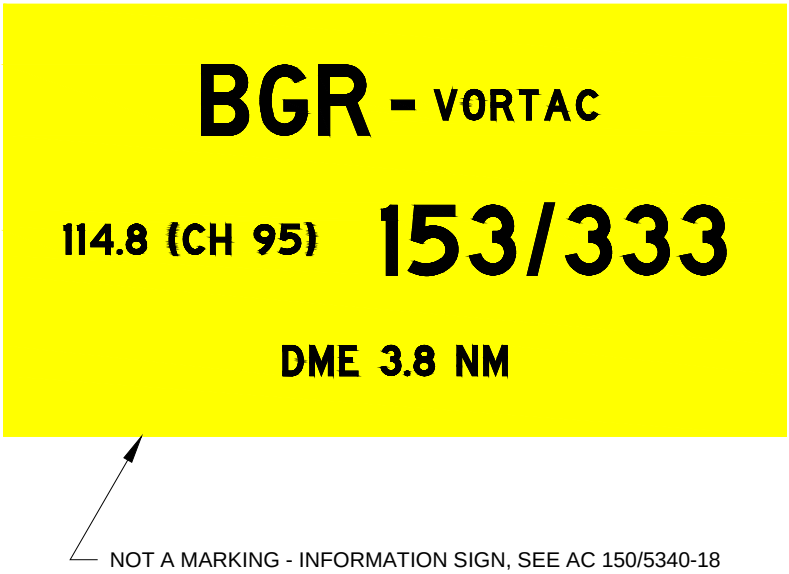
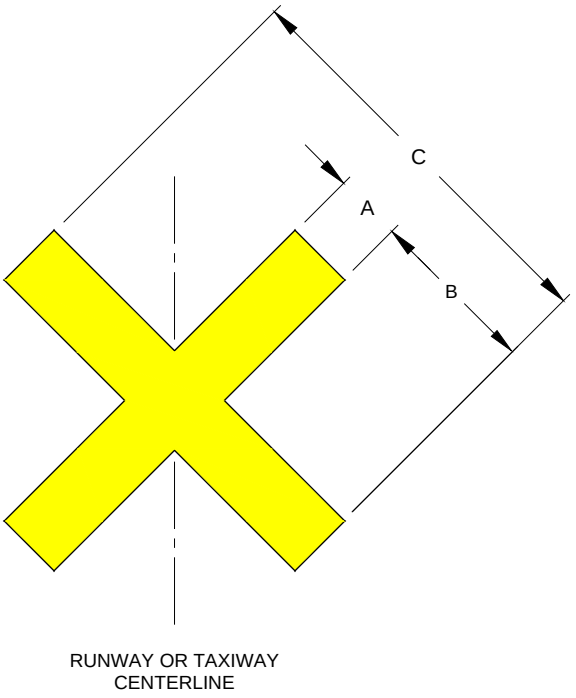
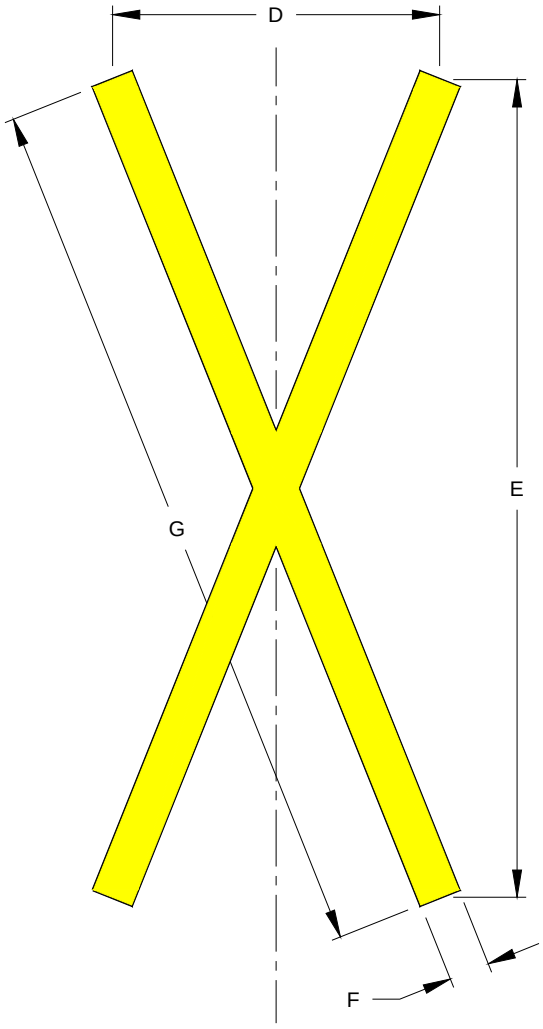


Figure 24. VOR Receiver Checkpoint Markings





NOTE: BOTH SYMBOLS ARE ALWAYS PAINTED YELLOW.

ALTERNATE

SYMBOL TYPE \ DIMENSION	A	B	C	D	E	F	G
CLOSED RUNWAY	10' [3M]*	25' [7.5M]	60' [18M]	-	-	-	-
CLOSED RUNWAY (ALTERNATE)	-	-	-	48 [14.4M]	120 [36M]	6 [1.8M]	129.25' [39M]
CLOSED TAXIWAY	5' [1.5M]**	12.5' [3.8M]	30' 9M]	-	-	-	-
CLOSED TAXIWAY (ALTERNATE)	-	-	-	24 [7.2M]	60 [18M]	3 [.09M]	64.6 [20M]

* FOR TEMPORARY SYMBOL THIS DIMENSION MAY BE CHANGED TO 8' [2.4M]

* * FOR TEMPORARY SYMBOL THIS DIMENSION MAY BE CHANGED TO 4' [1.2M]

Figure 25. Closed Runway and Taxiway Markings

Blank Page

APPENDIX A. INSCRIPTIONS FOR SIGNS AND GEOGRAPHIC POSITION MARKINGS

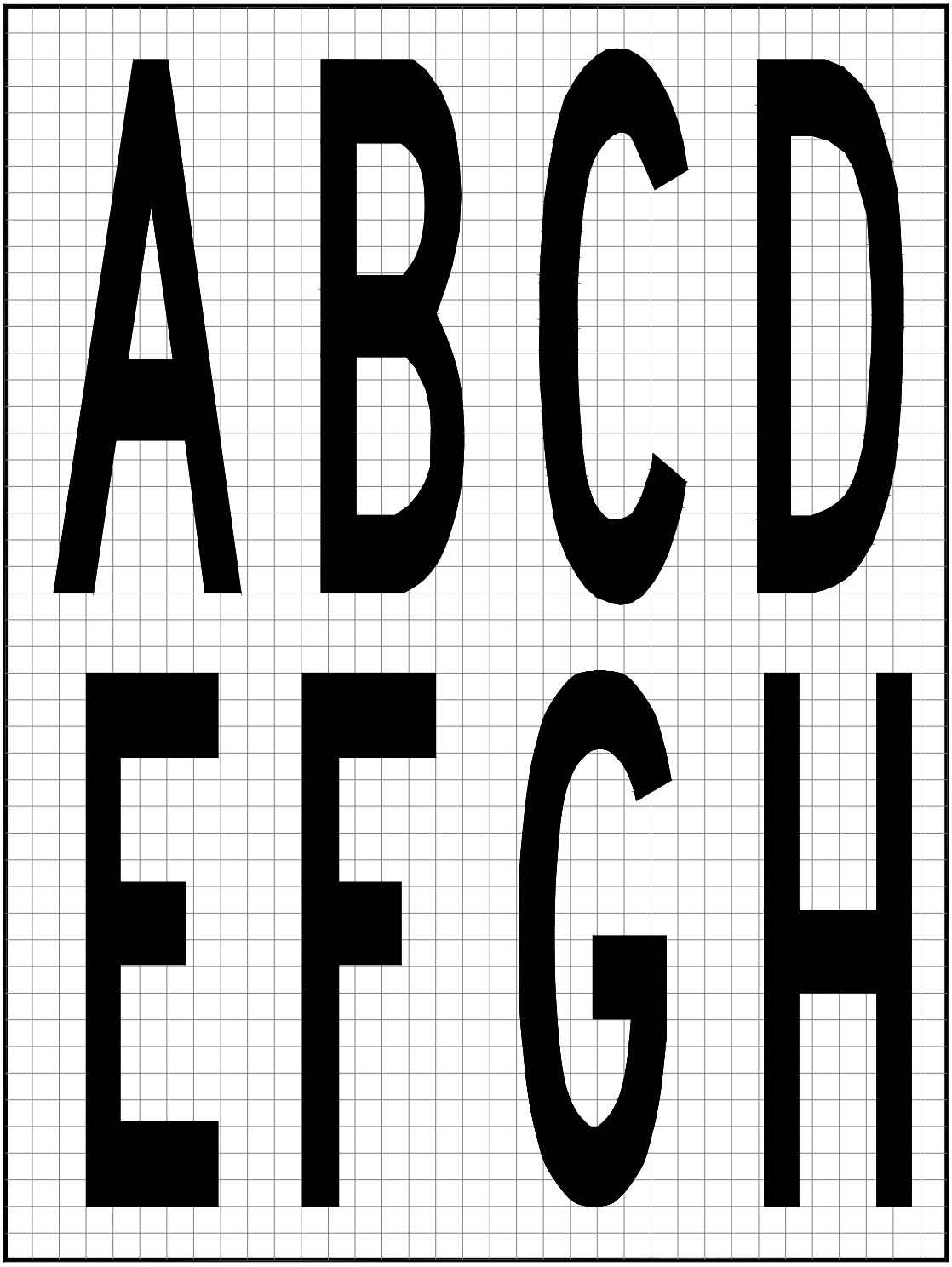


Figure A - 1. Pavement Markings ABCDEFGH

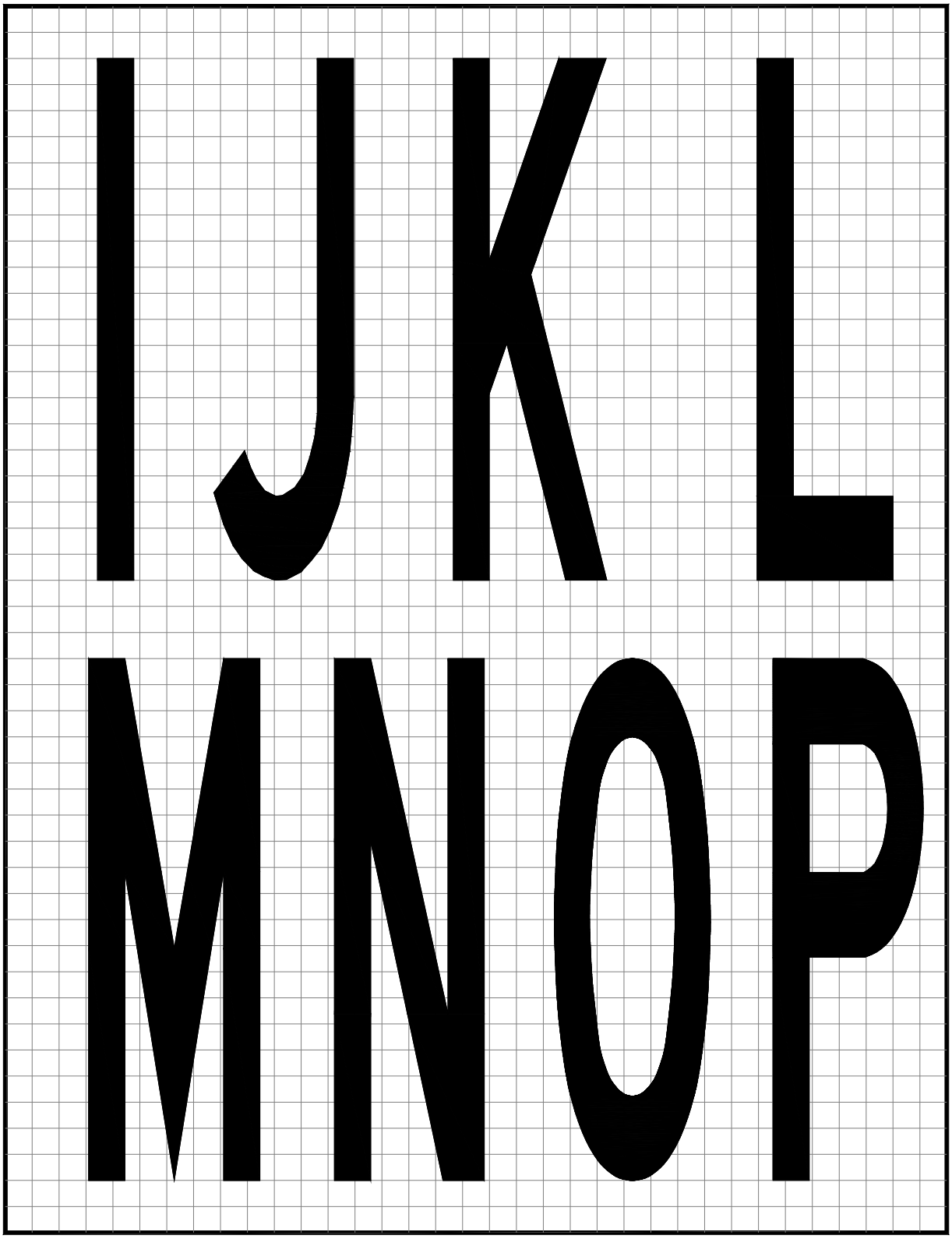


Figure A - 2. Pavement Markings IJKLMNOP

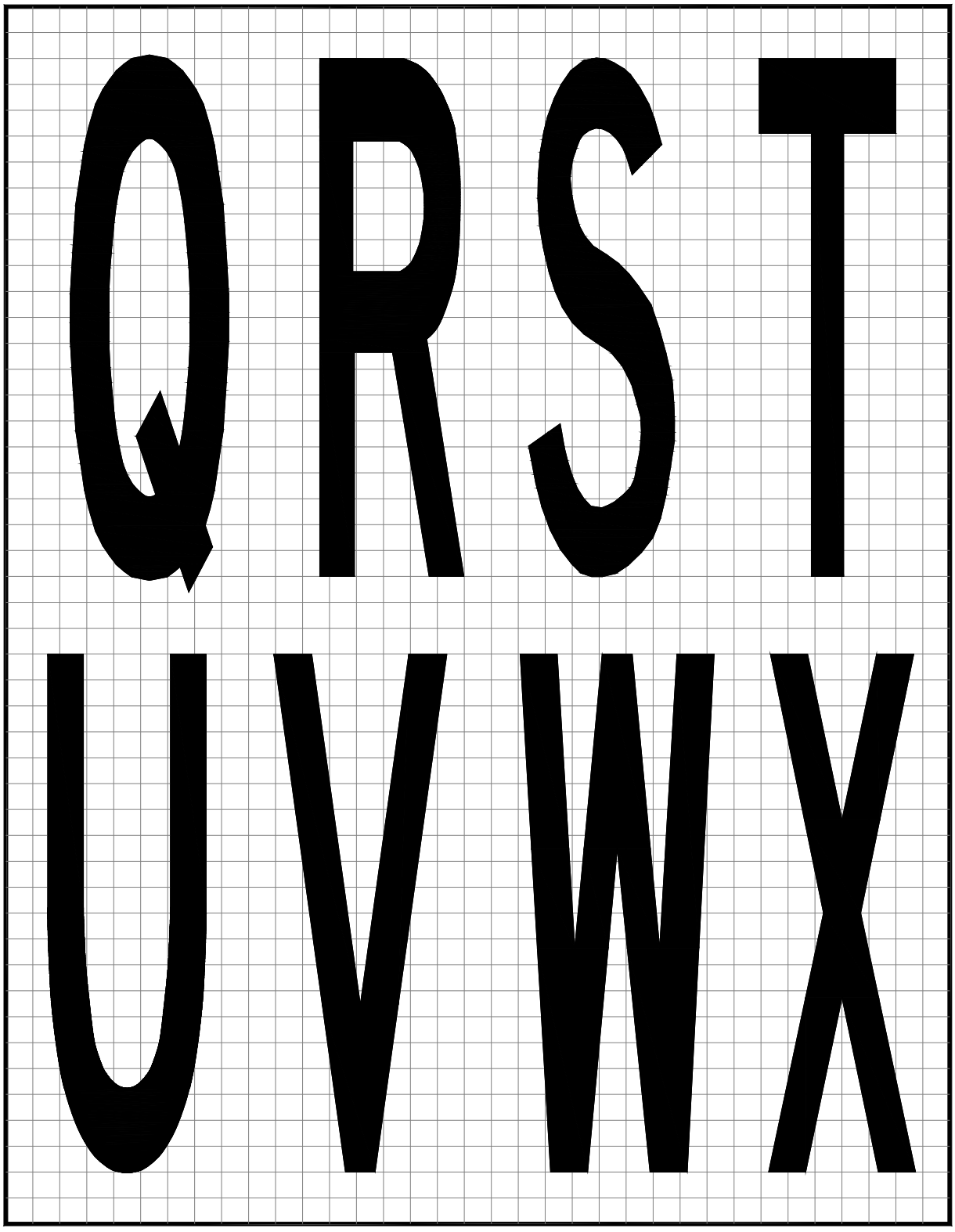


Figure A - 3. Pavement Markings QRSTUVWX

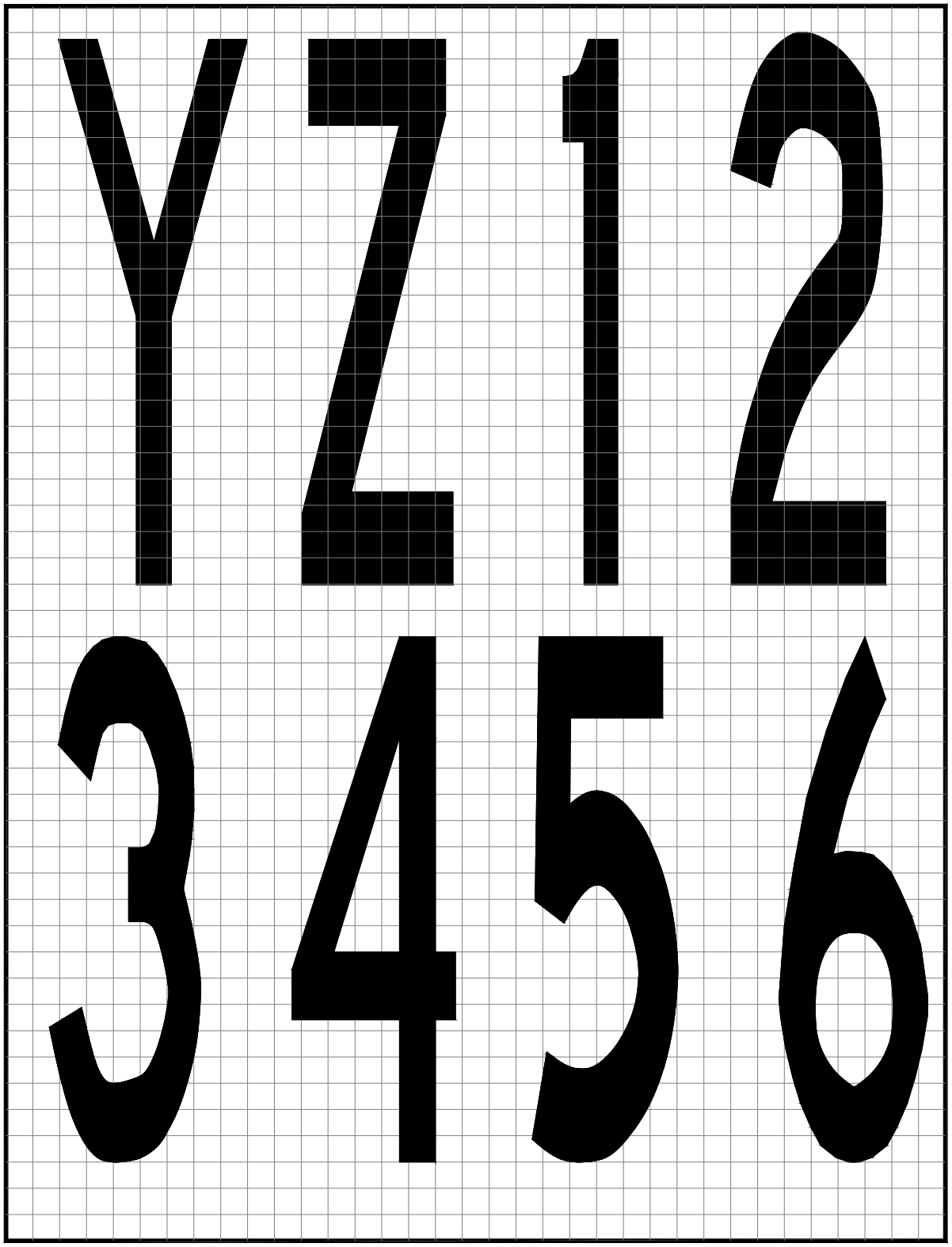


Figure A - 4. Pavement Markings YZ123456

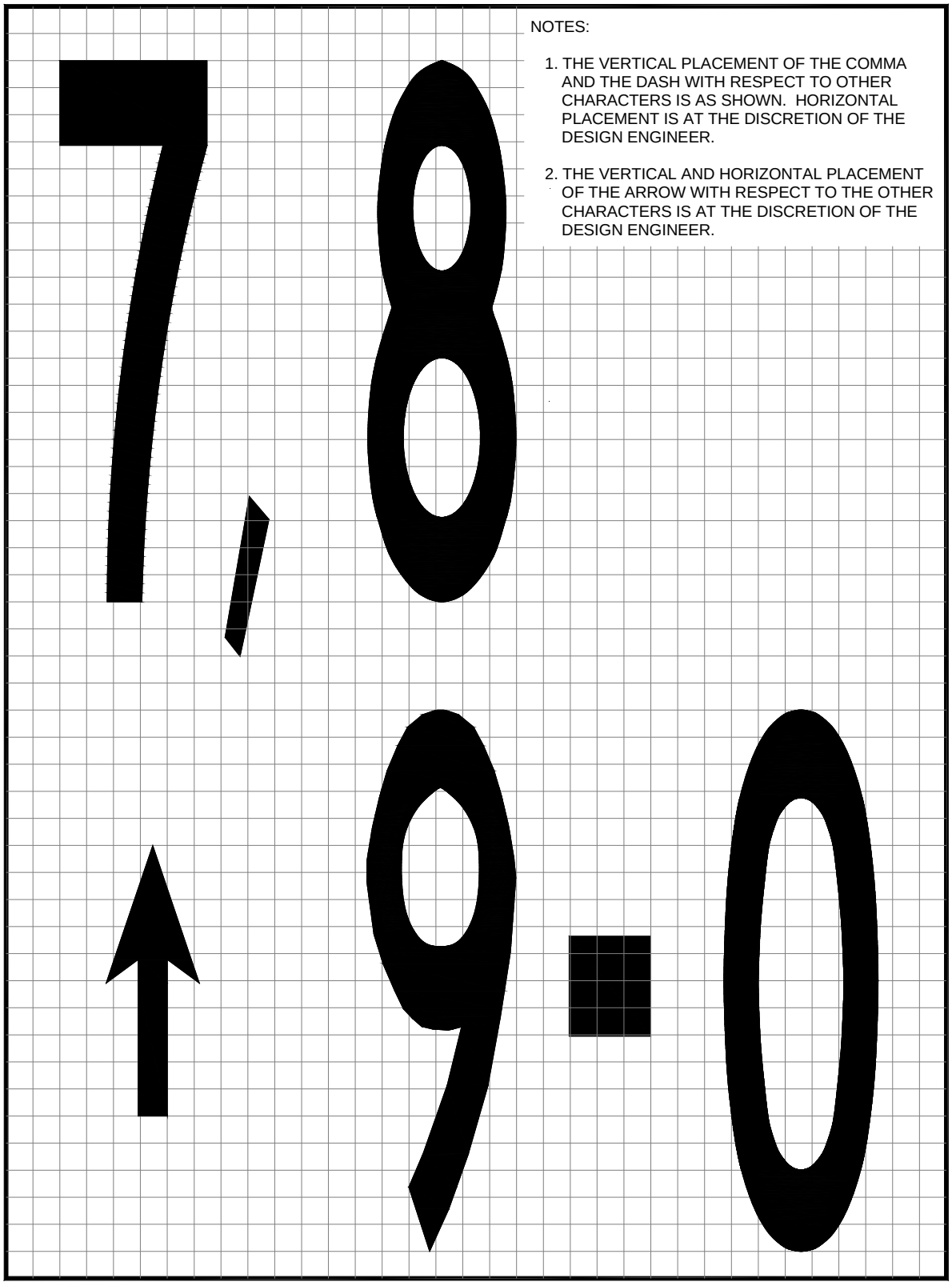


Figure A - 5. Pavement Markings 7890-,↑

Blank Page

APPENDIX B. EXAMPLES OF MARKINGS OUTLINED IN BLACK

This appendix illustrates the acceptable layout for various markings outlined in black. The black paint extends at least 6 inches (X cm) beyond the outside edge of the markings. All spaces between paint lines in markings composed of two or more lines or dashes are painted in black as illustrated in the figures below. An alternate outlining pattern is provided for dashed taxiway edge line markings. These figures are not drawn to scale.

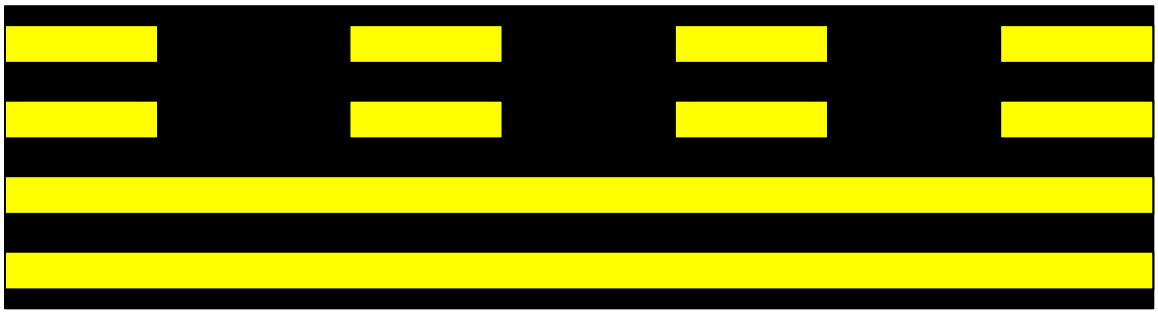


Figure B - 1. Runway Holding Position Marking

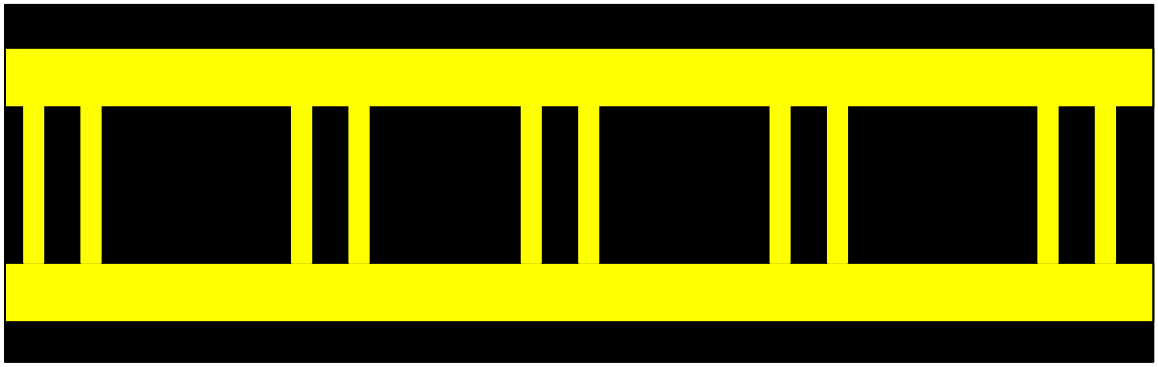


Figure B - 2. ILS/MLS Holding Position Marking

Figure B - 3. Continuous Taxiway Edge Line Marking

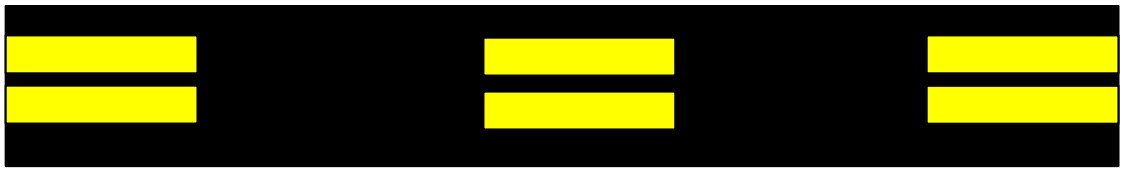


Figure B - 4. Dashed Taxiway Edge Line Marking

Figure B - 5. Alternate Outlining Method for Dashed Taxiway Edge Line Marking

Figure B - 6. Taxiway Centerline Marking

Figure B - 7. Intermediate Holding Position Markings

Figure B - 8. Non-movement Area Boundary

APPENDIX C. ENHANCED MARKINGS FOR RUNWAY HOLDING POSITION

1. GENERAL.

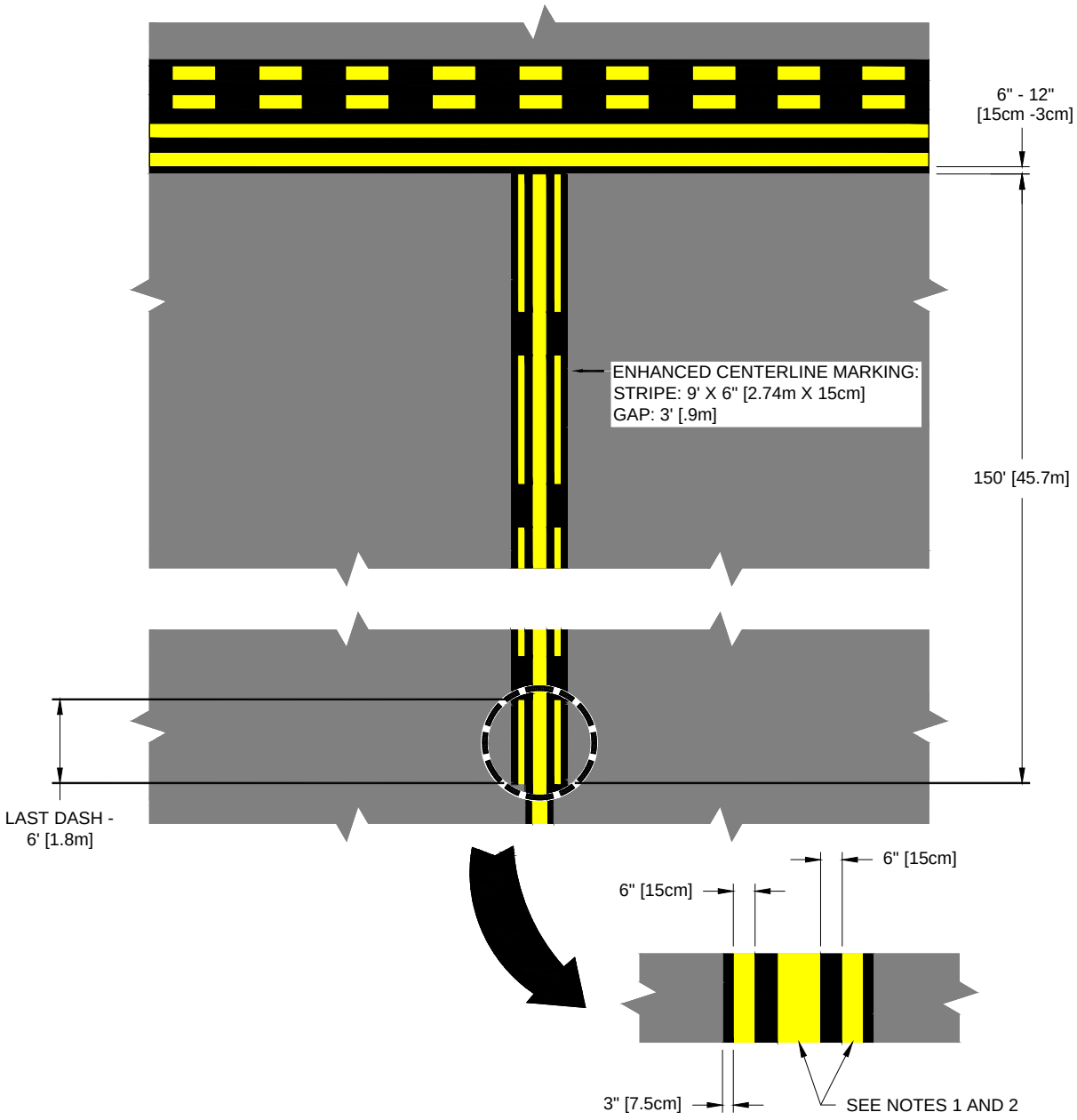
Enhanced taxiway markings are intended to provide additional visual cues to taxiing pilots to help them identify the location of the runway holding position. This appendix provides standards for these enhanced markings and guidance, including examples, on where to use the enhanced markings.

The figures included in this appendix are not drawn to scale.

2. APPLICABILITY.

The guidelines and standards for enhanced taxiway markings contained in this appendix may be used as a runway incursion prevention initiative. They may be used in combination or separately with existing taxiway markings. However, all intersections at an airport must use the same combination of markings.

3. ENHANCED TAXIWAY CENTERLINE MARKINGS.

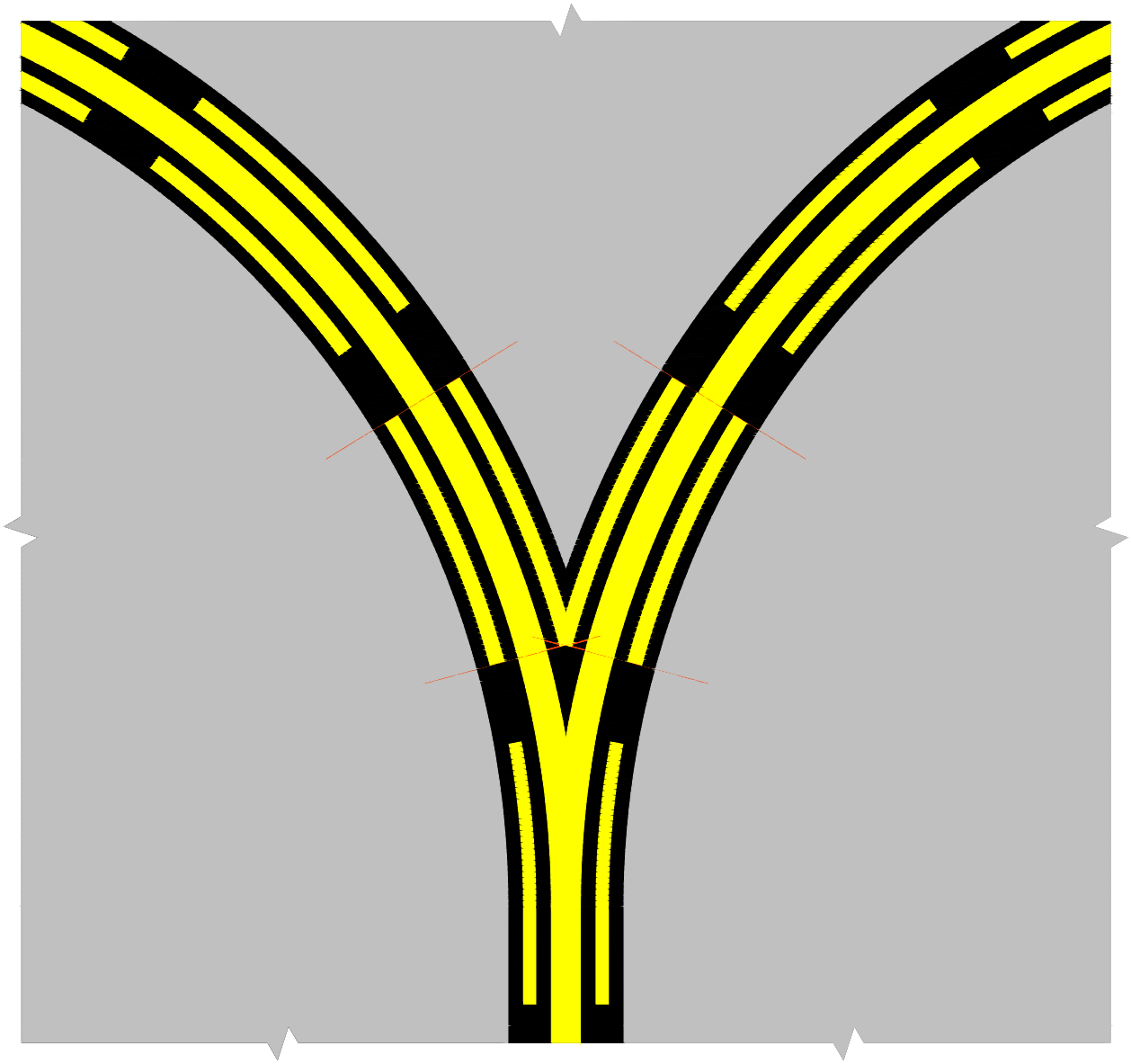


NOTES:

1. DASHED LINES FOR THE ENHANCED TAXIWAY CENTERLINE MARKING ARE 6" [15cm] IN WIDTH AND SEPARATED 6" [15cm] FROM THE TAXIWAY CENTERLINE. THIS APPLIES TO BOTH 6" [15 cm] AND 12" [30 cm] TAXIWAY CENTERLINE MARKINGS.

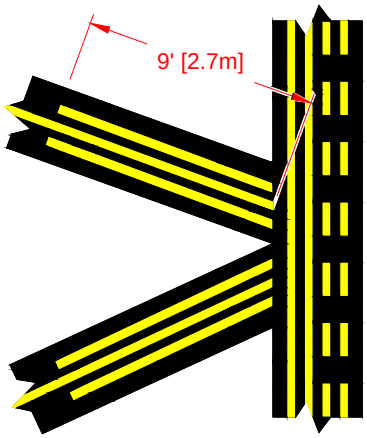
2. THE TAXIWAY CENTERLINE MARKINGS MAY BE SHIFTED LEFT OR RIGHT TO AVOID INTERFERENCE WITH THE TAXIWAY CENTERLINE LIGHTS.

Figure C - 1. Enhanced Taxiway Centerline Markings



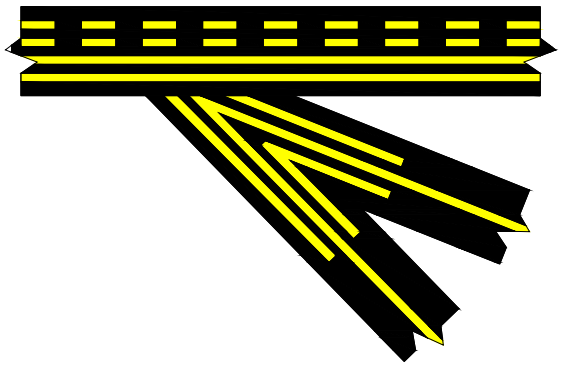
NOTE:
AS SHOWN IN THIS CASE THE V -SHAPED INNER DASHES START AND STOP WITH THE OUTSIDE 9 FOOT [3m] DASHES. HOWEVER THIS MAY NOT ALWAYS BE THE CASE FOR THE INNER DASHES. IF THE V-SHAPED ARE LESS THAN 5 FEET [1.5m] THEY MAY BE OMITTED.

Figure C - 2. Dashed Lines at Converging Taxiway Centerlines

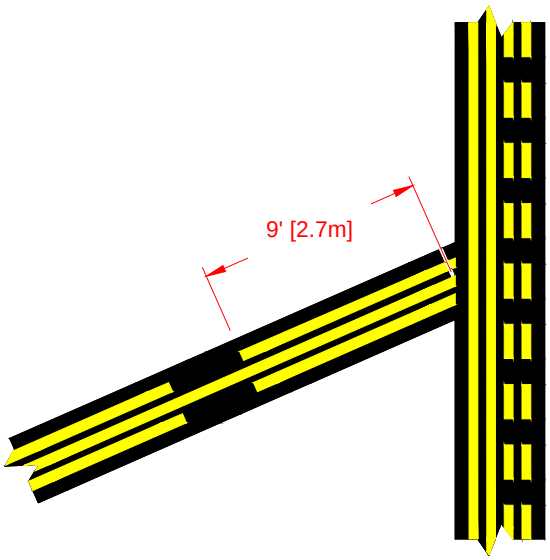


DETAIL A
Example of two straight enhanced taxiway centerline markings intersecting the runway holding position marking.

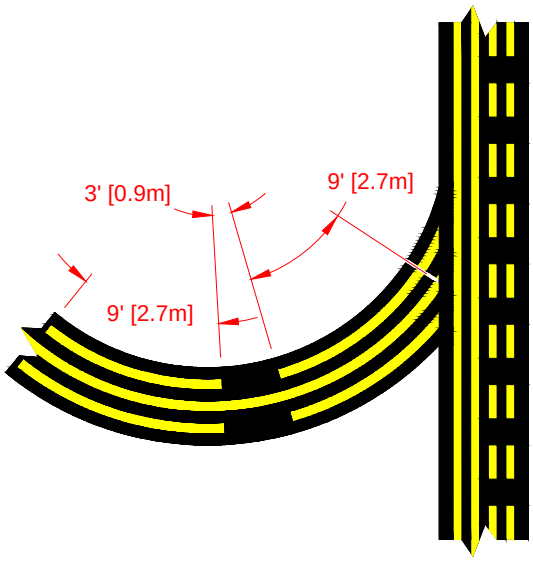
PARTIAL INNER DASHES INCLUDED BECAUSE THEY EXCEED 5 FEET IN LENGTH. ACCEPTABLE TO OMIT ANY DASHES THAT ARE LESS THAN 5' [1.5m] IN LENGTH.



DETAIL B
Example of converging enhanced taxiway centerline markings intersecting at an angle of less than 90° with runway holding position marking.



DETAIL C
Example of straight enhanced taxiway centerline markings intersecting with runway holding position marking.



DETAIL D
Example of curved enhanced taxiway centerline markings intersecting with runway holding position marking.

NOTE: ALL MEASUREMENTS ARE TAKEN ALONG THE CENTER OF THE CENTERLINE.

Figure C - 3. Converging, Straight, and Curved Enhanced Taxiway Centerlines Intersecting with Holding Position Marking

4. ENHANCED RUNWAY HOLDING POSITION MARKINGS.

The enhanced runway holding position marking, applicable only to those taxiway entrances that serve Airplane Design Group (ADG) V or VI airplanes, measures 125 feet (38 m) from one paved shoulder to the other paved shoulder, i.e., 62.5 feet (19 m) from the main taxiway centerline. Figure C-4 illustrates the enhanced surface marking on a standard 75-foot (23 m) wide taxiway with a standard 35-foot (10.5 m) wide taxiway shoulder for ADG V. For taxiways wider than 75 feet (23 m) that serve ADG V or VI aircraft, the holding position line is extended so it is 25 feet (7.5 m) on both paved taxiway shoulders.

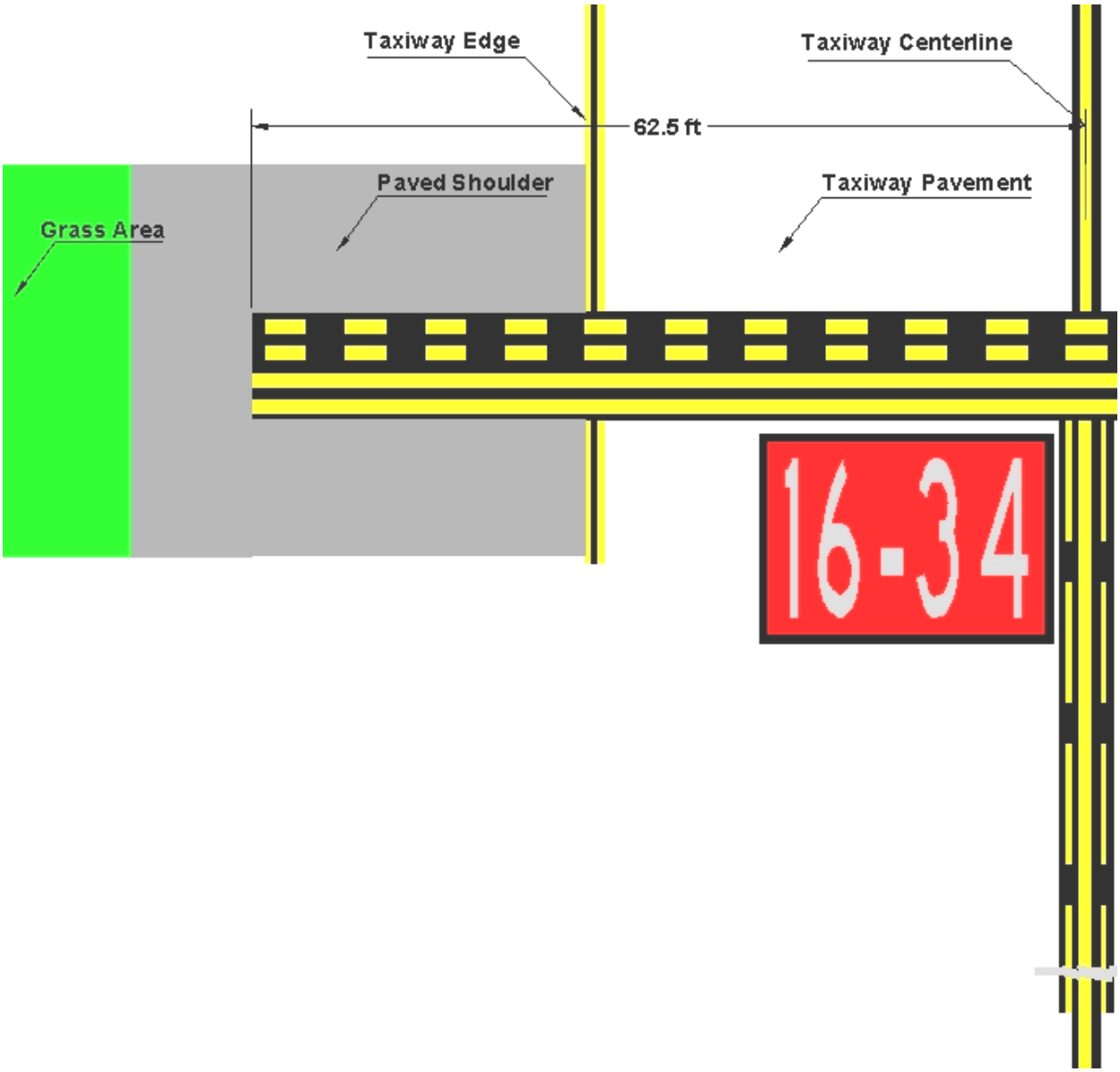
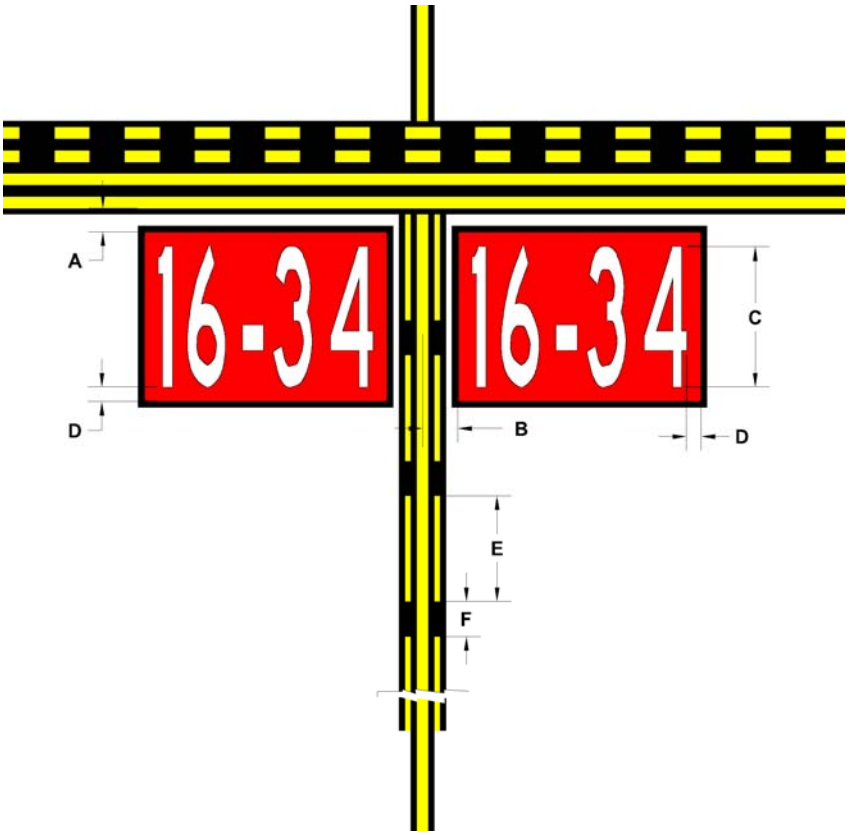


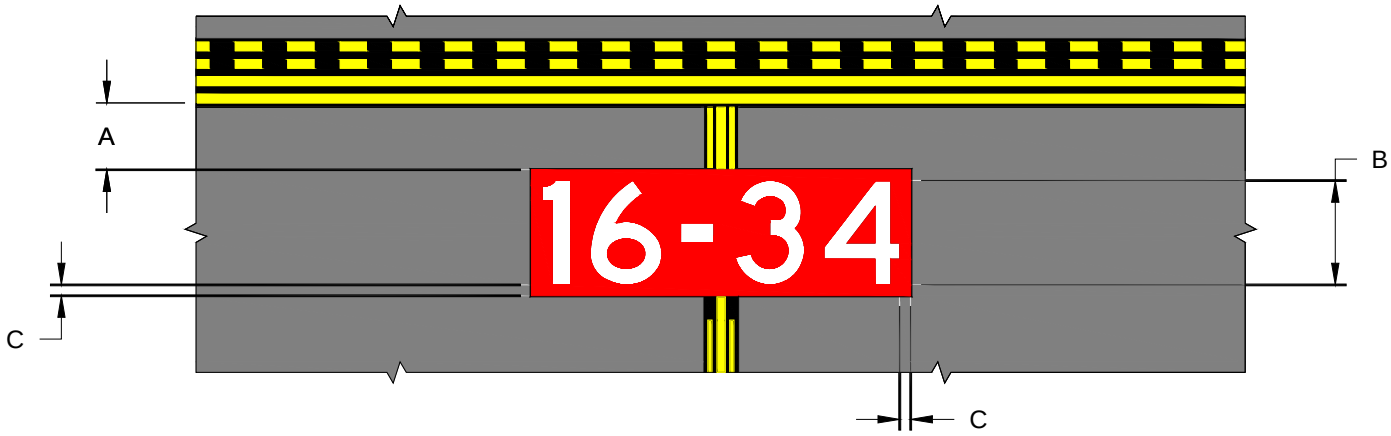
Figure C - 4. Enhanced Runway Holding Position Markings on Taxiways

5. SURFACE PAINTED HOLDING POSITION SIGNS



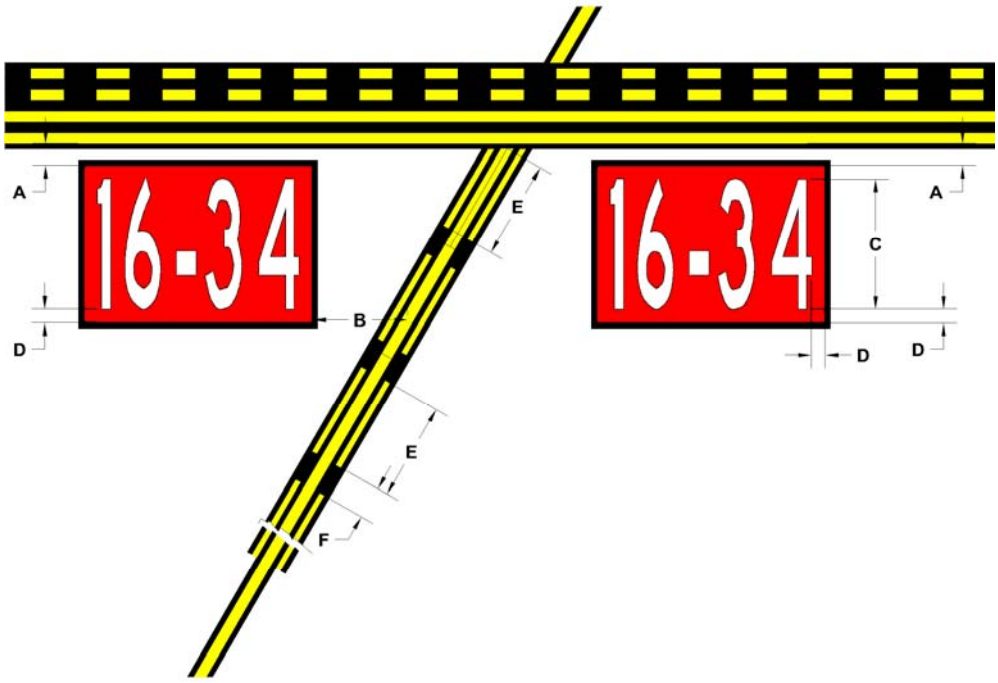
Dimension Letter	Dimension feet (meters)	Notes
A	2 – 4 (0.67 – 1.34)	
B	3 – 10 (0.91 – 3.0)	
C	9 – 12 (2.75 – 3.7)	Inscriptions must have a height of 12 feet (3.7 m); however, the height may be reduced, as necessary, to the minimum height of 9 feet (2.75 m). In special situations, the surface painted marking may be reduced to less than 9 feet (2.75 m) in order to fit the marking appropriately. Examples of special situations include taxiways with widths narrower than 75 feet (23 m) or taxiways that need to display multiple runway designations with arrows. In all cases, inscriptions follow Appendix A inscription criteria. All other taxiway entrances to the same runway not needing the reduction are to maintain the 12 foot (3.7 m) height dimension. For practicality, the lowest height reduction is 6 feet (1.8 m).
D	15 inches (38 cm)	
E	9 (2.75)	
F	3 (0.91)	

Figure C - 5. Surface Painted Holding Position Signs



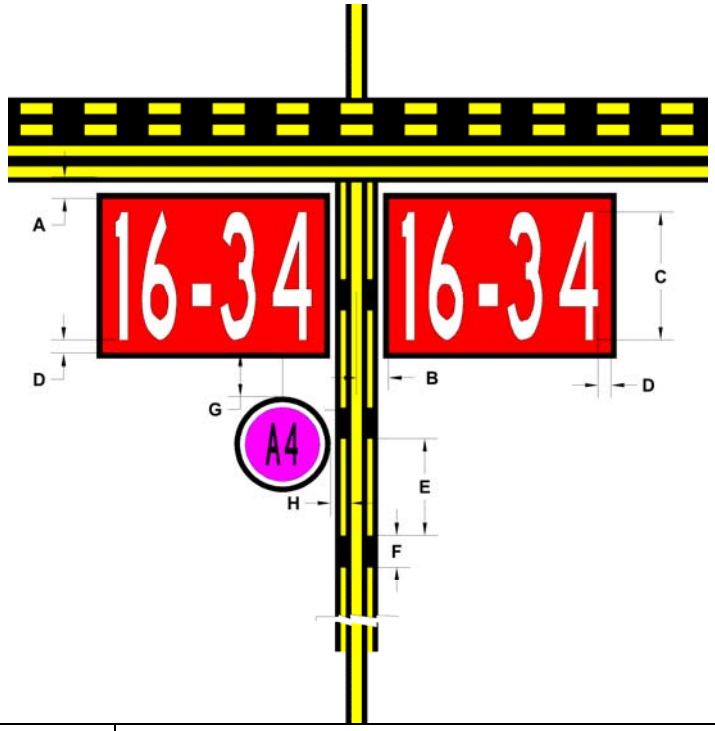
Dimension Letter	Dimension feet (meters)	Notes
A	2 – 3 (0.67 – 0.91)	
B	6 (1.8)	Inscriptions follow Appendix A inscription criteria. The size of the sign inscription is scaled to fit taxiways 35 feet or less in width for Airplane Design Groups I and II. Reference AC 150/5300-13. In special situations, the surface marking may be reduced to less than 6 feet (1.8 m) in order to fit the marking appropriately. Examples of special situations include taxiways that need to display multiple runway designations with arrows. In all cases, the inscriptions follow Appendix A inscription criteria. All other taxiway entrances to the same runway not needing the reduction are to maintain the 6-foot (1.8-m) height dimension. For practicality, the lowest height reduction is 3 feet (0.91 m).
C	7.5 in (19 cm)	
NOTE		The dimensions for the enhanced taxiway centerline are in Figure C-1.

Figure C - 6. Surface Painted Holding Position Sign for Taxiway Widths Less Than 35 Feet



Dimension Letter	Dimension feet (meters)	Notes
A	2 – 4 (0.67 – 1.34)	
B	3 – 10 (0.91 – 3.0)	
C	9 – 12 (2.75 – 3.7)	Inscriptions must have a height of 12 feet (3.7 m); however, the height may be reduced, as necessary, to the minimum height of 9 feet (2.75 m). In special situations, the surface painted marking may be reduced to less than 9 feet (2.75 m) in order to fit the marking appropriately. Examples of special situations include taxiways with widths narrower than 75 feet (23 m) or taxiways that need to display multiple runway designations with arrows. In all cases, inscriptions follow Appendix A inscription criteria. All other taxiway entrances to the same runway not needing the reduction are to maintain the 12 foot (3.7 m) height dimension. For practicality, the lowest height reduction is 6 feet (1.8 m).
D	15 inches (38 cm)	
E	9 (2.75)	
F	3 (0.91)	

Figure C - 7. Surface Painted Holding Position Signs when Taxiway Centerline is not Perpendicular to Runway Holding Position Marking



Dimension Letter	Dimension feet (meters)	Notes
A	2 – 4 (0.67 – 1.34)	
B	3 – 10 (0.91 – 2.75)	
C	9 – 12 (2.75 – 3.7)	Inscriptions must have a height of 12 feet (3.7 m); however, the height may be reduced, as necessary, to the minimum height of 9 feet (2.75 m). In special situations, the surface painted marking may be reduced to less than 9 feet (2.75 m) in order to fit the marking appropriately. Examples include taxiways with widths narrower than 75 feet (23 m) or taxiways that need to display multiple runway designations with arrows. In all cases, the inscriptions follow Appendix A inscription criteria. All other taxiway entrances to the same runway not needing the reduction are to maintain the 12 foot (3.7 m) height dimension. For practicality, the lowest height reduction is 6 feet (1.8 m).
D	15 inches (38 cm)	
E	9 (2.75)	
F	3 (0.91)	
G	4 (1.3)	From edge of red border
H	2 (0.65)	From outermost edge of main yellow taxiway centerline

Note: Because the geographic position marking cannot be located at a runway holding position for the low-visibility runway (see paragraph 4.11), this figure applies only where the designated taxi route for low-visibility operations crosses a runway that is not itself the low-visibility runway.

Figure C - 8. Surface Painted Holding Position Signs Co-Located with Geographic Position Marking

6. ADDITIONAL GUIDELINES FOR APPLICATION.

The following illustrations provide examples of various runway holding position locations using the enhanced markings. The figures included in this appendix are not drawn to scale.

a. Two Taxiway Centerlines Converging at a Runway Holding Position Marking. Where two taxiway centerlines converge at a runway holding position marking, the surface painted holding position signs must be installed parallel to the runway holding position marking. As shown in figure C-9, only one sign on either side of the two taxiway centerlines is practical.

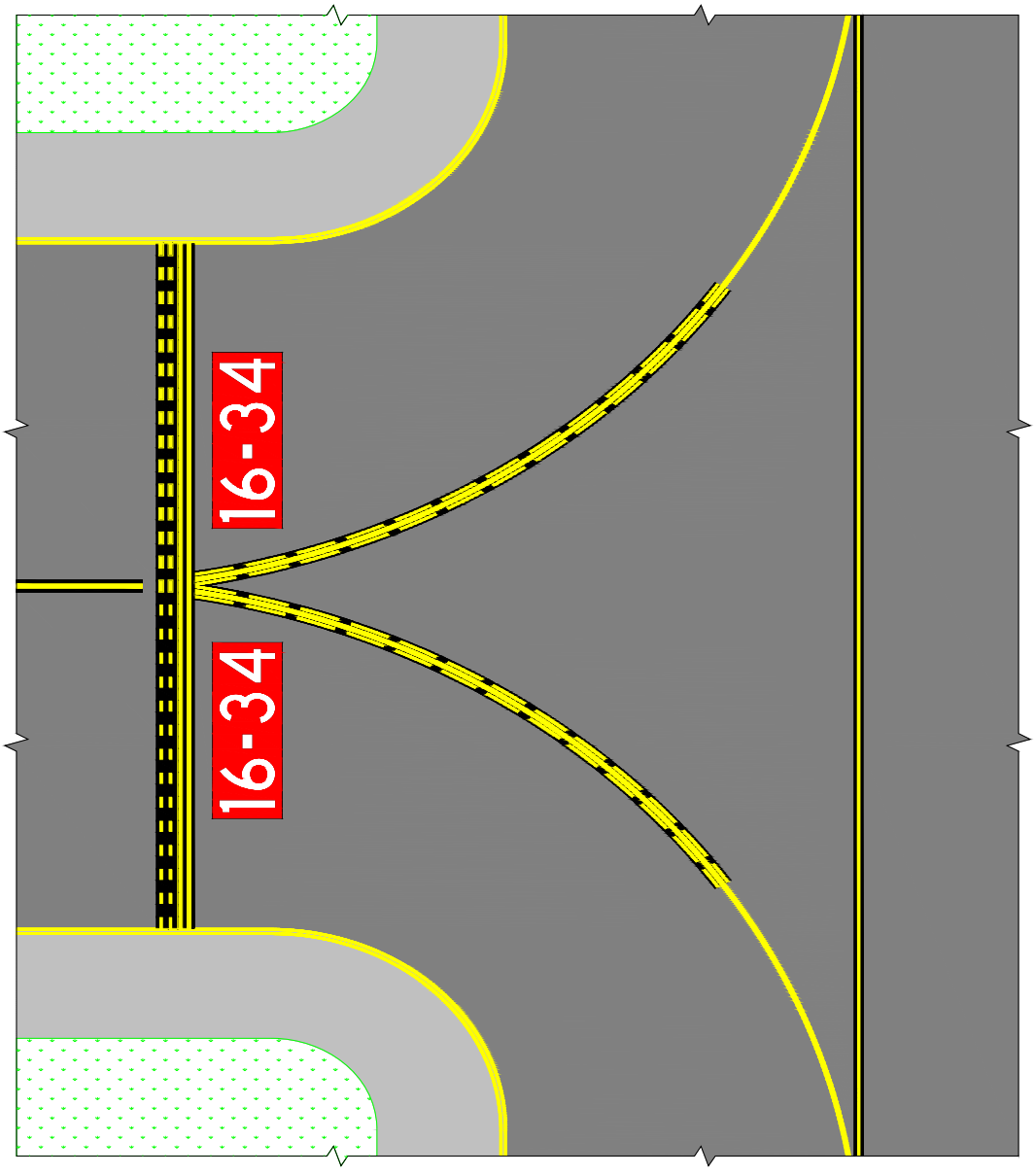


Figure C - 9. Two Taxiway Centerlines Converging at a Runway Holding Position Marking

b. Intersection of Two Taxiways at Runway End. In the case of two converging taxiway centerlines, surface painted holding position signs containing a single runway designator must be positioned parallel to the runway holding position marking, as shown in figure C-10.

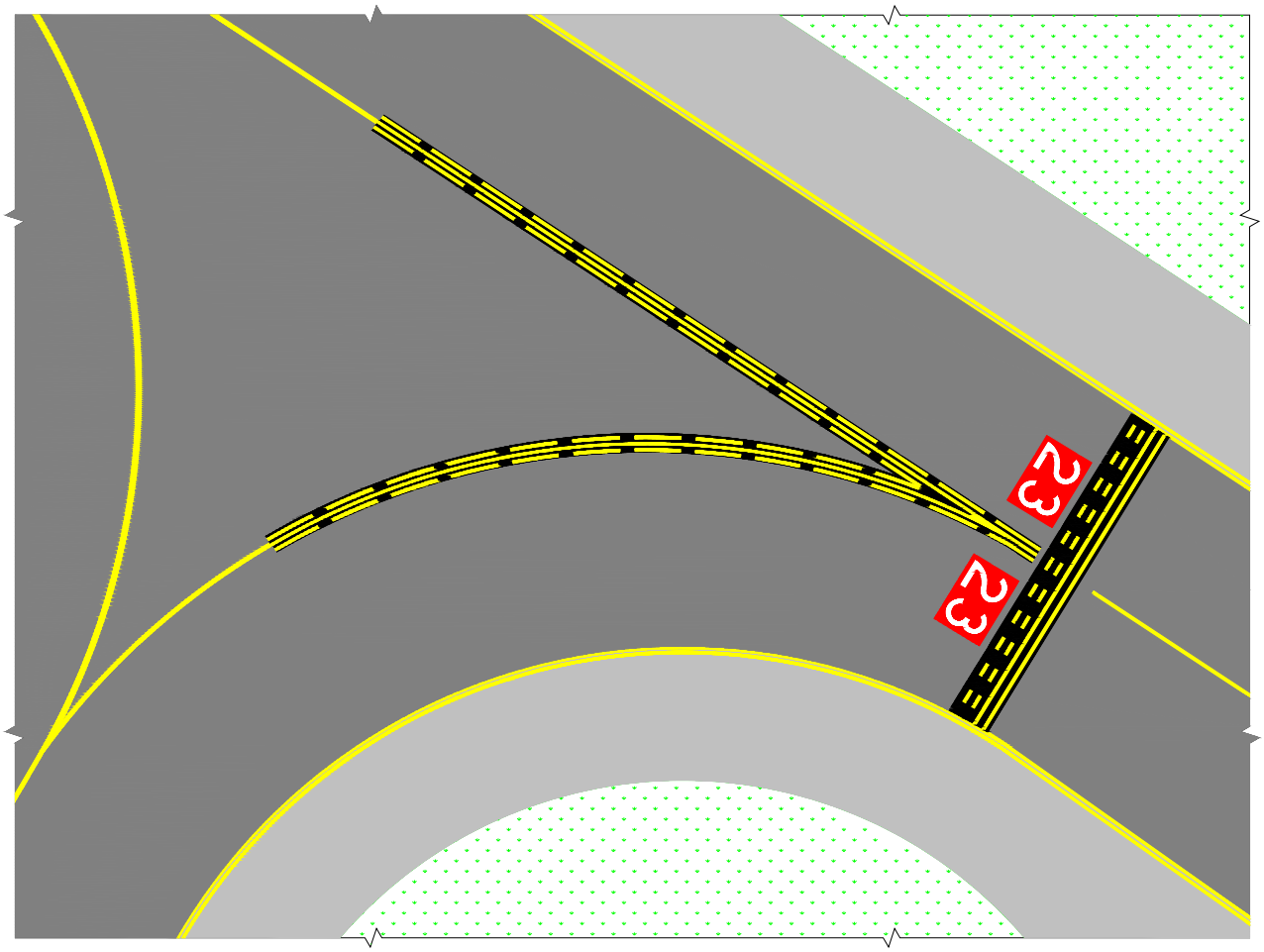
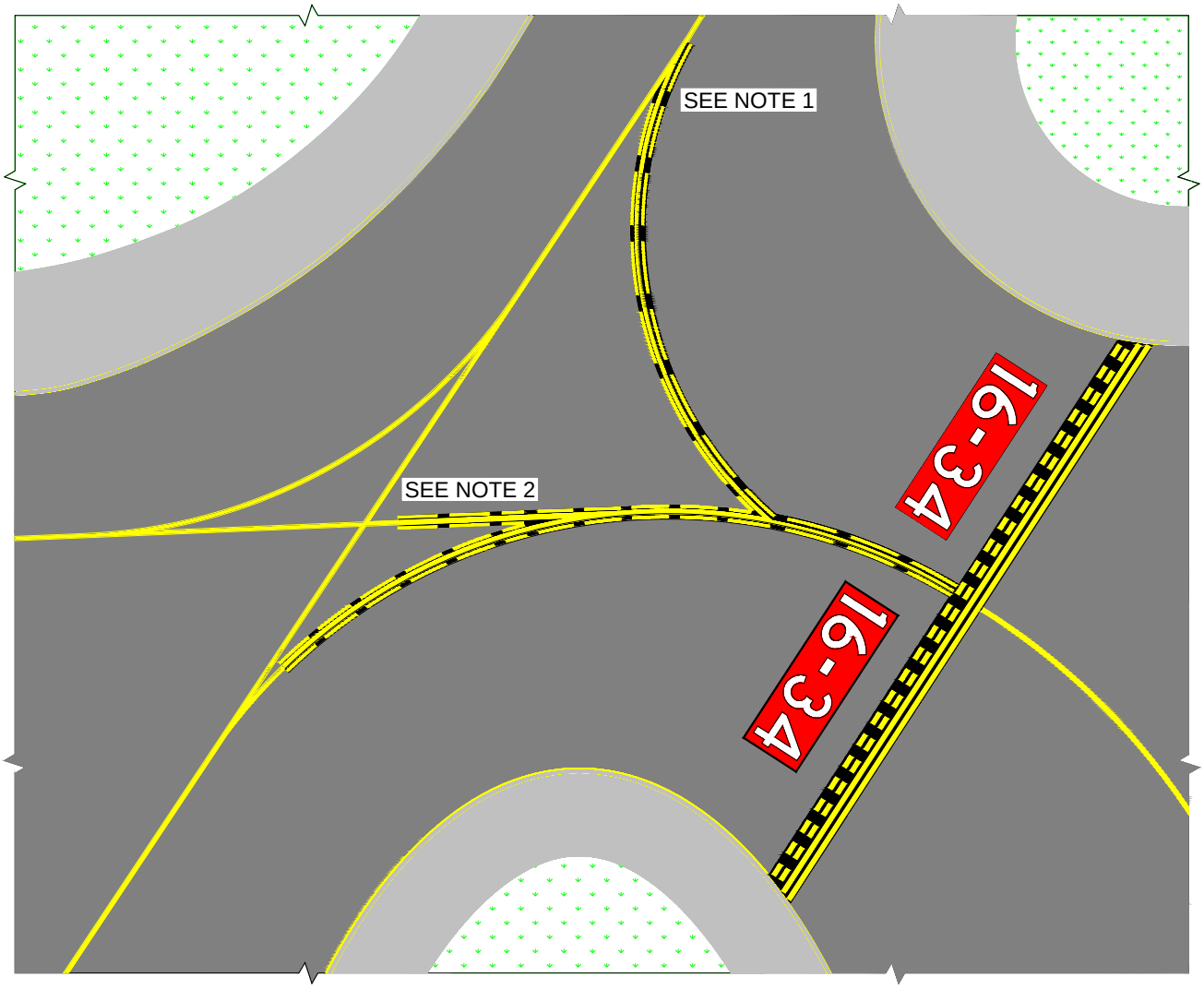


Figure C - 10. Intersection of Two Taxiways at Runway End

c. Intersection of Three Converging Taxiway Centerlines. Figure C-11 illustrates taxiway centerline configurations when there are three converging centerlines.

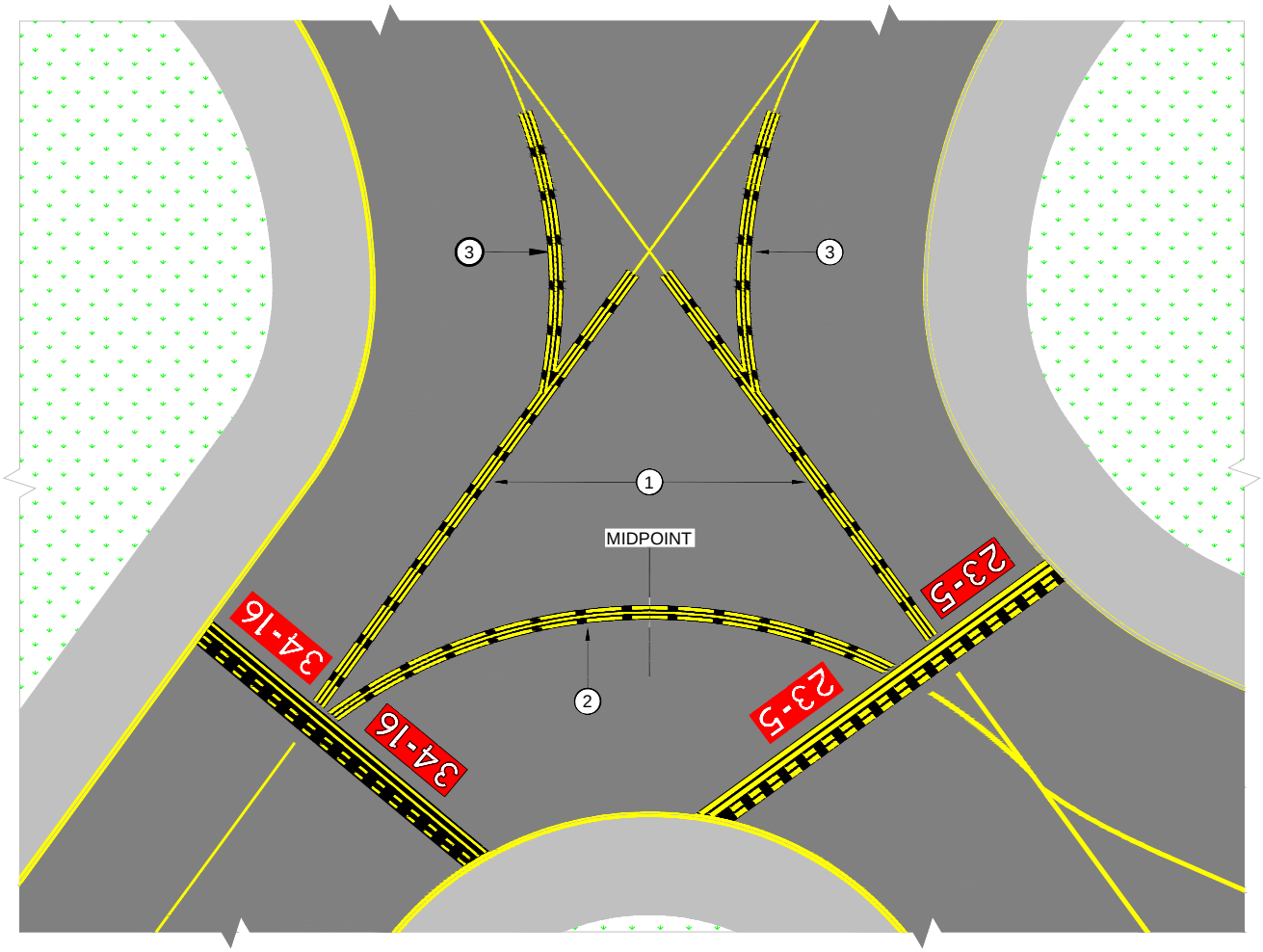


NOTES:

1. ENHANCEMENT IS TANGENT TO MERGING CURVE.
2. ENHANCEMENT TERMINATES 5 FEET [1.5m] FROM INTERSECTION.

Figure C - 11. Intersection of Three Converging Taxiway Centerlines

d. Intersection of Multi-Taxiway Centerlines with Less than 150 Feet (46 m) Between Taxiways. Figure C-12 illustrates different taxiway centerline configurations when there are three converging centerlines, less than 150 feet (46 m) between the runway holding position markings, and potential difficulty in positioning surface painted holding position signs in the available space.



NOTES:
1. Illustrates perpendicular taxiway centerlines less than 150 feet (45.7 m) (see paragraph 4.3d).

2. Illustrates a curved taxiway centerline between two runway holding position markings with less than 150 feet (45.7 m) along the taxiway centerline (see Paragraph 4.3d).

3. Illustrates a converging taxiway centerline curving toward two runway holding positions.

Figure C - 12. Intersection of Multi-Taxiway Centerlines with Less than 150 Feet (46 m) Between Taxiways

e. Two Taxiway Centerlines Intersecting a Runway Holding Position Marking. Figure C-13 illustrates an angled runway holding position marking that is intersected by two taxiway centerlines.

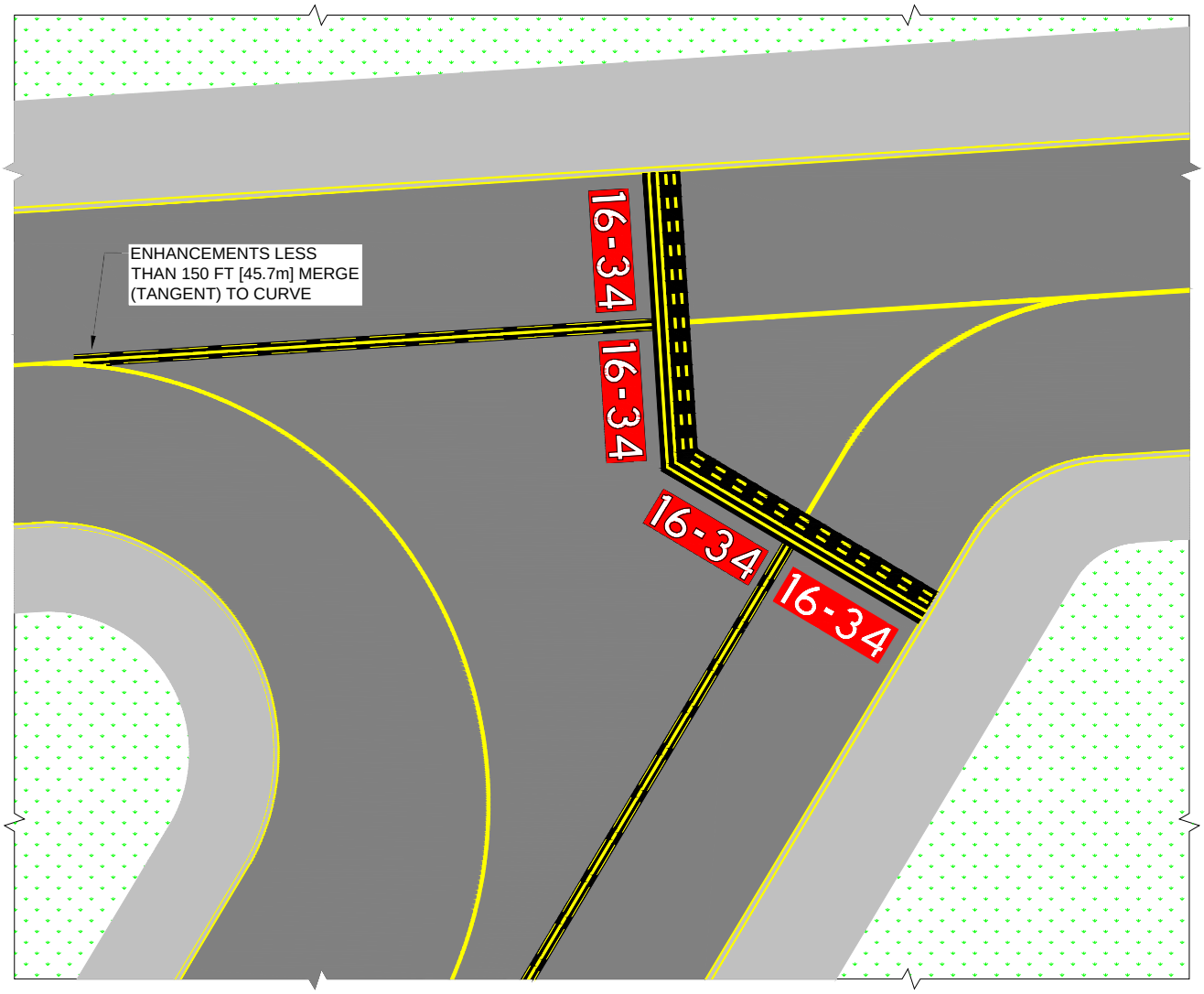


Figure C - 13. Two Taxiway Centerlines Intersecting a Runway Holding Position Marking

f. Intersection of Stub Taxiway and Runway. Figure C-14 illustrates a solution for a stub taxiway that is less than 150 feet (46 m) long, with a 90-degree turn and angled taxiway shoulder areas. Per paragraph 4.3(d), the enhancement terminates 5 feet (1.5 m) from a taxiway/taxiway intersection.

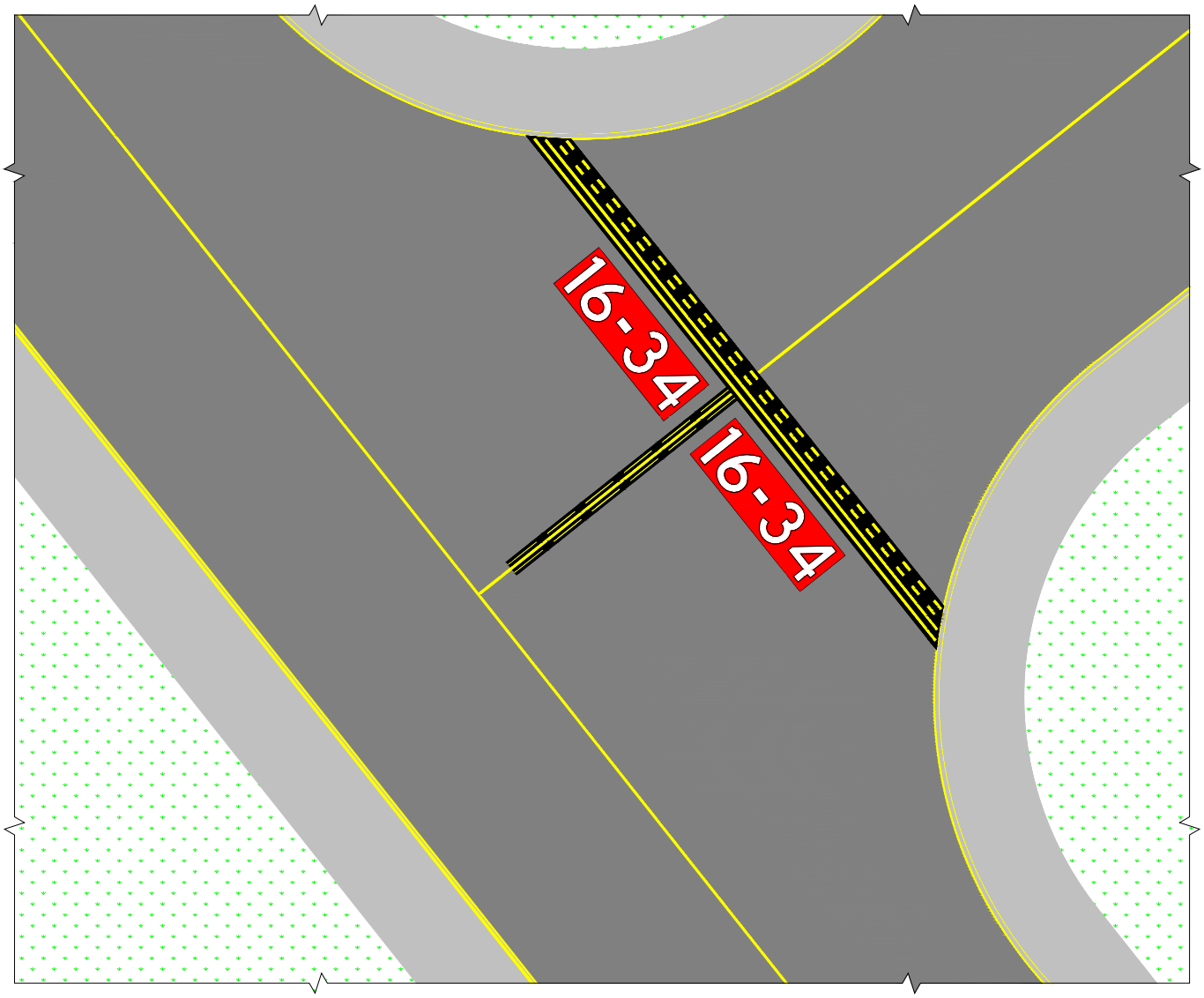
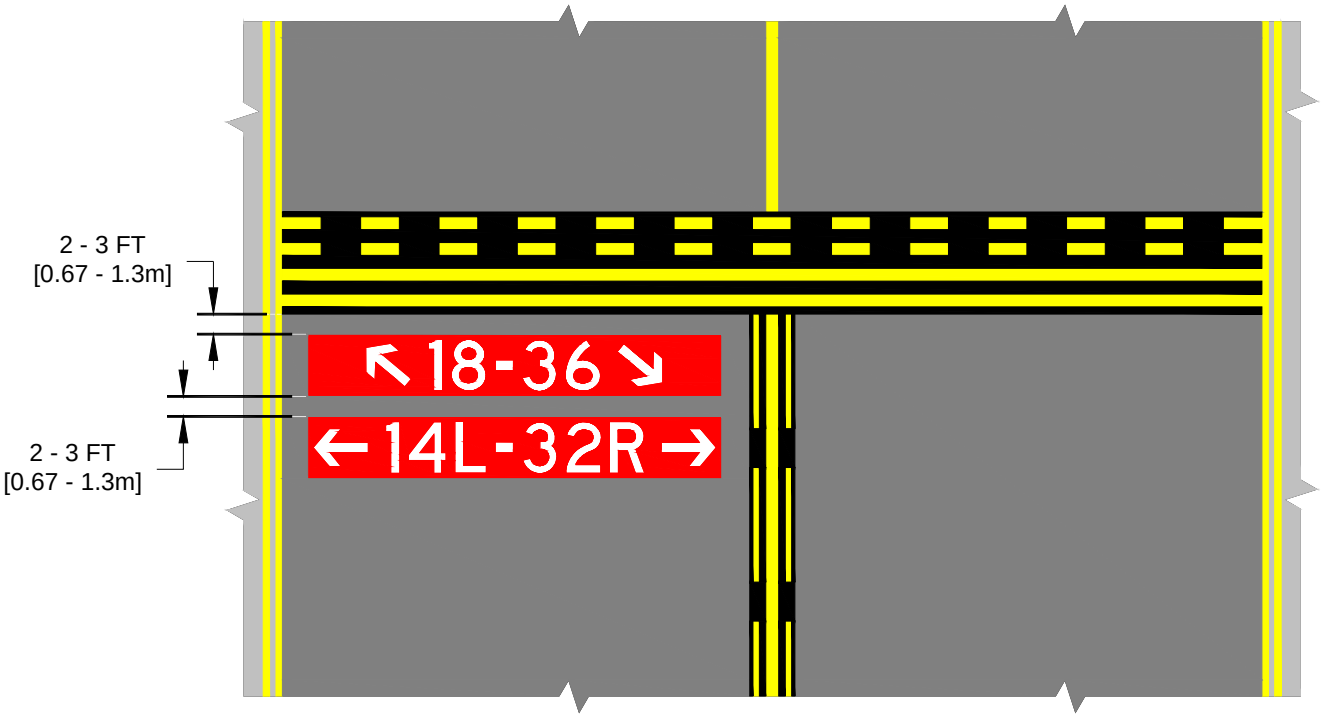


Figure C - 14. Intersection of Stub Taxiway and Runway

NOTE: WHEN APPLIED ON LIGHT COLOR PAVEMENTS, THE SIDA MARKING MUST USE A BLACK OUTLINE.

Figure C - 15. TSA Security Identification Display Area (SIDA) Marking



NOTES:

1. STACKED SURFACE PAINTED HOLDING POSITION SIGNS FOR NARROW TAXIWAYS - ONLY TO BE USED PER PARAGRAPH 4.5 (d)(1)(ii).

Figure C - 16. Narrow Taxiway Stacked Surface Painted Holding Position Signs