



U.S. Department
of Transportation

**Federal Aviation
Administration**

Advisory Circular

Subject: Standards for Airport Markings

Date: 11/17/2010

AC No: 150/5340-1K

Initiated by: AAS-100

Change: 1

- 1. PURPOSE.** This advisory circular (AC) contains the Federal Aviation Administration (FAA) standards for markings used on airport runways, taxiways, and aprons. Change 1 corrects text and formatting errors, clarifies instructions and marking characteristics, and incorporates the corrections noted in the errata sheet for AC 150/5340-1K.
- 2. 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, Certification of Airports (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.”)
- 3. PRINCIPAL CHANGES.** In addition to minor editorial and formatting changes, this Change —

 - a.** Revises figures 1, 8, A-4, C-4, C-5, C-8, C-15, and C-16. Text remains unchanged.
 - b.** Revises the distance between the threshold and aiming point markings at which a note is placed in the Airport/Facility Directory in paragraph 2.2(d).
 - c.** Clarifies the separation between the Threshold Bar Marking and the Runway Threshold Marking in paragraph 2.5(b).
 - d.** Clarifies the use of the proportioning method for runway widths less than 150 feet. For certain runway widths, revises the width of the rectangular markings and the lateral spacing between the inner sides of runway Aiming Point Markings in paragraph 2.6(d).
 - e.** Clarifies the use of the proportioning method for runway widths less than 150 feet. For certain runway widths, revises the lateral spacing between the inner sides of the rectangular bars centered on the runway centerlines for the Runway Touchdown Zone Marking in paragraph 2.7(d).
 - f.** Clarifies the width of Runway Side Stripe Markings on runways of at least 100 feet (30.5 m).
 - g.** Deletes the option that allowed airport operators to paint a Pattern A holding position marking up to and not interrupt the taxiway edge marking in former paragraph 3.3(b)(3).

h. Clarifies the location of Taxiway Centerline Markings on curved sections to be in accordance with table 4-2 of AC 150/5300-13 in paragraph 4.2(b).

i. Clarifies the same start point for Enhanced Taxiway Centerline Markings relative to centered Surface Painted Holding Position Signs in paragraph 4.3(b).

j. Revises text to clarify that a taxiway centerline is discontinued [interrupted] when it crosses the Non-Movement Area Boundary Marking in paragraph 5.4(d).

k. Clarifies how to use the patterns in figure 25 when marking and lighting permanently closed runways and taxiways.

4. CHANGED TEXT. Changed text is indicated by vertical bars in the margins.

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

(1) When the aiming point markings of a given runway that are 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 newly designated 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) or 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 could be a non-compatible threshold crossing height for landing airplanes. When the aiming point markings are shifted more than 60 feet (18.3 m), the co-located PAPI or VASI should be evaluated for relocation 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).

(3) For landing safety, the FAA requires that whenever the distance between the threshold and aiming point markings is 1,220 feet (372 m) or more, the airport operators 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 runway 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 of a “wrong-runway” takeoff operation by pilots, the airport operator should reconstruct closed V-shaped runway geometries to a different 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 marking(s) 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, *Requirements and Recommendations for Enhanced Conspicuity of Surface Markings*, for required and recommended techniques to enhance visibility of 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. See paragraph 2.3(d)(6).

(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. See paragraph 2.3(d)(6).

(vi) Seven 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. See paragraph 2.3(d)(6).

(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 several terminals, it is preferable to designate the runways 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 (18.3 m) in height. Numerals 6 and 9, which are 63 feet (18.9 m) in height, follow the Rule of 69. That is, although the numerals 6 and 9 are taller, the 3-foot tips of the numerals are ignored so that 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 Airplane Design Group (ADG) I Runway Width
(Painting)**

Due to the space limitations on very narrow runways, the size and spacing of the numbers and letters are reduced only when necessary such that the painted runway landing designator is no closer than 2 feet (0.6 m) from the runway edge or runway side stripes. For example, this problem may occur when painting certain dual-numbered runway landing designators spaced 15 feet (4.5 m) apart on an ADG I runway width of 60 feet (18.3 m). In such cases, first reduce the 15-foot (4.5-m) spacing to 10 feet (3.1 m) and retain the size of numerals and letter per figure 5. Second, reduce the 15-foot (4.5-m) spacing to 10 feet (3.1 m) and reduced the size of numerals and letter proportionally to maintain the 2-foot (0.6 m) edge or runway side stripe clearance.

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 and of uniform width.

(1) The stripes are 120 feet (36.5 m) in length and the gaps are 80 feet (24.3 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 uniform 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, reduce the lengths of both the stripes and gaps starting from midpoint and proceed toward the runway thresholds. Reduced stripes must be at least 80 feet (24 m) in length, and the reduced gaps must be at least 40 feet (12.3 m) in length. The affected stripes and gaps within the section should show a uniform pattern.

2.5. RUNWAY THRESHOLD MARKING.

a. Purpose. A runway threshold marking, which commences 20 feet (6 m) from the actual start point of 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 start point of the runway threshold as shown in figures 1 and 2. This value remains the same even though a 10-foot (3-m) white threshold bar is introduced, such as for displaced thresholds or the addition of a blast pad or stopway as shown in figure 8. Previously, when a displaced threshold was painted or a blast pad or stopway added, the 20-foot (6-m) dimension was increased to 30 feet (9 m) to accommodate the requirement for painting the runway threshold bar. When a runway is completely remarked, the newly painted displaced threshold and threshold bar markings are 10 feet (3 m) apart as shown in figure 6.

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 2-2 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 2.5(d)(3) for painting guidance applicable to non-standard runway widths.

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

Standard runway widths	Number of symmetrical stripes
60 feet (18.3 m)	4
75 feet (22.9 m)	6
100 feet (30.5 m)	8
150 feet (45.7 m)	12
200 feet (61 m)	16

(2) For standard runway widths, the longitudinal stripes are 150 feet (45.7 m) long and 5.75 feet (1.75 m) wide with the outer edges spaced (stripe-gap) 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 (46 m) wide runways. The stripe-gap pattern allows sufficient room to paint runway side stripes without interfering with the outermost longitudinal stripes.

**Application of Proportioning Runway Markings
for Non-Standard Runway Widths
(Painting)**

For standard 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).

(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 width for the pattern used on the standard 200-foot (61-m) wide runways.

(4) When there is pavement in excess of 5 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 load 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 to support the light fixtures and the supportive pavement abuts the start point of the runway threshold, then the supportive pavement is not considered a part of the runway. In this instance, the painting of a runway threshold bar is not required.

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 overlapping aiming point markings at dual 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 may negatively impact the threshold crossing heights for approaching airplanes. One potential impact of the shift is to the co-located runway approach aids, such as the PAPI, in which the previous vertical guidance offered by the aiming point marking to pilots is now incompatible with the threshold crossing height associated with the runway approach aid. Under such conditions, adjustment in the location of the affected runway approach aid may be necessary after an evaluation so that the co-located relationship between the PAPI (and other approach aids) and the shifted aiming point marking permits an acceptable landing operation for both landing aids.

(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 (45.7 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 (30.5 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 2-2 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 (45.7 m) or greater.
- (ii)** 20 feet (6 m) for standard runway widths of 100 feet (30.5 m).
- (iii)** 15 feet (5 m) for standard runway widths of 75 feet (22.9 m).
- (iv)** 12 feet (3.7 m) for a standard runway width of 60 feet (18.3 m).

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

- (i)** For runways of 150 feet (45.7 m) or more in width, the lateral spacing between the inner sides of the rectangular bars centered on the runway centerline is 72 feet (21.9 m).

(ii) For runways of 100 feet (30.5 m) in width, the lateral spacing between the inner sides of the rectangular bars centered on the runway centerline is 48 feet (14.6 m).

(iii) For runways of 75 feet (22.9 m) in width, the lateral spacing between the inner sides of the rectangular bars centered on the runway centerline is 36 feet (11.0 m).

(iv) For runways of 60 feet (18.3 m) in width, the lateral spacing between the inner sides of the rectangular bars centered on the runway centerline is 28.8 feet (8.8 m).

**Application of Proportioning Runway Markings
for Non-Standard Runway Widths
and for Standard Runway Widths less than 150 feet (45.7 m)
(Painting)**

For runways with widths below 150 feet (45.7 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 by using the 150-foot (45.7 m) width runway parameters to determine the percentage decrease in lateral spacing and width of each marking. For example, a non-standard 70-foot wide runway would apply $70/150 = 0.467$ to obtain a lateral spacing of $72 \times 0.467 = 33.6$ feet (10.25 m) between the pair and an individual width of $30 \times 0.467 = 14$ feet (4.27 m).

If runway side stripes are also painted, which are not reduced, 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 (9.1 m) except for runways less than 75 feet (22.9 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 a precision runway in 500-foot (152-m) increments. For lighting provisions, see AC 150/5340-30.

a. 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 back toward the threshold. 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 do 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 2-3 (case #1) and table 2-4 (case #2).

Case #1 – Only one runway end requires the runway touchdown zone marking scheme. Apply table 2-3 criteria, which take into account the “no-marking zone” of 900 feet (275 m) from the midpoint back toward the threshold.

Table 2-3. Pairs of Touchdown Zone Markings Required When Installed From 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
<p>Note 1: The value of 6,065 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 <i>preferred</i> aiming point marking, which starts 1,020 feet from the start of 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.</p> <p>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.</p> <p>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.</p>		

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

Table 2-4. Pairs of Touchdown Zone Markings Required When Installed From 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
<p>Note 1: The value of 7,990 feet is derived as follows. Proceed from the runway midpoint in one direction, and 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.</p> <p>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.</p> <p>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.</p>	

(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 (48.8 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) For runway widths of 150 feet (45.7 m) or greater, each rectangular bar is 75 feet (22.9 m) long and 6 feet (1.8 m) wide. 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).

(2) For runway widths less than 150 feet (45.7 m), the length of the marking remains unchanged, but the width and the lateral spacing between the markings are reduced proportionally to the decrease in runway width by using 150-foot (45.7 m) parameters to determine the percentage decrease.

(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 2-2 for the dimensions of standard runway widths.

(i) For runways of 150 feet (45.7 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 (30.5 m) in width, the lateral spacing between the inner sides of the rectangular bars centered on the runway centerline is 48 feet (14.6 m).

(iii) For runways of 75 feet (22.9 m) in width, the lateral spacing between the inner sides of the rectangular bars centered on the runway centerline is 36 feet (11.0 m).

(iv) For runways of 60 feet (18.3 m) in width, the lateral spacing between the inner sides of the rectangular bars centered on the runway centerline is 28.8 feet (8.8 m).

**Application of Proportioning Runway Markings
for Non-Standard Runway Widths
(Painting)**

For runways with widths below 150 feet (45.7 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 by using the 150-foot (45.7 m) width runway parameters to determine the percentage decrease in lateral spacings and width of the marking. For example, a non-standard 70-foot wide runway would apply $70/150 = 0.467$ to obtain a lateral spacing for the centered pair of $72 \times 0.467 = 33.6$ feet (10.25 m), a lateral spacing for other pairs of $5 \times 0.467 = 2.3$ ft (0.7 m), and a width of $6 \text{ feet} \times 0.467 = 2.8$ feet (0.85 m). 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. Given that the runway side stripes are painted, the adjustment should be such that the clearance between the runway side strip and the outer edge of the three-bar grouping is a minimum of 1-foot (0.3 m). 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 consists 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 (61 m). 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 runway side stripe marking has a minimum width of 36 inches (90 cm) for runways of 100 feet (30.5 m) or wider in width and at least 18 inches (45 cm) on smaller width runways (see table 2-2 for standard runway widths).

CHAPTER 3. HOLDING POSITION MARKINGS.

3.1. APPLICATIONS OF HOLDING POSITION MARKINGS. The purposes for the different holding position markings are to prevent aircraft and vehicles from entering into critical areas associated with a runway and navigational aids or to control traffic at the intersection of taxiways. This advisory circular describes six operational situations (cases) using three different holding position marking schemes. Cases 1, 2, and 3 employ the same marking scheme referred to as Pattern A – runway holding position marking. Cases 4 and 5 employ a different marking scheme referred to as Pattern B – ILS/MLS or POFZ holding position marking. The latter operational situation, Case 5, uses Pattern B in which it usually appears as an L-shaped ladder. Case 6 uses a different marking scheme referred to as Pattern C – intermediate holding position marking for taxiway/taxiway intersections. Figures 12 and 12a show the four different marking patterns.

- **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** (most common application for Cases 1, 2, and 3): In terms of taxiing on a taxiway, an aircraft will need to hold short prior to entering an active runway (see paragraph 3.3).
- **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 3.4).
- **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 3.5). Although the surface marking pattern is the same as Case 4, the pattern in many applications is L-shaped, instead of only linear in shape.
- **Case 6:** In terms of taxiing on a taxiway, an aircraft will need to hold short of a taxiway/taxiway intersection (see paragraph 3.6).

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

a. Purpose. Pattern A when painted on a runway, as shown in figure 12, identifies the location where a pilot (or vehicle driver) is to stop and hold when (1) the runway is operationally closed for an interval of time so that ATCT can control taxiing operations through a runway/runway intersection or (2) the runway is used for land and hold short operations (LAHSO). For necessary corresponding signage and lighting provisions, see AC 150/5340-18, Standards for Airport Sign Systems, and AC 150/5340-30, Design and Installation Details for Airport Visual Aids.

**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 (ATCT).

Note 2: Paragraph 405, *Parallel Taxiway*, 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, we do not recommend the use of an operationally closed runway as a taxiway, especially when a parallel taxiway exists. Such an operation can potentially confuse pilots because this taxiing operation introduces yellow-colored taxiway surface markings onto the runway itself. Hence, to avoid the potential for 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 dual parallel taxiways to avoid this type of taxiing operation.

Note 3: To avoid a runway incursion event at runway/runway intersections when an operationally closed runway is used as a taxiway, the intersection must have the runway holding position marking and corresponding signs whether or not pilots taxi through the runway/runway intersection. Additionally, this marking should only be used in those instances where documentation supports the need for the operational use of the runway as a taxiway. The operational use of a runway as a taxiway must be described in a Letter of Agreement with the ATCT.

b. Location. In all Case 1 and Case 2 applications, the location of the runway holding position marking is at or beyond the edge of the runway safety area of the intersecting runway as provided by AC 150/5300-13. The criteria given below assume that the centerlines of the intersecting runways are perpendicular. Hence, for runway/runway intersections that are non-perpendicular, additional distance may be required to ensure that all airplane features, such as wingtips, remain outside the runway safety area of the intersecting runway.

(1) Operationally Closed Runways Used for Taxiing Operations. The location of the runway holding position marking on operationally closed runway is in accordance with the holdline criteria per table 2-1 or table 2-2 in AC 150/5300-13 for the intersecting runway's airport reference code.

(2) Runways Used for LAHSO.

(i) The location of the runway holding position marking on the runway used for LAHSO is in accordance with the holdline criteria per table 2-1 or table 2-2 in AC 150/5300-13 for the intersecting runway's airport reference code. On rare cases the location of the runway holding position marking for LAHSO is based on a *predetermined hold-short point* along the landing runway to protect an approach/departure flight path or to overcome painting difficulties as described below in subparagraph 3.2(b)(2)(ii). In no case should the location of the predetermined hold-short point be within the holdline criteria in table 2-1 or table 2-2 in AC 150/5300-13 for the intersecting runway's airport reference code.

Certain airfield geometries for runways that are used for taxiing or LAHSO operations have intersecting taxiway(s) that hamper the painting of the runway holding position marking (and accompanying necessary signage) in accordance with the applicable holdline criterion. One such geometry occurs when a crossing taxiway or its fillet intersects the same area indicated by table 2-1 or table 2-2 of AC 150/5300-13. One solution is to move the hold-short point further away from the runway/runway intersection so that both the marking and the installed signage clear the common crossing area. Under this solution (1) the marking is always painted at a greater distance than the holdline criteria

and (2) the required corresponding signage retains only the runway designations, i.e., never uses a taxiway designation.

c. Color. The Pattern A marking scheme, as shown in figure 12, is yellow and, when painted on light-colored pavements, is outlined in black. See paragraph 1.4 and table 1-1 for required and recommended techniques to enhance this surface marking on light-colored pavements.

d. Characteristics.

(1) The marking is identical to the runway holding position marking 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. If the runway holding position marking should interrupt the mentioned exceptions, then paint the runway holding position marking further away than specified by AC 150/5300-13 to avoid any interruption of these specified markings. The painting practice is to avoid “over striping” existing runway surface markings.

(3) The runway holding position marking extends across the full width of the runway but not onto the 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 when painted on a taxiway as shown in figure 12 serves several roles. For a taxiway that intersects a runway at an airport with an operating airport traffic control tower (ATCT), the Pattern A marking scheme identifies the location on a taxiway where pilots and vehicle drivers are to stop until they receive a clearance from ATCT 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 (SMGCS) Plan as described in paragraph 4.11 and as shown in figure C-8. 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 and vehicle drivers are to stop to ensure that they have 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 or the runway safety area, the Pattern A marking scheme identifies the location on a taxiway where pilots and vehicle drivers are to stop to receive clearance from the airport traffic control tower before proceeding through the protected area. This application serves to stop a taxiing aircraft from penetrating the runway safety area (a runway incursion) or any of several airspace surfaces, for example, those used to define the runway threshold, runway inner approach obstacle free zone, or the runway 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 the impacted runway end. AC 150/5300-13 includes a discussion of these airspace surfaces. Except as specified in paragraph 3.2, the runway holding position marking must not be used for any other situations 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 the holdline criteria per table 2-1 or table 2-2 in AC 150/5300-13 for the runway's airport reference code. 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. Pattern A is used also 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 any runways used at night and in low-visibility conditions. Locating a runway holding position marking other than what is required by this paragraph must be approved by the FAA.

(2) For a taxiway not intersecting a runway but crossing through a runway safety area or a runway approach surface, the Pattern A runway holding position markings must be located on all such taxiways in accordance with the more protective area obtained by either the holdline criteria per table 2-1 or table 2-2 in AC 150/5300-13 for the runway's airport reference code or the boundary of the approach surface's critical area. 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 Airports Regional Office or Airports District Office.

(3) The Pattern A marking must extend across the entire width of the taxiway. For taxiways having taxiway edge markings, discontinue the taxiway edge marking as shown in figure 21 so that the Pattern A marking continues to the edge of the defined taxiway width. For taxiways that serve Airplane Design Groups (ADG) V or VI airplanes as defined by AC 150/5300-13, the marking is further extended onto both paved shoulders as shown in figure C-4. For both airplane design groups, the length of the marking from the taxiway centerline onto the paved shoulder measures 62.5 feet (19 m). The 62.5-foot (19-m) measurement takes into account the downward viewing angle from the cockpit while the pilots are seated in the normal position as well as other safety factors, such as aircraft wander from the taxiway centerline. For taxiways with widths greater than 75 feet (22.9 m), the runway holding position marking is extended 25 feet (7.5 m) [62.5 viewing angle minus (1/2)(75) standard taxiway width equals 25 feet] onto the paved taxiway shoulders. Only those taxiway entrances to a runway that serve ADGs V or VI are to be further enhanced. Typical airplane models within ADGs V and VI 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.

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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. This surface painted marking is part of the taxiway centerline marking standard under 14 CFR Section 139.311(a)(2).

c. Color. The Pattern A marking scheme, as shown in figure 12, is yellow and, when painted on light-colored pavements, outlined in black. See paragraph 1.4 and table 1-1 for required and recommended techniques to enhance this surface marking.

CHAPTER 4. SURFACE MARKINGS FOR TAXIWAYS.

4.1. APPLICATION. All taxiways regardless of their width have a centerline marking, and whenever a taxiway intersects a runway, the taxiway should have a surface painted runway holding position marking. For 14 CFR Part 139 certificated airports, all taxiways that intersect a runway must have a surface painted runway holding position marking and an enhanced taxiway centerline marking. Taxiway edge markings are 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 FAA (in some cases, with input from the tower manager of the airport traffic control tower (ATCT)) include the Pattern A, B, and C holding position markings discussed in Chapter 3, the intermediate holding position markings for taxiway/taxiway intersections, geographic position marking, and the taxiway shoulder marking.

4.2. TAXIWAY CENTERLINE MARKINGS. All taxiways regardless of their width have a surface painted taxiway centerline.

a. Purpose. The taxiway centerline marking provides pilots continuous visual guidance to permit taxiing along a designated path. See AC 150/5300-13 for standard fillet design, AC 150/5340-30 for lighting provisions and AC 150/5340-18 for signage provisions.

b. Location. On a straight section of a taxiway, the taxiway centerline marking is located along the physical centerline of the paved taxiway. This statement assumes the taxiway was built to standard, i.e., symmetrical with a taxiway centerline. On curved sections of a taxiway, the taxiway centerline marking continues from the centerline marking of the straight portion of the taxiway along a curved centerline defined as the Radius of Taxiway Turn in table 4-2 of AC 150/5300-13.

(1) For taxiways that intersect other taxiways, the adequacy of the fillet design determines the centerline painting scheme as shown in figure 16. The recommended design is cockpit-over-centerline steering which reduces the number of airplane main gear excursions from the taxiway.

(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. This practice applies to intersecting taxiways that are or are not of the same airport reference code.

(ii) Where adequate fillets exist, that is, the 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. This practice applies to intersecting taxiways that are or are not of the same airport reference code.

<p>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 (1) construct standard fillets and (2) paint taxiway centerlines according to cockpit-over-centerline design.</p>
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(2) For taxiways that intersect runways, different painting requirements or restrictions apply.

(i) For a taxiway that intersects a runway *at a runway end*, as shown in figures 14 and 15, 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-on and lead-off) will continue onto the runway under the following conditions:

(1) Where there is a displaced threshold, as shown in figures 6 and 10, the taxiway centerline marking continues onto the displaced area of the runway and extends parallel to the displaced threshold markings (arrow heads and arrow shafts) for a distance of 200 feet (61 m) beyond the point of tangency or terminates at the point of contact with the displaced threshold bar, whichever is less. As shown in figure 6 the lead-on and lead-off taxiway centerlines are 3 feet (1 m) from the runway arrow markings as measured near-edge to near-edge. This lead-on or lead-off taxiway centerline line is interrupted for all runway markings with some exceptions (see paragraph 4.2(b)(2)(i)(2)).

(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 and, unless required by a SMGCS Plan, the runway threshold marking (longitudinal stripes). The painted taxiway centerline marking must follow the path of the in-pavement lighting criteria of AC 150/5340-30. That is, if the in-pavement lighting is curved, the painted taxiway centerline is curved. In this situation, the taxiway centerline marking continues onto the runway and extends parallel to the runway centerline marking for a distance of 200 feet (61 m) beyond the point of tangency and is 3 feet (1 m) from the runway centerline as measured near-edge to near-edge. For some airfield geometry, such as an airfield with parallel runways with several parallel taxiways, the painted taxiway centerline at the runway end is painted straight through the runway end and curved onto the runway. See AC 150/5340-30 for the different RVR in-pavement lighting requirements and recommendations associated with various airfield configurations.

(ii) For taxiways that intersect a runway at any *other locations than at the runway end*, as shown in figure 14, 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 with the runway centerline or terminates at the point of contact with the displaced threshold bar, whichever is less. As shown in figures 14 and 15, these lead-on and lead-off taxiway centerlines are 3 feet (1.0 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 all runway markings with some exceptions (see paragraph 4.2(b)(2)(ii)(2)).

(2) For low-visibility taxiing operations, when the 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, unless required by the SMGCS Plan, the runway threshold marking (longitudinal stripes), aiming point marking, and the touchdown zone markings.

c. Color. The taxiway centerline marking is yellow. See paragraph 1.4 and table 1-1 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 Airport Safety and Standards. Regarding aircraft deicing facilities that are located in non-movement area, taxiway/taxilane centerlines are painted in accordance with AC 150/5300-14, Design of Aircraft Deicing Facilities.

d. Characteristics.

(1) Width. The taxiway centerline marking width, which is either 6 inches (15 cm) or 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 under the following conditions.

(i) The taxiway or part of the taxiway is designated as a 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 route through the confused intersection by painting a wider centerline width. The FAA recommends that airport operators take measures to realign or reconstruct confusing taxiway intersections.

(iii) Airport operators may, if deemed necessary to provide pilots a better visual clue of the location of troublesome taxiway exits from the runway, increase 6-inch (15-cm) wide taxiway centerline markings before the aircraft hold side at the runway holding position location to 12-inch (30-cm) wide lead-off taxiway centerline markings on the runway side.

(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 connects to a runway), (2) an intermediate holding position marking (intersection of taxiways), (3) an ILS/MLS or POFZ holding position marking, or (4) non-movement area boundary marking (paragraph 5.4). Figures 12 and 12a illustrate the marking details for most of 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 runway holding position marking (Pattern A) for minimizing the potential for runway incursions. To reinforce situational awareness before entering a runway, this safety enhancement is only used on those taxiways that directly enter a runway. For example, this safety enhancement would not be painted on a runway or used at all Pattern A applications, such as case 1 or case 2 (paragraph 3.2), situations as shown in figure C-16, or a taxiway that goes through the runway safety area but not onto the

runway itself. The same restriction is valid for case 4 Pattern B applications, such as, a taxiway through an approach area.

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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 entrance taxiways with a runway holding position marking are to have the enhanced taxiway centerline marking. Painting this safety enhancement should be completed in the shortest period of time, preferably concurrently for all taxiway entrances to a given runway. The intent of this revision is to avoid pilot confusion by eliminating the previous three different applications of this safety enhancement at 14 CFR Part 139 certificated airports.

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. Beyond this deadline, all new taxiway entrances must be painted accordingly prior to opening the taxiway; and (3) for all other commercial service airports and non commercial service airports certificated under 14 CFR Part 139, December 31, 2010. Beyond this deadline, all new taxiway entrances must be painted accordingly prior to opening the taxiway.

This surface painted marking is part of the taxiway centerline marking standard under 14 CFR Section 139.311(a)(2).

b. Location. Taxiway centerlines are enhanced for 150 feet (45.7 m) prior to a Pattern A – runway holding position marking, as shown in figure C-1, except for the situations described in paragraph 4.3(d). 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 and table 1-1 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. All black borders never use glass beads.

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 figures C-1 and C-6. For both applications, the first dashes start 6 to 12 inches (15–30 cm) from the runway holding position marking. For figure C-1 applications, the marking runs for a length of 9 feet (2.7 m) with a 6-inch (15-cm) width and are followed with a gap of 3 feet (0.9 m) between the dashes. For figure C-6 applications, the first and second set of dashes are 6 to 12 inches (15 - 30 cm) from the runway holding position marking and the surface painted holding position sign. For both cases, the standard painted pattern has a total length of 150 feet (45.7 m). For Figure C-1 applications, the standard pattern consists of 12 sets of 9-foot (2.75-m) dashes plus 3-foot (0.9-m) spaces and ends with a 6-foot (1.8-m) dash for a total length of 150 feet (45.7 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 in this section below.

CHAPTER 5. OTHER SURFACE MARKINGS.

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

5.2. VEHICLE ROADWAY MARKINGS.

a. Purpose. The three distinct 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 that collisions and other mishaps are averted. Markings for roadways not located on aircraft maneuvering areas, such as airport service roads, should conform, whenever possible, to the U.S. Department of Transportation's Manual on Uniform Traffic Control Devices. For roadway signage provisions for either case, 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 (0.6 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 (a) roadway edge lines to delineate each edge of the roadway, (b) a dashed line to separate lanes within the edges of the roadway, and, where appropriate, (c) a roadway stop line (bar). The roadway edge lines, which are either solid lines 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 (0.6 m) wide and extends across its appropriate lane. See figure 23 for illustrations and details.

(2) In lieu of the solid lines for 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 onto or across a taxi route must have a solid roadway stop line (bar). The placement of the stop line (bar) is in accordance with the criteria for taxiway centerline to fixed/movable object in table 2-3 of AC 150/5300-13 for the largest airplane design group serving the airport. This placement generally ensures adequate vehicle clearance from taxiing aircraft. However, the airport operators should evaluate if the effects of jet blasts by turning aircraft operations on vehicle traffic require a larger setback.

5.3. VERY HIGH FREQUENCY OMNIDIRECTIONAL RANGE (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 location of 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 the accompanying 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 preferably is 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 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 shown in 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 (3.1 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.

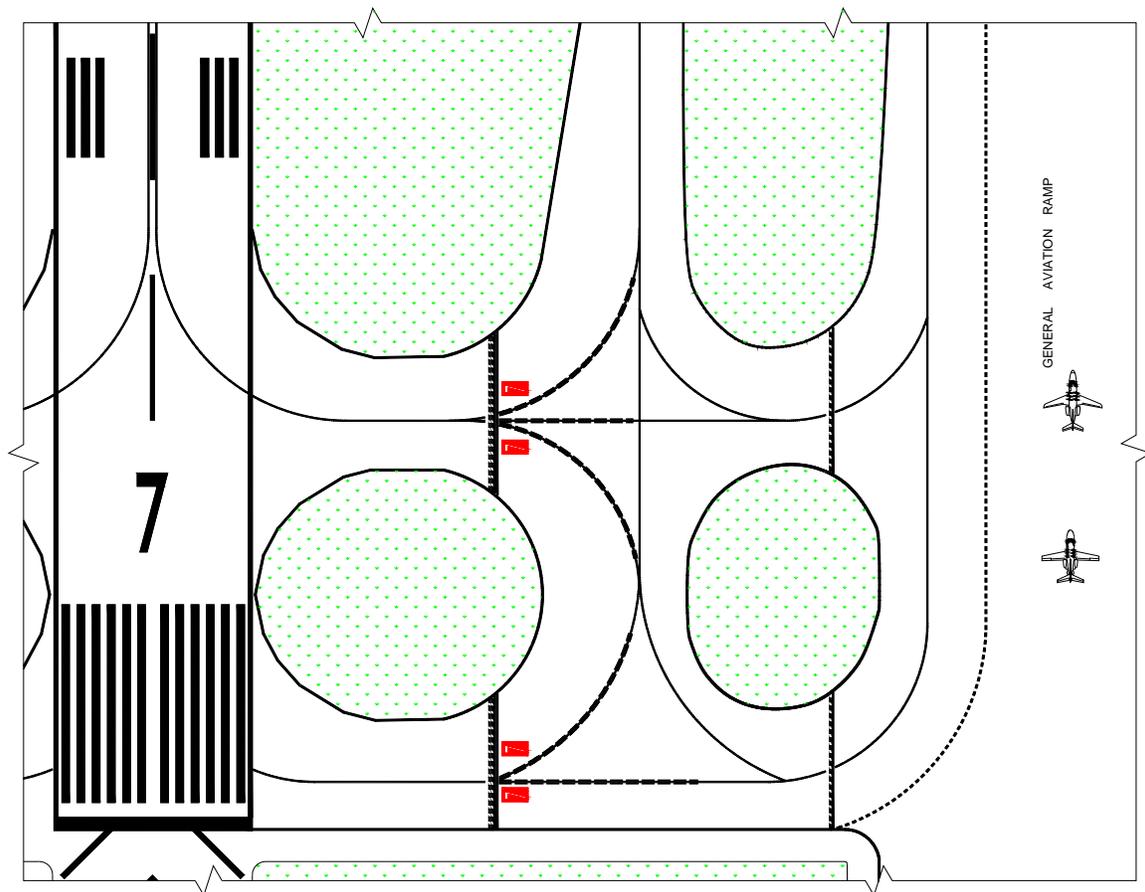
5.4. NON-MOVEMENT AREA BOUNDARY MARKING.

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 location(s) of the boundaries. Secondary purpose: The primary users of this marking are airport operators with an airport traffic control tower. However, some airport operators without an airport traffic control tower have effectively used this surface marking on terminals and other aprons to separate vehicle traffic, equipment traffic, etc. from the areas where aircraft taxi, such as, when aircraft enter/exit an aircraft parking area located off the terminal. Thus, airports without an airport traffic control tower may use the surface marking to help delineate aircraft traffic routes, aircraft parking limits, etc.

b. Location. A non-movement area boundary marking is located on the boundary between the movement and non-movement area as shown in figure 13. 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 set back in accordance with the taxilane centerline to fixed/movable object criteria of table 2-3 of AC 150/5300-13. However, the airport operators should evaluate if the effects of jet blasts by turning aircraft operations on equipment, personnel, or vehicle traffic require a larger setback. Taxilane instead of taxiway clearance criteria is given because this marking is painted in nearly all cases on terminal aprons, cargo areas, and aircraft parking areas where aircraft taxi at lower speeds.

Mitigation of Wrong Runway Takeoffs (Safety)

Precaution should be taken not to paint a non-movement area boundary marking on the outer edges of an apron that is transitioning into a taxiway that leads directly to a runway. Under certain runway/taxiway geometries, such as shown in figure 5-1, placement of this surface marking where dual parallel taxiways support a runway have resulted in pilots taking off on a parallel taxiway. The concern of such usage is that pilots who expect a *nearby* runway holding position marking after leaving an apron will confuse these two markings because of their visual similarities, i.e., single dash/single line versus dual dashes/dual lines. It is recommended that the non-movement boundary marking not be located on or just prior to a taxiway that leads directly to a runway.



NOTE: DO NOT SCALE DRAWING. THE RUNWAY IDENTIFICATION MARKINGS HAVE BEEN ENLARGED FOR CLARITY.

Figure 5-1 Precautionary Placement of the Non-movement Boundary Marking

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. The solid line is located on the side of the non-movement area while the dashed line is located on the side of the movement area.

(2) Each line is 6 inches (15 cm) in width with 6-inch (15-cm) spacing between lines. In the event of circumstances where pilots may have difficulty discerning the edge of a movement area, the width of the lines and spaces may be doubled to 12 inches (30 cm). In both applications, the dashes are 3 feet (0.9 m) in length with 3-foot (0.9-m) spacing between dashes.

(3) If a taxiway centerline intersects a non-movement area boundary marking, then the taxiway centerline is interrupted so that it is 6 to 12 inches (15 to 30 cm) from both sides of the non-movement area boundary marking.

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. Permanently closed paved areas are indicated by the use of an “X”. Figure 25 provides the detail criteria for the “X” marking.

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 (305-m) intervals.

c. For a closed runway that intersects an active 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 of the closed taxiway.

e. In terms of pattern selection from figure 25, the larger alternate pattern is preferable over the smaller pattern *for closed runways* because this pattern is seen more readily from aircraft on final approach. *For closed taxiways*, the smaller pattern is preferable over the larger alternative pattern unless taxiing pilots have difficulty seeing the marking and are entering the closed taxiway or 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” is yellow in color and conforms to the dimensions specified in figure 25. Since the “X” is 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, not flap in the wind, say by using a ground anchor device. Since the “X” 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.

General Comment
<p>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.</p>

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.

a. 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.

b. 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 150/5345-56, 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.

c. 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.

d. 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.

General Comment

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 both of these applications, the airport operator must properly re-mark affected pavements (including provisions for signage and lighting). One required restriction for any conversions is that the converted pavement cannot be marked simultaneously with a yellow taxiway centerline and a white runway designation number. Other re-marking actions are listed below. The FAA recommends a Safety Management System risk assessment to determine if other necessary actions need to be implemented.

General Comment

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 2-1, that is, 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.

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.

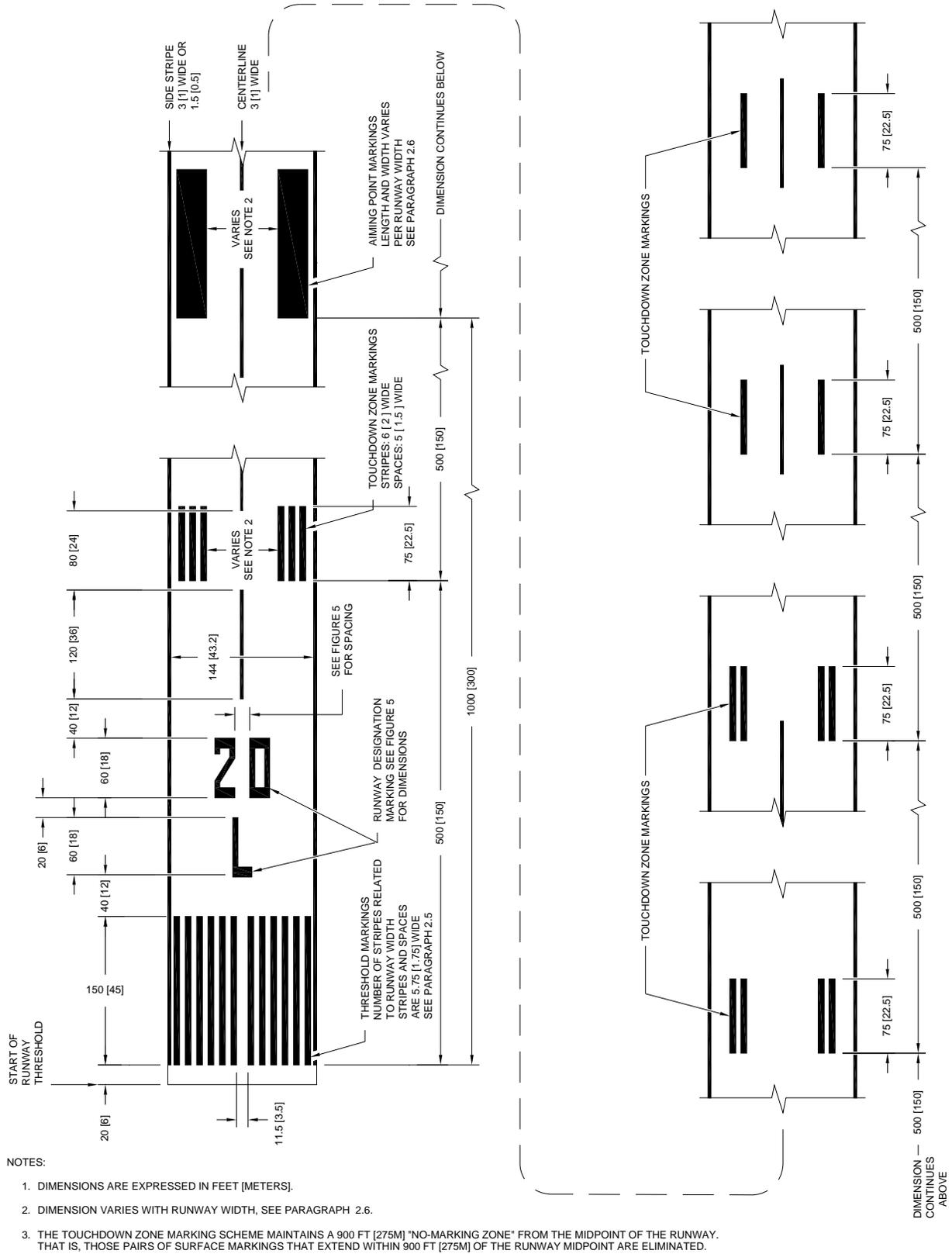
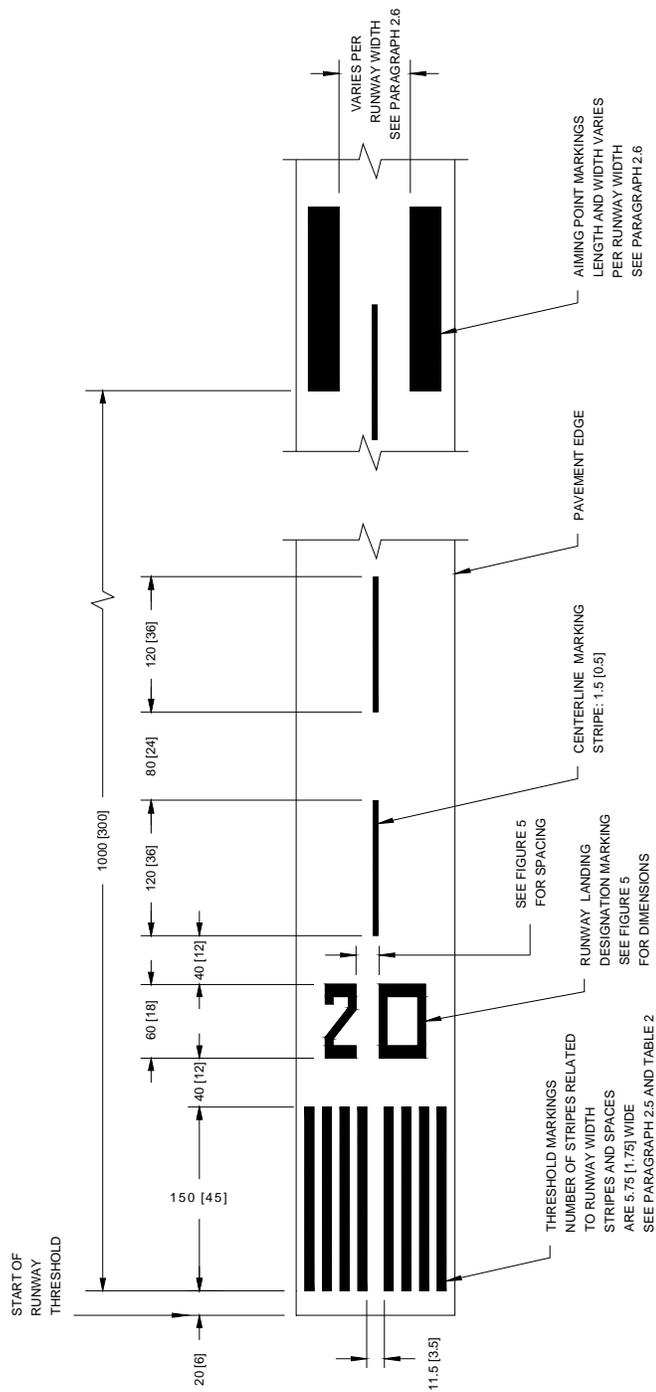


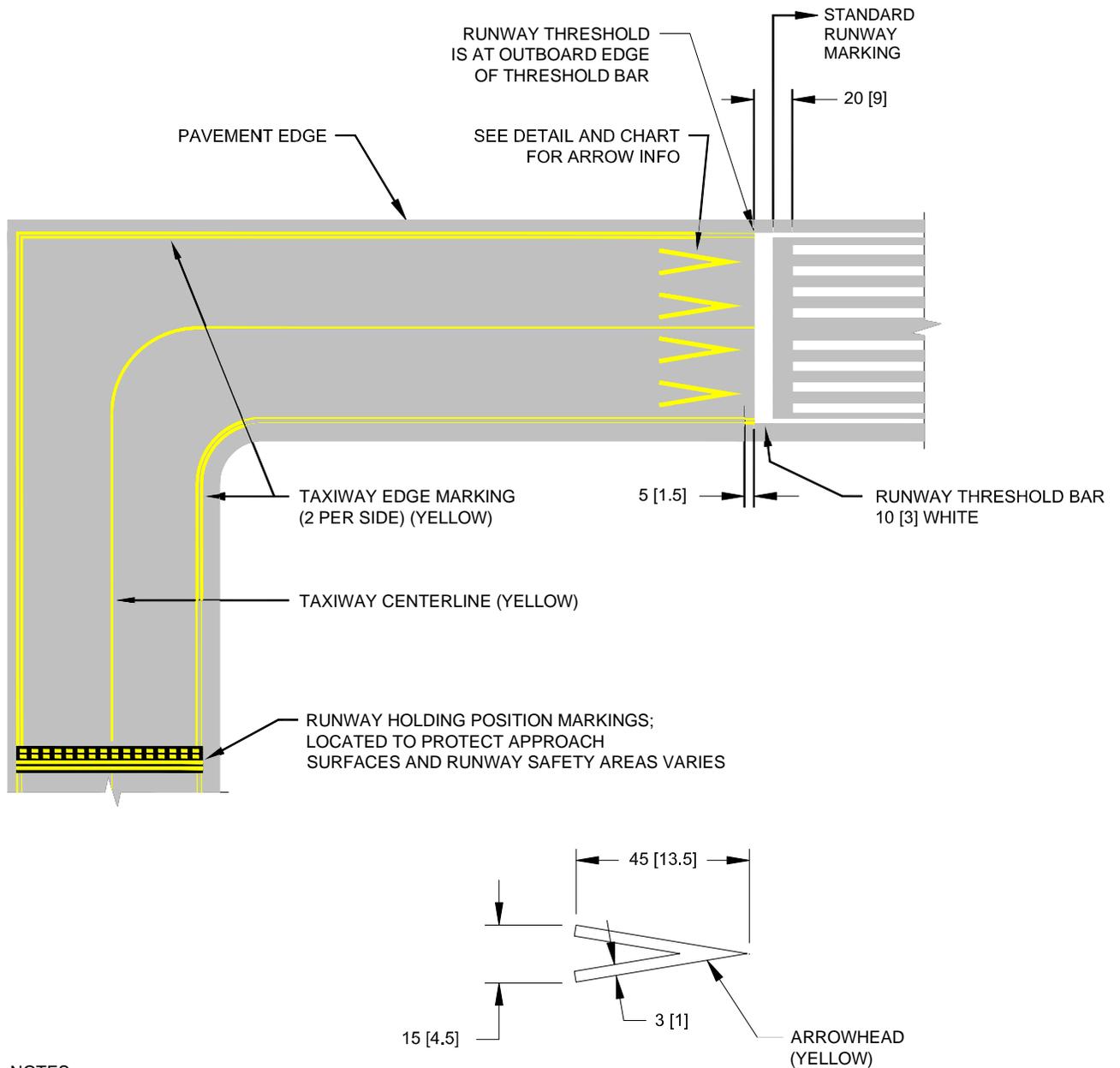
Figure 1. Precision Runway Markings



NOTES:

1. DIMENSIONS ARE EXPRESSED IN FEET [METERS].

Figure 2. Non-precision Runway

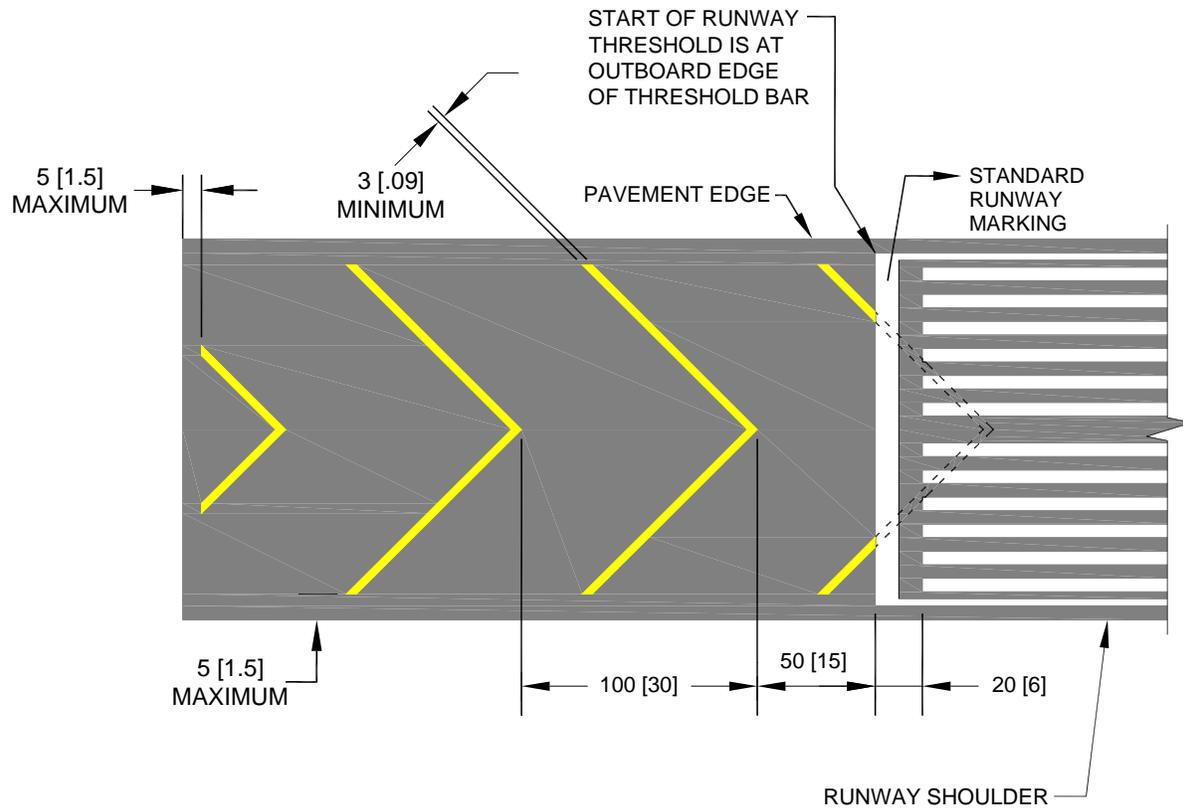


NOTES:

1. DIMENSIONS ARE IN: FEET [METERS]

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 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

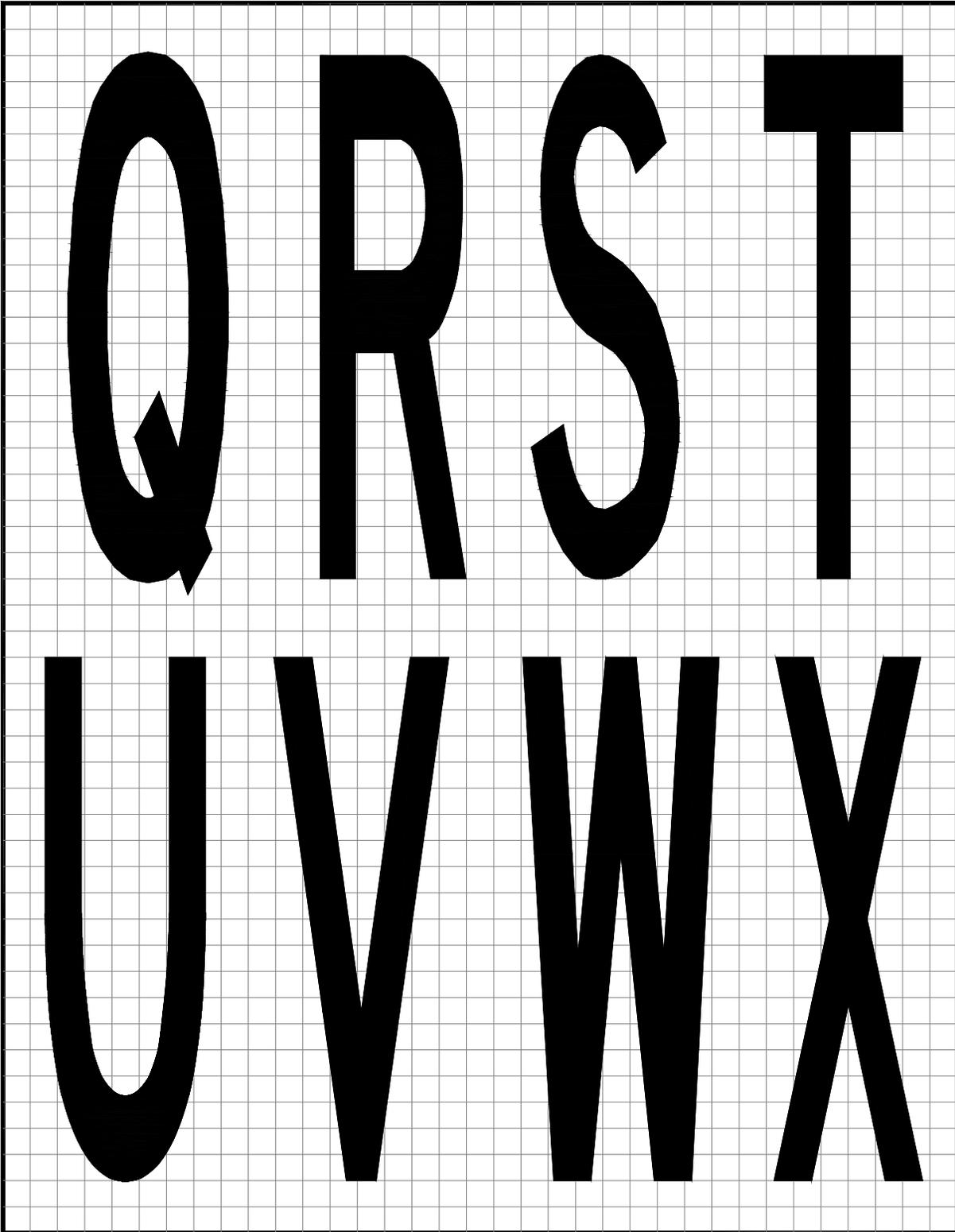


Figure A - 3. Pavement Markings QRSTUVWX

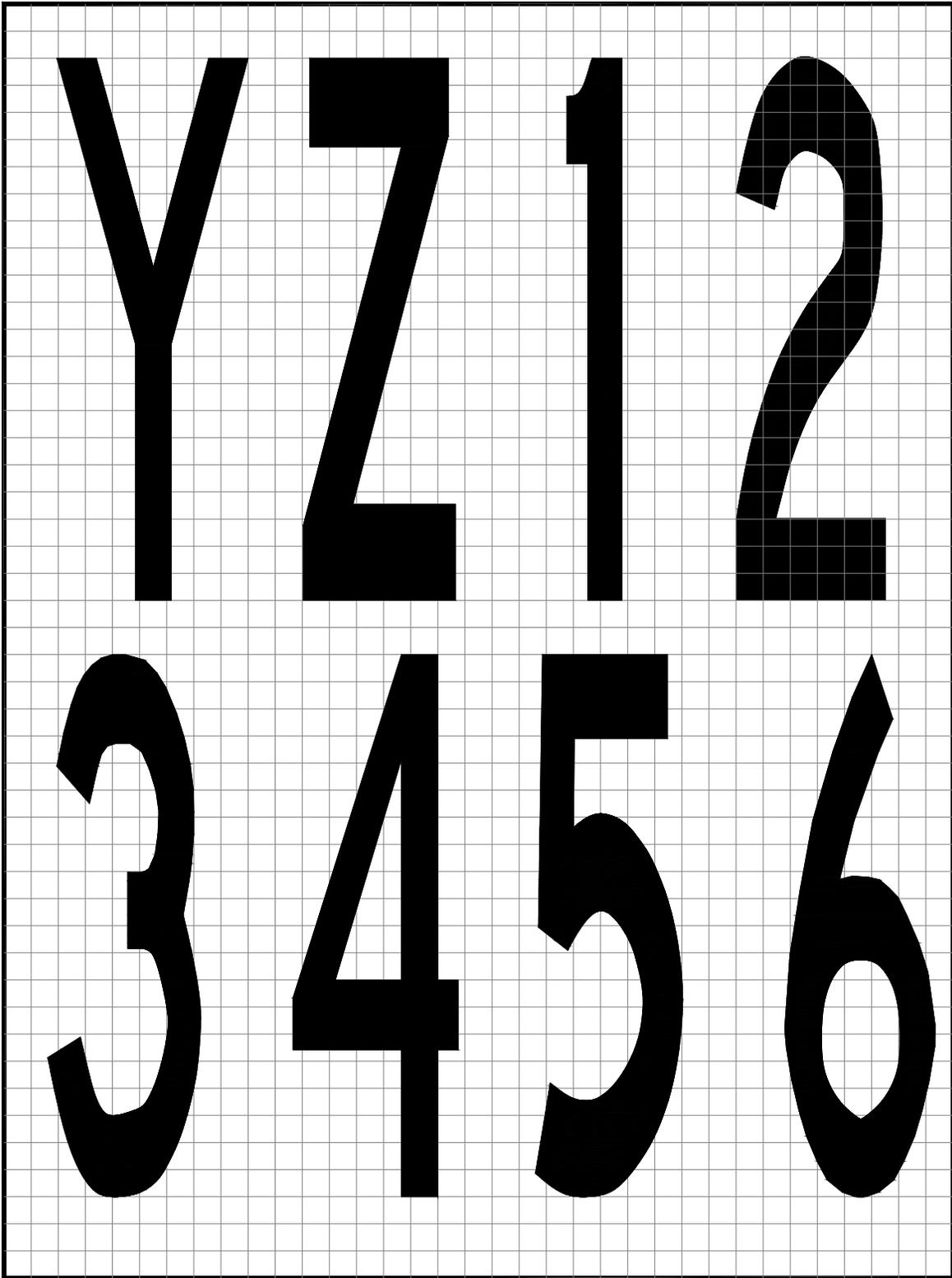


Figure A - 4. Pavement Markings YZ123456

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 (22.9 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.

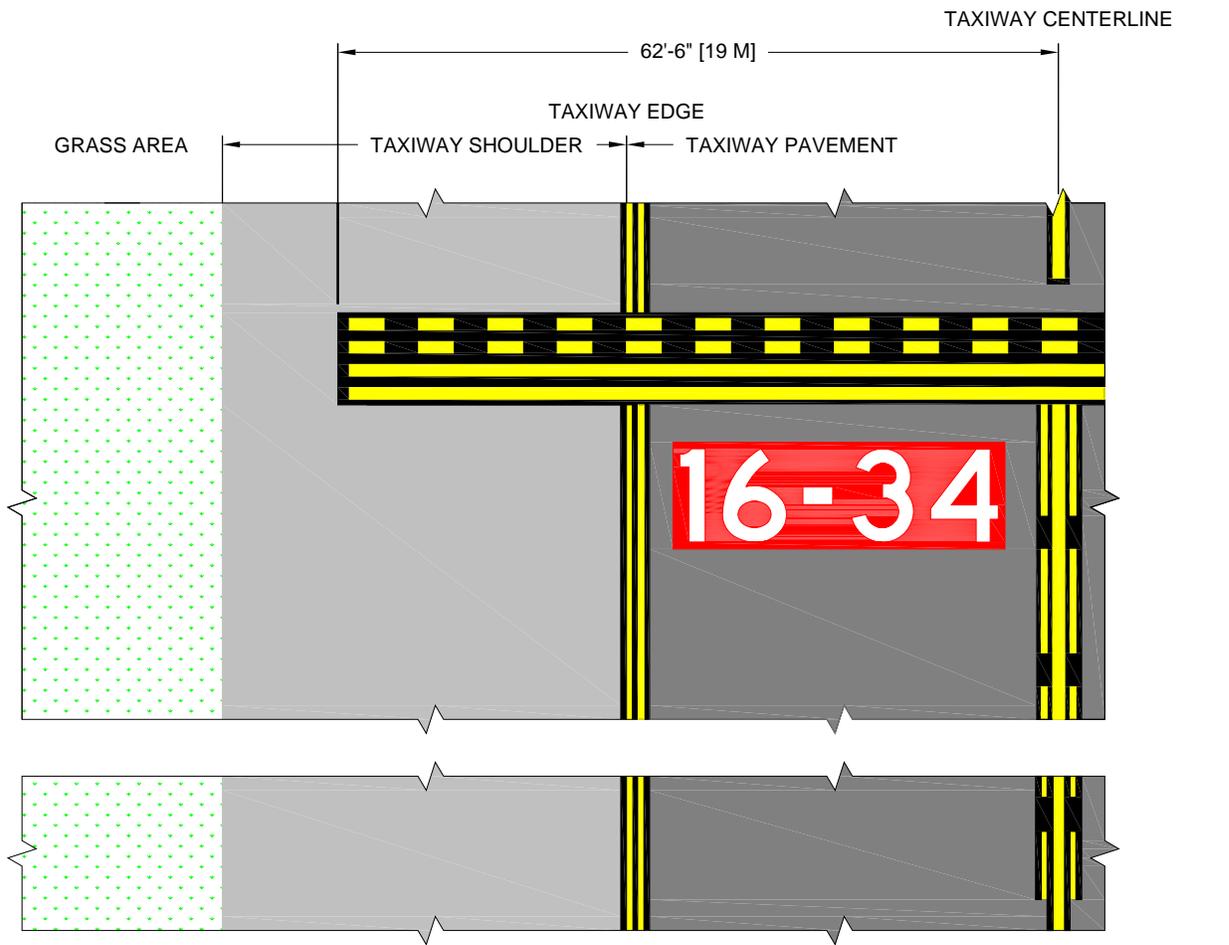


Figure C - 4. Enhanced Runway Holding Position Markings on Taxiways

5. SURFACE PAINTED HOLDING POSITION SIGNS.

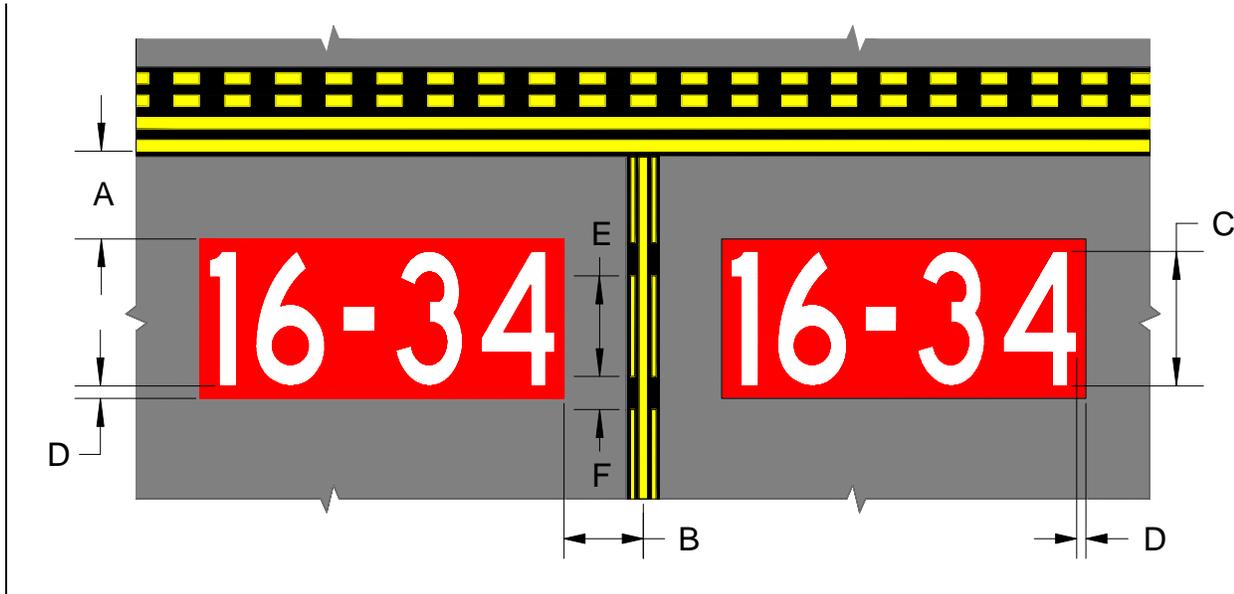


Figure C - 5. Surface Painted Holding Position Signs for Taxiway Widths Greater Than 35 Feet (10.5 m)

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 (22.9 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). In all cases, the dimension D is not reduced.
D	15 inches (38 cm)	
E	9 (2.75)	
F	3 (0.91)	

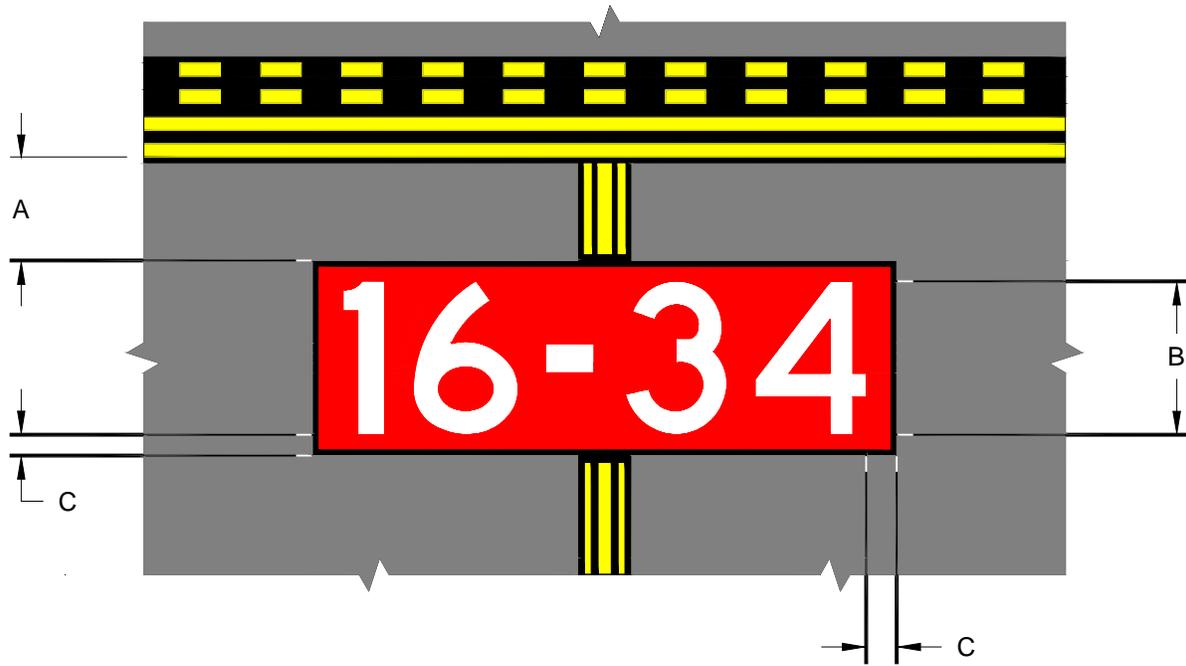


Figure C - 6. Surface Painted Holding Position Sign for Taxiway Widths Equal to or Less Than 35 Feet (10.5 m)

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 (10.5 m) 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. The spacing between the enhanced taxiway centerline and the surface painted holding position sign is 6 -12 inches (15 – 30 cm) see figure C-1.

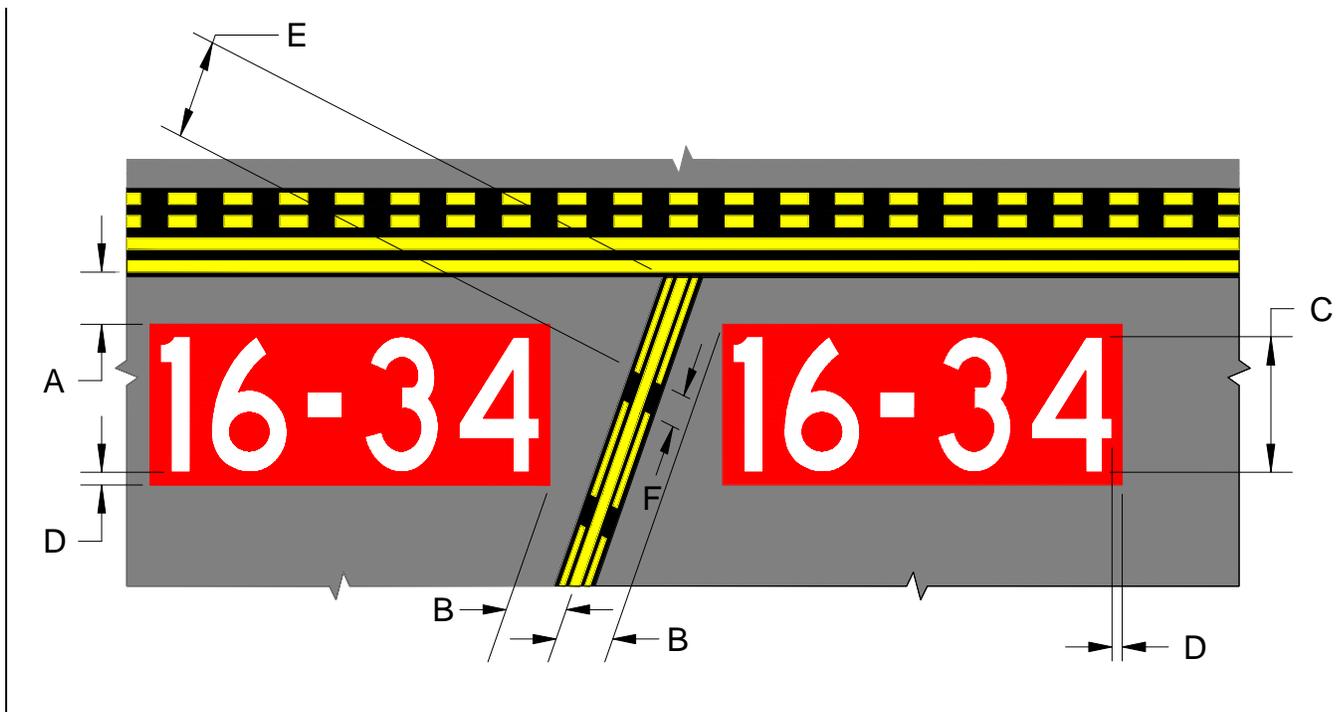


Figure C - 7. Surface Painted Holding Position Signs when Taxiway Centerline is not Perpendicular to Runway Holding Position Marking

Dimension Letter	Dimension feet (meters)	Notes
A	2 – 4 (0.67 – 1.34)	
B	3 – 10 (0.91 – 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 (22.9 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). In all cases, the dimension D is not reduced.
D	15 inches (38 cm)	
E	9 (2.75)	
F	3 (0.91)	

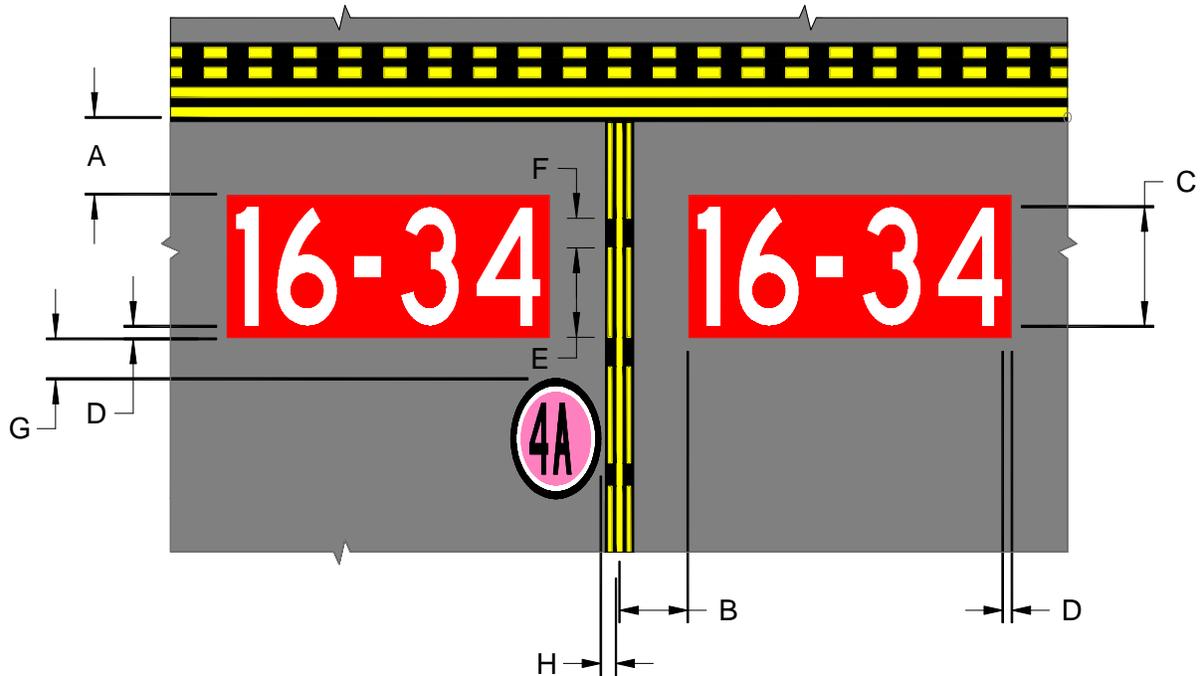


Figure C - 8. Surface Painted Holding Position Signs Co-Located with Geographic Position Marking

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 include taxiways with widths narrower than 75 feet (22.9 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). In all cases, the dimension D is not reduced.
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.

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.

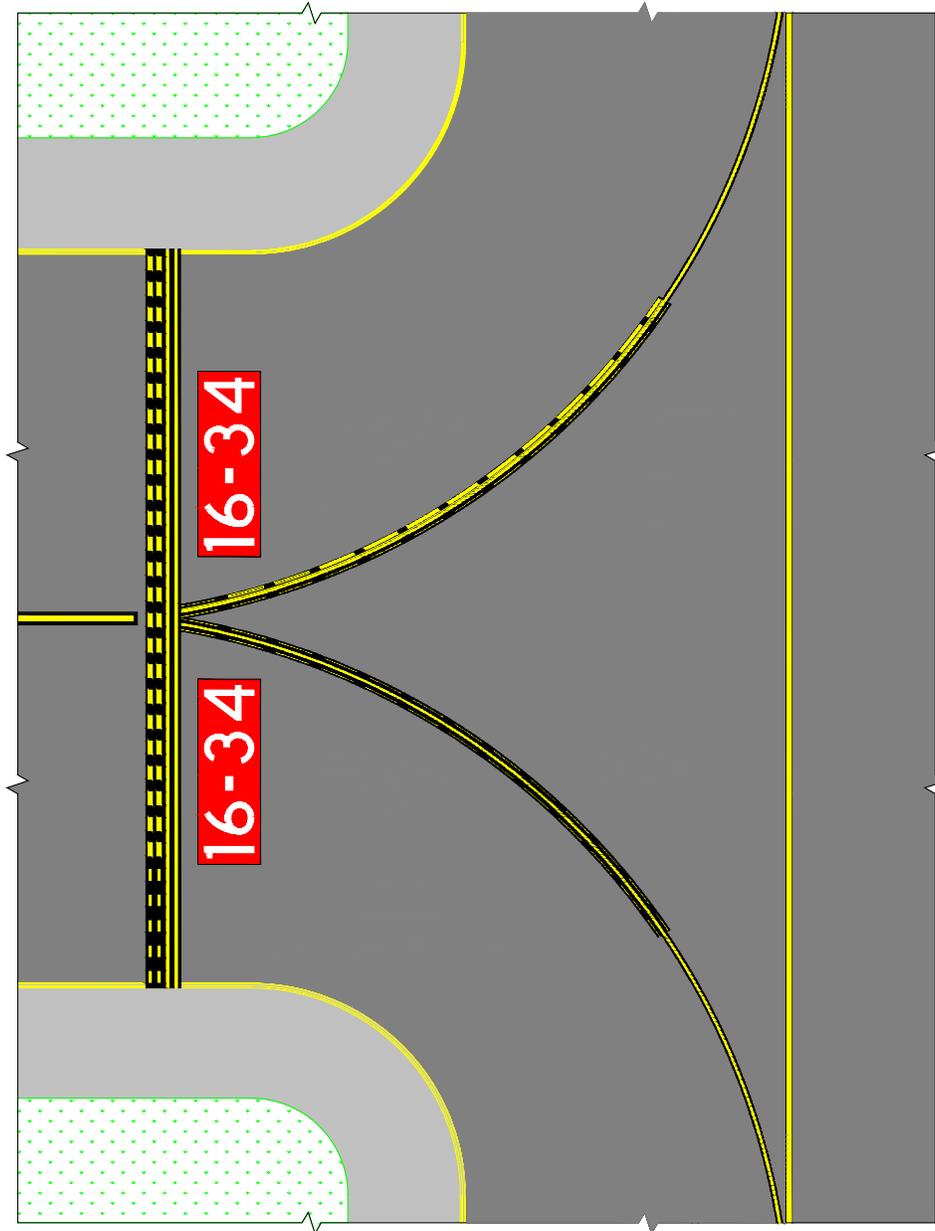


Figure C - 9. Two Taxiway Centerlines Converging at a Runway Holding Position Marking

f. Intersection of Stub Taxiway and Runway. Figure C-14 illustrates a solution for a stub taxiway that is less than 150 feet (45.7 m) long, with a 90-degree turn and angled taxiway shoulder areas. Per paragraph 4.3d, the enhancement terminates 5 feet (1.5 m) from a taxiway/taxiway intersection.

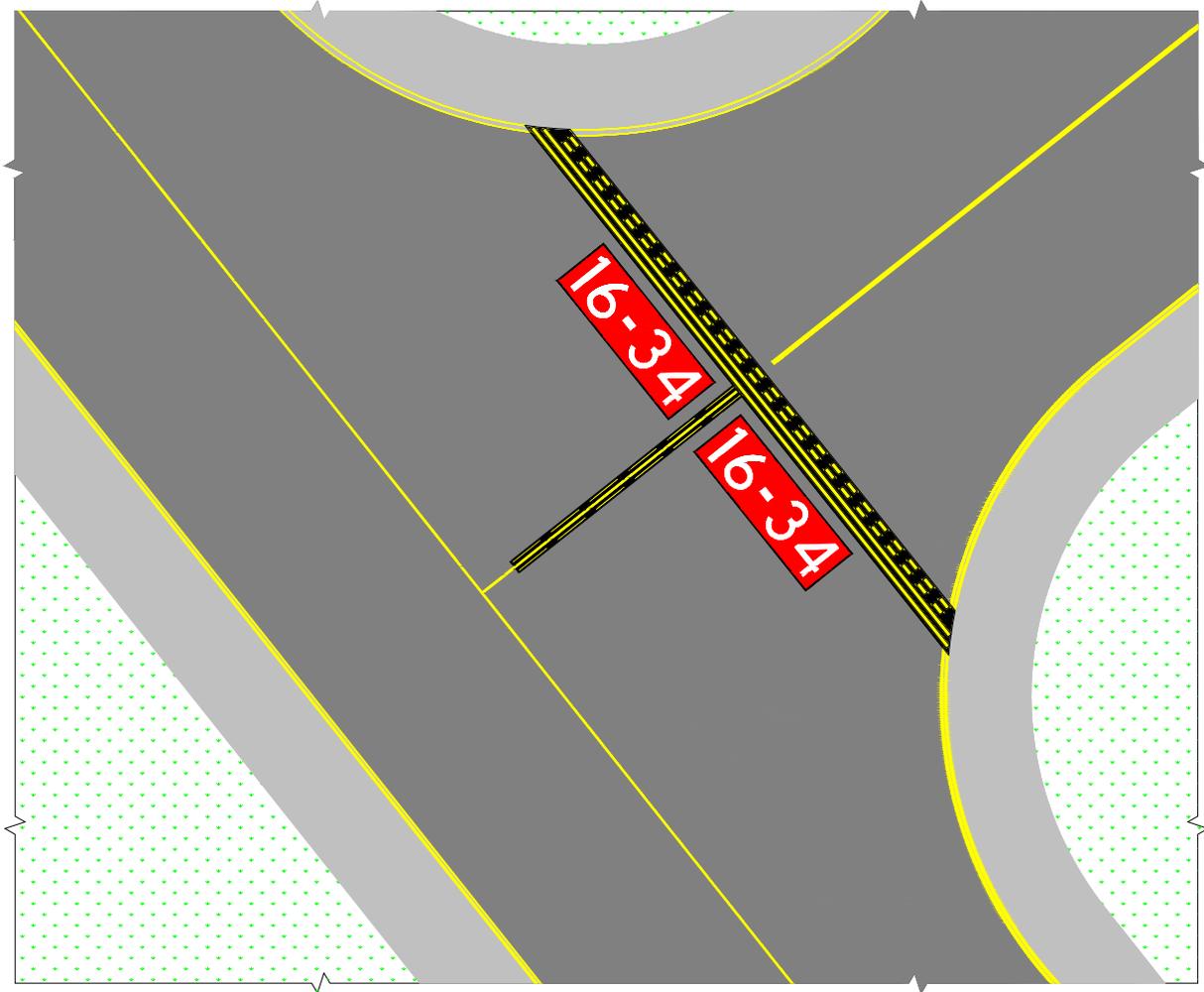
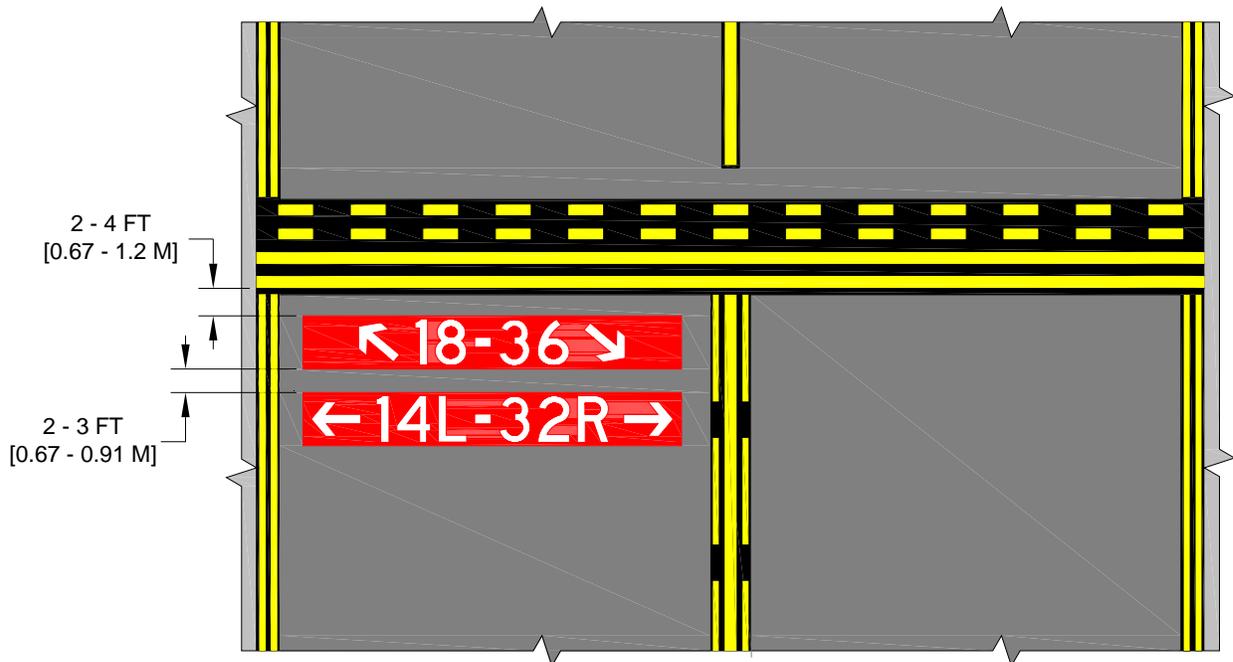


Figure C - 14. Intersection of Stub Taxiway and Runway



NOTES:

1. STACKED SURFACE PAINTED HOLDING POSITION SIGNS FOR NARROW TAXIWAYS - ONLY TO BE USED PER PARAGRAPH 4.5 (d)(1)(ii).
2. THE RECOMMENDED ORDER OF APPEARANCE FOLLOWS:
 - (A) IF THE "STACKED" SURFACE PAINTED HOLDING POSITION SIGNS ARE FOR A TAXIWAY THAT CLEARLY ACCESSES ONE RUNWAY (FOR EXAMPLE, RWY 14L/32R) BEFORE ANOTHER RUNWAY (RWY 18/36), THEN THE ORDER OF APPEARANCE IS FROM "BOTTOM UP" AS SHOWN ABOVE.
 - (B) IF THE "STACKED" SURFACE PAINTED HOLDING POSITION SIGNS ARE FOR A TAXIWAY THAT EQUALLY OFFERS ACCESS TO TWO OR MORE RUNWAYS, THEN FOLLOW A "CLOCKWISE" ORDER OF APPEARANCE AS VIEWED FOR THE HOLDING POSITION. HENCE, THE BOTTOM SURFACE PAINTED HOLDING POSITION SIGN IS THE FIRST RUNWAY AS VIEWED FROM THE HOLDING POSITION. THIS PRACTICE FOLLOWS THE SIGNAGE CONVENTION.

Figure C - 15. Narrow Taxiway Stacked Surface Painted Holding Position Sign

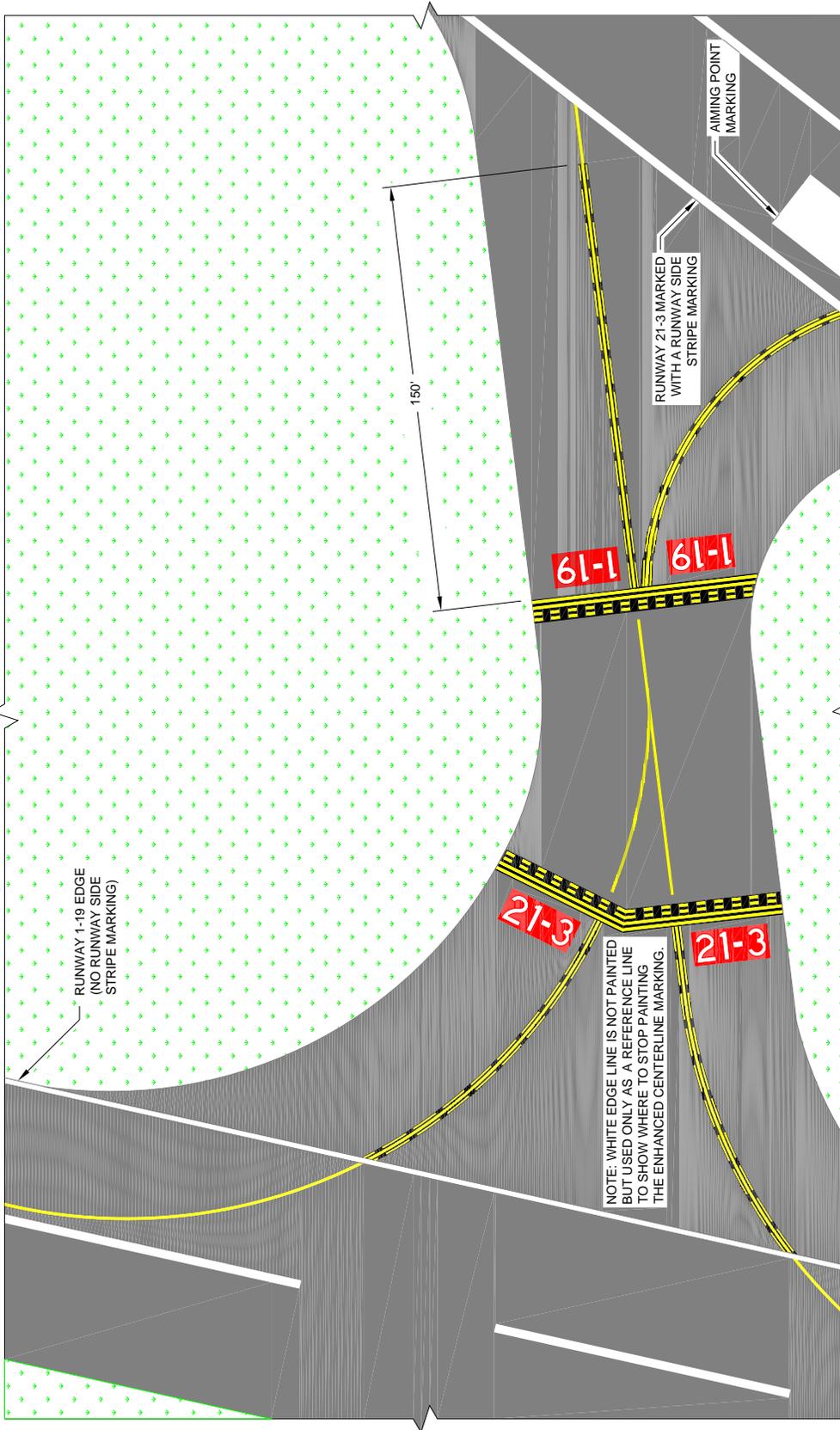


Figure C - 16. Enhanced Taxiway Centerlines When a Taxiway Connects Closely Spaced Runways

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