

TECHNICAL MANUAL

TAXIWAY MARKINGS

SHOREBASED AIRFIELDS

Reference Material

Introduction 002 00

Runway Markings 004 01

Taxiway Visual Aids 005 00

Special Taxiway Signs (TACAN, Billboards) 005 05

Colors FED-STD-595

Apron and Parking Area Markings 006 01

Beads (Glass Spheres), Retroreflective FED-TT-B-P-1325

Paint, Traffic and Airfield Marking, Water Emulsion Base FED-TT-P-1952

Marking of Paved Areas on Airports FAA AC 150/5340-1

Standards for Specifying Construction of Airports FAA AC 150/5370-10

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Record of Applicable Technical Directives

None

1. GENERAL INFORMATION.

2. PURPOSE.

This Work Package (WP) contains the requirements for the Taxiway Markings for paved taxiways on shorebased airfields. These markings provide visual cues pilots for taxiway identification, longitudinal alignment information, holding position lines, taxiway edge recognition, and runway exits. They assist pilots in taxiing aircraft between the runway and the parking or service areas. These requirements establish uniformity for ease of recognition in the interest of safety and efficiency. The requirements shall be used for all new or resurfaced taxiways and whenever the existing markings are to be repainted. Existing taxiway markings may continue to be used until repainting is required.

3. JUSTIFICATION REQUIREMENTS.

The taxiway markings are the basic visual aids for taxiing guidance during daylight for Visual Flight Rules (VFR) or Instrument Flight Rules (IFR) operations (WP002 00). The taxiway markings aid in taxiing at night although the edge lights or centerline lights are the basic visual aid. All paved taxiways shall be provided with taxiway markings. Additional markings or modifications may be approved for special operating conditions (WP002 00).

4. RELATED FACILITIES.

This WP includes all the standard taxiway markings. However these markings are related to the runway markings (WP004 01) for runway exits and entrances and connect with the apron and parking area markings (WP006 01). The markings are related to the taxiway lights and signs as indicated in taxiway visual aids (WP005 00).

5. DESCRIPTION.

6. GENERAL.

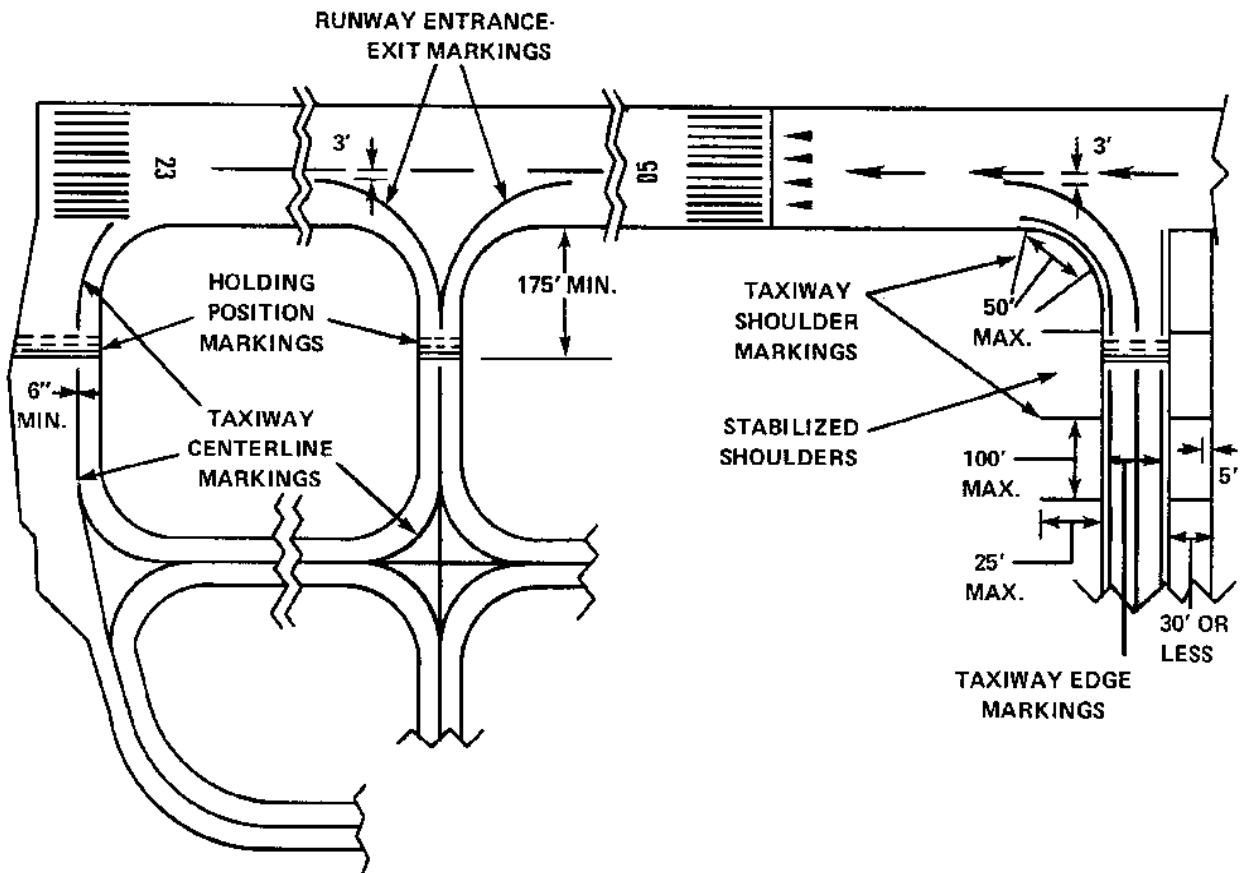
The taxiway markings consist of a system of markings identified by the functions which they serve. The elements of the taxiway markings are as follows:

- a. Taxiway centerline markings — required.
- b. Holding position markings (Standard and Category II) — required.
- c. Runway entrance-exit markings — required.
- d. TACAN checkpoint markings — required, if established.
- e. Edge markings — optional.
- f. Shoulder markings — optional.
- g. Hazardous area markings — optional.
- h. Closed taxiway markings — optional.

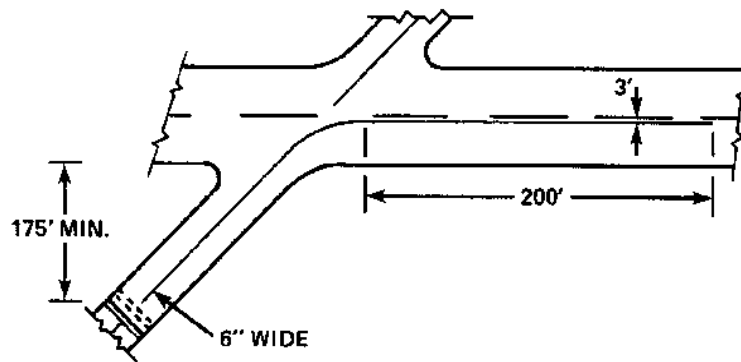
The markings shall be painted of the specified color applied to the taxiway surface except temporary hazardous area markings may use flags or barrier markings. Also temporary closed taxiway markings may be of materials such as tape of the proper color that can be easily removed. The markings configurations shall be as shown in figures 1, 2, and 3.

7. TAXIWAY CENTERLINE MARKINGS.

(See figure 1.) The centerline markings shall be a continuous retroreflective yellow stripe not less than 6 inches wide located along the taxiway axis. If taxiway centerline lights are installed, the axis of the centerline stripe may be offset not more than 12 inches from the taxiway centerline to avoid painting over the lights. These markings provide identification of a taxiway and longitudinal guidance for steering the aircraft. The markings may continue across intersecting taxiways or curve into the intersecting taxiway to indicate turns which are frequently used in taxiing. On curves or curved sections the markings shall be smooth curves and the minimum distance from the edge of the taxiway shall be not less than one-half the width of the taxiway.



A. AN EXAMPLE OF TAXIWAY MARKINGS LAYOUT



B. DETAILS OF TAXIWAY CENTERLINE AND RUNWAY ENTRANCE-EXIT MARKINGS

Figure 1. Typical configuration of taxiway markings

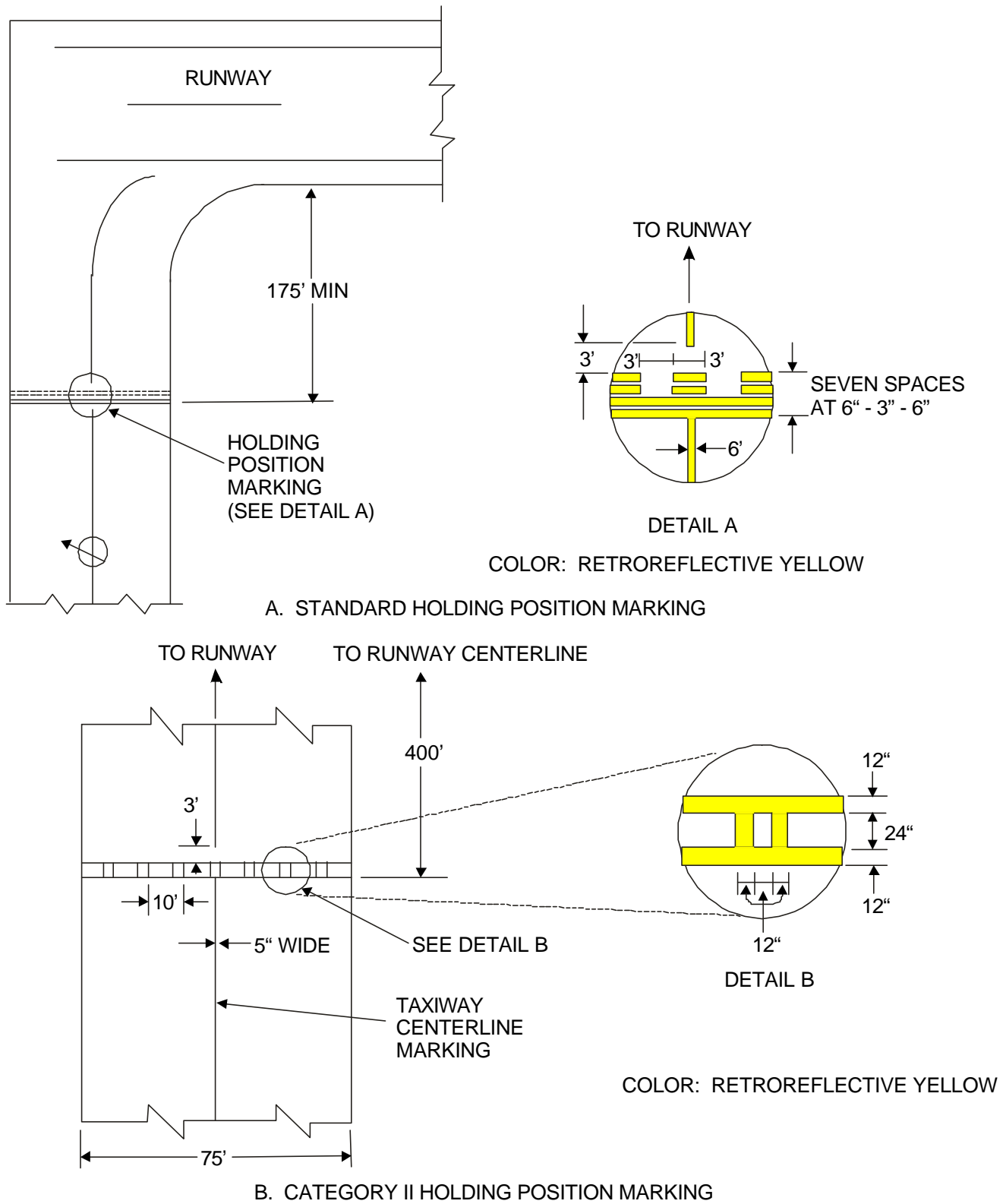
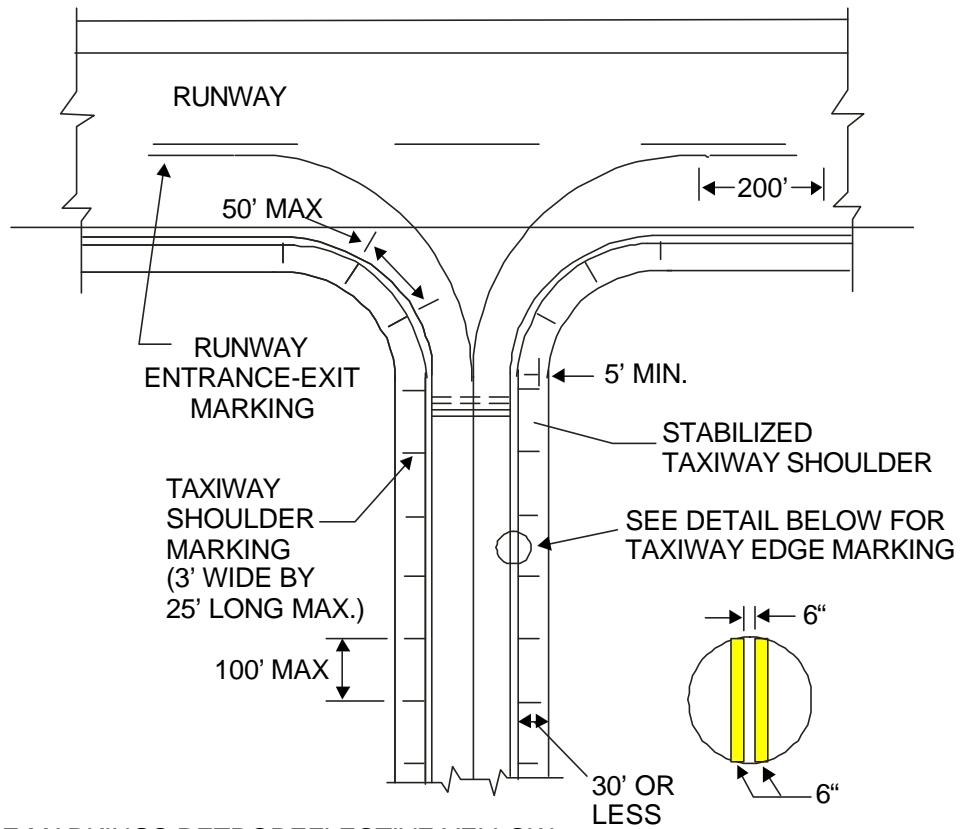
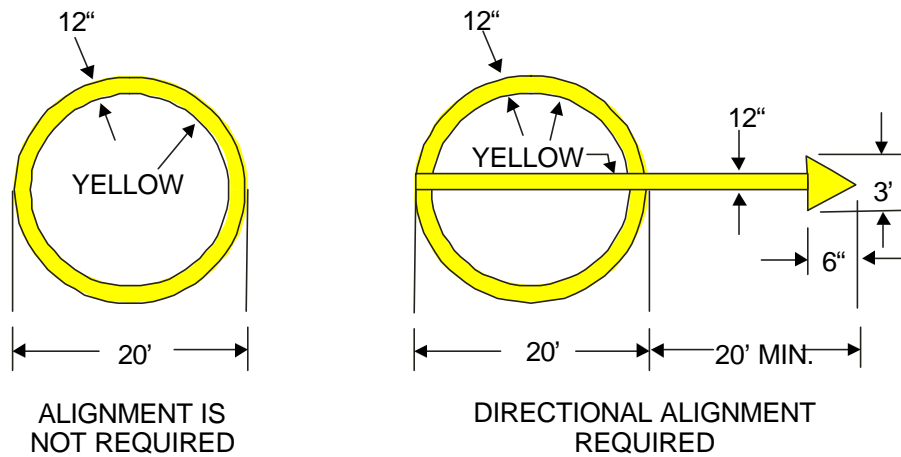


Figure 2. Holding position markings



COLOR: EDGE MARKINGS RETROREFLECTIVE YELLOW
 SHOULDER MARKINGS NONRETROREFLECTIVE YELLOW

A. TYPICAL TAXIWAY EDGE AND TAXIWAY SHOULDER MARKINGS



COLOR: NONRETROREFLECTIVE YELLOW

B. TACAN CHECKPOINT MARKINGS

Figure 3. Typical edge, shoulder, and TACAN checkpoint markings

8. HOLDING POSITION MARKINGS.

(See figure 2.) The holding position or clearance markings indicate the minimum safe distance for the taxiing aircraft from the runway when waiting to be cleared for takeoff or to taxi across the runway. The holding position markings shall be retroreflective yellow stripes and shall extend across the entire width of the taxiway. They shall be straight lines perpendicular to the taxiway centerline except at intersections with large areas for aircraft traffic. If this area extends beyond the holding position and the taxiway edge is not clearly defined, the holding position markings may be parallel to the runway centerline. Two types of holding position markings are used. In some cases both types may be installed for a given intersection. The types of holding position markings are:

- a. Standard holding position markings.
- b. Category II holding position markings.

9. Standard Holding Position Markings.

These holding position markings are used for all taxiway intersections with runways except for runways authorized for Category II operations. These markings are located not less than 175 feet (250 feet preferred) from the runway edge. These markings consist of four parallel stripes, two continuous and two dashed lines, 6 inches wide with the edges of adjacent stripes 6 inches apart (figure 2A).

10. Category II Holding Position Markings.

For those runways authorized for Category II operations (WP002 00), the taxiway intersections shall be provided with Category II holding position markings. These markings shall be located not less than 400 feet from the runway centerline and outside of the critical area for the approach electronic aids. The Category II markings shall consist of two parallel continuous stripes which are 12 inches wide and 24 inches apart and perpendicular to the taxiway together with the double 12-inch wide connecting lines at 10-foot intervals (figure 2B).

11. RUNWAY ENTRANCE-EXIT MARKINGS.

(See figures 1 and 3A.) These markings indicate the paths which are intended for entering onto or exiting from the runways at intersections with taxiways. These markings are extensions of the yellow retroreflective taxiway centerline markings, except where interrupted for runway markings. Some intersections of taxiways with runways may not be intended for runway entrances or exits but have the taxiway centerline continue directly across the runway. Entrance-exit markings are

curved continuous stripes beginning at the Point of Tangency (PT) of the taxiway fillet to a PT 36 inches from the near edge of the runway centerline marking. This curve should have the maximum radius which maintains a separation from the taxiway and runway edges not less than one half the width of the taxiway. Beyond the PT near the runway centerline marking, the entrance-exit markings shall continue parallel to the runway centerline marking for not less than 200 feet from the PT. The entrance-exit marking shall be 6 inches wide except for the long-radius exits. For taxiway intersections at the ends of the runway, the entrance-exit marking shall terminate in line with the runway edge. For other intersections, the entrance-exit stripe shall be interrupted for the runway side stripes and other runway markings. For long-radius (high-speed) exits, the exit stripe shall be not less than 12 inches wide and shall follow the exit curve.

12. TACAN CHECKPOINT MARKINGS.

If a checkpoint has been established for checking operation of the TACAN navigation equipment before takeoff the designated position shall be marked (see figure 3B). If the checkpoint location has not been established, its position shall be coordinated with NAVELEX. The position should be on the taxiway centerline near the runway threshold, but far enough away from the runway edge for the checkpoint sign (WP005 05) to be outside the holding position area. The center of the TACAN checkpoint marking shall be not less than 262.5 feet from the runway edge. The line-of-sight between the checkpoint and the TACAN antenna shall be clear of obstructions that may affect the transmitted signal. The markings shall be a circle about the checkpoint position. The circle shall be 20 feet in diameter with the marking 12 inches wide. The marking shall be nonretroreflective yellow. When the aircraft is to be aligned in a specific direction towards the transmitter antenna for the check, an arrow shall be provided across the circle through the center on the desired azimuth and extends outside the circle for another 20 feet. This arrow shall be nonretroreflective yellow with the shaft 12 inches wide and the arrowhead 6 feet long and 3 feet wide.

13. TAXIWAY EDGE MARKINGS.

(See figures 1 and 3A.) Taxiway edge markings are installed only where the visual contrast between the edge of the full strength taxiway and the adjoining area is such that pilots may tend to run off the taxiway. These edge markings shall consist of a pair of continuous parallel retroreflective yellow stripes. The stripes shall be 6 inches wide and 6 inches apart with

the outer edge of the outer stripe along the edge of the full strength or designated edge of the taxiway. Where used, the edge markings are usually placed along both sides of the taxiway but may be used only in critical areas and do not have to extend the length of the taxiway.

14. TAXIWAY SHOULDER MARKINGS.

Taxiway shoulder markings are used to mark stabilized shoulder areas which are not full strength pavements or where aircraft taxiing is undesirable. In some areas such as stabilized islands in apron areas, along some taxiway curves, or former runways which have had part of the width designated as a taxiway, confusion may occur as to which side of the edge marking is the taxiway, and shoulder markings may be needed. These markings shall be nonretroreflective yellow bars painted on the shoulder surface (see figures 1 and 3A). These bars shall be not less than 3 feet wide and are perpendicular to the taxiway edge beginning at the taxiway edge stripes and extending outboard. The length of the bars shall be 25 feet long or to within 5 feet of the outer edge of the shoulder paving whichever is less. Along straight sections of taxiway, the shoulder marking bars shall be equally spaced not more than 100 feet apart with a bar at the PT of a curve or at the end of the taxiway or of the shoulder paving. On curves the bars shall be equally spaced along the taxiway edge not more than 50 feet apart.

15. HAZARDOUS AREA MARKINGS.

Small hazardous or failed areas of the taxiway shall be marked to assure avoidance by taxiing aircraft. The hazardous area on the traffic side of the taxiway shall be outlined with the pair of parallel retroreflective yellow lines as for the taxiway edge markings. The area shall also be outlined with yellow or orange rectangular flags not less than 18 inches on each side. The flags shall be provided with stiffeners to keep the flags extended in all wind conditions. The hazardous area may also use orange or orange and white cones to outline the area. Flags and cones shall be fastened in position to resist movement from prop or jet blast of taxiing aircraft and the height shall not exceed 30 inches above the pavement.

16. CLOSED TAXIWAY MARKINGS.

Taxiways which have been closed permanently or temporarily shall be marked to indicate visually that the taxiway is closed and not to be used. The closed

taxiway markings are nonretroreflective yellow X-shaped crosses (see figure 4). The arms of the cross shall intersect at right angles and shall be not less than 5 feet wide and the overall length not less than 30 feet, except temporary markings may be reduced to 4-foot wide arms to permit use of standard widths of plywood. The marking crosses shall be located at each end of the closed taxiway, at any potential entrance from an intersection with an active runway or taxiway, and at intervals not greater than 1000 feet apart along the closed length of taxiway. The distance of a closed marking cross from the ends of a closed taxiway or from the edges of an intersecting active runway or taxiway shall not exceed 10 feet. For permanently closed taxiways, the taxiway markings shall be removed or obliterated and the yellow crosses painted on the surface. For temporarily closed taxiways the crosses may be painted yellow on the surface or formed by tape or plywood which is secured in place.

17. BORDERS FOR MARKINGS.

For some installations, the taxiway markings and the surrounding pavement do not provide sufficient contrast for easy recognition. In such cases, the contrast can be improved by outlining the markings with a nonglossy black border. The borders shall be not less than 6 inches wide.

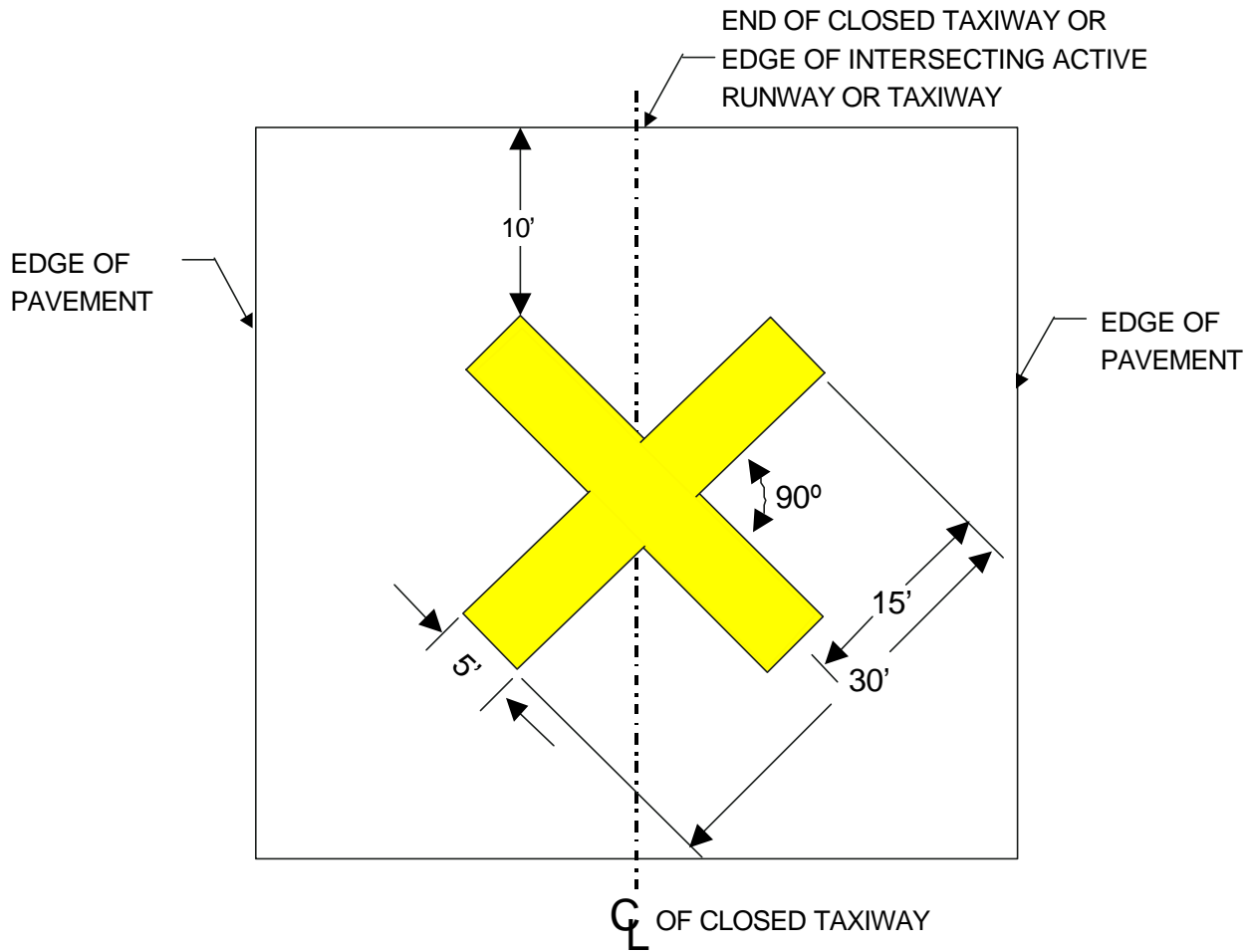
18. INSTALLATIONS.

19. INSTALLATION REQUIREMENTS.

For installation details and requirements for taxiway markings, refer to FAA AC 150/5340-1 and FAA AC 150/5370-10. The general requirements are given in paragraphs 5 through 18.

20. PRECEDENCE AT INTERSECTIONS.

Where the taxiway intersects a runway or another taxiway, the taxiway markings shall be interrupted for all runway markings but may intersect the taxiway markings. The taxiway markings shall maintain, by interruption or becoming parallel, a clearance of 36 inches from the runway markings. At intersections with other taxiways, the centerline markings may intersect or curve into directions that taxiing traffic may use. Taxiway edge markings may be interrupted at the edge of the intersecting taxiway or where the edge stripes intersect.



COLOR: NONRETROREFLECTIVE YELLOW

Figure 4. Typical closed taxiway marking

TABLE 1. MATERIALS FOR TAXIWAY MARKINGS

| Color of Marking | Federal Specification | Authorized Use |
|--|--|--|
| Retroreflective Yellow | TT-P-1952, paint, FED-STD-595, chip No. 23538, and TT-B-1325 glass spheres, type III, gradation A. | Taxiway centerline, holding position, taxiway edge, runway entrance-exit markings. |
| Nonretroreflective Yellow | TT-P-1952 paint, FED-STD-595, chip No. 23538. | Taxiway shoulders, TACAN checkpoint, closed runway markings. |
| Nonretroreflective Black | Paint, FED-STD-595, chip No. 27038. | Border around yellow or white markings. |
| Flags, yellow or orange, with stiffeners, local or commercial sources. | | |
| Cones, orange or orange-white, local or commercial sources. | | |

21. RESTRICTIONS.

Regulations of some states, such as California, or other authority may prohibit or restrict the use of solvent base paints. For the yellow markings, use type TT-P-1952. For the slower drying type TT-P-1952 paint, timing of application of the retroreflective beads (spheres) may be required to assure adherence of the beads without sinking too deeply into the paint. Use black for long-wearing semigloss or flat black paint, such as type TT-P-1952, with black pigment and suitable for the surface may be substituted.

22. MATERIALS.

The materials required for taxiway markings are paint and retroreflective spheres (beads), except for the flags and cones for marking hazardous areas. The approved materials and colors are shown in table 1.

23. PHOTOMETRIC REQUIREMENTS.

The taxiway markings shall be airfield marking paints of the required aviation surface colors. For these refer to FED-STD-595. The specific colors shall be as follows:

- a. Yellow, color chip No. 23538,
- b. Black, color chip No. 27038.

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