

AC NO: 150/5320-13

DATE: March 1, 1978

# ADVISORY CIRCULAR



## DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION

**SUBJECT:** LOCATING RUNWAY APPROACH THRESHOLDS

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1. **PURPOSE.** This advisory circular provides guidance for locating runway approach thresholds.
2. **REFERENCES.** Advisory Circular (AC) 00-2, Advisory Circular Checklist and Status of Federal Aviation Regulations (FARs), updated triannually, contains the listing of current issuances of advisory circulars and changes thereto. It explains the circular numbering system and gives instructions for ordering advisory circulars that are for sale as well as those distributed free of charge. AC 00-2 also gives instructions for ordering the Federal Aviation Regulations.
  - a. The following free advisory circulars may be obtained from the Department of Transportation, Publications Section, M-443.1, Washington, D.C. 20590.
    - (1) AC 00-2, Advisory Circular Checklist and Status of Federal Aviation Regulations.
    - (2) AC 00-44, Status of the Federal Aviation Regulations.
    - (3) AC 70/7460-1, Obstruction Marking and Lighting.
    - (4) AC 70-2, Airspace Utilization Considerations in the Proposed Construction, Alteration, Activation and Deactivation of Airports.
    - (5) AC 120-29, Criteria for Approving Category I and Category II Landing Minima for FAR 121 Operators.
    - (6) AC 150/5000-3, Address List for Regional Airports Divisions and Airports District Offices.

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- (7) AC 150/5190-4, A Model Zoning Ordinance to Limit Height of Objects Around Airports.
  - (8) AC 150/5300-2, Airport Design Standards - Site Requirements for Terminal Navigational Facilities.
  - (9) AC 150/5340-1, Marking of Paved Areas on Airports.
  - (10) AC 150/5340-24, Runway and Taxiway Edge Lighting System.
- b. The following Federal Aviation Regulations and Order may be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.
- (1) FAR Part 77, Objects Affecting Navigable Airspace.
  - (2) FAR Part 97, Standard Instrument Approach Procedures.
  - (3) FAR Part 121, Certification and Operations: Domestic, Flag, and Supplemental Air Carriers and Commercial Operators of Large Aircraft.
  - (4) FAR Part 152, Airport Aid Program.
  - (5) FAR Part 157, Notice of Construction, Alteration, Activation, and Deactivation of Airports.
  - (6) Order 8260.3, United States Standard for Terminal Instrument Procedures (TERPS).
- c. The following Federal Aviation Administration Order may be obtained on request at any FAA Regional Office headquarters or any Airports District Office.
- (1) Order 1050.1B, Policies and Procedures for Considering Environmental Impacts.

3. HOW TO OBTAIN THIS PUBLICATION. Additional copies of this advisory circular may be obtained free of charge from the Department of Transportation, Publications Section, M-443.1, Washington, D.C. 20590. FAA field personnel may obtain copies from their respective regional Distribution Officers.

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1. DEFINITIONS. The following definitions apply to terms used in this publication.
  - a. Airport Hazard. Any structure or object of natural growth located on or in the vicinity of a public airport, or any use of land near such airport, which obstructs the airspace required for the flight of aircraft in landing or taking off at such airport or is otherwise hazardous to such landing or taking off of aircraft.
  - b. Displaced Runway Approach Threshold. A threshold that is located at a point on the runway other than at the beginning of the full strength pavement. The paved area behind the displaced runway approach threshold is available for the landing rollout or takeoff of aircraft.
  - c. Obstruction. An existing object, including a mobile object, is, and a future object would be, an obstruction to air navigation if it is of greater height than any of the heights defined in FAR 77.23.
  - d. Relocated Runway Approach Threshold. A threshold that is located at a point on the runway other than at the beginning of the full strength pavement. The paved area behind the relocated runway approach threshold is no longer available for the landing or takeoff run of aircraft.
  - e. Runway. A defined area on an airport prepared for the landing and takeoff of aircraft.
  - f. Runway Approach Threshold. The designated beginning of the runway that is available and suitable for the landing of airplanes.
  - g. Visual Runway. A runway intended solely for the operation of aircraft using visual approach procedures, with no straight-in instrument approach procedure and no instrument designation indicated on an FAA approved airport layout plan, a military service approved military airport layout plan, or by any planning document submitted to the FAA by competent authority.
2. DISCUSSION.
  - a. The runway approach threshold should be located at the beginning of the full strength runway pavement or runway surface. However, displacement of the runway approach threshold may be required when an object that obstructs the airspace required for landing aircraft is beyond the airport authority's power to remove, relocate, or lower. Runway approach thresholds may be displaced or relocated for environmental considerations, such as noise abatement.

- b. When an airport hazard exists, displacement of the runway approach threshold should be determined by the operational requirements of the critical aircraft and/or the type of aircraft operation using or expected to be using the runway. The criteria depicted in this advisory circular are an effort to retain the existing operations on the runway and to minimize the loss of operational use of the established runway. These criteria are consistent with the FAA policy of maximum utilization and retention of existing paved areas on airports.
- c. Displacement of a runway approach threshold reduces the length of runway available for landing aircraft. The runway behind a displaced runway approach threshold is available for completing landing rollouts and takeoff in either direction. However, takeoff toward the controlling object may be limited. Therefore, the clear zone requirements and airspace protection around the runway ends should be retained to the maximum extent possible.

### 3. APPLICATION.

- a. The inability to establish or maintain approaches clear of objects that could constitute an airport hazard may require displacing or relocating the runway approach threshold. The surfaces described in this advisory circular should be kept free of all penetrating objects.
- b. This advisory circular presents the minimum standards that should be met in determining the location of a runway approach threshold.
  - (1) The runway approach threshold should be located to provide maximum operational usability of the existing or planned runway pavement.
  - (2) Where feasible, the runway approach threshold should be located in accordance with the ultimate development plans for the runway.
  - (3) In some cases, displacing or relocating the runway approach threshold for noise abatement purpose may be prudent provided the benefits justify the cost and the safety of flight operations is not compromised. The repositioning or removal of displaced or relocated runway approach thresholds may require an environmental action. See FAA Order 1050.1B, Appendix 6.
- c. The airport owner/operator should coordinate the displacement or relocation of the runway approach threshold with the local FAA Airports field office and the airport users. AC 70-2 should be consulted for guidance on the need to file FAA Form 7480-1, Notice of Landing Area Proposal. Also, in the interest of aviation safety, the airport owner or operator should assure that a Notice to Airmen (NOTAM) is issued.

- d. When the displacement or relocation of a runway approach threshold is being considered at an airport subject to a Federal agreement (Federal-aid Airport Program, Airport Development Aid Program, etc.), the airport owner should contact the local FAA Airports field office, having jurisdiction over the airport, to determine acceptability and effect the displacement or relocation will have on the owner's contractual obligations.

#### 4. LIMITATIONS.

- a. This guidance should not be interpreted as an FAA endorsement to displace or relocate a runway approach threshold. Runway approach threshold displacement or relocation should be undertaken after a full evaluation by the airport owner/operator reveals that displacement or relocation is the most desirable solution.
- b. The criteria contained in this advisory circular should be used exclusively for:

- (1) Locating runway approach thresholds on new runways.
- (2) Displacing or relocating existing runway approach thresholds.

This advisory circular should not be used to identify objects affecting navigable airspace, nor should it be used for airspace zoning, or for airspace protection. The criteria to accomplish these functions are contained in other publications, such as FAR Part 77 and AC 150/5190-4.

- c. Elimination of the penetrations of the surfaces described in this advisory circular for determining the runway approach threshold location will not automatically result in attainment of the instrument landing minimums stated for each surface. Determination of the instrument landing minimums is based upon an airspace investigation conducted by the FAA in accordance with the requirements of Order 8260.3.
- d. This advisory circular has NO effect on the standards set forth in FAR Part 77, Objects Affecting Navigable Airspace; FAR Part 157, Notice of Construction, Alteration, Activation, and Deactivation of Airports; or FAR 152.9, Runway clear zones: general.

#### 5. EVALUATION CONSIDERATIONS.

- a. For the design of airports, the approach surfaces, as defined in FAR Part 77, should be cleared and kept cleared, as far as practicable. If these criteria cannot be complied with and if penetrations to the operational surfaces as defined in paragraph 6 exist, the following courses of action may be considered:
  - (1) Apply a less critical surface, but in no case less than that surface specified in paragraph 6a(1), and accept higher instrument landing minimums than desired.

- (2) Displace the runway approach threshold so that the object will not penetrate the applicable surfaces and accept a shorter landing surface (runway).
- b. In determining the action to pursue, all relevant factors should be evaluated. These factors include but are not limited to:
- (1) Types of airplanes which will use the runway and their performance characteristics.
  - (2) Extent of the operational disadvantages associated with accepting higher landing minimums.
  - (3) Cost of removing, relocating, or lowering the object.
  - (4) Effect of the reduced available landing length, especially under operating conditions when the runway is wet or icy.
  - (5) Cost of extending the runway if insufficient runway length would remain as a result of displacing the runway approach threshold. The environmental and public acceptance aspects of a runway extension must also be evaluated under this consideration.
  - (6) Cost and feasibility of relocating existing visual and electronic approach aids such as threshold lights, visual approach slope indicators, runway end identification lights, instrument landing system (ILS), approach lighting system, and runway markings.
  - (7) Effect of the threshold change on the present and future role of the airport, including noise abatement.
- c. Reference material which should be applied when evaluating threshold change proposals includes:
- (1) The latest approved airport layout plan and obstruction chart. If available, the airport master plan should also be used.
  - (2) The proposed airport development shown in the current National Airport System Plan.
  - (3) The appropriate airport design standards.
  - (4) The operational characteristics of the types of airplanes the runway is intended to serve and the types of operations, including expected minimums.

6. LOCATING, DISPLACING, OR RELOCATING THE RUNWAY APPROACH THRESHOLD. The runway approach threshold siting criteria are based upon aircraft operational requirements and landing visibility. Therefore, the shape, dimensions, and slope of the surface used for locating a runway approach threshold are dependent upon the type of aircraft operations currently conducted or forecast, the landing visibility minimums desired, and the types of instrumentation available or planned for that runway end.
- a. The runway approach threshold should be sited to provide for maximum operational use of the runway pavement and to accommodate the following pertinent conditions for:
- (1) Approach End of Runways Expected to Accommodate Landing Visibility Minimums Greater Than  $\frac{3}{4}$  of a Mile and Visual Runways. No object should penetrate a surface that starts at the runway approach threshold and at the elevation of the runway centerline at the runway approach threshold and slopes upward from the runway at a slope 20 (horizontal) to 1 (vertical).
    - (a) Runways Expected to Accommodate Only Aircraft of 12,500 Pounds (5 670 kg) or Less, Maximum Certificated Takeoff Weight. In plan view, the centerline of this surface extends 5,000 feet (1 530 m) along the extended runway centerline. This surface extends laterally 125 feet (38 m) on each side of the centerline at the runway approach threshold and increases uniformly to 350 feet (110 m) on each side of the centerline at a point 2,250 feet (690 m) from the start; thereafter, it extends laterally 350 feet (110 m) on each side of the centerline. (See figures 1 and 2.)
    - (b) Runways Expected to Accommodate Aircraft of More Than 12,500 Pounds (5 760 kg), Maximum Certificated Takeoff Weight. In plan view, the centerline of this surface extends 10,000 feet (3 000 m) along the extended runway centerline. This surface extends laterally 200 feet (60 m) on each side of the centerline at the runway approach threshold and increases uniformly to 500 feet (150 m) on each side of the centerline at a point 1,500 feet (450 m) from the start; thereafter, it extends laterally 500 feet (150 m) on each side of the centerline. (See figures 1 and 2.)
  - (2) Approach End of Runways Expected to Accommodate Landing Visibility Minimums as Low as  $\frac{3}{4}$  of a Mile. No object should penetrate a surface that starts 200 feet (60 m) out from the runway approach threshold and at the elevation of the runway centerline at the runway approach threshold and slopes upward from the starting point at a slope of 20 (horizontal) to 1 (vertical). In the

plan view, the centerline of this surface extends 10,000 feet (3 000 m) along the extended runway centerline. This surface extends laterally 500 feet (150 m) on each side of the centerline at the starting point 200 feet (60 m) out from the runway approach threshold, and increases uniformly to 2,000 feet (600 m) on each side of the centerline at the far end of this surface. (See figures 1 and 2.)

- (a) If the instrument approach procedure is to utilize an offset localizer with an offset angle of 3 degrees or less, the above described surface is centered upon the final approach course rather than the extended runway centerline. (See figure 3.)
- (b) If the runway approach threshold is being displaced for reasons other than a controlling object, the surface described in paragraph 6a(3) should be considered rather than the above described surface in view of possible lower minimums.

(3) Approach End of Runways Expected to Accommodate Landing Visibility Minimums Lower Than  $\frac{3}{4}$  of a Mile (Except Category II Runway End).

No object should penetrate a surface that starts 200 feet (60 m) out from the runway approach threshold and at the elevation of the runway centerline at the runway approach threshold and slopes upward from the starting point at a slope of  $\frac{3}{4}$  (horizontal) to 1 (vertical). In the plan view, the centerline of this surface extends 10,000 feet (3 000 m) along the extended runway centerline. This surface extends laterally 500 feet (150 m) on each side of the centerline at the starting point 200 feet (60 m) out from the runway approach threshold, and increases uniformly to 2,000 feet (600 m) on each side of the centerline at the end of this surface. (See figures 1 and 2.) If the instrument approach procedure is to utilize an offset localizer with an offset angle of 3 degrees or less, the above surface is centered upon the final approach course rather than the extended runway centerline. (See figure 3.)

(4) Approach End of Runways Expected to Accommodate Category II Landing Minimums. The criteria set forth in AC 120-29, Criteria for Approving Category I and Category II Landing Minima for FAR Part 121 Operators, are to be satisfied.

- b. If the runway end has an electronic (ILS) glide slope, the vertical distance between the runway approach threshold and the straight line extension of the glide slope (threshold crossing height (TCH)) should also be considered in establishing the runway approach threshold. The following tolerances apply:



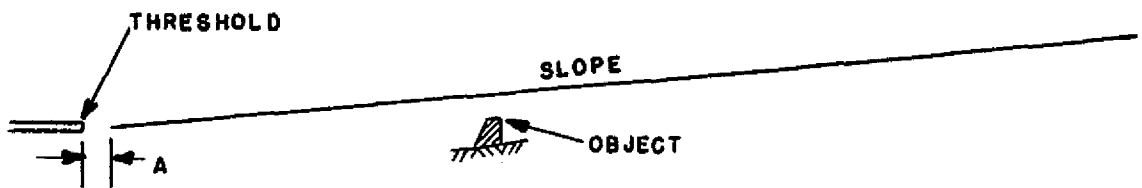
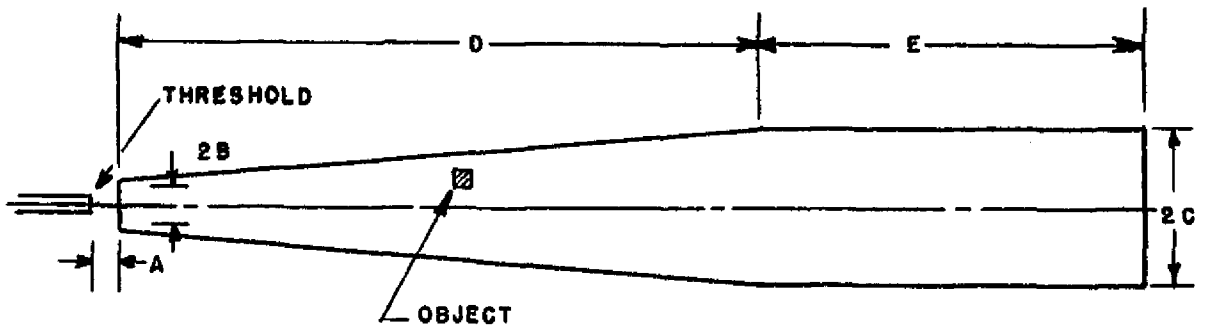
- (1) 37 feet (11 m) to 60 feet (18 m) inclusive at runways without existing or programmed approach Category "D" turbojet aircraft operations, as defined in FAR Part 97, Standard Instrument Approach Procedures.
  - (2) 47 feet (14 m) to 60 feet (18 m) inclusive at runways with existing or programmed approach Category "D" turbojet aircraft operations, and all other runways 7,000 feet (2 134 m) or longer.
- c. Displacement or relocation of thresholds should be initiated only after a full evaluation reveals that it is the most appropriate solution. (See paragraph 5b, page 4.)
7. MARKING AND LIGHTING THE THRESHOLD. Once the location of the approach threshold is determined, it should be marked and lighted in accordance with AC 150/5340-1, Marking of Paved Areas on Airports, and AC 150/5340-24, Runway and Taxiway Edge Lighting System.

RUNWAY TYPE	RECOMMENDED DIMENSIONAL STANDARDS					FEET (METERS)
	A	B	C	D	E	SLOPE
RUNWAYS EXPECTED TO ACCOMMODATE ONLY AIRCRAFT OF 12,500 POUNDS (5 670 kg) OR LESS, MAXIMUM CERTIFICATED TAKEOFF WEIGHT.						
(1) Runways with approach ends having visibility minimums greater than 3/4 mile.	0	125 (38)	350 (110)	2,250 (690)	2,750 (840)	20:1
RUNWAYS EXPECTED TO ACCOMMODATE AIRCRAFT OF MORE THAN 12,500 POUNDS (5 670 kg), MAXIMUM CERTIFICATED TAKEOFF WEIGHT.						
(2) Runways with approach ends having visibility minimums greater than 3/4 mile.	0	200 (60)	500 (150)	1,500 (450)	8,500 (2 550)	20:1
(3) Runways with approach ends having visibility minimums as low as 3/4 mile. (For offset localizer, see figure 3 and paragraph 6a(2)(a).)	200 (60)	500 (150)	2,000 (600)	10,000 (3 000)	0	20:1
(4) Runways with approach ends having visibility minimums lower than 3/4 mile. (For offset localizer see figure 3 and paragraph 6a(3).)	200 (60)	500 (150)	2,000 (600)	10,000 (3 000)	0	34:1
(5) Runways with approach ends having Category II landing minimums.	The criteria are set forth in AC 120-29.					

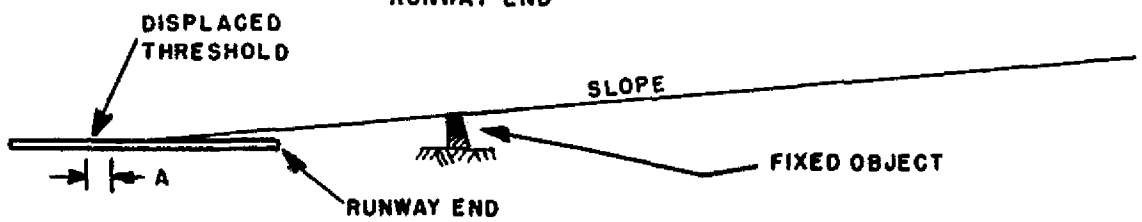
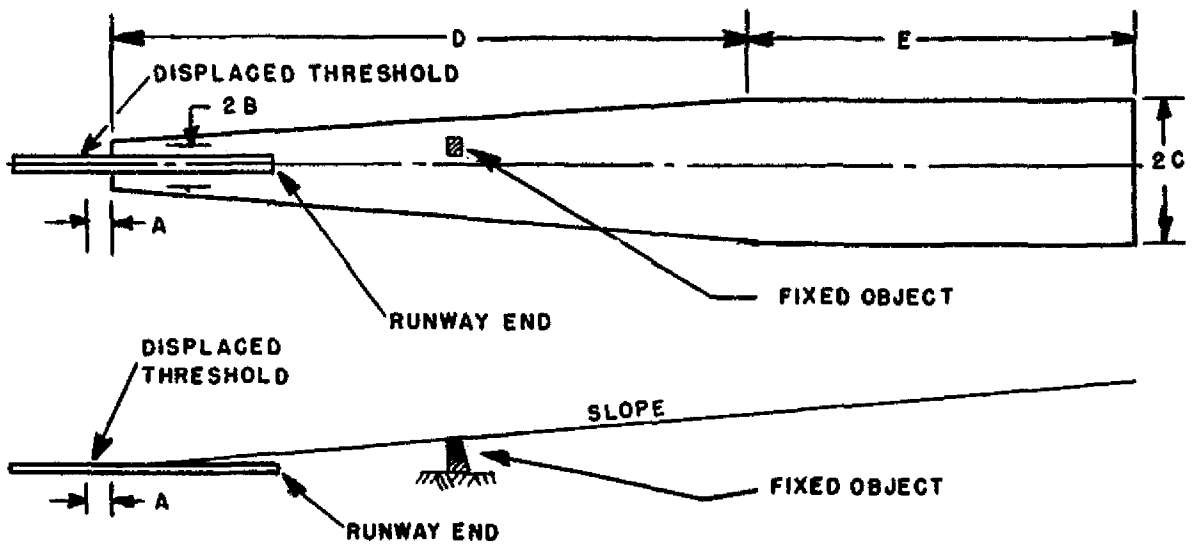
The letters are keyed to those shown for dimensions and slopes on figures 2 and 3.

NOTE: Runway types 3, 4, and 5 are applicable irrespective of aircraft weight.

FIGURE 1. RECOMMENDED DIMENSIONAL STANDARDS FOR LOCATING RUNWAY APPROACH THRESHOLDS



DISPLACEMENT NOT NECESSARY



DISPLACEMENT NECESSARY

FIGURE 2. APPROACH SLOPES

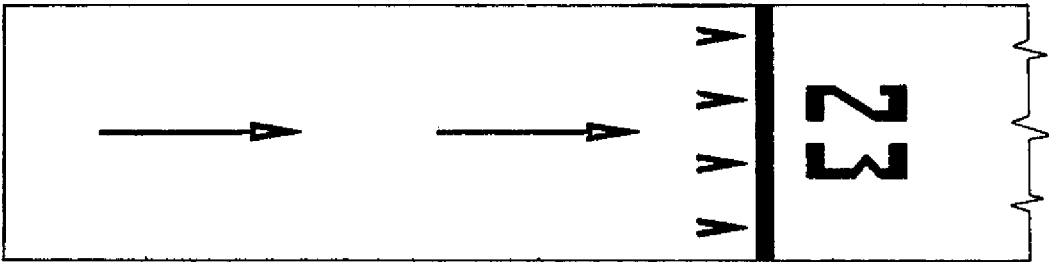
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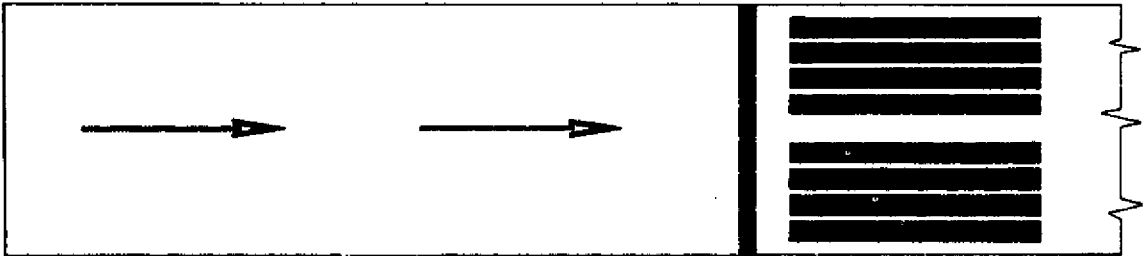
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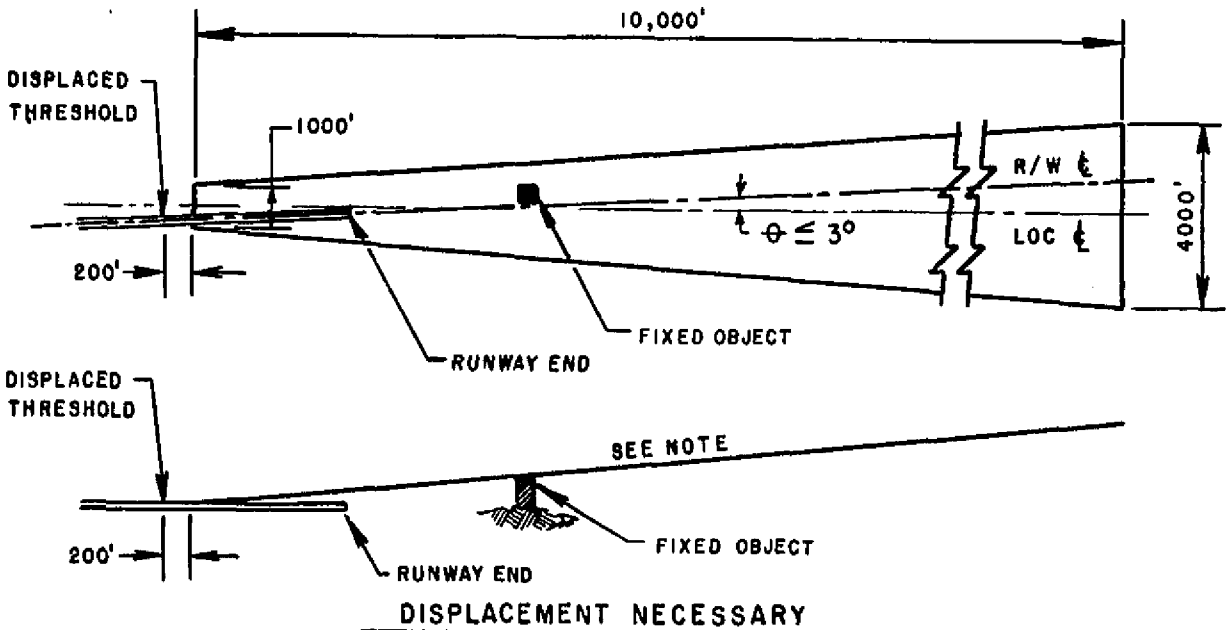
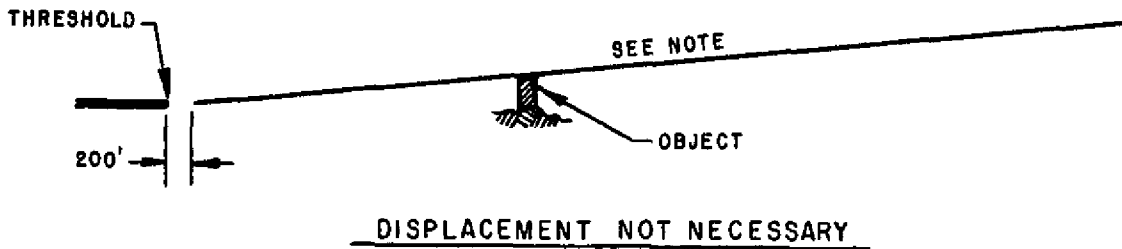
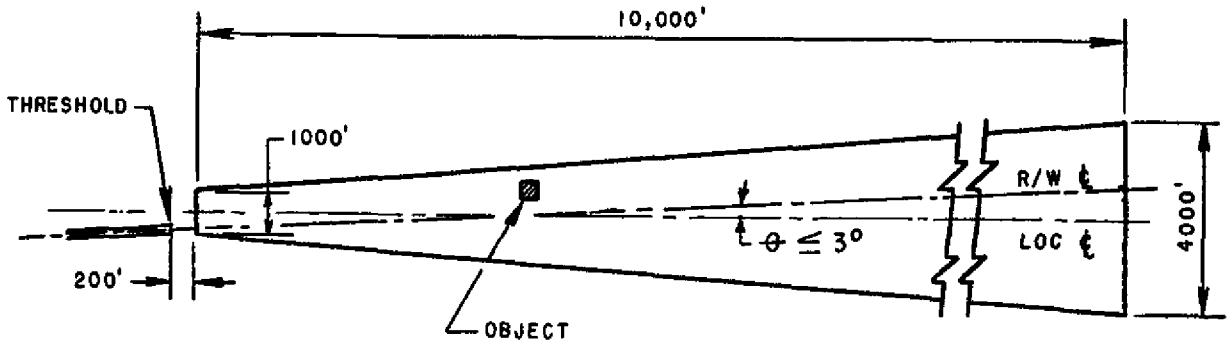


LOCATING RUNWAY APPROACH THRESHOLDS



**DEPARTMENT OF TRANSPORTATION  
FEDERAL AVIATION ADMINISTRATION**

Initiated by: AAP-560



NOTE: APPLICABLE SLOPE IS DEPENDENT UPON DESIRED VISIBILITY MINIMUM, SEE PARAGRAPHS 6a.(2)(a) & (3)(b).

FIGURE 3. APPROACH SLOPES--OFFSET LOCALIZER

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