AC NO: 150/5310-3

DATE: 5/27/68

ADVISORY CIRCULAR

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

SUBJECT: FAA ORDER 5310.2, RELOCATING THRESHOLDS DUE TO OBSTRUCTIONS AT EXISTING RUNWAYS

1. PURPOSE. This advisory circular announces the issuance of instructions to Federal Aviation Administration field personnel on the displacement or relocation of thresholds.

2. DESCRIPTION OF THE PUBLICATION. The intent of the subject order is to establish uniformity in agency actions when applying criteria for the relocation of thresholds. The order is procedural in nature and is not intended to conflict with the obstruction standards prescribed in Subpart C of FAR Part 77. It is applicable only to existing runways to which the approaches are obstructed by objects in the approach area which cannot practically be removed, relocated, or lowered.

3. HOW TO OBTAIN THIS PUBLICATION. Copies of this advisory circular and the subject order may be requested from the Department of Transportation, Distribution Unit, TAD-484.3, Washington, D. C. 20590.

Chester G. Bowers, Director
Airports Service

Initiated by: AS-560

ORDER

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

5310.2

4/10/68

SUBJ: RELOCATING THRESHOLDS DUE TO OBSTRUCTIONS AT EXISTING RUNWAYS

1. PURPOSE. This order provides guidance to assure maximum uniformity in agency actions in determining the relocation of thresholds at existing runways where there are obstructions in the approach area which cannot feasibly be removed, relocated, or lowered.

2. REFERENCES.

   a. Federal Aviation Regulations Part 77, Objects Affecting Navigable Airspace, dated May 1, 1967.

   b. Federal Aviation Regulations Part 121, Certification and Operations: Domestic, Flag, and Supplemental Air Carriers and Commercial Operators of Large Aircraft, dated April 15, 1965.

   c. Federal Aviation Regulations Part 151, Federal Aid to Airports.

   d. FAA Handbook 8260.3, United States Standard for Terminal Instrument Procedures (TERPs), dated September 1966.

   e. Advisory Circular 150/5300-4, Utility Airports - Design Criteria and Dimensional Standards, dated May 9, 1967.

   f. Advisory Circular 150/5340-1A, Marking of Serviceable Runways and Taxiways, dated June 30, 1966.

   g. Advisory Circular 150/5340-13A, High Intensity Runway Lighting System, dated April 14, 1967.

   h. Advisory Circular 150/5340-16A, Medium Intensity Runway Lighting System, dated December 19, 1967.

   i. Advisory Circular 120-20, Criteria for Approval of Category II Landing Weather Minima, dated June 6, 1966.

3. DEFINITIONS. For the purpose of this order, the following definitions apply:

   a. Threshold: A line, at right angles to the runway centerline and extending for the full width of the runway, established by the airport authority for the purpose of identifying the beginning of the runway area that is available and suitable for the landing of airplanes.

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b. Displaced Threshold: A term used to indicate that the location of the threshold for the landing of airplanes has been moved and is no longer located at the beginning of the runway area that may be available for the takeoff of airplanes.

4. APPLICATION.

a. The application of airport design standards in locating thresholds of runways is aimed at having the approach surfaces, as described in FAR Part 77, free of penetrating objects. In some cases, the inability to obtain clear approaches may lead to displacing a threshold. The surfaces used in this order to locate a displaced threshold must not be penetrated.

b. This order is applicable only to situations where consideration is given to the displacement of a threshold on an existing runway.

c. The criteria contained herein must not be applied to evaluating airport owners' compliance with Federal agreements to keep approaches free of obstructions, and they must not be used to identify obstructions since that is a function of the obstruction standards as described in FAR Part 77.

5. DISCUSSION.

a. In the design of a new runway the threshold is at the beginning of the runway. The beginning of the runway is located so as to provide obstruction-free approach surfaces as described in FAR Part 77 for the various types of runways.

b. There have been cases when the displacement of a threshold, due to an approach obstruction, has been determined by the operational requirement for airplanes in air carrier service rather than by airport design criteria. These requirements are based on the application of the 20 to 1 obstruction clearance plane of FAR Part 121, under Subpart I, Airplane Performance Operating Limitations, that intersects the runway and clears all objects in the approach. Application of this 20 to 1 obstruction clearance plane is an effort to retain, to the maximum practical extent, the existing operations on the runway and to minimize the loss of operational use of the established runway.

c. Displacement of a threshold reduces the length available for landing. Such reduction could have a more significant effect on the operations than an approach obstruction that is marked and lighted. Normally, the design runway length is related to the takeoff length requirement of the airplane on which the design of the runway is based. This length, minus the required displacement, in many cases will still exceed the design landing length.

d. There may be greater costs and difficulties in obtaining obstruction-free approaches based on FAR Part 77 provisions, as compared to using the operational criteria of FAR Part 121, under Subpart I, Airplane Performance Operating Limitations. However, there are advantages in preserving the flatter approach surfaces, which include:

(1) A better designed runway because of an obviously greater vertical clearance cushion between the airplane approach path and objects in the approach area.

(2) Less pressure for accepting higher obstructions in the area based on the precedent set by an existing object rising to a steeper obstruction clearance slope.

(3) An ability to secure the lowest landing weather minimums associated with the navigational aids used.

(4) An ability to realize advantages of the later establishment of navigational aids such as instrument landing systems, through prior protection of flatter approach protection surfaces.

6. PROCEDURE.

a. In the design of new runways and the extension of existing runways, thresholds will continue to be located by applying FAA airport design standards which seek to provide obstruction-free approach surfaces. Under these circumstances, sufficient runway length to achieve clear approach surfaces described in FAR Part 77 shall be encouraged and will be an eligible FAAP item.

b. Runway extensions to achieve required runway design landing lengths will not be an eligible FAAP item, where such lengths can be obtained through relocating the threshold in accordance with this order.

c. This order shall not be interpreted as an endorsement to relocate all existing thresholds with approach obstructions. Other more appropriate remedies may result from full evaluation of each situation.

d. The area Airports Branch shall document and formally coordinate all proposals for displacement of a threshold with the other concerned area branches (Flight Standards, Airway Facilities, and Air Traffic). There should also be coordination at this point with the appropriate airport users. Each case shall be submitted for review and approval by the area manager to assure maximum uniformity of recommendations to the public on threshold location.

7. INSTRUCTIONS.

a. The relocation of a runway threshold should be considered only after analysis of the problem indicates no other practicable solution. All relevant factors should be evaluated, including but not limited to the following:

(1) Types of airplanes which will use the runway and their performance characteristics.

(2) Landing visibility and decision heights (DH) or minimum descent altitudes (MDA) under which the runway will be used with consideration being given to changing landing visibility minimums, if necessary and justified.

(3) Location of obstructions in relation to the beginning of the runway and the extended runway centerline.

(4) Significance of obstructions in establishment of decision heights and minimum descent altitudes.

(5) Effect of marking and/or lighting obstructions.

(6) Removal, relocation, or lowering of obstructions.

(7) Effect of the reduced available landing length under operating conditions such as wet or icy runways.

(8) Existence of visual and electronic aids to approach and landing, such as VASI, runway marking and lighting, and ILS.

(9) Consideration of relocating the glide slope antenna or changing the glide slope angular setting.

b. Reference material which shall be applied when evaluating threshold relocation proposals includes:

(1) The latest approved airport layout plan and obstruction chart.

(2) The proposed airport development shown in the current National Airport Plan.

(3) The appropriate airport design standards, as required and applied by Airports Service personnel.

(4) The operational characteristics of the types of airplanes the runway is intended to serve and the types of operations to be conducted on that runway, as assessed by Flight Standards personnel.

(5) The appropriate navigational aid siting and operational criteria, as applied by Airway Facilities personnel.

c. Displacements shall be accomplished according to the criteria that follow. In no case shall an obstruction penetrate the described critical surfaces.

(1) For runways at utility airports and at other runways where approach slopes of 20 (horizontal) to 1 (vertical), in accordance with FAR Part 77, are applicable, locate the threshold at the point where a plane at a slope of 20 to 1 intersects the runway and is tangent to, or clears, the highest object in the area described in Appendix 1, Figure 1.

(2) For other non-ILS runways where landing visibility minimums are 1 mile or more, locate the threshold at the point where a plane at a slope of 20 to 1 intersects the runway and is tangent, to or clears, the highest object in the area described in Appendix 1, Figure 2.

(3) For ILS runways and other runways where landing visibility minimums are less than 1 mile:

(a) Where landing visibility minimums as low as 3/4 of a mile are to apply, locate the threshold at a point where no obstruction penetrates a slope of 20 to 1 measured from 200 feet outward from this point and overlying the first 10,000 feet of an area which is the same as the ILS/PAR final approach area (see paragraph 342 TERPs and Appendix 1, Figure 3).

(b) Where landing visibility minimums lower than 3/4 of a mile are to apply (except for Category II runways), locate the threshold at a point where no obstruction penetrates a slope of 50 to 1, or no steeper than 34 to 1 (depending on the glide slope angle), measured from 200 feet outward from this point and overlying the first 10,000 feet of an area which is the same as the ILS/PAR final approach area (see paragraph 342 and 932 of TERPs and Appendix 1, Figure 4).

(c) If the precision approach glide slope is greater than 60 feet above the threshold, as determined by application of the criteria in (a) and (b) above, then the threshold is located at the point on the runway where the crossing height is 60 feet.

(d) For Category II runways, refer to the criteria in Advisory Circular 120-20.

(4) Where the obstruction is located outside of the areas described in Appendix 1, displacement of the threshold is not considered the most practical solution.

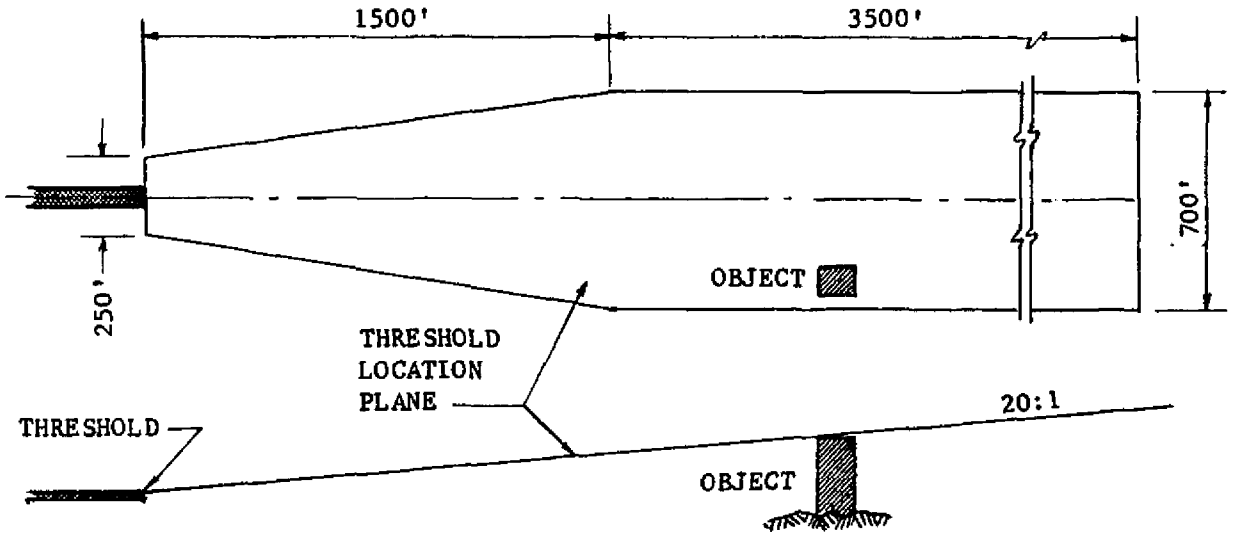
d. The relocated threshold approved by the agency in each case will be:

(1) The basis for determining the effective length of runway for landing, as applied in air carrier operations.

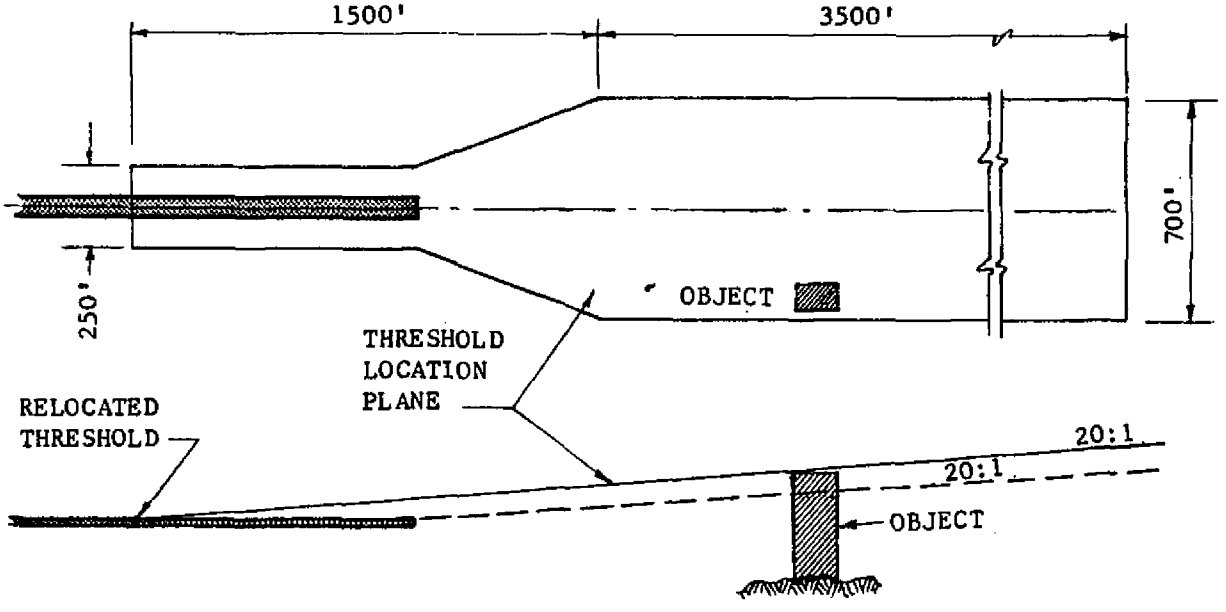
(2) The point of beginning for those marking and lighting systems which are referenced to the threshold.

e. Airport owners should be informed of any operational restrictions or airport development limitations, present or future, which may be necessary due to obstruction clearance problems or to displacement of thresholds.

G. S. Moore
Associate Administrator
for Operations

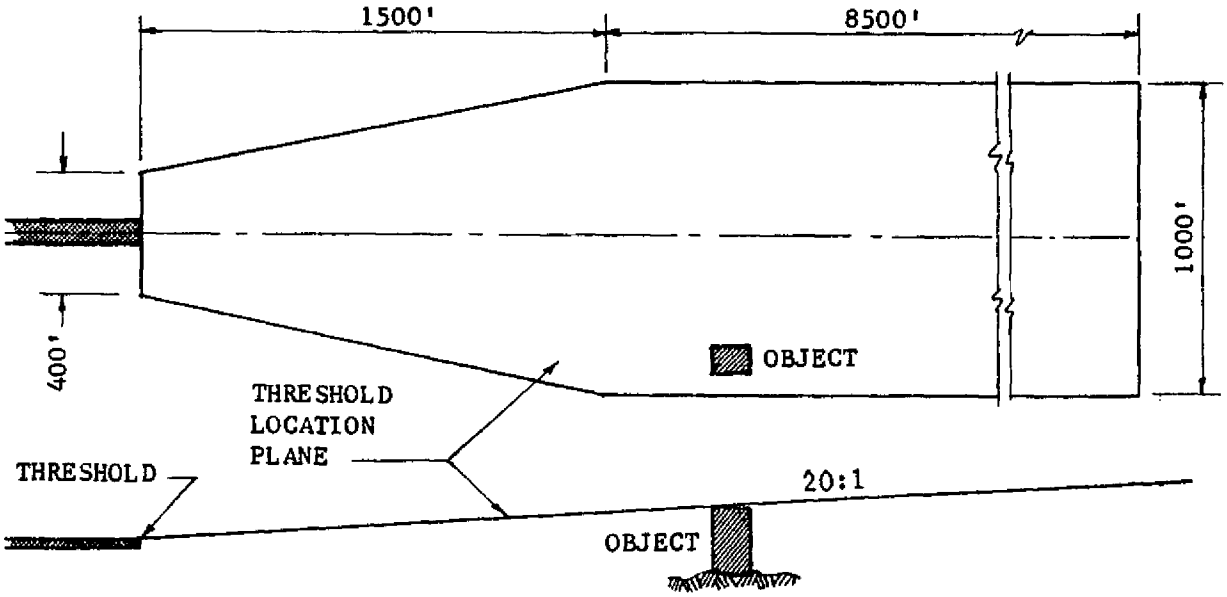


DISPLACEMENT NOT NEEDED



DISPLACEMENT NECESSARY

FIGURE 1. FOR RUNWAYS DESCRIBED IN PARAGRAPH 7c(1)



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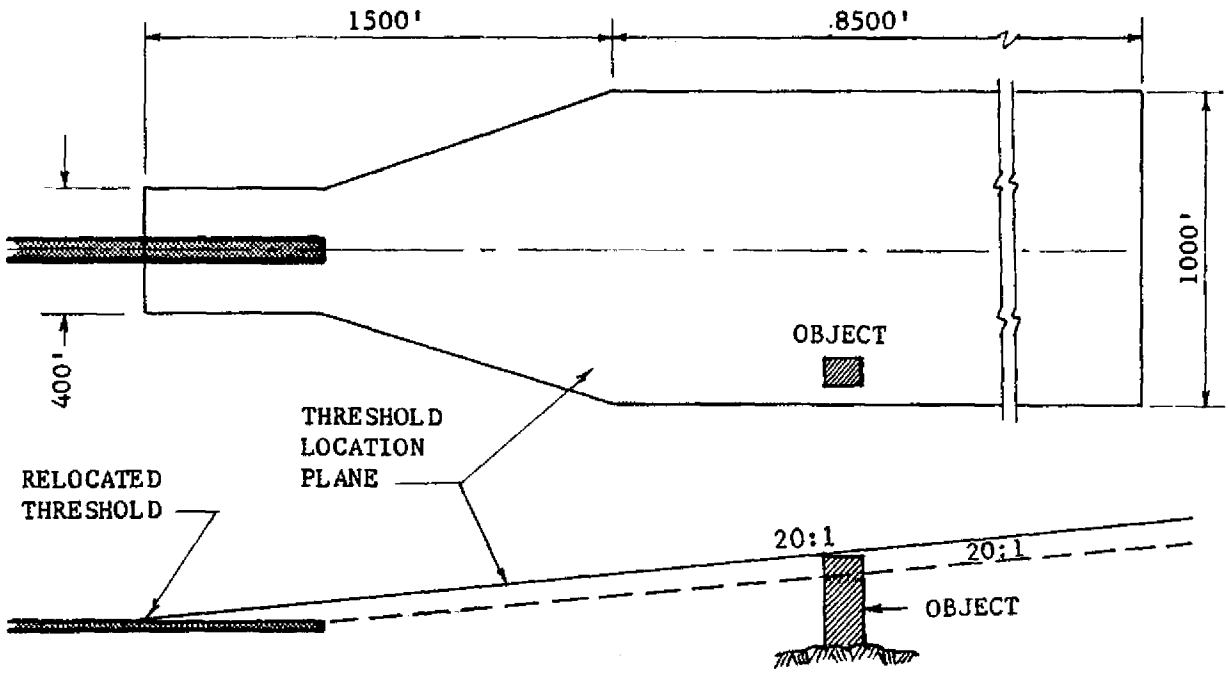

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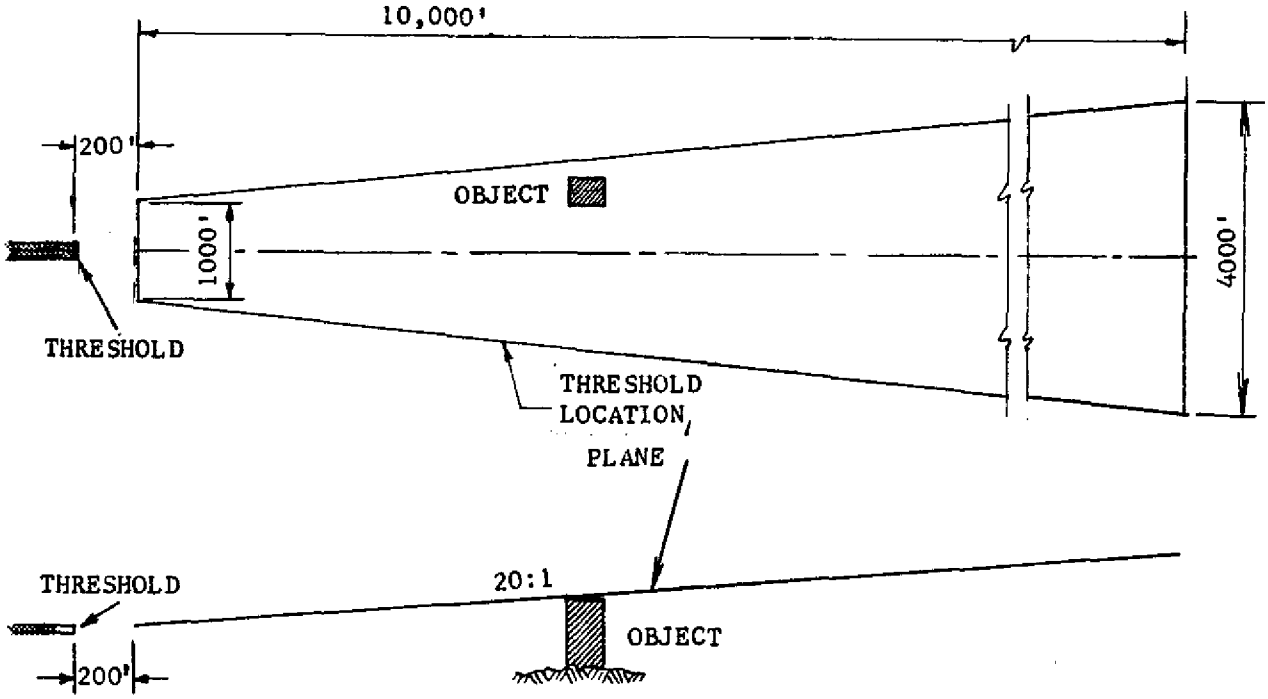
FIGURE 2. FOR RUNWAYS DESCRIBED IN PARAGRAPH 7c(2)



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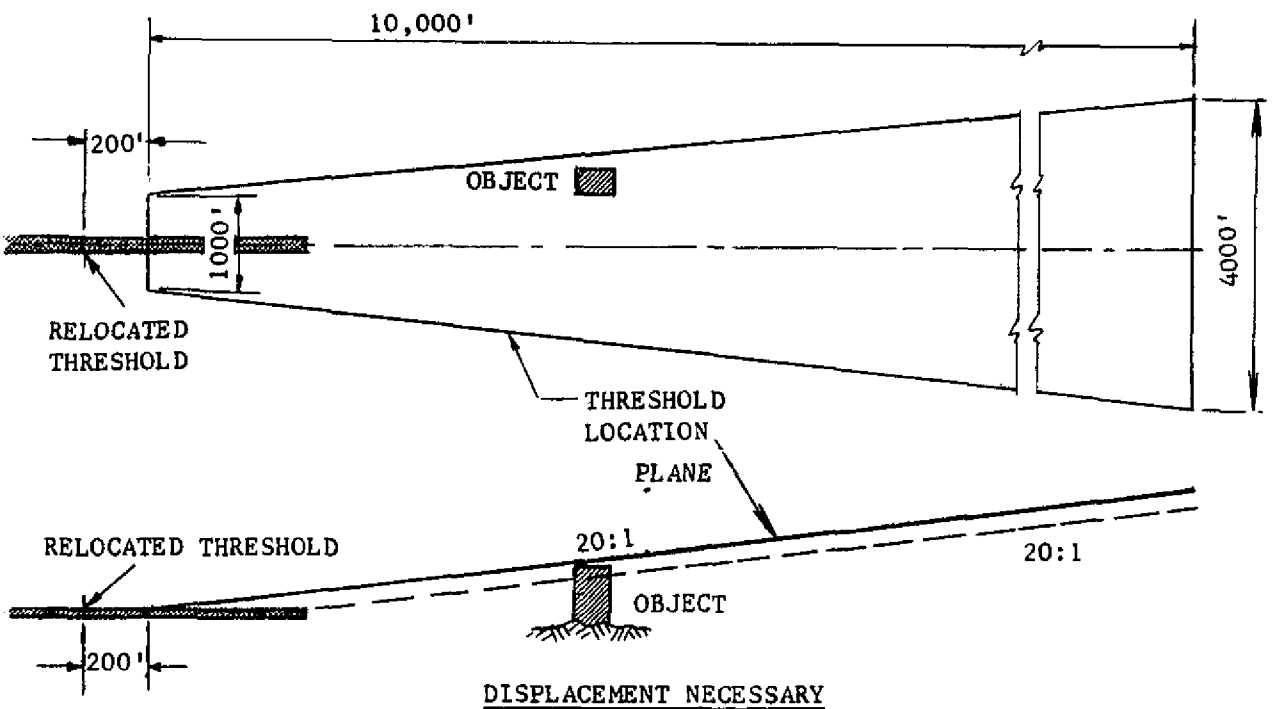

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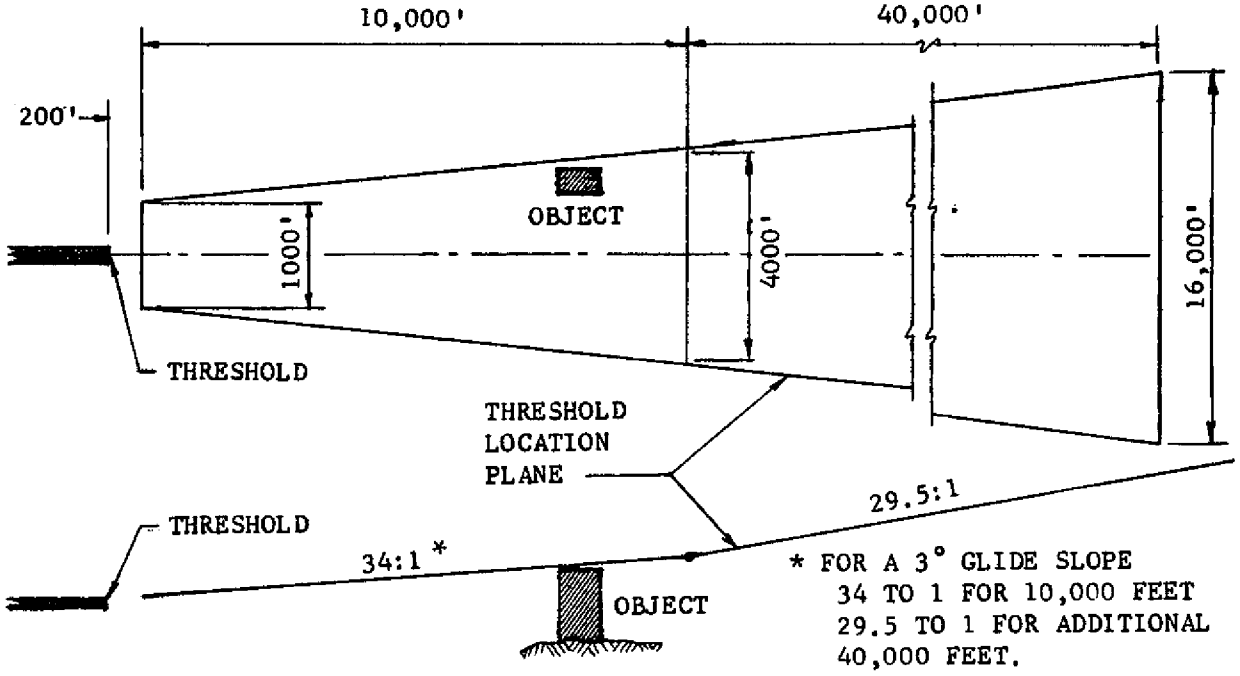
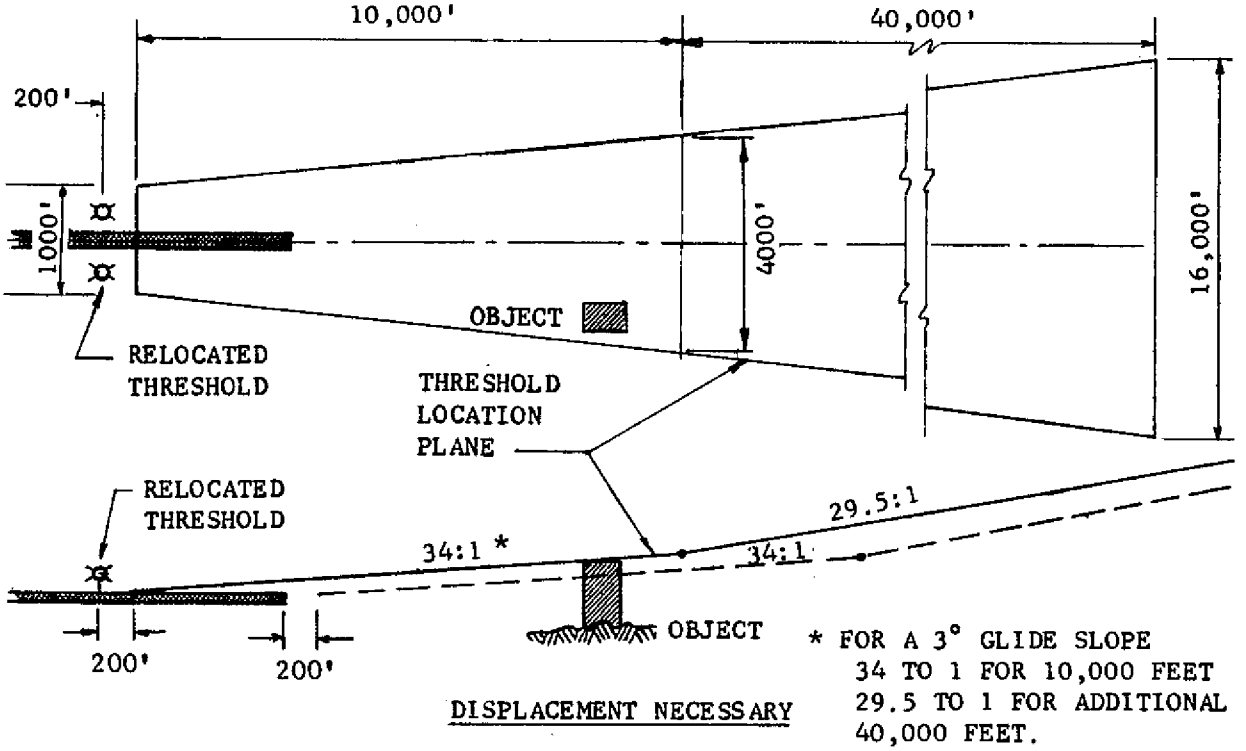
FIGURE 3. FOR RUNWAYS DESCRIBED IN PARAGRAPH 7c(3)(a)



DISPLACEMENT MAY NOT BE NEEDED



DISPLACEMENT NECESSARY

FIGURE 4. FOR RUNWAYS DESCRIBED IN PARAGRAPH 7c(3)(b)