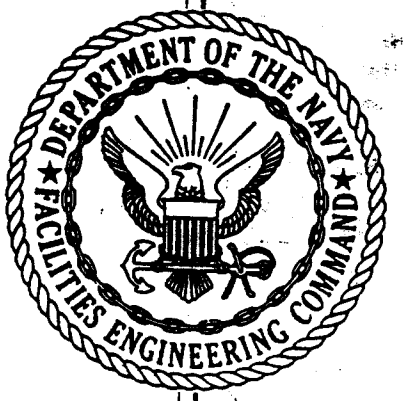

FACILITY PLANNING FACTOR CRITERIA FOR NAVY & MARINE CORPS SHORE INSTALLATIONS

Appendix E
AIRFIELD SAFETY CLEARANCES

NAVFAC P-80.3
JANUARY 1982

APPROVED FOR PUBLIC RELEASE

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
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SECTION I - GENERAL

A. PURPOSE. The purpose of this Appendix is to (1) provide facility planners with guidance for identifying obstructions to air navigation and (2) establish airfield safety clearances for fixed wing aircraft and helicopter installations . The Appendix amplifies information provided in Federal Aviation Regulation Part 77, Objects Affecting Navigable Airspace and includes airfield clearance criteria specified in the Joint Service Manual NAVFAC P-971 (Airfield and Heliport Planning criteria). Standards herein identify three types of airfield safety criteria:

(a) Height restrictions. Restrictions in the form of specific height limits or imaginary surfaces through which objects shall not penetrate.

(b) Lateral Clearances. Standards as to how close objects may be sited to airfield pavements regardless of their height including separations between airfield pavements.

(c) Clear Zones/Takeoff Safety Zones. The areas immediately adjacent to runway and helipad thresholds provide for unobstructed takeoffs and landings and serve as emergency overrun areas. Detailed guidance is required to prevent obstructions in these areas.

The clearances and imaginary surfaces defined herein are to be used solely for siting facilities and determining obstructions as differentiated from standards to determine flight paths, glide slopes, etc; actually flown by aircraft.

As a secondary purpose, the Appendix identifies some other factors related to aircraft operations such as noise and accident potential which should be considered when siting facilities at air installations. The criteria in this Appendix conform to that established by the Department of Defense for the Air Installations Compatible Use Zone (AICUZ) Program.

The following manuals and instructions are pertinent to planning and siting facilities at Navy and Marine Corps air installations.

Federal Aviation Regulation, Part 77	Objects Affecting Navigable Airspace
DOD 4270.1-M	Department of Defense Construction Criteria Manual
DOD INST 4165.57	Air Installation Compatible Use Zones
OPNAVINST 11010.36	Air Installations Compatible Uses Zones (AICUZ) Program
NAVFACINST 11010.57B	Site Approval of Naval Shore Facilities
MCO P 11000.12A	Real Proberty Facilities Manual, Vol II, Facilities Planning and Programming
NAVFAC DM-21 (Series)	Airfield Pavements
NAVSEA OP-5, Vol I	Ammunition and Explosives Ashore

B. APPLICABILITY/WAIVERS. The criteria in this Appendix apply to Navy and Marine Corps air installations located in the United States, its territories, trusts, and possessions. Where a Navy or Marine Corps air installation is a tenant on a civil airport use these criteria to the extent practicable, otherwise FAA criteria apply. Where a Navy/Marine Corps air installation host a civilian airport, these criteria shall apply. Also apply these standards to the extent practicable at overseas locations where the Navy and Marine Corps have vested base rights. While the criteria in this Appendix are not intended for use in a theater-of-operations situation, they may be used as a guideline where prolonged use is anticipated and no other standard has been designated.

The criteria shall be used for planning all new air installations and new airfield pavements at existing air installations. (Exception: Primary surface width for Class B runways, See Section II, paragraph C1.) Existing air installations have been developed using previous standards which may not conform to the criteria herein. Safety clearances at existing air installations need not be upgraded solely for the purpose of conforming to these criteria. However, at existing air installations where few structures have been sited/constructed in accordance with previous safety clearances, it may be feasible to apply the revised standards herein. The changes in standards primarily affect criteria for: (1) Class A designated runways (2) runways at basic training outlying fields used by T-34 aircraft and (3) helicopter landing

facilities operating under Visual Flight Rules. Approval from Headquarters NAVFACENGCOM shall be obtained prior to revising safety clearances at existing airfield pavements to conform with new standards herein. NAVFACENGCOM will coordinate the approval with the Naval Air Systems Command and CNO/CMC as required.

Once safety clearances have been established for an air installation, there may be occasions where it is not feasible to meet the designated standards. In these cases a waiver must be obtained from the Naval Air Systems Command. The waiver and its relationship to the site approval process is defined in NAVFACINST 11010.57, Site Approval of Naval Shore Facilities.

C. EXEMPTIONS FROM WAIVER. Certain navigational and operational aids normally are sited in violation of airspace safety clearances in order to operate effectively. The following aids are within this group and require no waiver from NAVAIR, provided they are sited in accordance with NAVFAC Definitive Designs (P-272) and/or the NAVFAC Design Manuals (DM Series):

a. Approach lighting systems
b. Visual Approach Slope Indicator (VASI) systems
c. Permanent Optical Lighting System (OLS), portable OLS and Fresnel lens equipment
d. Runways distance markers
e. Arresting Gear (A/G) systems including A/G signs
f. Taxiway guidance, holding and orientation signs
h. All beacons and obstructions lights
i. Arming and de-arming pad

D. DEFINITIONS.

Airfield Reference Point. The designated geographical location of an airfield. It is given in terms of the nearest second of latitude and longitude. The position of the reference point must be as near to the geometric center of the landing area as possible, taking future development of the airfield into account.

Established Airfield, Heliport or Helipad Elevation. The established elevation of the highest point of the usable landing area in terms of the nearest foot above mean sea level.

SECTION II - AIRFIELD CLEARANCES-FIXED WING AIRCRAFT

A. RUNWAY CLASSIFICATION. This Appendix uses the same runway classification system, Class A and B, established by the Office of the Secretary of Defense as a means of defining accident potential zones (APZs) for the Air Installations Compatible Use Zones (AICUZ) program. The runway classification must be known in order to determine the proper clear zone and airspace criteria for a runway. The classification is dependent on the type of aircraft which operate from the runway:

TABLE A
RUNWAY CLASSIFICATIONS BY AIRCRAFT TYPE

Class A Runways

C-1	C-47	OV-10	T-44
C-2	C-117	S-2	U-10
C-4	E-1	T-28	U-11
C-6	E-2	T-34	U-21
C-7	O-1	T-41	UV-18
C-12	O-2	T-42	
C-45	OV-1		

Class B Runways

A-3	C-10	F-4	P-2
A-4	C-14	F-5	P-3
A-5	C-15	F-8	S-3
A-6	C-118	F-14	SR-71
A-7	C-121	F-15	T-2
A-8	C-123	F-16	T-29
A-10	C-130	F-17	T-33
A-18	C-131	F-18	T-37
AV-8	C-135	F-100	T-38
B-1	C-137	F-101	T-39
B-52	C-140	F-104	TR-1
B-57	C-141	F-105	U-2
C-5	E-3	F-106	
C-9	E-4	F-111	

Class A runways are primarily used by small light aircraft as indicated in Table A and the runway should not have the potential for development for use by heavier aircraft or have a foreseeable requirement for such use. Ordinarily, Class A runways are less than 8000 feet long and less than 10 percent of the operations involve class B type aircraft. Class B runways are all other runways except basic training outlying fields used by T-34 aircraft for which special criteria are specified.

The classification of Navy and Marine Corps runways is determined as a part of the AICUZ program and is published in the AICUZ study for a particular installation. NAVFACENGCOM and NAVAIRSYSCOM concurrence and CMC/CNO approval is required prior to classifying any runway Class A or B. This approval is obtained via approval of the AICUZ study.

B. OBSTRUCTIONS TO AIRSPACE. The following paragraphs set standards for determining whether an object or structure is an obstruction to air navigation. It applies to existing and proposed objects including objects of natural growth or terrain. Facilities shall be sited so as not to be an obstruction to airspace.

An existing object (including a mobile object) is, and a future object would be, an obstruction to air navigation if it is higher than any of the following heights or surfaces.

a. A height of 500 feet above ground level at the site of the object.

b. A height that is 200 feet above ground level or above the established airfield elevation, whichever is higher, within 3 nautical miles of the established reference point of an airfield. This height increases in the proportion of 100 feet for each additional nautical mile of distance from the airfield up to a maximum of 500 feet.

c. A height that results in raising an established or proposed Minimum Descent Altitude (MDA) within the initial approach segment, or the intermediate approach segment; or that which raises the Decision Height (DH) for Precision Approach Radar (PAR) or Instrument Landing system (ILS) glide slopes within the final approach segment; or that which affects a departure or missed approach climb gradient within the departure area or missed approach segment; or that which affects the MDA within the circling approach area.

d. A height within an enroute obstacle clearance area, including turn and termination areas, of a federal airway or approved off-airway route that would increase the minimum obstacle clearance altitude.

e. The surface of a takeoff and landing area of an airfield or any imaginary surface as defined in Section II, paragraph C (Section III, Paragraph C for helicopter facilities). However, no part of the take off or landing area itself is considered an obstruction.

The height restrictions in paragraphs (a), (b) and (e) can be evaluated by planning personnel. The restrictions imposed by paragraphs (c) and (d) should be evaluated by flight operations personnel, however the planner should be aware of their existence.

Traverse ways (roads, railroads, canals etc) must be considered in terms of height of the objects using them. This is done by establishing a minimum vertical clearance (the clearance represents the height of the object using the traverse way) which must be maintained between the traverse way and the imaginary surfaces. The clearances are given in Table B and must be maintained except when:

a. Use of the traverse way is controlled. Control in this sense is exercised by Air Traffic Control (ATC) facility or through an agreement between the responsible ATC facility and another agency with the capability to exercise control.

b. Use of an existing traverse way is physically limited to lesser heights. For example, overpasses along a public highway have a clearance of 13 feet thereby restricting use of the highway to vehicles of 13 feet in height or less. Thirteen feet could then be used as the minimum vertical clearance requirement.

TABLE B
Highway, Railroad and Waterway Clearances

Item Description	Traverse Way	Clearance
Minimum vertical clearance between established imaginary surfaces and traverse ways	Interstate highway that is part National System of Military and Interstate Highways	17 ft
	Other public highways not covered above	15 ft
	Private or military road	10 ft minimum, or height of highest mobile object that normally would traverse them, whichever is greater
	Railroads	23 ft
	Waterway or other traverse way not previously covered	A distance equal to the height of the highest mobile object that normally would traverse them

c. IMAGINARY SURFACES. The following imaginary surfaces are defined for fixed wing aircraft facilities and are shown on the figures at the end of Section II.

1. Primary Surface. A surface ~~on the ground or water~~ HORIZONTAL AT THE PERPENDICULAR ELEVATION centered lengthwise on the runway and extending 200 feet beyond each end of the runway. The width of the primary surface is:

(a) 1000 feet - Class A runways
- Basic Training Outlying Fields (OLFs) used by T-34 aircraft

(b) 1500 feet - Class B runways constructed prior to June 1981

(c) 2000 feet - Class B runways constructed at new air installations where no runway existed prior to June 1981

NAVAIRSYSCOM, in coordination with NAVFACENGCOM, will determined on an individual basis whether a 1500 or 2000 foot wide primary surface shall be applied for new Class B runways constructed at air installations having existing runways with a 1500 foot wide primary surface.

2. Clear Zone Surface. See section II, paragraph D for Clear Zone standards.

3. Approach - Departure Clearance Surface. An inclined or combination inclined and horizontal plane, symmetrical about the runway centerline extended. The inclined plane flares outward and upward from the primary surface, beginning with the same width as the primary surface and starting with the centerline elevation at the runway end. The slope and dimensions of the surface vary by runway class:

a. Class A runway. The slope of the surface is 40 to 1 until it reaches an elevation of 500 feet above the established airfield elevation. It then continues horizontally at this elevation to a point 50,000 feet from the point of beginning. The outer width is 16,000 feet.

b. Class B runway. The slope of the surface is 50 to 1 until it reaches an elevation of 500 feet above the established airfield elevation. It then continues horizontally at this elevation to a point 50,000 from the point of beginning. The outer width is 16,000 feet.

c. OLF Basic Training Outlying Field (for T-34 aircraft). The slope of the surface is 20:1 and the surface continues until it rises 400 feet in elevation. The surface flares outward at an angle of 5^{o} 43'.

4. Inner Horizontal Surface. An oval shaped plane at a height of 150 feet above the established airfield elevation. For Class A and B runways it is constructed by scribing an arc with a radius of 7,500 feet about the centerline at each end of each runway and interconnecting these arcs with tangents. The radius is reduced to 3,200 feet at Basic Training Outlying Fields (for T-34 aircraft).

5. Conical Surface. An inclined plane that extends from the periphery of the inner horizontal surface outward and upward at a 20 to 1 slope. For Class A and B runways it extends for horizontal distance of 7,000 feet and to a height of 500 feet above the established airfield elevation. For Basic Training OLF (T-34 aircraft) runways, it extends for a horizontal distance of 5,000 feet and to a height of 400 feet above the established airfield elevation.

6. Outer Horizontal Surface. For Class A and B runways, a plane located 500 feet above the established airfield elevation, extending outward from the outer periphery of the conical surface for horizontal distance of 30,000 feet. This surface is not applied at Basic Training Outlying fields (T-34 aircraft).

7. Transitional Surface.

a. Class A and B runways. Inclined planes which connect the primary surface and the approach - departure clearance surface to the inner horizontal surface, conical surface, outer horizontal surface or other transitional surfaces. The slope is 7 to 1 outward and upward from the primary and approach-departure clearance surfaces at right angles to the runway centerline and runway centerline extended. To determine the elevation for the beginning of the transitional surface at any point along the lateral boundary of the primary surface, draw a line from the point, perpendicular to the runway centerline or the runway centerline extended. The elevation of the runway centerline or centerline extended at that intersection is the elevation for the beginning of the 7 to 1 slope.

b. Basic Training OLF (T-34 aircraft). Same definition as for the Class A and B runway except the slope is 2:1.

D. CLEAR ZONES. The areas adjacent to the runway thresholds require special restrictions to provide aircraft overrun areas and unrestricted visibility of airfield lighting. To accomplish this, clear zones are specified for each class of runway and further, the clear zone is subdivided into Types I, II and III to define the degree of restrictive use. The standards herein are in conformance with clear zone sizes specified in the AICUZ program.

CLEAR ZONE DIMENSIONS

Type Runway	Clear Zone Length	Clear Zone Width	Remarks
Class A	3000 Ft	1000 FT	NOTE 1.
Class B	3000 Ft	Same as approach departure-clearance surface	NOTE 2.
Basic Training OLF (T-34)	3000 Ft	1000 Ft	NOTE 3.

NOTE 1. The class A runway and clear zone are new to Navy and Marine Corps planning standards. Previously, all air installations except OLF's for basic training propeller aircraft received a clear zone equivalent to what is now specified for Class B runways. The criteria for Class A runway clear zones should only be applied after CNO/CMC has approved the classification of a particular runway as Class A.

NOTE 2. The DOD AICUZ program allows for a rectangular clear zone with a 3000 foot width for new construction, however, Navy accident data indicates the fan shaped clear zone is adequate for Navy installations. Clear zones with 3000 foot width shall not be planned unless coordinated with Headquarters, NAVFACENGCOM.

NOTE 3. The width of clear zone for basic training OLF's used by propeller aircraft was previously defined by the width of the approach-departure clearance surface. The criteria have been revised to conform with AICUZ guidelines.

The restrictions on land use within a clear zone vary. Therefore, the clear zone has been divided into three areas, Type I, II and III, for which specific restrictions are specified.

a. Clear Zone (Type-I) - This zone is immediately adjacent to the end of the runway. It should be cleared, graded and free of above ground objects (except airfield lighting) and is to receive special ground treatment or pavement in the area designated as the runway overrun. This type clear zone is required at both ends of all runways.

b. Clear Zone (Type - II) - This zone is used only for class B runways and is an extension of the Type I clear zone except that the width is reduced. The Type II clear zone shall be graded and cleared of all above ground objects except airfield lighting.

c. Clear Zone (Type III). This zone is laterally adjacent to the type II clear zone for Class B runways and is used in lieu of the type II clear zone at Class A runways and basic training OLFs used by T-34 aircraft. Objects in this zone shall not penetrate the approach departure clearance surface. Trees, shrubs, bushes, or any other natural growth shall be topped 10 feet below the approach departure clearance surface or to a lesser height if necessary to insure visibility of airfield lighting. Buildings for human habitation shall not be sited in the Type III Clear Zone even if they would not penetrate the approach departure clearance surface. The land in this type clear zone is best utilized for agriculture or permanent open space exclusive of agricultural uses which would attract birds or water-fowl. Land uses which would include human activity for extended periods or group activities should be avoided. Traverse ways (roads, railroads, canals, etc.,) are permitted provided they would not penetrate airfield imaginary surfaces after the height of the traverse way has been increased by the distances specified in Section II, paragraph B.

E. LATERAL CLEARANCES. In order to insure the safe operation of aircraft on the ground there are lateral clearances established for most airfield pavements. For example, no structures shall be sited within 100 feet of the edge of a fixed wing aircraft parking apron and the centerlines of a runway and parallel taxiway shall be a minimum of 500 feet apart. The lateral clearances are listed in P-80 under the category code for the pavement to which they apply.

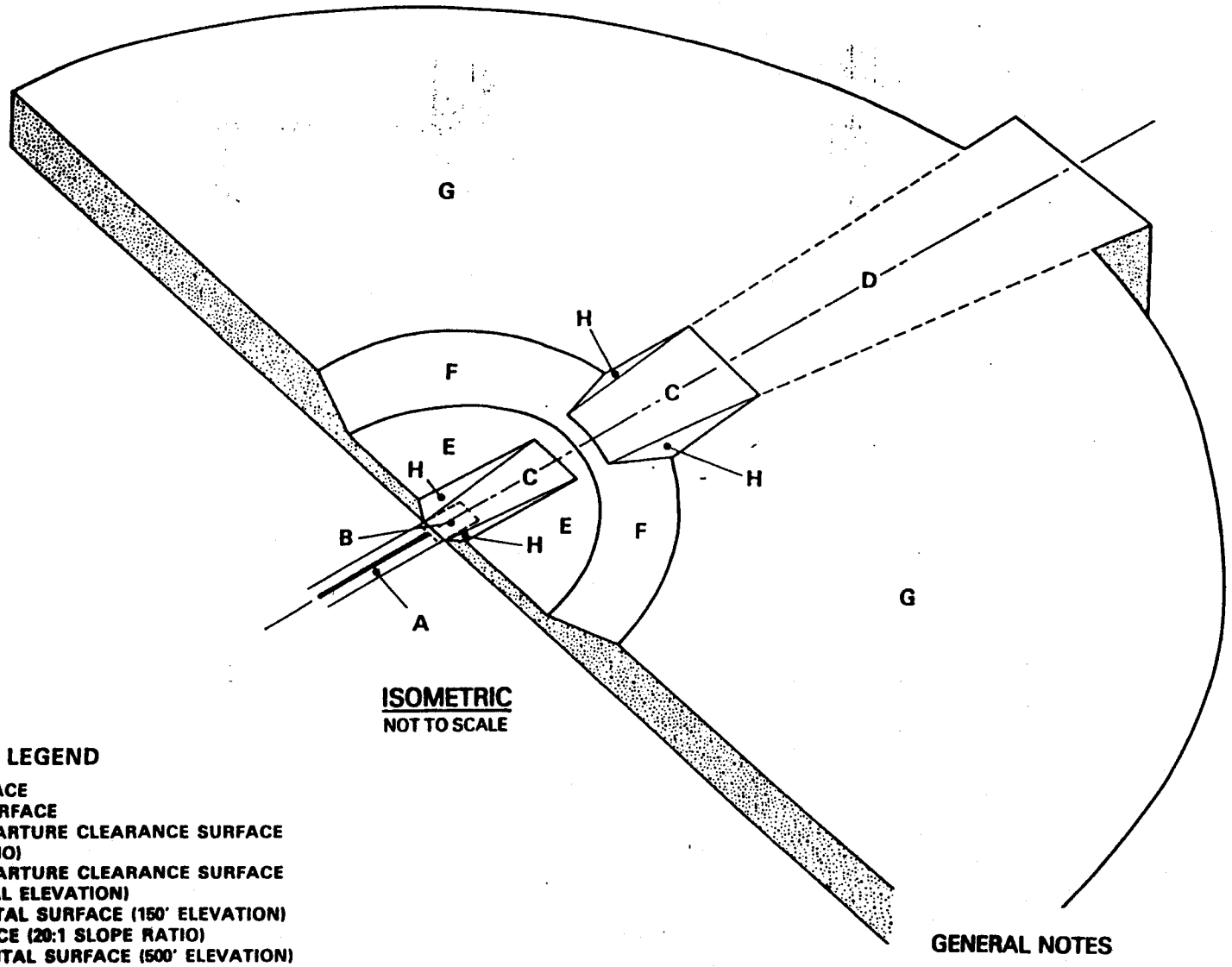
F. OTHER CONSIDERATIONS.

1. Air Installations Compatible Use Zones (AICUZ) Program. The criteria herein related to clear zones conforms to Navy AICUZ guidelines established by OPNAVINST 11010.36, Air Installation Compatiable Use Zones (AICUZ) Program. The AICUZ concept embodies a method of defining, quantifying and mapping aircraft noise, potential aircraft accident areas and existing or potential incompatible land uses, both on and off an air installation. The criteria herein is concerned with avoiding obstructions to air navigation and therefore does not address the aircraft accident potential zones, noise descriptions or compatible land use guidelines identified in the AICUZ program. OPNAVINST 11010.36 should be used as a basis for applying AICUZ guidelines.

2. Airfield Explosives Prohibited Areas. The Naval Sea Systems Command has established criteria with respect to handling and storing ammunition and explosives which are published in NAVSEA OP-5, Volume 1, Ammunition and Explosives Ashore. This publication addresses areas near runways and under flight paths where ammunition and explosives are prohibited and NAVSEA OP-5 should be used for ordnance safety criteria.

G. DRAWINGS. The following Figures are provided to illustrate the imaginary surfaces, typical airfield layouts and clear zones.

Figure	Title
II-1	CLASS A RUNWAY-AIRSPACE (ISOMETRIC)
II-2	CLASS A RUNWAY-AIRSPACE (PLAN & SECTIONS)
II-3	CLASS A RUNWAY-TYPICAL LAYOUT
II-4	CLASS A RUNWAY-CLEAR ZONE
II-5	CLASS B RUNWAY-AIRSPACE (ISOMETRIC)
II-6	CLASS B RUNWAY-AIRSPACE (PLAN & SECTIONS)
II-7	CLASS B RUNWAY-TYPICAL LAYOUT-SINGLE RUNWAY
II-8	CLASS B RUNWAY-TYPICAL LAYOUT-PARALLEL & CROSSWIND R/W
II-9	CLASS B RUNWAY-CLEAR ZONE (1500 FOOT WIDE PRIMARY SURFACE)
II-10	CLASS B RUNWAY-CLEAR ZONE (2000 FOOT WIDE PRIMARY SURFACE
II-11	AIRSPACE-BASIC TRAINING OUTLYING FIELD (T-34 AIRCRAFT)
II-12	BASIC TRAINING OUTLYING FIELD (T-34 AIRCRAFT) AIRSPACE ISOMETRIC & CLEAR ZONE DETAIL



ISOMETRIC
NOT TO SCALE

LEGEND

- **A** PRIMARY SURFACE
- **B** CLEAR ZONE SURFACE
- **C** APPROACH-DEPARTURE CLEARANCE SURFACE (40:1 SLOPE RATIO)
- **D** APPROACH-DEPARTURE CLEARANCE SURFACE (500' HORIZONTAL ELEVATION)
- **E** INNER HORIZONTAL SURFACE (150' ELEVATION)
- **F** CONICAL SURFACE (20:1 SLOPE RATIO)
- **G** OUTER HORIZONTAL SURFACE (500' ELEVATION)
- **H** TRANSITIONAL SURFACE (7:1 SLOPE RATIO)

GENERAL NOTES

1. See Figure II-2 for Sections

FIGURE II-1
CLASS A RUNWAY - AIRSPACE (ISOMETRIC)

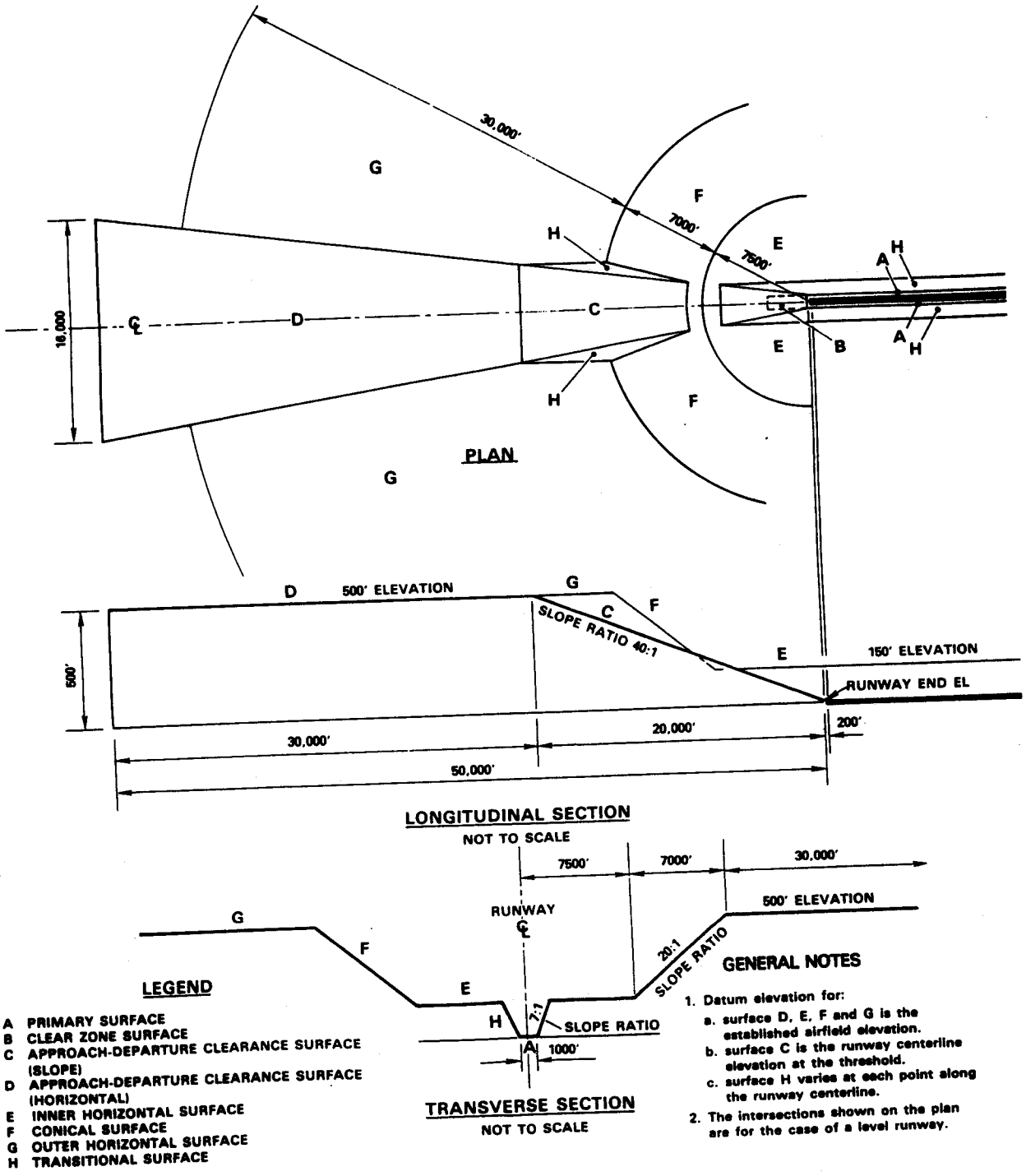


FIGURE II-2

CLASS A RUNWAY-AIRSPACE (PLAN & SECTIONS)

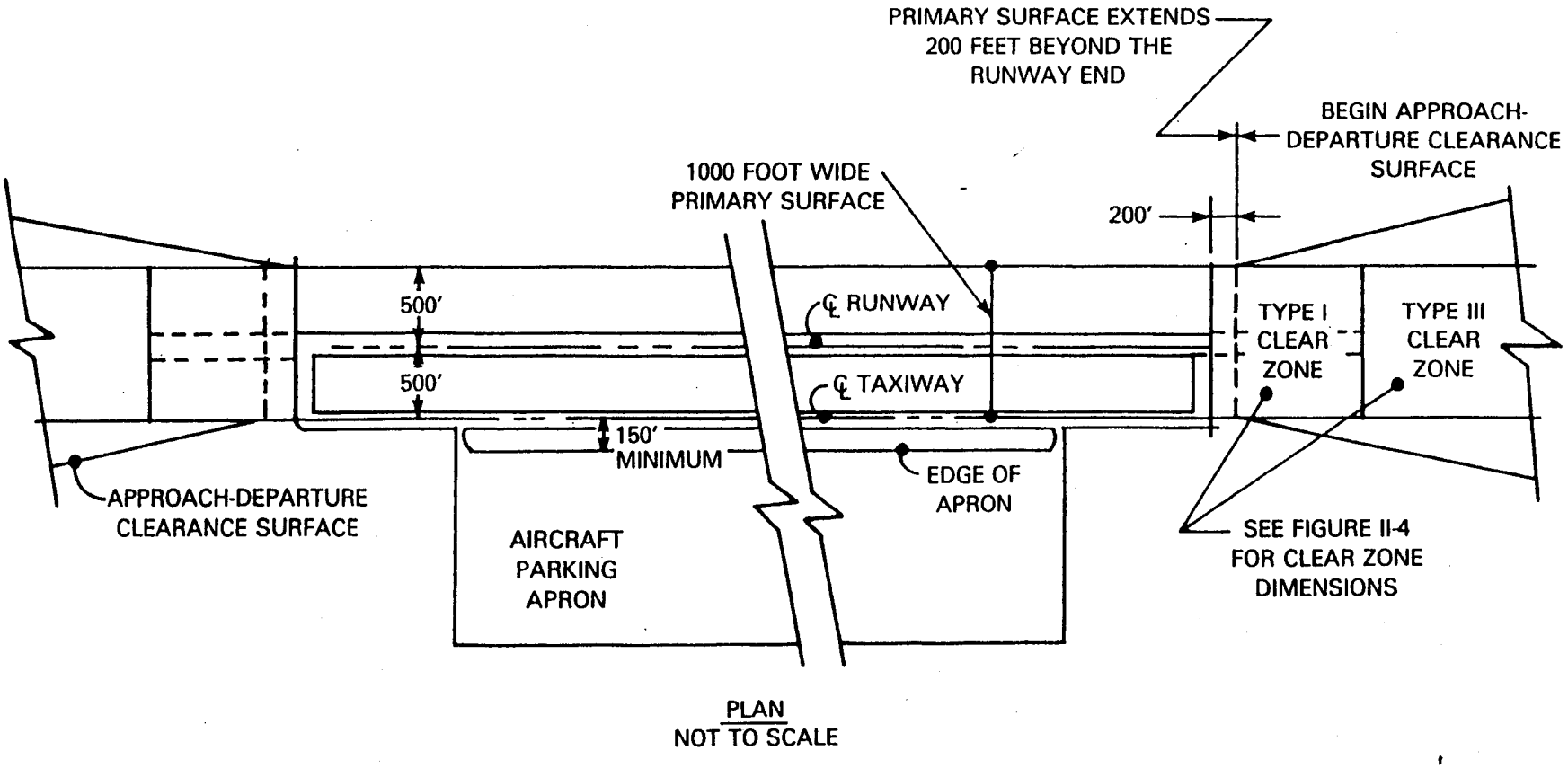
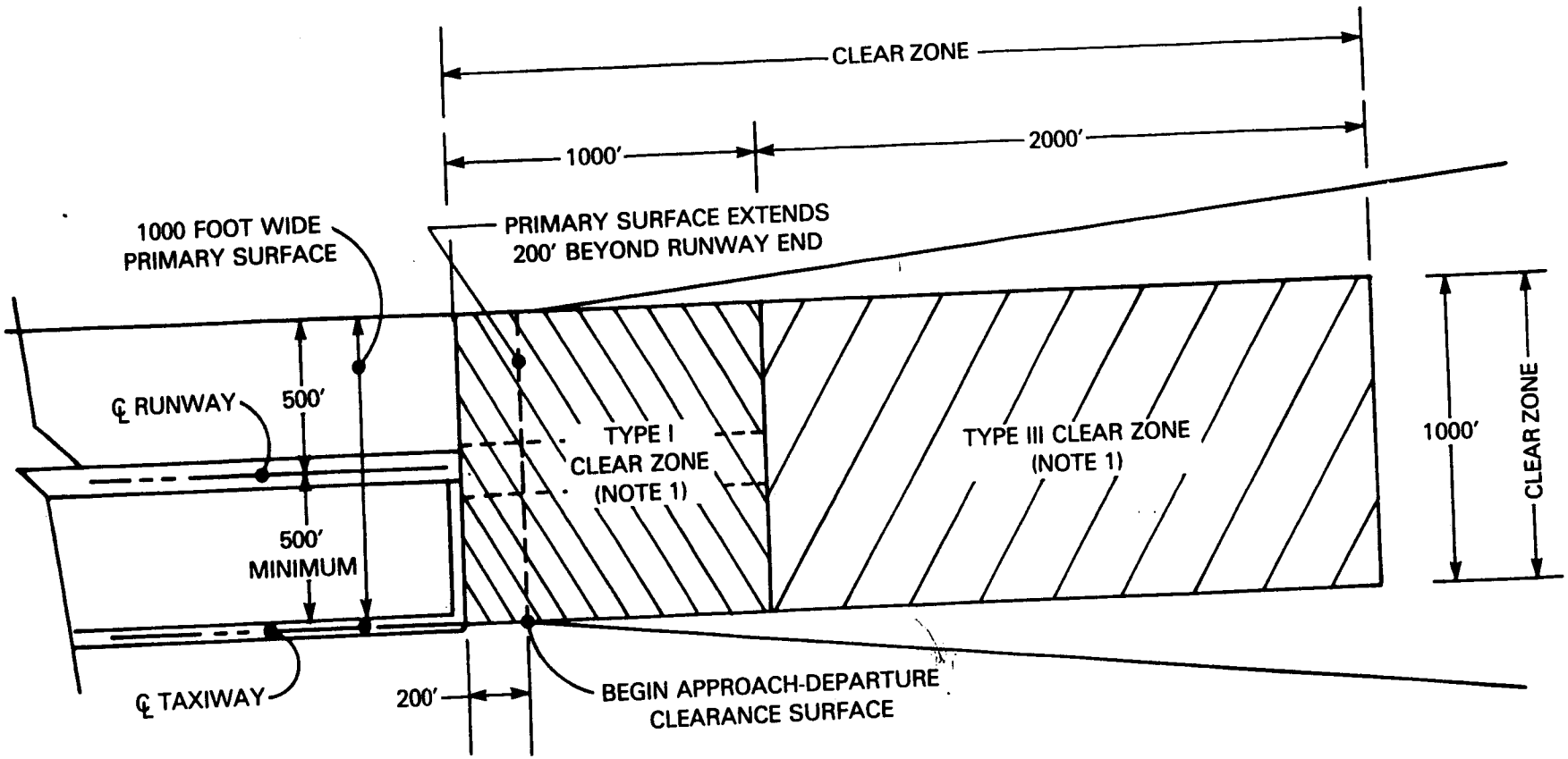


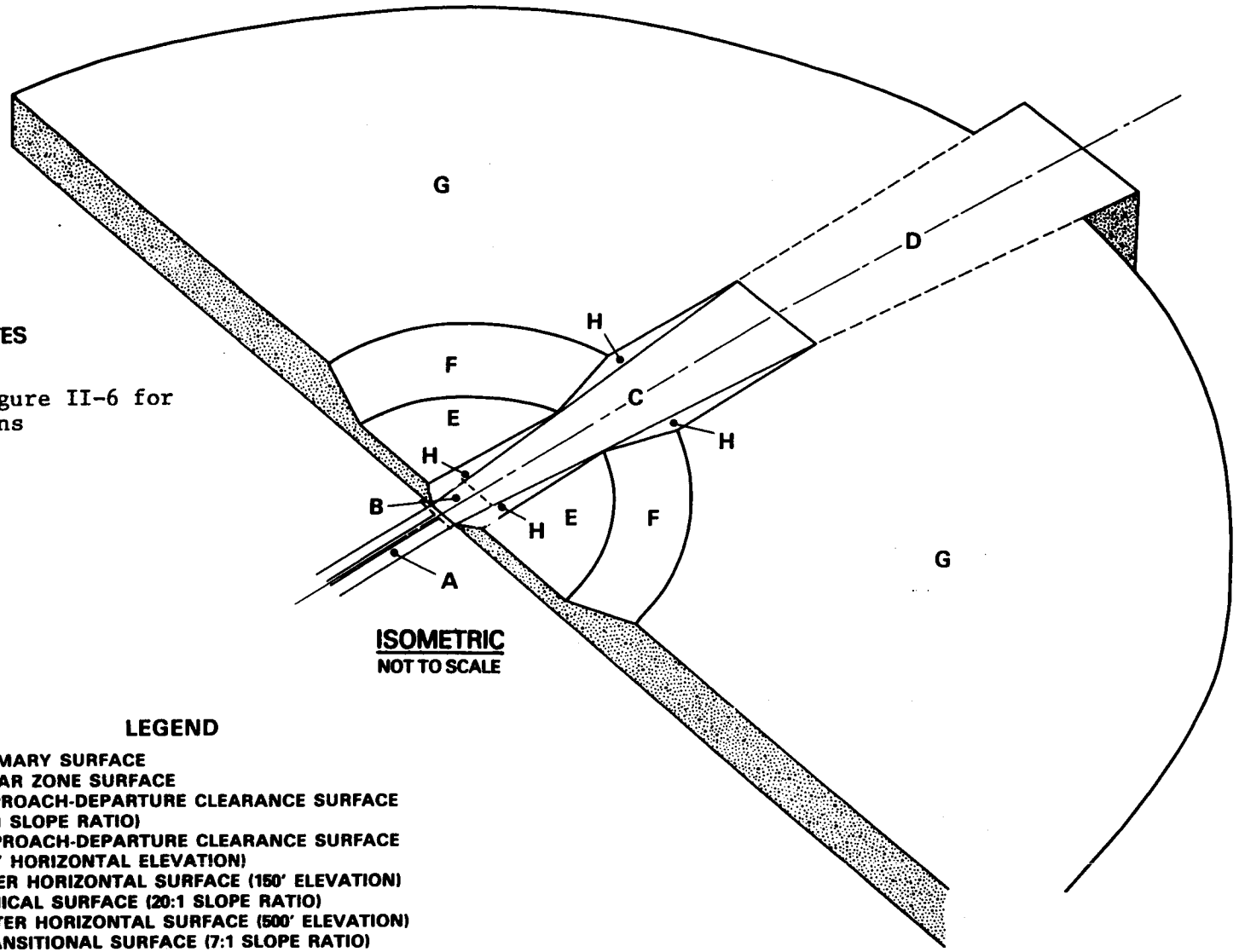
FIGURE II-3
CLASS A RUNWAY (TYPICAL LAYOUT)



NOTES

(1) See Section II, paragraph D for land use restrictions in the Type I and III clear zones.

FIGURE II-4
CLASS A RUNWAY - CLEAR ZONE



GENERAL NOTES

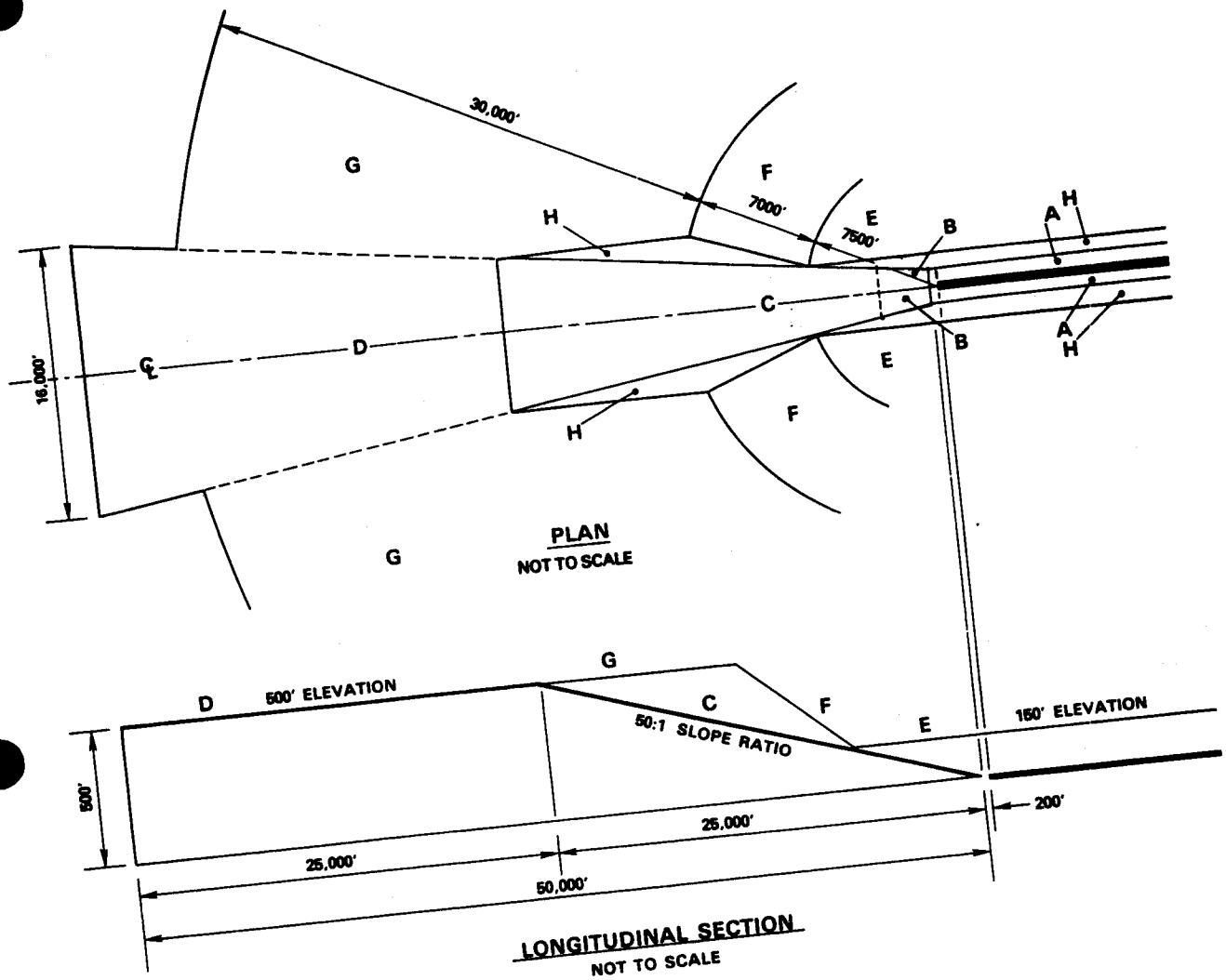
1. See Figure II-6 for Sections

LEGEND

- A PRIMARY SURFACE
- B CLEAR ZONE SURFACE
- C APPROACH-DEPARTURE CLEARANCE SURFACE (50:1 SLOPE RATIO)
- D APPROACH-DEPARTURE CLEARANCE SURFACE (500' HORIZONTAL ELEVATION)
- E INNER HORIZONTAL SURFACE (150' ELEVATION)
- F CONICAL SURFACE (20:1 SLOPE RATIO)
- G OUTER HORIZONTAL SURFACE (500' ELEVATION)
- H TRANSITIONAL SURFACE (7:1 SLOPE RATIO)

FIGURE II-5

CLASS B RUNWAY - AIRSPACE (ISOMETRIC)



(SEE SECTION II, PARAGRAPH C FOR EXCEPTION TO PRIMARY SURFACE WIDTH)

LEGEND

A PRIMARY SURFACE
B CLEAR ZONE SURFACE
C APPROACH-DEPARTURE CLEARANCE SURFACE (SLOPE)
D APPROACH-DEPARTURE CLEARANCE SURFACE (HORIZONTAL)
E INNER HORIZONTAL SURFACE
F CONICAL SURFACE
G OUTER HORIZONTAL SURFACE
H TRANSITIONAL SURFACE

GENERAL NOTES

1. Datum elevation for:
   a. surface D, E, F and G is the established airfield elevation.
   b. surface C is the runway centerline elevation at the threshold.
   c. surface H varies at each point along the runway centerline.
2. The intersections shown on the plan are for the case of a level runway.

FIGURE II-6

CLASS B RUNWAY-AIRSPACE (PLAN & SECTIONS)

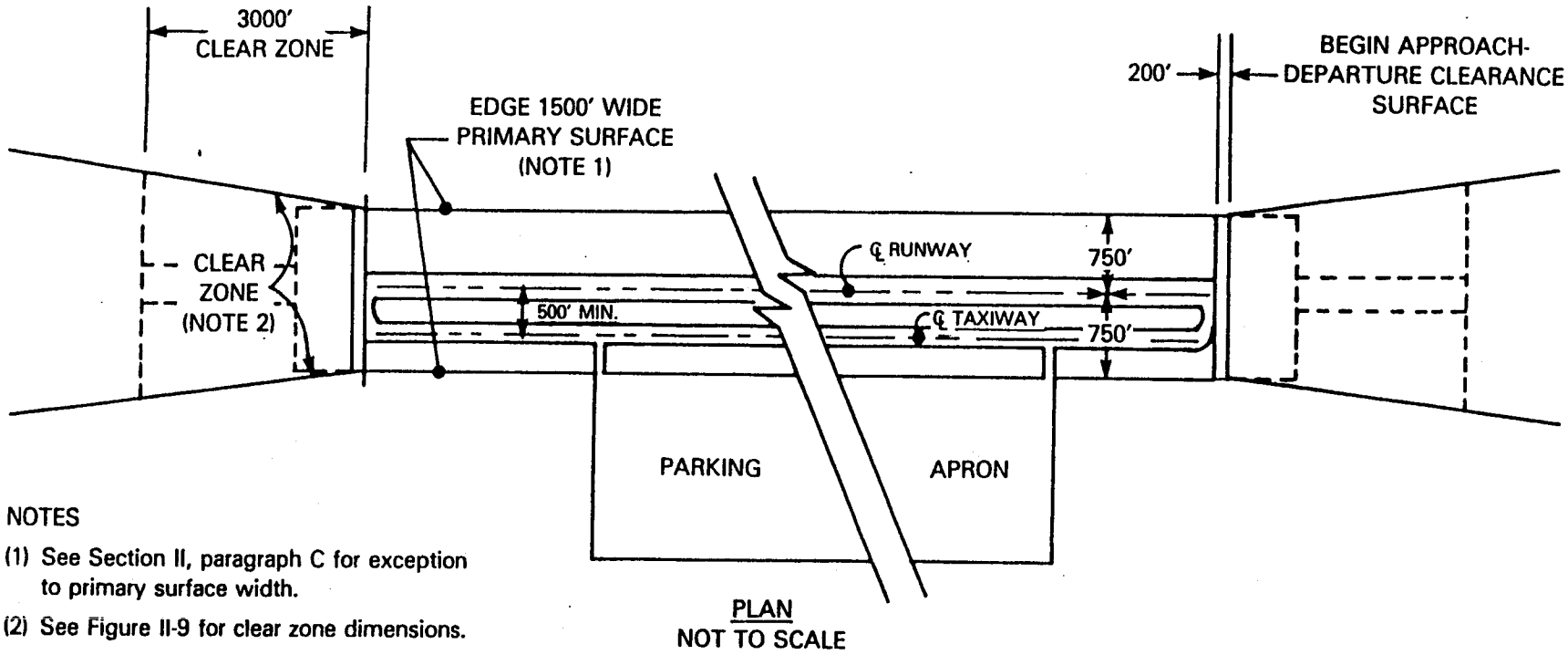


FIGURE II-7

CLASS B RUNWAY- TYPICAL LAYOUT - SINGLE RUNWAY

GENERAL NOTES

- THE LAYOUT SHOWN IS SCHEMATIC IN THAT IT ASSUMES THAT THE ENDS OF THE PARALLEL RUNWAYS ARE AT THE SAME ELEVATION. WHERE THE RUNWAY ENDS ARE AT DIFFERENT ELEVATIONS (OR IF THE RUNWAYS ARE STAGGERED), APPLY THE AIRSPACE CRITERIA TO EACH RUNWAY SEPARATELY AND THEN SUPERIMPOSE THE IMAGINARY SURFACES FOR EACH RUNWAY. WHERE SURFACES OVERLAP, THE LOWER ONE GOVERNS.
- THE DATUM ELEVATION IS THE ESTABLISHED AIRFIELD ELEVATION.

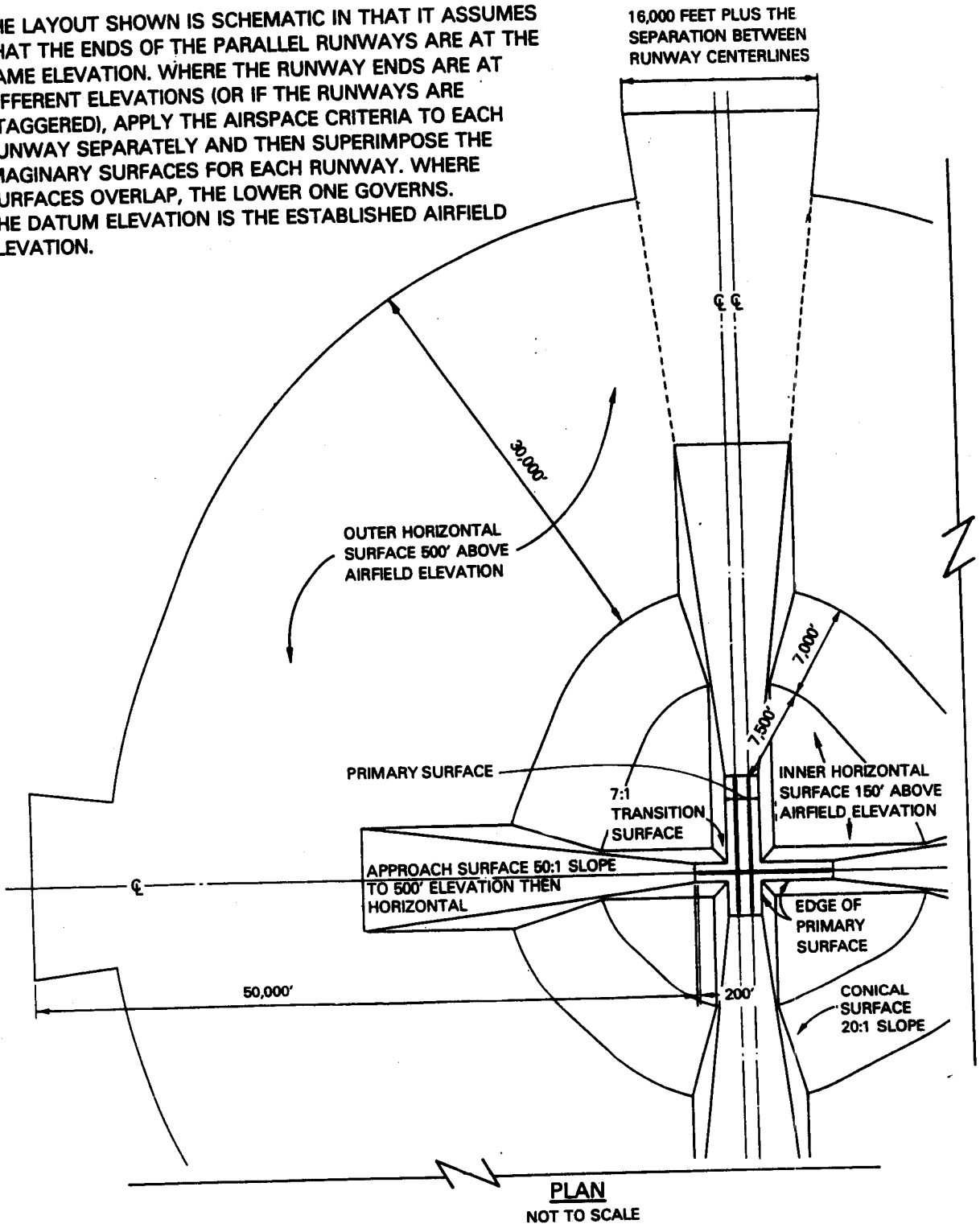
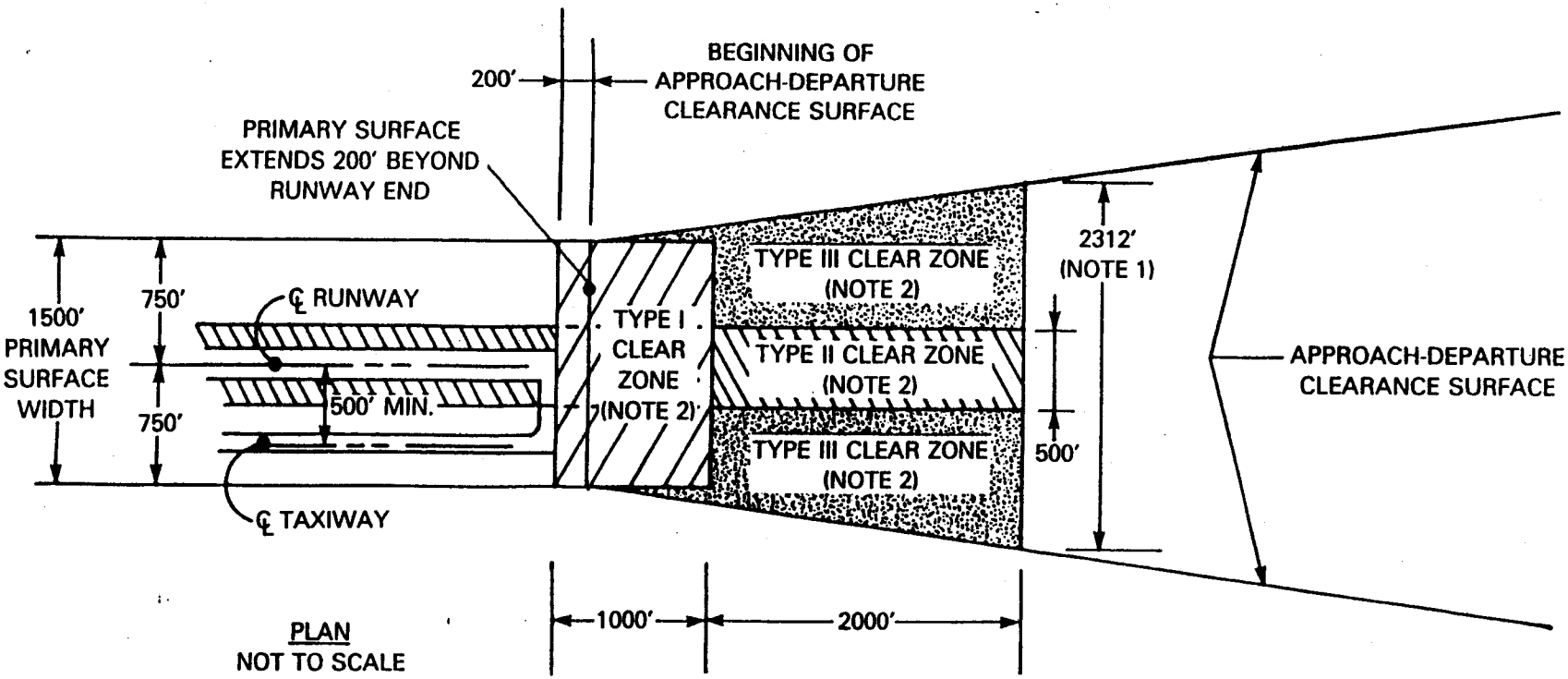


FIGURE II-8
CLASS B RUNWAY - TYPICAL LAYOUT - PARALLEL & CROSSWIND RUNWAYS

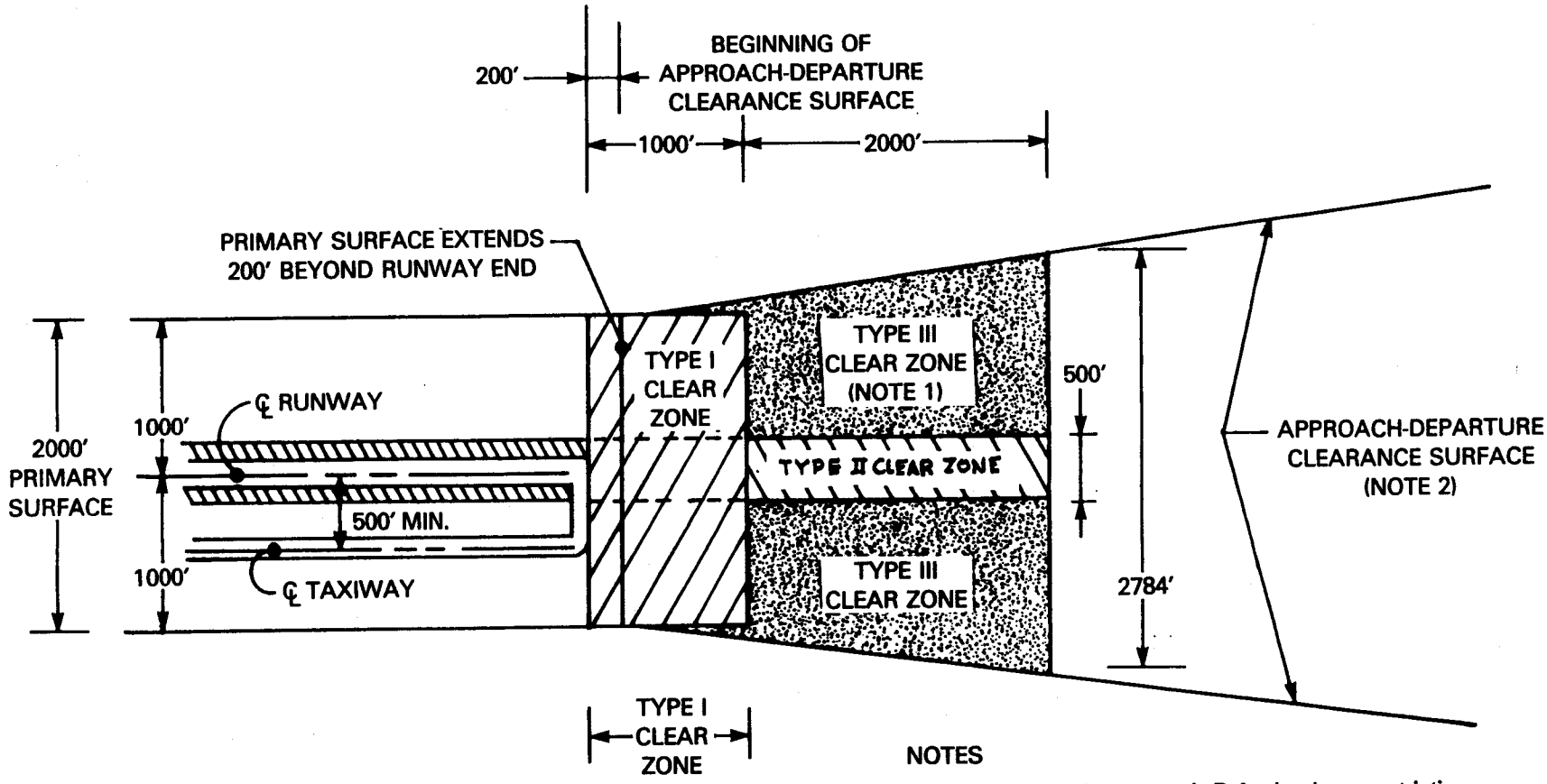


NOTES

(1) This dimension is based on criteria herein which revises outer width of approach-departure clearance surface to 16,000 feet. At runways where the outer width has been established at 15,500 feet (based on previous criteria of 7°-58'-11" flare angle for approach-departure clearance surface), this dimension is 2284 feet.

(2) See Section II, paragraph D for land use restrictions in Types I, II, and III clear zones.

FIGURE II-9
CLASS B RUNWAY - CLEAR ZONE
(1500 WIDE PRIMARY SURFACE)



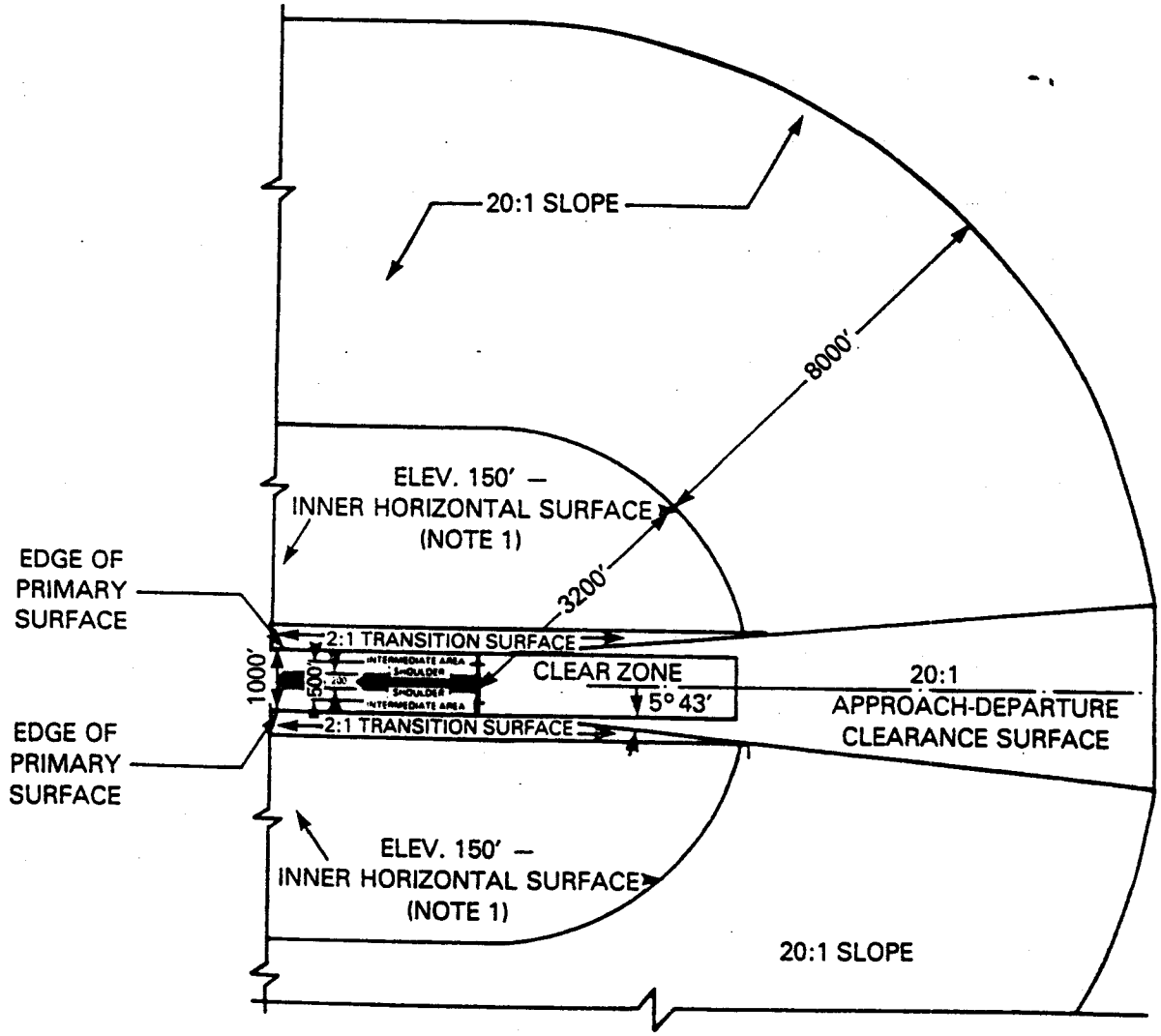
NOTES

(1) See Section II, paragraph D for land use restrictions for Types I, II, and III clear zones and for possible variance from the dimensions shown.

(2) The approach-departure clearance surface begins 200 feet from the runway end with a width of 2000 feet and flares outward to a width of 16,000 feet at a point 50,000 feet (measured horizontally) from its beginning.

FIGURE II-10

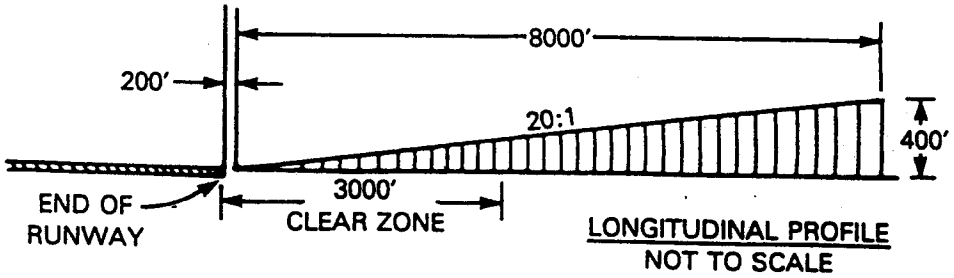
CLASS B BUNWAY - CLEAR ZONE
(2000 FOOT WIDE PRIMARY SURFACE)



NOTES

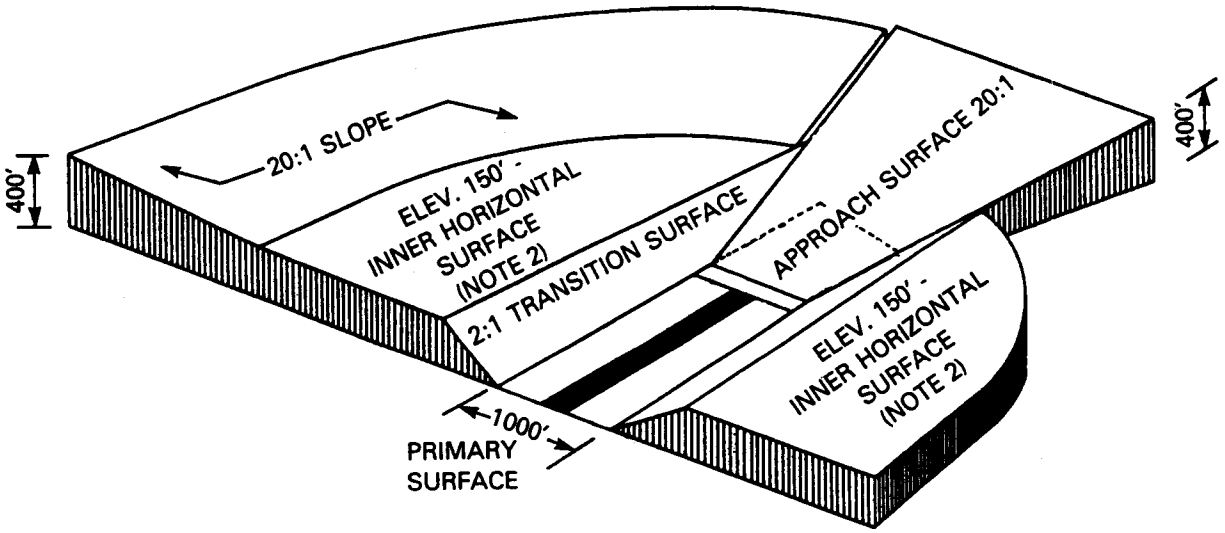
(1) Inner horizontal surface elevation is 150 feet above the established airfield elevation.

PLAN
NOT TO SCALE

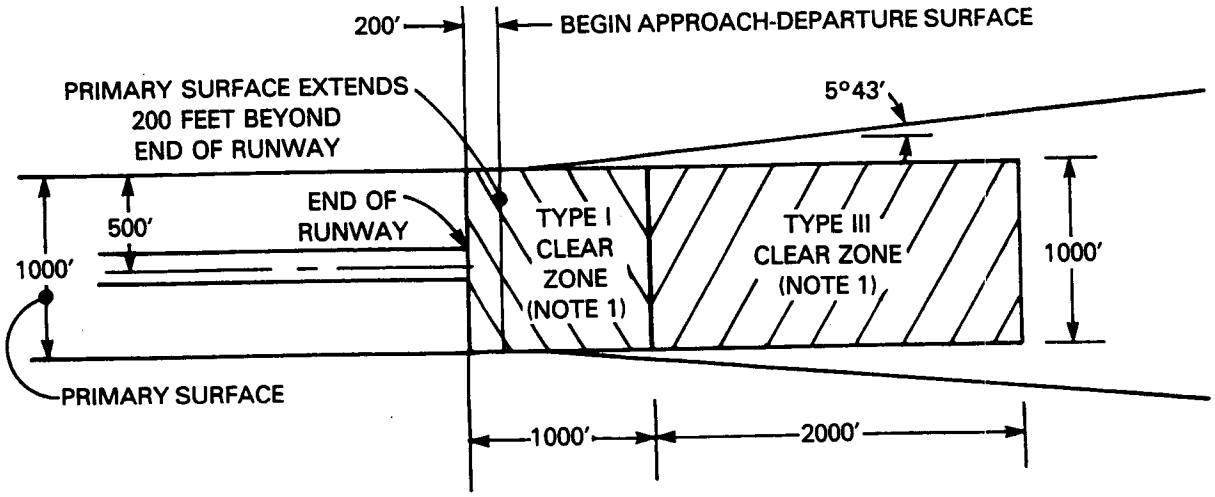


LONGITUDINAL PROFILE
NOT TO SCALE

FIGURE II-11
AIRSPACE-BASIC TRAINING OUTLYING FIELD
(T-34 AIRCRAFT)



ISOMETRIC
AIRSPACE/IMAGINARY SURFACES
NOT TO SCALE



CLEAR ZONE DETAIL
NOT TO SCALE

NOTES

(1) See Section II, paragraph D for land use restrictions in Types I and III clear zones.

(2) Inner horizontal surface elevation is 150 feet above the established airfield elevation.

FIGURE II-12

BASIC TRAINING OUTLYING FIELD (T-34 AIRCRAFT) AIRSPACE ISOMETRIC AND CLEAR ZONE DETAIL

SECTION III - AIRFIELD CLEARANCES - HELICOPTERS

A. TYPES OF FACILITIES. The major helicopter landing facilities consist of helipads and helicopter runways. The airspace clearances for helicopter facilities differ for Instrument Fight Rules (IFR) and Visual Flight Rules (VFR), therefore, the type of flight operations (IFR or VFR) must be identified before the obstruction standards may be applied.

B. OBSTRUCTIONS TO AIRSPACE. The standards for determining obstruction to air navigation for helicopter facilities are the same as specified for fixed wing aircraft in Section II, paragraph B, except that different imaginary surfaces are defined for helicopter facilities.

C. IMAGINARY SURFACES. The following imaginary surfaces are defined for helicopter facilities and are shown on the figures at the end of Section III:

1. Primary Surface. A horizontal plane symetrically centered on the helicopter runway or helipad at the established elevation of the landing surface. The area beneath the primary surface (referred to as the primary surface area) shall be free of obstructions. The dimensions of the primary surface are:

Type Facility	Length of Primary Surface	Width of Primary Surface
VFR Helipad	150 FT	150 FT
VFR Runway	Runway length plus 75 feet at each end	300 FT
IFR Helipad	1550 FT	750 FT
IFR Runway (Single GPI) (Note 1)	1550 FT	750 FT
IFR Runway (Double GPI) (Note 1)	2450 FT	750 FT

Note 1. The GPI (Ground point intercept) is the point on the centerline of the landing surface where the straight line extension of the glide slope intersects the approach surface baseline. For planning purposes, the GPI can be considered to be the helicopter touchdown point. The primary surface extends beyond the runway a distance of 775 feet from the GPI. The lengths shown are based on a single GPI at the middle of a 450 foot runway and a 1000 foot runway with two GPIs, each 50 feet in from the runway end.

2. Horizontal Surface (IFR only). A circular or oval level plane, located 150 feet above the established runway or helipad elevation, defined by scribing an arc with a 4,600 radius from the GPI. For multiple GPI's, connect the arcs with tangents.

3. Transitional Surface. Planes that connect the primary surface and the approach-departure clearance surface and horizontal surface. Each surface is outward and upward from the edge of the primary surface or approach-departure clearance surface at a specified slope measured perpendicular to the runway centerline or helipad longitudinal centerline.

a. VFR Facilities. The slope ratio is 2:1 and for runways it rises to 150 feet above the established elevation of the landing surface. For helipads, the surface rises at a 2:1 slope until it reaches a horizontal distance of 250 feet from the centerline of the pad, it then rises vertically to an elevation of 150 feet above the established elevation of the landing surface.

b. IFR Facilities. The slope ratio is 4:1 and rises to the horizontal surface. At the intersection of the horizontal surface and the approach departure surface, it continues adjacent to the approach-departure clearance surface for the entire length, at which point an elevation of 375 feet above the approach-departure clearance surface is reached.

4. Approach-Departure Clearance Surface. An inclined plane which flares outward and upward above the runway or helipad longitudinal centerline extended. It starts at the end of the primary surface with the same width as the primary surface at the established elevation of the landing surface. The area under this surface is referred to as the approach - departure zone.

Type Facility	Width at Start	Width at End	Length	Slope
VFR Helipad	150 FT	500 FT	1,200 FT	8:1 (Note 1)
VFR Runway	300 FT	600 FT	1,200 FT	8:1 (Note 1)
IFR Helipad and Runway	750 FT	8,000 FT	24,225 FT	25:1

Note 1. When VFR helicopter facilities are located such that they do not fall under the horizontal surface of a fixed wing runway or IFR helicopter landing area, the approach departure surface shall be continued on an 8:1 slope until the minimum in route altitude is reached. The width for the extension of the surface shall be 500 feet for helipads and 600 feet for runways.

D. TAKE OFF SAFETY ZONE. A take off safety zone is required under the first 400 feet of VFR approach departure clearance surfaces and has the same width as the approach-departure clearance surface. The take off safety zone shall be free of obstructions, rough graded and turfed where practicable. Take off safety zones are not required at IFR facilities due to the extensive primary surface provided for these facilities. An 800 foot long take-off safety zone is provided at Marine Corps Helicopter Training Outlying fields, see Figure III-6.

E. LATERAL CLEARANCES. In order to insure the safe operation of helicopters on the ground, there are lateral clearances established for many airfield pavements. For example, no structures shall be sited within 100 feet of the edge of a fixed wing aircraft parking apron. The lateral clearances are listed in NAVFAC P-80 under the category code for the pavement to which they apply.

F. OTHER CONSIDERATIONS.

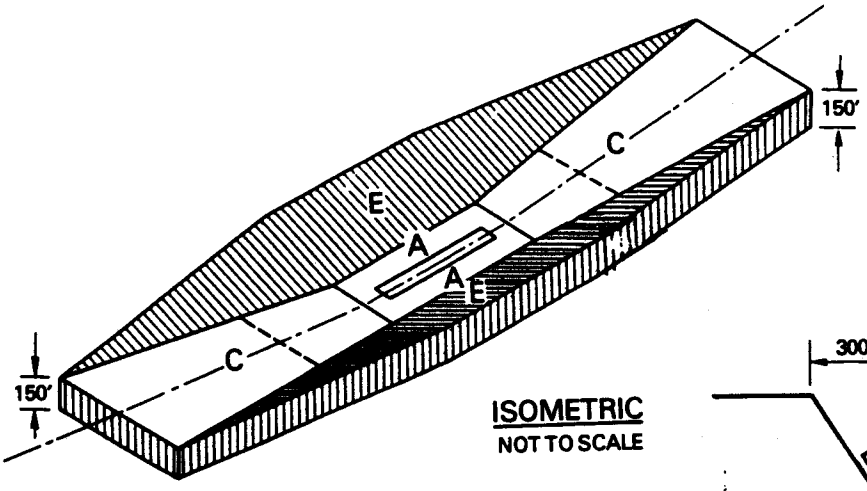
1. Air Installations Compatiable Use Zones (AICUZ) Program. The AICUZ concept embodies a method of defining, quantifying and mapping aircraft noise, potential aircraft accident areas and existing or potential incompatible land uses, both on and off an air installation. AICUZ guidelines are specified in OPNAVINST 11010.36 and apply to helicopter as well as fixed wing aircraft installations.

2. Airfield Explosives Prohibited Areas. The Naval Sea Systems Command has established criteria with respect handling and storing ammunition and explosives which are published in NAVSEA OP-5, Volume 1, Ammunition and Explosives Ashore. This publication addresses areas near runways and helipads and under flight paths where ammunition and explosives are prohibited and should be used for ordnance safety criteria.

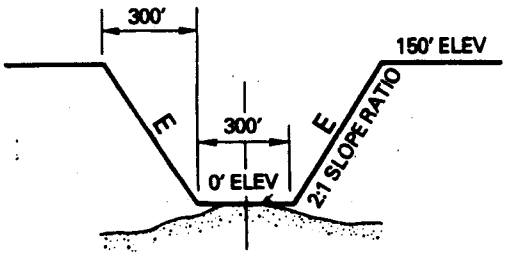
G. DRAWINGS. The following figures are provided to illustrate the imaginary surfaces, typical helicopter facility layout and take off safety zones.

	Figure	Title
	III-1	VFR HELICOPTER RUNWAY-AIRSPACE
	III-2	VFR HELIPAD-AIRSPACE
	III-3	IFR HELIPAD/RUNWAY-AIRSPACE (ISOMETRIC)
	III-4	IFR HELIPAD/RUNWAY-AIRSPACE (PLAN & SECTION)
	III-5	IFR HELIPAD/RUNWAY-PRIMARY SURFACE
	III-6	MARINE CORPS HELICOPTER OUTLYING FIELD (VFR)
Note (1)	III-7	HELICOPTER LANDING LANES-TYPICAL LAYOUT

Note (1): Figure III-7 is included to show the spacing between multiple VFR touchdown points on a single runway and the separation between parallel VFR runways. The heliport configuration shown is for a typical Army staging field and should not be used for planning Navy/Marine Corps installations without the prior approval of the Naval Air Systems Command



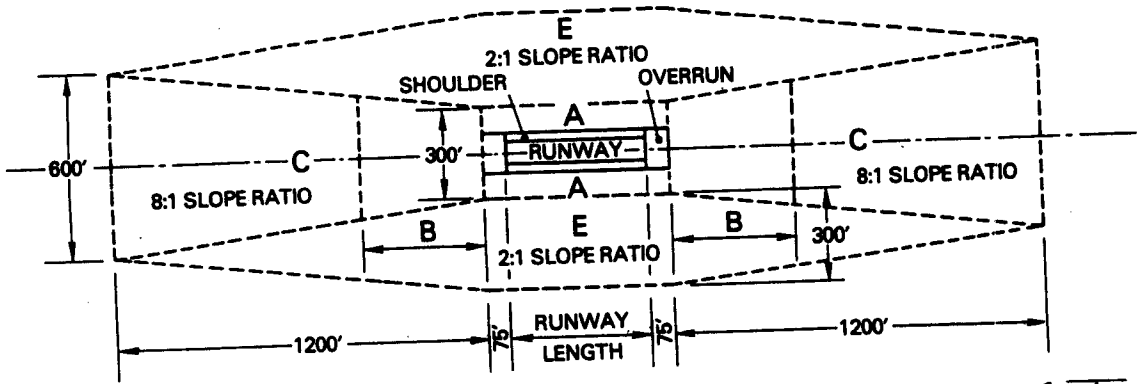
ISOMETRIC
NOT TO SCALE



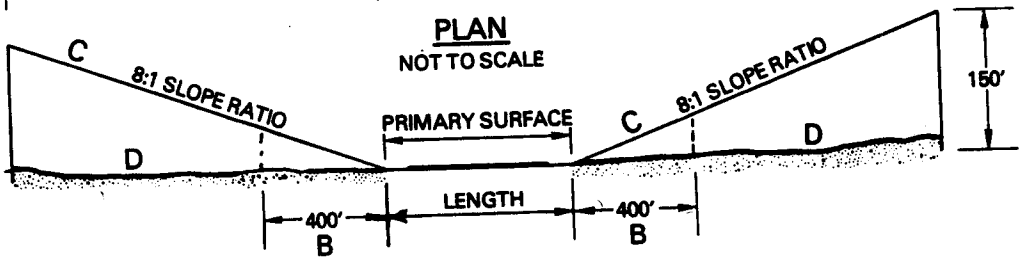
TRANSVERSE SECTION
NOT TO SCALE

LEGEND

A PRIMARY SURFACE
B TAKEOFF SAFETY ZONE
C APPROACH-DEPARTURE CLEARANCE SURFACE (8:1 SLOPE RATIO)
D APPROACH-DEPARTURE ZONE
E TRANSITIONAL SURFACE (2:1 SLOPE RATIO)



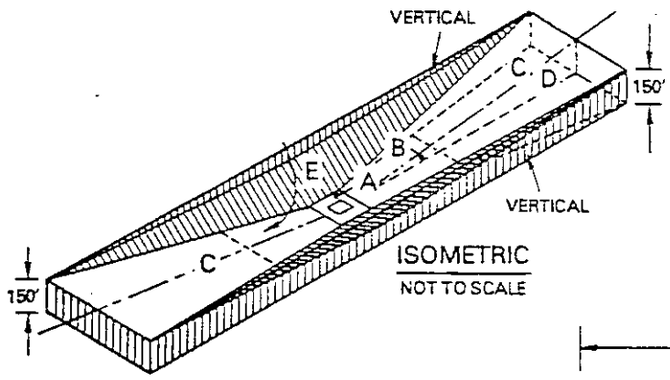
PLAN
NOT TO SCALE

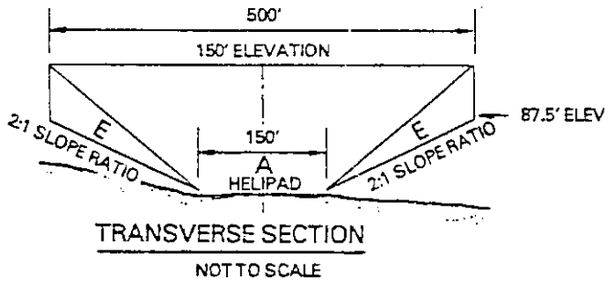


LONGITUDINAL PROFILE
NOT TO SCALE

FIGURE III-1

VFR HELICOPTER RUNWAY - AIRSPACE





LEGEND

- A PRIMARY SURFACE
- B TAKEOFF SAFETY ZONE
- C APPROACH-DEPARTURE CLEARANCE SURFACE (8:1 SLOPE RATIO)
- D APPROACH-DEPARTURE ZONE
- E TRANSITIONAL SURFACE (2:1 SLOPE RATIO)

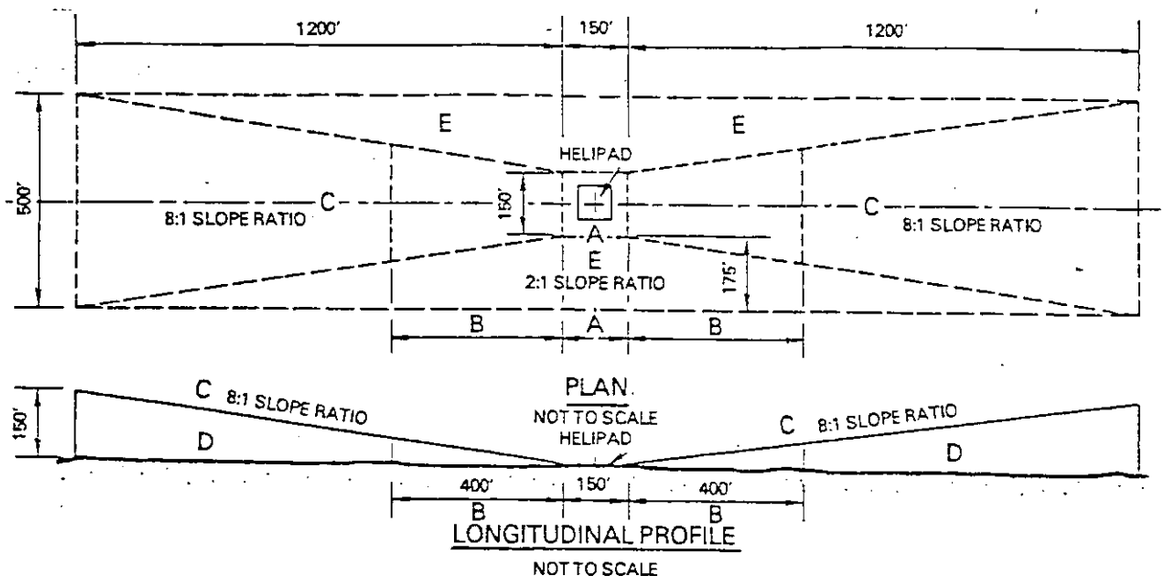


FIGURE III-2

VFR HELIPAD - AIRSPACE

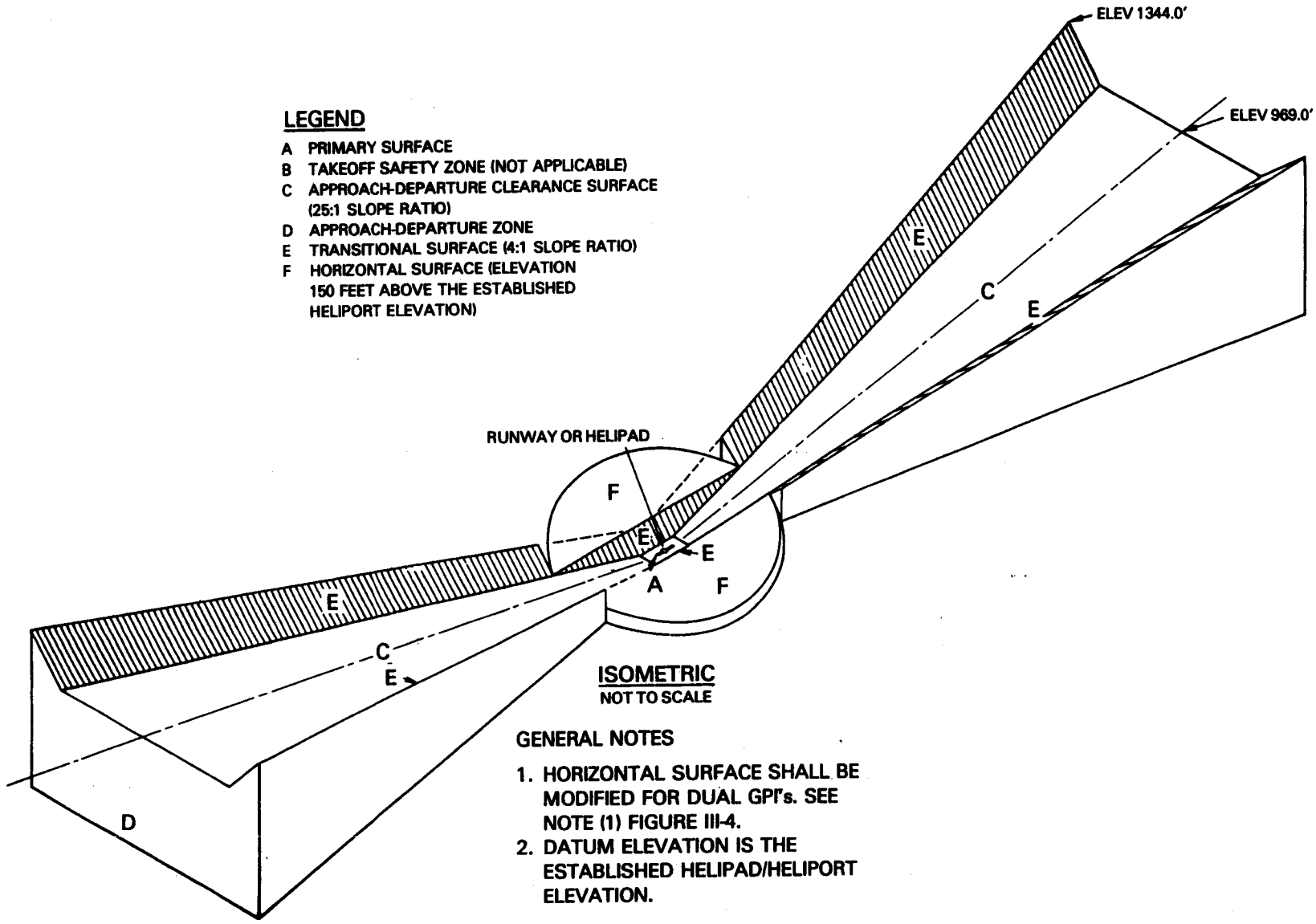
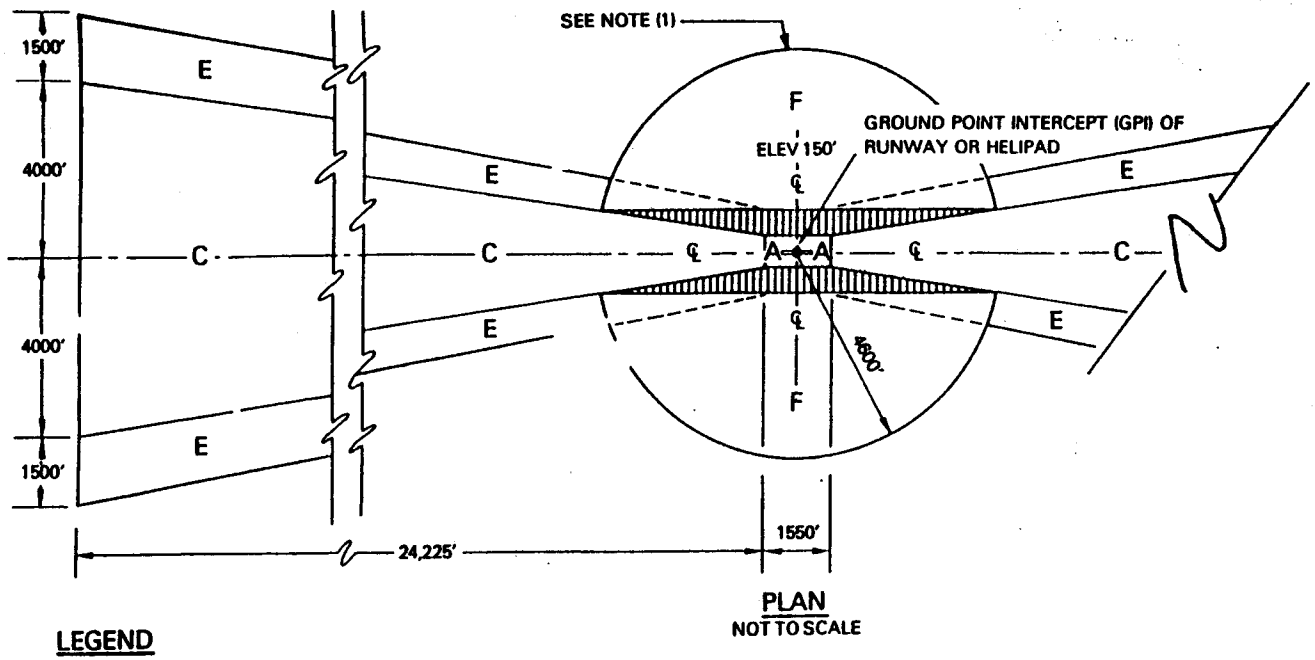


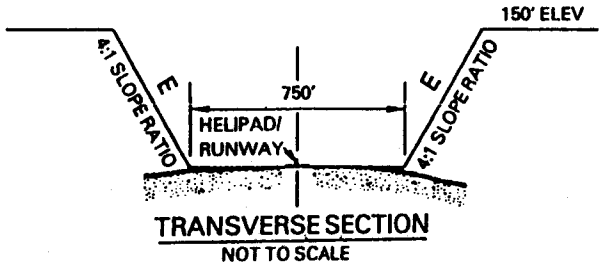
FIGURE III-3
IFR HELIPAD/RUNWAY AIRSPACE (ISOMETRIC)



PLAN
NOT TO SCALE

LEGEND

- A PRIMARY SURFACE
- B TAKEOFF SAFETY ZONE (NOT APPLICABLE)
- C APPROACH-DEPARTURE CLEARANCE (25:1 SLOPE RATIO)
- D APPROACH-DEPARTURE ZONE
- E TRANSITIONAL SURFACE (4:1 SLOPE RATIO)
- F HORIZONTAL SURFACE (150' ELEVATION)



TRANSVERSE SECTION
NOT TO SCALE

NOTE (1) CIRCULAR HORIZONTAL SURFACE APPLIES TO SINGLE GPI. FOR RUNWAY WITH TWO GPI's, SWING 4600 FOOT RADIUS ARCS ABOUT EACH GPI AND CONNECT WITH TANGENTS

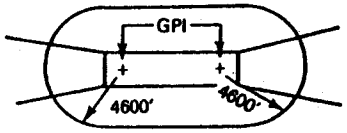
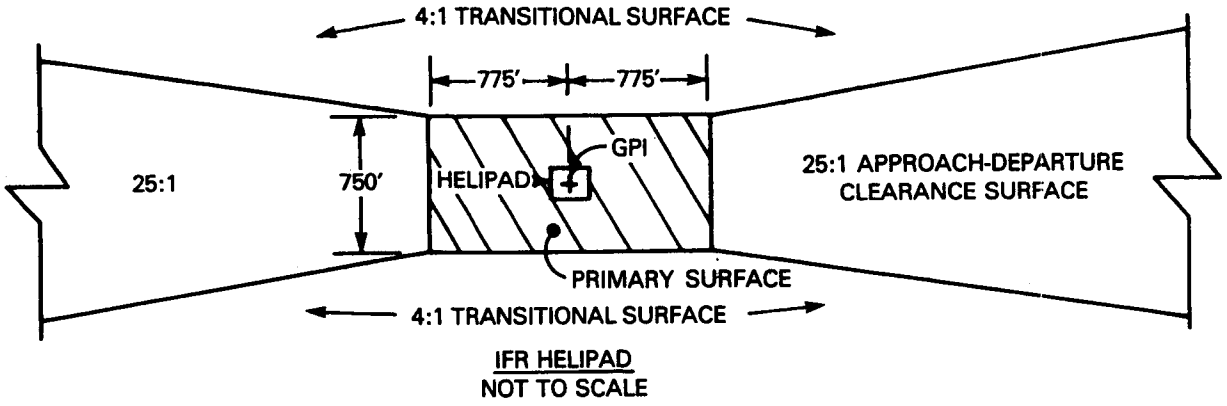
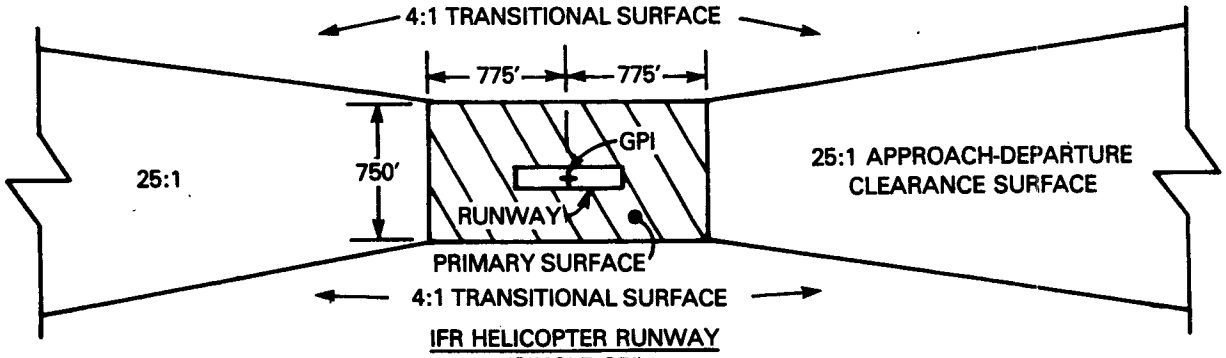


FIGURE III-4

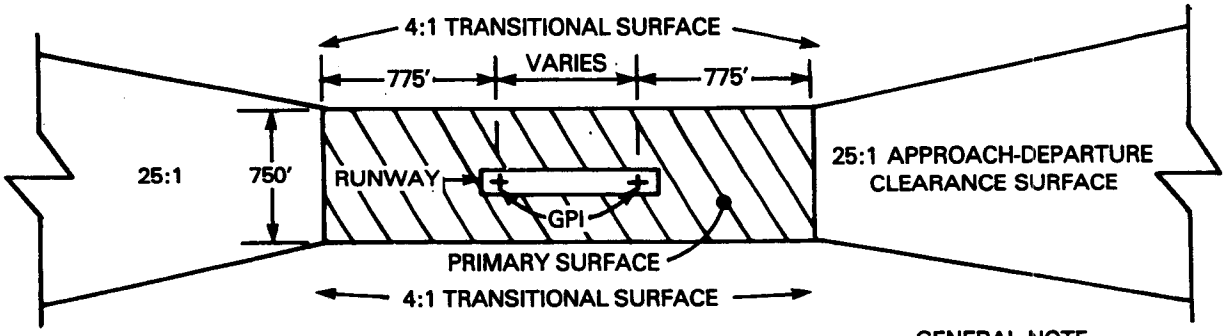
IFR HELIPAD/RUNWAY-AIRSPACE (PLAN & SECTION



IFR HELIPAD
NOT TO SCALE



IFR HELICOPTER RUNWAY
(SINGLE GPI)
NOT TO SCALE



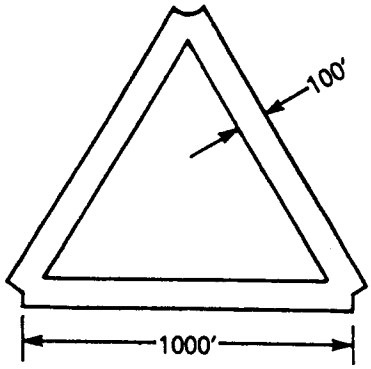
IFR HELICOPTER RUNWAY
(DUAL GPI'S)
NOT TO SCALE

GENERAL NOTE

— GPI is the ground point intercept. See Section III, paragraph C for definition.

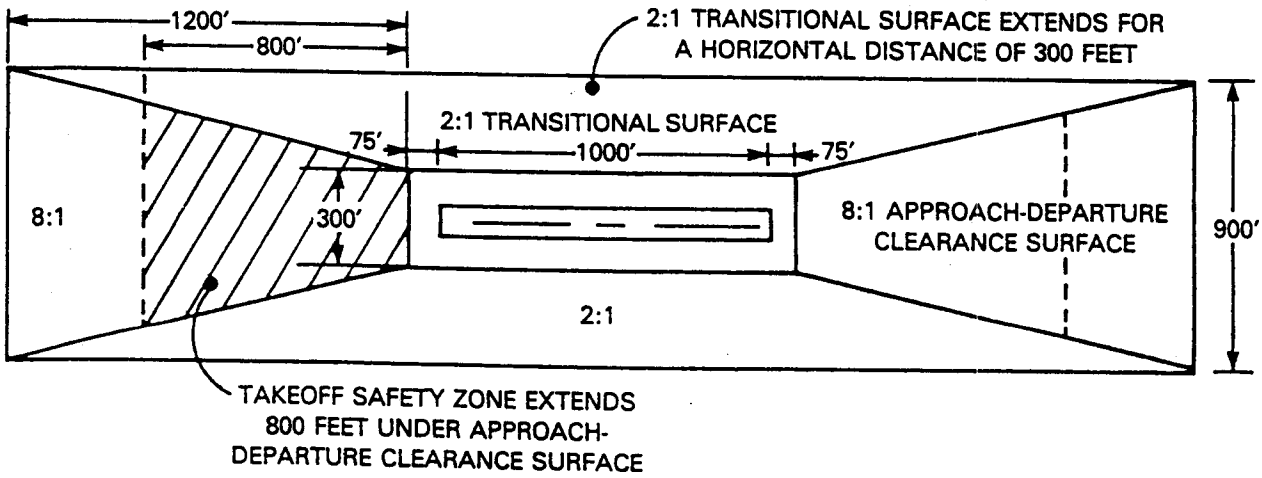
FIGURE III-5

IFR HELIPAD/RUNWAY-PRIMARY SURFACE



1. THREE 1000 FOOT LONG RUNWAYS ARRANGED IN EQUILATERAL TRIANGLE
2. AIRSPACE SHOWN BELOW SHOULD BE APPLIED TO EACH RUNWAY

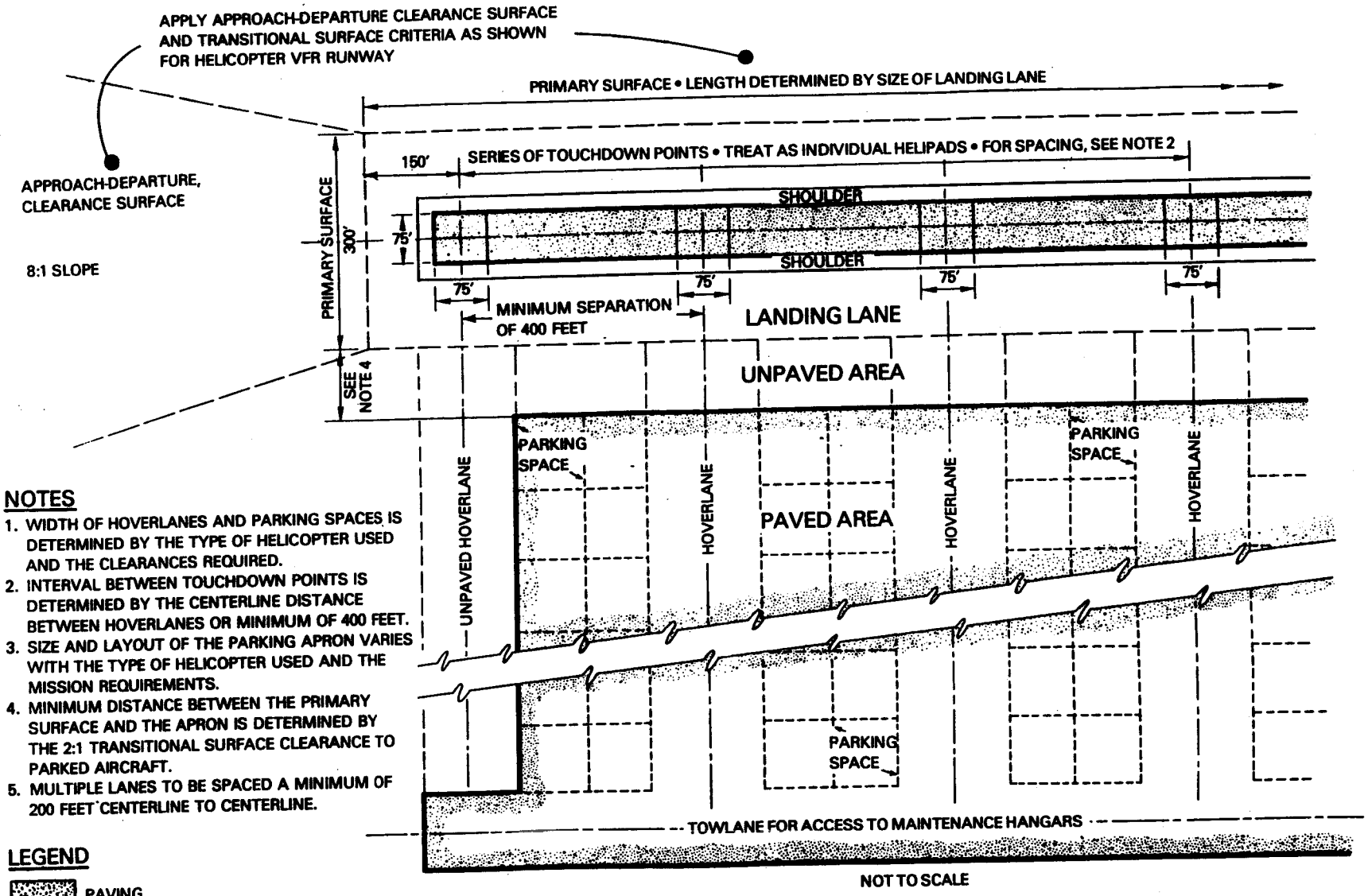
PLAN – SCHEMATIC
NOT TO SCALE



TYPICAL AIRSPACE/IMAGINARY SURFACES
PLAN – NOT TO SCALE

FIGURE III-6

MARINE CORPS HELICOPTER OUTLYING FIELD
(VFR)



NOTES

1. WIDTH OF HOVERLANES AND PARKING SPACES IS DETERMINED BY THE TYPE OF HELICOPTER USED AND THE CLEARANCES REQUIRED.
2. INTERVAL BETWEEN TOUCHDOWN POINTS IS DETERMINED BY THE CENTERLINE DISTANCE BETWEEN HOVERLANES OR MINIMUM OF 400 FEET.
3. SIZE AND LAYOUT OF THE PARKING APRON VARIES WITH THE TYPE OF HELICOPTER USED AND THE MISSION REQUIREMENTS.
4. MINIMUM DISTANCE BETWEEN THE PRIMARY SURFACE AND THE APRON IS DETERMINED BY THE 2:1 TRANSITIONAL SURFACE CLEARANCE TO PARKED AIRCRAFT.
5. MULTIPLE LANES TO BE SPACED A MINIMUM OF 200 FEET CENTERLINE TO CENTERLINE.

LEGEND

PAVING

FIGURE III-7

HELICOPTER LANDING LANES - TYPICAL LAYOUT

SECTION IV - LAND REQUIREMENTS

Land acquisition guidance for Navy and Marine Corps air installations is given in OPNAVINST 11010.36, Air Installations Compatible Land Use Zones (AICUZ) Program. The AICUZ land acquisition policies address the area beyond runways under flight paths. No policy is provided for the primary surface and laterally adjacent areas, which fall under the transitional surfaces. Land requirements in these areas are usually dictated by the requirement to site supporting facilities such as aprons, hangars, station buildings, etc. However as a minimum, the area within the primary surface and laterally out from the primary surface until the transitional surface is 50 feet above the ground should be controlled by fee purchase or restrictive easement. Fee purchase is preferred for the primary surface area.

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