FAA No. 405
STANDARDS FOR AERONAUTICAL SURVEYS AND RELATED PRODUCTS
FOURTH EDITION

EXPLANATION OF CHANGES
CHANGE 1
EFFECTIVE APRIL 15, 1998

PURPOSE: To implement approved changes to FAA No. 405.

DISTRIBUTION: Normal distribution for this document.

CHANGED PAGES:

New Page(s)	Replaces	Old Page(s)
2.14		2.14
TABLE 3.3		TABLE 3.3
3.9		3.9
FIGURE 3.5		FIGURE 3.5
FIGURE 3.6		FIGURE 3.6
A2.1		A2.1
FIGURE A2.1		FIGURE A2.1
A5.6		A5.2
A5.8		A5.8
G11		G11

SUMMARY OF CHANGES:

Page 2.14

Changes the decimal places reported for the latitude and longitude of runway ends and displaced thresholds from three decimal places in seconds to four decimal places in seconds. Four decimal places are required when computing geodetic azimuths to match published azimuths.

Changes the decimal places reported for the latitude and longitude of the Airport Reference Point from three decimal places in seconds to one decimal place in seconds. ARP is a theoretical point and reporting ARP to more than 0.1 second is not significant.

TABLE 3.3

Changes the elevation at 2,566 ft. to read: “51.3 FT. ABOVE THRESHOLD.”

Changes the elevation at 50,000 ft. to read: ”1,446.4 FT. ABOVE THRESHOLD.”

Page 3.9

Deletes the requirement for the highest obstruction between the threshold at the runway stop end and the stop end of the primary surface. Obstructions in this area are covered by other survey requirements.

Deletes the requirement for the highest man-made object that is within the first 2,566 feet of an approach area and also higher than the threshold. This object frequently does not obstruct the approach surface. This change eliminates the expensive requirement to survey fence posts, guard rails, sheds, and other insignificant man-made objects that are often embedded in much higher obstructions. These objects are frequently difficult for surveyors to measure and the process of determining the highest among them can be very time consuming.

FIGURE 3.5

Makes FIGURE 3.5 consistent with text changes.

FIGURE 3.6

Makes FIGURE 3.6 consistent with text changes.

Page A2.1

Changes “RUNWAY CENTER POINT” in description of the Airport Reference Point (ARP) computation to “ APPROXIMATE RUNWAY CENTER POINT” and defines approximate runway center point as the mean of the latitudes and mean of the longitudes of the ends. This change eliminates the need to use complex geodetic formulas to determine the precise runway center point position for the ARP computation. By using the mean method, ARP positions can be easily computed using only a four function, handheld calculator, allowing simple and consistent ARP computations.

For airports below 70 degrees latitude, the difference in the ARP position as computed by the “precise” or “mean” method is less than 0.02 seconds in latitude and no difference in longitude.

FIGURE A2.1

Makes FIGURE A2.1 consistent with text changes.

Page A5.6

Changes vertical accuracy requirements (orthometric and ellipsoidal) for Airport Obstruction Chart surveys from 20 feet to 50 feet for the areas indicated in the table on this page.

Page A5.8

Changes vertical accuracy requirements (orthometric and ellipsoidal) for Area Navigation Approach (ANA) obstruction surveys from 20 feet to 50 feet for the areas indicated in the table on this page.

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- Object Numbering Scheme

  All profiled objects shall be numbered consecutively from left to right in the Profile with matching numbers for the corresponding objects in the Plan.

A north arrow shall be placed between each Plan and Profile.

When there is insufficient room to print the RPP on the AOC front, the RPP shall be printed on the AOC back. In these cases, a runway layout diagram, at the scale of the AP, showing runway numbers and a north arrow shall be included on the chart back.

10.1.5. TABULATED OPERATIONAL DATA (TOD)

TOD content, portrayal, and general format conform to the chart sample (OC 000) presented in Appendix 7. The following items further define or clarify certain TOD requirements.

TOD shall include:

- Airport Location Point (ALP)

  Latitude and longitude listed in degrees and whole minutes.

- Airport Reference Point (ARP)

  Latitude and longitude listed in degrees, minutes, and one decimal place in seconds.

- A Runway Data Table (RDT) depicting the following information for each usable runway:

  Runway number

  Latitude and longitude of the approach end listed in degrees, minutes, and four decimal places in seconds.

  Touchdown Zone Elevation (TDZE) listed to one decimal place in feet. This requirement applies only to runways with specially prepared hard surfaces equal to, or greater than, 3,000 feet in length.

  Geodetic azimuth from approach end to stop end, listed to whole seconds. The geodetic azimuth shall be reckoned from north.

  Runways with a displaced threshold shall be listed twice, once with the runway physical end coordinates listed and a second time with the displaced threshold coordinates listed , all carried to four decimal places in seconds. The runway azimuth shall be carried only with the physical end listing. The TDZE shall be carried only with the displaced threshold listing.

10.1.6. NOTES AND LEGENDS (NL)

NL content, portrayal, and general format shall conform to the chart sample (OC 000) presented in Appendix 7. The following items further define or clarify certain notes and legend requirements.

The following information shall be included in the notes and legend of the AOC:

- Horizontal datum shown in title box

- Vertical datum shown in title box

- Map projection shown in title box

- Airport elevation shown to one decimal place in feet in the upper left corner of the chart, inside of the margin

- Legend of chart symbols

- Graphic horizontal scales shown in feet, meters, nautical miles, and statute miles at the bottom center of chart, outside of the margin.

- Graphic vertical scale shown at lower right corner of chart inside of the margin.

TABLE 3.3

APPROACH SURFACE
PRECISION AREA NAVIGATION APPROACH

BEGINS	200 FT. ON APPROACH SIDE OF THRESHOLD (AT END OF PRIMARY SURFACE)
LENGTH	50,000 FT.
BEGINNING WIDTH	800 FT.
WIDTH AT 50,000 FT.	4,400 FT.
SLOPE	50:1 FOR FIRST 2,566 FT. THEN 34:1 TO END OF APPROACH SURFACE
ELEVATION AT BEGINNING	ELEVATION OF THRESHOLD
ELEVATION AT 2,566 FT.	51.3 FT. ABOVE THRESHOLD
ELEVATION AT 50,000 FT.	1,446.4 FT. ABOVE THRESHOLD

THE APPROACH SURFACE IS CENTERED ON THE RUNWAY CENTERLINE/CENTERLINE EXTENDED.

times and that further investigation by the data user regarding maximum vessel height, travel limits, and frequency of passage is advised. This exemption does not apply to vessels that are permanently moored.

- Parked aircraft. The location and maximum elevation of individual parked aircraft cannot be determined and shall not be provided under ANA surveys. This exemption does not apply to aircraft that are permanently parked for display purposes.

6.4. SELECTION

Obstruction selection shall include a representation of objects that penetrated ANA OIS's at the time of the field survey. In addition, certain nonobstructing objects may be required in the first 2,566 feet of the approach area. The special cases that apply to obstructions (see Subsection 6.3) also apply to these required nonobstructing objects.

Required objects/obstructions include:

- Primary Surface (See Figure 3.5)

The highest obstruction on the approach side of the threshold.

In addition, for Category II and Category III approaches, the highest obstruction on each side of the runway centerline and between thresholds shall be determined. This requirement is in effect only when the approach has been specifically identified as a Category II or Category III by appropriate FAA authorities.

- Precision Approach Surfaces (See Figure 3.6 and Fig. 3.7)

The two most penetrating obstructions and the most penetrating man-made obstruction in the first 2,566 feet of an approach area.

The two highest objects that are within the first 2,566 feet of an approach area and also higher than the threshold. These objects may or may not penetrate the approach surface and may be nonobstructing EME points.

The highest obstruction between 2,566 feet and 10,000 feet of an approach area. This area is the first 7,434 feet of the 34:1 slope area.

The highest obstruction in the first 20,000 feet, in the first 30,000 feet, and in the first 40,000 feet of an approach area.

The highest obstruction in the approach area.

- Nonprecision Approach Surface (See Figure 3.4)

TO BE DEVELOPED

- Transition Surfaces (See Figure 3.8)

The two highest obstruction in the first 2,566 feet (as measured along the runway centerline or centerline extended) of each transition area.

The highest obstruction in the first 10,000 feet, in the first 20,000 feet, in the first 30,000 feet, and in the first 40,000 feet of the each transition area.

The highest obstruction in each transition area.

- Missed Approach Surface (See Figure 3.9)

The highest obstruction and the most penetrating obstruction on each side of the runway centerline or centerline extended.

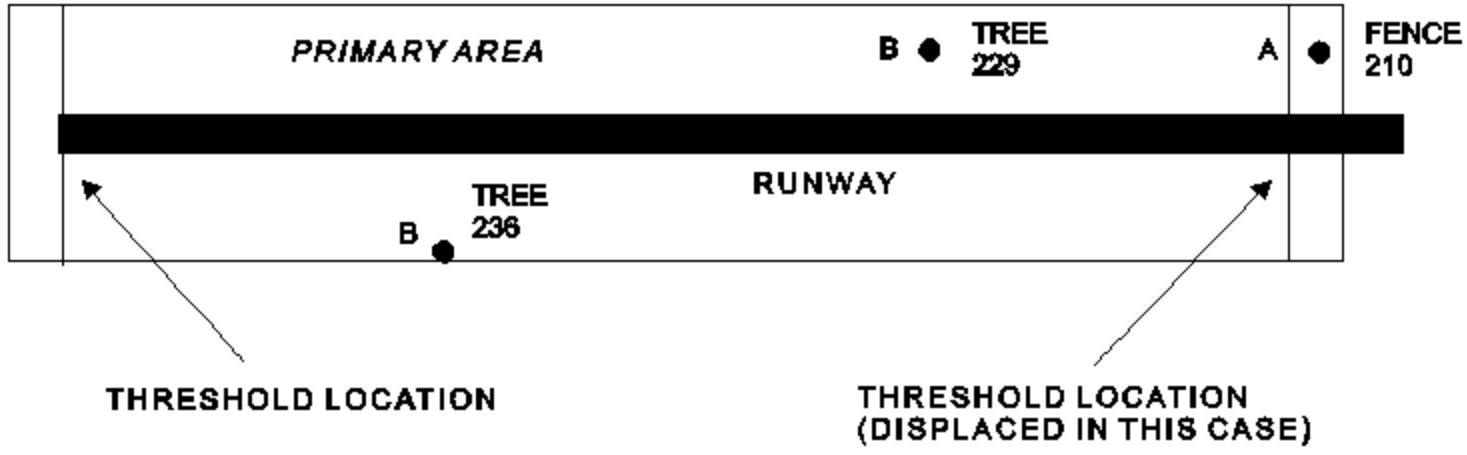
Note: obstructions may be EME points for obstructing mobile object areas. (See Figure 3.10)

OBSTRUCTION REPRESENTATION IN THE PRIMARY AREA SHALL INCLUDE THE:

A HIGHEST OBSTRUCTION ON THE APPROACH SIDE OF THE THRESHOLD

B HIGHEST OBSTRUCTION ON EACH SIDE OF THE RUNWAY CENTERLINE AND BETWEEN THRESHOLDS. THIS REPRESENTATION IS REQUIRED ONLY FOR CATEGORY II AND III APPROACHES.

SEE TEXT WHEN OBJECT/OBSTRUCTION CONGESTION OCCURS



THIS FIGURE EXPLAINS OR CLARIFIES CERTAIN DATA REQUIREMENTS - SEE TEXT FOR COMPLETE STANDARDS

NOT TO SCALE

FIGURE 3.5

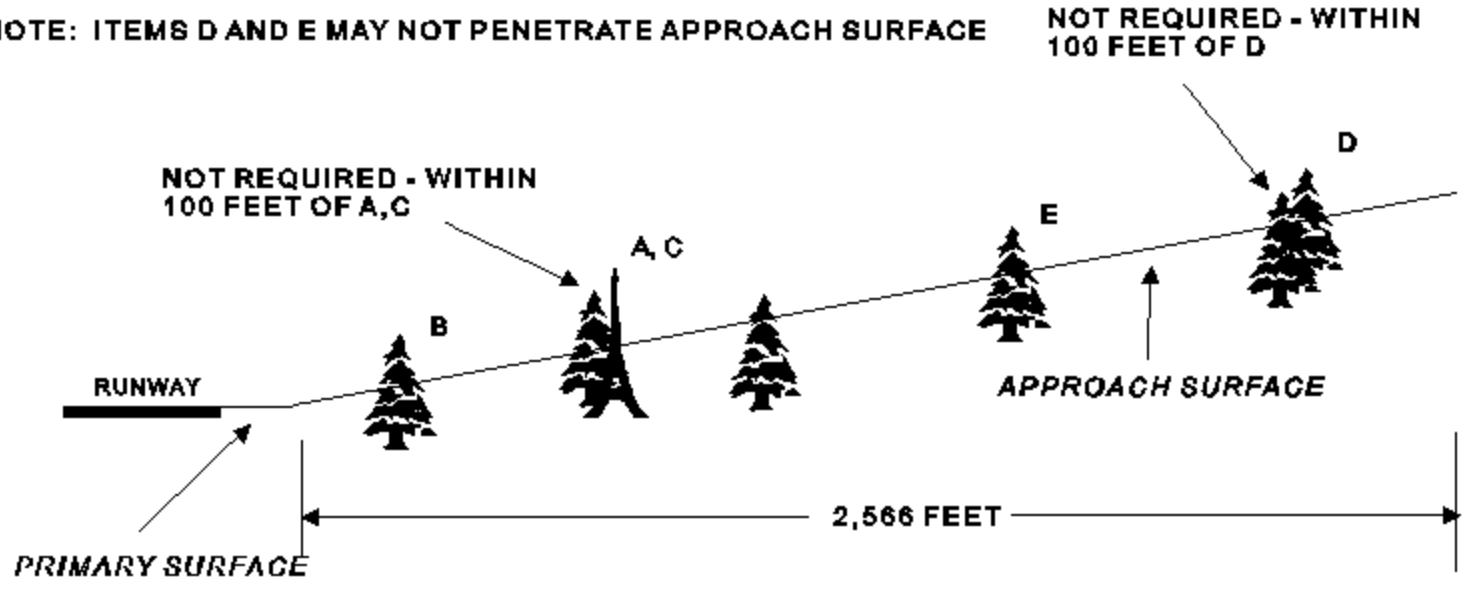
OBSTRUCTION REPRESENTATION IN THE PRIMARY AREA

OBJECT REPRESENTATION IN THE FIRST 2,566 FEET OF A PRECISION APPROACH AREA SHALL INCLUDE THE:

A MOST PENETRATING OBSTRUCTION
B SECOND MOST PENETRATING OBSTRUCTION
C MOST PENETRATING MAN-MADE OBSTRUCTION
D HIGHEST OBJECT ABOVE THE THRESHOLD
E SECOND HIGHEST OBJECT ABOVE THE THRESHOLD

NOTE: ITEMS D AND E MAY NOT PENETRATE APPROACH SURFACE

SEE TEXT WHEN OBJECT/OBSTRUCTION CONGESTION OCCURS



THIS FIGURE EXPLAINS OR CLARIFIES CERTAIN DATA REQUIREMENTS - SEE TEXT FOR COMPLETE STANDARDS

NOT TO SCALE

FIGURE 3.6

OBJECT REPRESENTATION IN FIRST 2,566 FEET OF A PRECISION APPROACH AREA

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APPENDIX 2: AIRPORT REFERENCE POINT COMPUTATION

The Airport Reference Point (ARP) is the approximate geometric center of all usable runways. The ARP position computation is somewhat similar to a center of mass computation, except that only two dimensions are considered.

The datums used in the computations are normally selected as the lowest absolute value latitude and longitude coordinates, respectively, of all runway ends used in the computation. This convention eliminates computing with negative moments.

ARP_{LAT} = LATITUDE DATUM + (SUM OF RUNWAY MOMENTS ABOUT THE LATITUDE DATUM/SUM OF RUNWAY LENGTHS)

ARP_{LON} = LONGITUDE DATUM + (SUM OF RUNWAY MOMENTS ABOUT THE LONGITUDE DATUM/SUM OF RUNWAY LENGTHS)

RUNWAY MOMENT ABOUT THE LATITUDE DATUM = RUNWAY GROUND LENGTH TIMES THE DISTANCE IN SECONDS BETWEEN THE APPROXIMATE RUNWAY CENTER POINT* AND THE LATITUDE DATUM

RUNWAY MOMENT ABOUT THE LONGITUDE DATUM = RUNWAY GROUND LENGTH TIMES THE DISTANCE IN SECONDS BETWEEN THE APPROXIMATE RUNWAY CENTER POINT* AND THE LONGITUDE DATUM

RUNWAY COORDINATES MUST BE ENTERED AS ABSOLUTE VALUES.

RUNWAY LENGTHS MUST BE ENTERED AS GROUND LENGTH, ROUNDED TO THE NEAREST WHOLE FOOT.

* THE APPROXIMATE RUNWAY CENTER POINT IS THE MEAN OF THE LATITUDES AND LONGITUDES OF A RUNWAY'S ENDS. THIS CONVENTION ELIMINATES THE NEED FOR COMPLEX GEODETIC FORMULAS TO COMPUTE THE PRECISE RUNWAY CENTER POINT, THUS ALLOWING SIMPLE AND CONSISTENT ARP COMPUTATIONS AFTER ONLY BRIEF INSTRUCTIONS.

A SAMPLE ARP COMPUTATION FOLLOWS (SEE FIGURE A2.1):

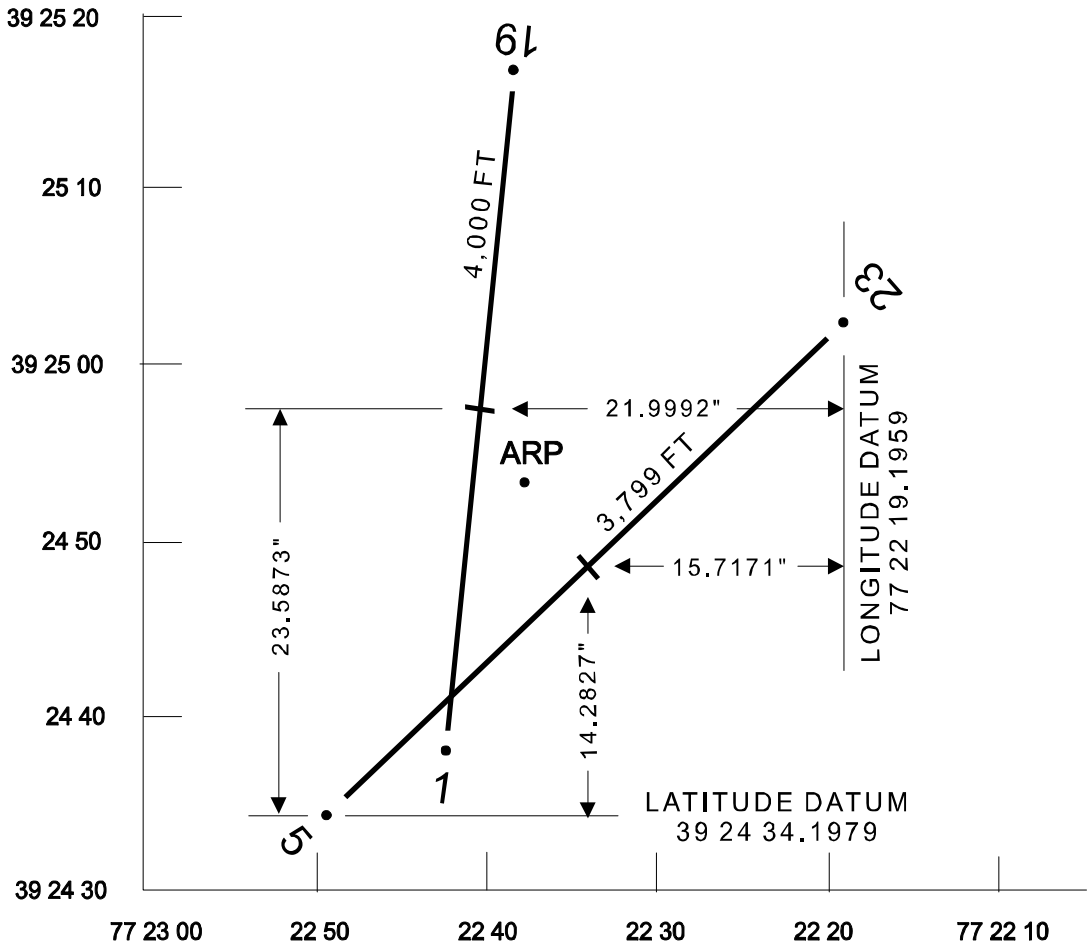
APPROXIMATE RUNWAY CENTER PTS:

RWY 1/19 LAT = 39 24 57.7852
LON = 77 22 41.1951
RWY 5/23 LAT = 39 24 48.4806
LON = 77 22 34.9130

ARP_{LAT} = 39 24 34.1979 + (4,000 FT(23.5873 SEC) + 3,799 FT(14.2827 SEC))/7,799 FT
= 39 24 34.1979 + 19.0549 SEC
= 39 24 53.3

ARP_{LON} = 77 22 19.1959 + (4,000 FT(21.9992 SEC) + 3,799 FT(15.7171 SEC))/7,799 FT
= 77 22 19.1959 + 18.9391 SEC
= 77 22 38.1

RUNWAY END	LATITUDE	LONGITUDE	GROUND* LENGTH
1	39 24 38.0871	077 22 43.3322	4,000 FT
19	39 25 17.4832	077 22 39.0579	
5	39 24 34.1979	077 22 50.6301	3,799 FT
23	39 25 02.7632	077 22 19.1959	



* USE GROUND, NOT GEODETIC, RUNWAY LENGTH ROUNDED TO THE NEAREST WHOLE FOOT

THIS FIGURE EXPLAINS OR CLARIFIES CERTAIN DATA REQUIREMENTS - SEE TEXT FOR COMPLETE STANDARDS

NOT TO SCALE

FIGURE A2.1

AIRPORT REFERENCE POINT COMPUTATION

2.6. OBSTRUCTIONS

AIRPORT OBSTRUCTION CHART SURVEYS

ITEM (VALUES ARE IN FEET)	HORZ	VERTICAL ORTHO	VERTICAL ELLIP	VERTICAL AGL
NON MAN-MADE OBJECTS, AND MAN-MADE OBJECTS LESS THAN 200 FT. AGL, THAT PENETRATE THE FOLLOWING OBSTRUCTION IDENTIFICATION SURFACE:				
- A PRIMARY SURFACE	20.00	3.00	3.00	N/A
- THOSE AREAS OF AN APPROACH SURFACE WITHIN 10,200 FEET OF THE RUNWAY END	20.00	3.00	3.00	N/A
- THOSE AREAS OF A PRIMARY TRANSITION SURFACE WITHIN 500 FEET OF THE PRIMARY SURFACE	20.00	3.00	3.00	N/A
- THOSE AREAS OF AN APPROACH TRANSITION SURFACE THAT ARE WITHIN 500 FEET OF THE APPROACH SURFACE AND ALSO WITHIN 2,766 FEET OF THE RUNWAY END	20.00	3.00	3.00	N/A
- THOSE AREAS OF A PRIMARY TRANSITION SURFACE FURTHER THAN 500 FEET FROM THE PRIMARY SURFACE	50.00	20.00	20.00	N/A
- THOSE AREAS OF AN APPROACH TRANSITION SURFACE FURTHER THAN 500 FEET FROM AN APPROACH SURFACE AND ALSO WITHIN 10,200 FEET OF THE RUNWAY END	50.00	20.00	20.00	N/A
- THE HORIZONTAL SURFACE	50.00	20.00	20.00	N/A
- THOSE AREAS OF AN APPROACH SURFACE FURTHER THAN 10,200 FEET FROM THE RUNWAY END	100.00	50.00	50.00	N/A
- THOSE AREAS OF AN APPROACH TRANSITION SURFACE FURTHER THAN 10,200 FEET FROM THE RUNWAY END	100.00	50.00	50.00	N/A
- THE CONICAL SURFACE	100.00	50.00	50.00	N/A

2.6. OBSTRUCTIONS CONT.

AREA NAVIGATION APPROACH (CONVENTIONAL LANDING) SURVEYS

ITEM (VALUES ARE IN FEET)	HORZ	VERTICAL ORTHO	VERTICAL ELLIP	VERTICAL AGL
NON MAN-MADE OBJECTS, AND MAN-MADE OBJECTS LESS THAN 200 FEET AGL, THAT PENETRATE THE FOLLOWING OBSTRUCTION IDENTIFICATION SURFACES:				
- THE PRIMARY SURFACE	20.00	3.00	3.00	N/A
- THOSE AREAS OF THE APPROACH SURFACE WITHIN 10,200 FEET OF THE THRESHOLD	20.00	3.00	3.00	N/A
- THOSE AREAS OF AN APPROACH TRANSITION SURFACE WITHIN 2,766 FEET OF THE THRESHOLD (AREA T1)	20.00	3.00	3.00	N/A
- THOSE AREAS OF THE APPROACH TRANSITION SURFACE FURTHER THAN 2,766 FEET FROM THE THRESHOLD BUT NOT MORE THAT 10,200 FEET FROM THE THRESHOLD	50.00	20.00	20.00	N/A
- THE MISSED APPROACH SURFACE	50.00	20.00	20.00	N/A
- THOSE AREAS OF THE APPROACH SURFACE FURTHER THAN 10,200 FEET FROM THE THRESHOLD	100.00	50.00	50.00	N/A
- THOSE AREAS OF THE APPROACH TRANSITION SURFACE FURTHER THAN 10,200 FEET FROM THE THRESHOLD	100.00	50.00	50.00	N/A
MAN-MADE OBJECTS EQUAL TO OR GREATER THAN 200 FEET AGL THAT PENETRATE THE FOLLOWING OBSTRUCTION IDENTIFICATION SURFACES:				
- THE PRIMARY SURFACE, THOSE AREAS OF THE APPROACH AND TRANSITION SURFACES WITHIN 10,200 FEET OF THE THRESHOLD	20.00	3.00	3.00	10.00
- THE MISSED APPROACH SURFACE	20.00	3.00	3.00	10.00

Remote Communications Outlet (RCO) - An unmanned communications facility remotely controlled by air traffic personnel. RCO's serve flight service stations. Remote Transmitter/Receivers (RTR) serve terminal ATC facilities.

Remote Transmitter/Receiver (RTR) - See Remote Communications Outlet.

Runway - A defined rectangular area on a land airport prepared for the landing and takeoff run of aircraft along its length. Runways are normally numbered in relation to their magnetic direction rounded off to the nearest 10 degrees: e.g., Runway10, Runway 25.

Runway Length - The straight line distance between runway end points. This line does not account for surface undulations between points. Official runway lengths are normally computed from runway end coordinates and elevations.