U.S. Department of Transportation
Federal Aviation Administration

FAA No. 405

STANDARDS FOR AERONAUTICAL SURVEYS AND RELATED PRODUCTS

Fourth Edition-September 1996

Aeronautical Information Services (ATA-130)

FAA NO. 405

STANDARDS FOR AERONAUTICAL SURVEYS AND RELATED PRODUCTS

FOURTH EDITION
SEPTEMBER 1996

FAA No. 405

United States Government
STANDARDS FOR AERONAUTICAL SURVEYS
AND RELATED PRODUCTS
Fourth Edition, September 1996

The standards contained in this manual have been developed by the Federal Aviation Administration (FAA) and the National geodetic survey (NGS) for use in the preparation of AERONAUTICAL SURVEYS, AIRPORT OBSTRUCTION CHARTS and RELATED PRODUCTS. These standards shall be complied with, without deviation, until such time as they are amended by formal FAA specification action.

New or revised pages to these standards will be provided when necessitated by new requirements.

Questions on interpretation that arise in the use of this manual shall be referred to the Division Manager, Aeronautical Information Services, ATA-100, Federal Aviation Administration, Washington, DC 20591.

APPROVED BY:

_____

Division manager, Aeronautical Information Services, ATA-100
Federal Aviation Administration
U.S. Department of Transportation

AMENDMENT OF STANDARDS

1. PROCEDURE

Recommendations for amendments to standards shall be directed to:

DOT/Federal Aviation Administration
Aeronautical Information Services, ATA-100
800 Independence Ave SW
Washington, DC 20591

2. AMENDMENT SYSTEM

a. Changes to the standards will be issued in the form of Change Notices.

b. Change Notices, which may contain more than one change, will be identified by the standards title/number, edition, and effective date, and will be consecutively numbered. Changes conveyed by the Notices shall remain in effect until revised by a subsequent Change Notice or a new edition of the standards.

c. The standards number, change number, and date will be indicated in the lower right corner of each revised or additional page.

d. Vertical lines in the right margin of the text mark the location of substantive standards changes. The accompanying cover page explains the intent of the change and provides information for proper interpretation.

e. "Editorial Change" at the left bottom of the page indicates that revisions have been made that do not change the intent of the standards; e.g., changes in wording, numbering of paragraphs or pages, or page makeup. This notation will not appear whenever editorial and substantive changes are on the same page.

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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.

Richard V. Powell
Division Manager, Aeronautical Information Services, ATA-100

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SECTION 1

INTRODUCTION

SECTION 1: INTRODUCTION

The aeronautical surveys and related products covered in this document provide information critical to the operation of the National Airspace System (NAS). Most of this information is source data, being acquired by field survey and/or photogrammetric methods.

Information furnished under these standards includes:

- Geodetic control data for permanent survey monuments established in the airport vicinity. These monuments and their accurate connections to the National Spatial Reference System (NSRS), assure accurate relativity between surveyed points on an airport and between these points and other surveyed points and facilities in the NAS, including the navigation satellites.

- Runway and stopway data, including runway end, stopway end, and displaced threshold positions and elevations, runway geodetic azimuths, touchdown zone elevations, and runway/stopway profiles

- Navigational aid (NAVAID) data, including NAVAID position and elevation, type, and distance from runway end and runway centerline

- Obstruction data, including obstruction description, position and elevation, and amount penetrating an Obstruction Identification Surface (OIS)

- Planimetric detail, including taxiways and aprons, and delineations of features of landmark value, such as, rivers, lakes, tidal shorelines, and major highways

- Aerial photograph coverage of the airport vicinity

This information is used to:

- Develop instrument approach and departure procedures

- Certify airports for certain types of operations, including those conducted under Federal Aviation Regulations Part 139

- Determine maximum takeoff weights for civil aircraft

- Update official U.S. Government aeronautical publications

- Provide geodetic control for engineering projects related to runway/taxiway construction, NAVAID siting, obstruction clearing, road building, and other airport improvement activities

- Assist in airport planning and land use studies in the airport vicinity

- Support miscellaneous activities, such as, aircraft accident investigations and special purpose one time projects

The precise meaning of terms is always important to a clear understanding of spoken or written information. This understanding is especially critical in technical areas where safety is involved. Certain terms and expressions used in this document have specific meanings that must not be misconstrued or applied incorrectly.

Critical terms are defined in the glossary located at the end of this publication. Many of these definitions have come from the "Aeronautical Information Manual" published by FAA and the "Geodetic Glossary" published by the National Geodetic Survey. Other definitions have been developed as needed.

In addition to the word usage as defined in the glossary, the following conventions have been adopted:

- The term "should" implies a first choice or preference but does not imply mandatory compliance. The term "shall" means that compliance is mandatory.

- The contraction "N/A" means not applicable.

- The term "position" means latitude and longitude unless otherwise specified.

- The term "mean sea level" (MSL) implies orthometric height. MSL is used throughout the NAS when reporting altitude values. In actuality, these altitudes are relative to a vertical datum that approximates mean sea level and are correctly referred to as "orthometric heights." While the mean sea level elevation phraseology is retained in this document, the more technically correct orthometric height is implied.

Because of the position and elevation uncertainties implied in horizontal and vertical accuracy standards (no position or elevation determined through measurement is error free), users of data provided under these standards must allow for these position and elevation uncertainties in the operational use of this information.

Future aviation will be heavily dependent on satellite navigation systems, such as, the Global Positioning System (GPS). GPS navigation requires that both the aircraft and destination coordinates be accurately known. This concept differs from conventional navigation which requires accurate tracking of a ground based signal, with coordinates of secondary importance. With GPS navigation, coordinates and geodetic datums become extremely important.

Ideally, coordinates should be referenced to a high accuracy global datum, such as, the International Earth Rotation Service (IERS) Terrestrial Reference Frame (ITRF). However, surveys, whether accomplished using classical or GPS methods, are conducted relative to control stations, including Continuously Operating Reference Stations (CORS). Therefore, it is impractical to deliver aeronautical data with global datum coordinate until these global coordinates become available to the surveyor.

Eventually, regional datums, such as, the North American Datum of 1983 (NAD 83) and the European Terrestrial Frame 1989 (ETRF89), will probably be replaced by a global system, such as, ITRF. However, as long as regional datums are used, they should meet the following three criteria:

1 - the datum, or more specifically, the positions and/or elevations of control stations that physically represent the datum, must be sufficiently accurate to support required surveys.

2 - the datum must be represented on the ground by a control station network that is readily available to the surveyor.

3 - the datum should be consistent (at about the two meter or better level) with a global datum, such as, ITRF, thereby ensuring smooth flight transitions between datums.

NAD 83 fully meets these criteria and has been selected as the FAA No. 405 standard for positions and ellipsoid heights in the United States. This datum has been developed by the National Geodetic Survey, United States Department of Commerce, and implemented to support virtually all surveying, charting, and navigation requirements. In addition, NAD 83 has been adopted by the Federal Geodetic Control Subcommittee as the official geodetic datum for the United States. (See Federal Register/Vol 54 No 113).

SECTION 2

AIRPORT OBSTRUCTION CHART SURVEYS

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AIRPORT OBSTRUCTION CHART SURVEYS

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FIGURES

SECTION 2: AIRPORT OBSTRUCTION CHART SURVEYS

1. DESCRIPTION

The Airport Obstruction Chart (AOC) survey is an extensive field/photogrammetric operation which provides aeronautical and other information to support a wide range of National Airspace System (NAS) activities.

AOC surveys provide source information on:

- Runways/stopways
- Navigational aids (NAVAID)
- Federal Aviation Regulations Part 77 (FAR-77) obstructions
- Aircraft movement and apron areas
- Prominent airport buildings
- Selected roads and other traverse ways
- Cultural and natural features of landmark value
- Miscellaneous and special request items

AOC surveys also establish (if it does not exist) geodetic control in the airport vicinity consisting of permanent survey marks accurately connected to the National Spatial Reference System (NSRS). This control and the NSRS connection assures accurate relativity between surveyed points on the airport and between these points and other surveyed points in the NAS, including the navigation satellites. In addition, this control supports not only AOC surveys, but also future engineering activities, such as, runway/taxiway construction, NAVAID siting, obstruction clearing, road building, and other airport related projects.

AOC survey data is used to:

- Develop instrument approach and departure procedures
- Determine maximum takeoff weights for civil aircraft
- Certify airports for certain types of operations, including Federal Aviation Regulations Part 139
- Update official U.S. Government aeronautical publications
- Provide geodetic control for engineering projects related to runway/taxiway construction, NAVAID siting, obstruction clearing, road building, and other airport improvement activities
- Assist in airport planning and land use studies in the airport vicinity
- Support miscellaneous activities, such as, aircraft accident investigations and special purpose one time projects

Standards for AOC survey products are described in detail in Subsection 10 of this section.

Unless otherwise stated, all data provided in accordance with this section is current as of the time of the AOC field survey.

2. DATUM TIE AND LOCAL CONTROL

Datum tie and local control requirements for all surveys accomplished in accordance with FAA No. 405 standards are identified in Appendix 3.

3. ACCURACIES

Accuracy requirements for all data provided in accordance with FAA No. 405 standards are identified in Appendix 5.

4. RUNWAY AND STOPWAY POINTS

Runway/stopway data shall be provided for all runways and stopways with a specially prepared hard surface (SPHS) existing at the time of the field survey. Data shall be provided for non-SPHS runways/stopways existing at the time of the field survey if: (1) they are depicted in the United States Government flight information publication "U.S. Terminal Procedures" current at the time of the field survey, (2) the runway/stopway survey was specifically requested by appropriate Federal Aviation Administration authorities, or (3) the stopway was officially designated a stopway by appropriate airport authorities.

Unless otherwise stated, all runway/stopway points shall be on the runway/stopway centerline.

Runways shall be identified by the number painted on the runway at the time of the field survey. If a number is not painted on the runway, the runway number published in the "U.S. Terminal Procedures" current at the time of the field survey shall be used.

4.1. REQUIRED DATA FOR RUNWAYS AND STOPWAYS

Required data for SPHS and Non-SPHS runways and stopways are presented in Table 2.1. (Also see Figure 2.1)

TABLE 2.1
REQUIRED RUNWAY/STOPWAY DATA

RWY/STWY POINT	REQUIRED DATA SPHS RWY	REQUIRED DATA NON-SPHS RWY
AIRPORT ELEV	D/E	D/E
RUNWAY ENDS	P/E	P/E*
INTERSECTION OF SPHS RWYS	D/E	N/N
DISPLACED THLDS	P/E	P/N
TOUCHDOWN ZONE	N/E	N/N
STOPWAY ENDS	D/E	D/E
SUPPLEMENTAL PROFILE POINTS	D/E	N/N
POINT ABEAM GS	P/E	N/N
POINT ABEAM MLSEL	P/E	N/N
POINT ABEAM OFFSET LOC	P/N	N/N
POINT ABEAM OFFSET LDA	P/N	N/N
POINT ABEAM OFFSET SDF	P/N	N/N
POINT ABEAM OFFSET MLSAZ	P/N	N/N

C ELEVATION REQUIRED ONLY IF AN OBSTRUCTION SURVEY WAS PERFORMED
D = DISTANCE FROM RUNWAY'S: (1) NEAR END FOR AIRPORT ELEVATION, (2) APPROACH END FOR RUNWAY INTERSECTIONS AND SUPPLEMENTAL PROFILE POINTS, AND (3) STOP END FOR STOPWAYS
E = ELEVATION
N = POSITION, DISTANCE, OR ELEVATION IS NOT REQUIRED
P = LATITUDE AND LONGITUDE

A FACILITY IS CONSIDERED OFFSET IF LOCATED MORE THAN 10 FEET FROM THE RUNWAY CENTERLINE/CENTERLINE EXTENDED.

5. NAVIGATIONAL AIDS

5.1. ELECTRONIC NAVAIDS

A position, and sometimes an elevation, depending on the navigational aid (NAVAID), shall be determined for selected electronic NAVAIDS associated with the airport. The horizontal and vertical survey points for electronic NAVAIDS are listed in Appendix 4.

Survey data is required for NAVAIDS meeting all of the following three criteria:

- The NAVAID is listed in Appendix 4.

- The NAVAID is located within 10 nautical miles of the Airport Reference Point.

- The NAVAID is associated with an instrument approach procedure for the airport being surveyed and the procedure is published in the United States Government flight information publication "U.S. Terminal Procedures" current at the time of the field survey. This requirement also applies to Airport Surveillance Radars.

In addition to the NAVAIDS identified above, Airport Surveillance Radars and Air Route Surveillance Radars located within FAR-77 limits for the airport being surveyed, and not located on a military aerodrome, shall be routinely surveyed.

If the NAVAID is also an obstruction, the obstruction requirements of Subsection 6 of this section also apply.

5.2. VISUAL NAVAIDS

The position of a "plot point" or points shall be determined for certain visual NAVAIDS. The "plot point" may be the center of the NAVAID, or when the NAVAID is composed of more than one unit, the center of the unit array, or in the case of approach light systems, the first and last lights. A plot point is required if, and only if, the NAVAID is associated with the airport being surveyed.

Elevations are not required for visual NAVAIDS. However, if the NAVAID is also an obstruction, the obstruction requirements of Subsection 6 of this section also apply.

Required visual NAVAIDS and their plot points are identified below:

- Visual Glideslope Indicators (the most common types are listed below). Note that data is not required for "Alignment of Elements" systems.

  Precision Approach Path Indicator (PAPI) - Plot point is the center of the light array. Since PAPI systems usually have two or four light units installed in a row aligned perpendicular to the runway centerline, the array center (plot point) will be between units.

  Pulsating Visual Approach Slope Indicator (PVASI) - Plot point is the center of the projecting unit.

  Visual Approach Slope Indicator (VASI) - Plot points are the center of the near, middle (if present), and far VASI bars. Where two light units exist in a bar, the plot point shall be midway between the two units.

  Tri-Color Visual Approach Slope Indicator (TRCV) - Plot point is the center of the projecting unit.

  "T"-Visual Approach Slope Indicator (TVASI) - Plot point is center of light array.

- Approach Light Systems - Plot points are the first and last lights. Omnidirectional Approach Lighting System (ODALS) lights that function as Runway End Identifier Lights (REIL) shall be treated as REILs. Other ODALS lights shall be treated as approach lights.

- Runway End Identifier Lights (REIL) - Plot point is the center of each light.

- Airport Beacon - Plot point is the axis of light rotation.

6. OBSTRUCTIONS

6.1. DEFINITION

An obstruction, for purposes of this section, is any object that penetrates an obstruction identification surface (OIS) as defined in Federal Aviation Regulations Part 77 (FAR-77). A supplemental obstruction is any object that penetrates an OIS that has been defined as a supplemental OIS by appropriate FAA authorities.

6.2. OBSTRUCTION IDENTIFICATION SURFACES

OIS dimensions for AOC surveys are defined in FAR-77 for civil airports. (See Figure 2.2).

6.3. SPECIAL CASES

6.3.1. Catenaries

In most cases, the position and elevation of supporting towers will adequately represent catenaries. These towers shall be treated as any other potential obstruction. However, if one, or both towers are outside the limits of the OIS, the catenary itself may become a significant obstruction. In these cases, a position and elevation shall be provided on the imaginary straight line connecting the tops of the two adjacent catenary support towers at the highest point within the OIS. The elevation of this point shall be carried as an estimated maximum elevation (EME).

6.3.2. Vehicular Traverse Ways

In general, a vehicular traverse way shall be treated as any other potential obstruction, except that the appropriate vehicle height allowance must be included in the elevation. (See "Obstruction Exemptions" in this subsection for possible exemptions that may apply to vehicular traverse ways and Subsection 10. for additional requirements concerning vehicular traverse ways as planimetric detail).

Vehicle Height Allowances follow:

Noninterstate roads	15 feet
Interstate roads	17 feet
Railroads	23 feet

6.3.3. Mobile Obstructions

Representative obstructions that are mobile within a defined area (except vehicles on roads and railroads, and vessels, which are treated under separate headings) shall have their obstructing travel limits determined. An estimated maximum elevation (EME) shall be furnished for each of these obstructing mobile object areas.

If a nonobstructing mobile object is outward from the runway end, is the highest object in the primary area or first 2,000 feet of an approach, and is higher than the runway end, an EME point shall be provided at the point nearest to the runway centerline end. Travel limits need not be determined.

The word "MOBILE," which always implies an EME, shall be included in the object name, such as, "MOBILE CRANE".

(See Subsection 10. and Figure 2.7 and Figure 2.8 for proper depiction of mobile objects on AOC survey products).

6.3.4. Obstructions Under Construction

Representative objects that are under construction should be identified as being under construction, such as, "BUILDING UNDER CONSTRUCTION." The elevation at the time of the survey shall be carried. However, if a construction crane extends above the feature under construction, it is necessary and sufficient to carry the elevation and position of the crane.

6.3.5. Vessels

Because of uncertainties in determining maximum vessel heights, travel limits, and frequency of passage,

vessel heights and locations shall not be provided. However, if a possible obstructing condition exists, a note shall be entered on AOC survey products cautioning that vessels may obstruct certain OIS's at certain times and that further investigation by the data user regarding maximum vessel height, travel limits, and frequency of passage is advised. (See Subsection 10. for proper depiction on AOC survey products).

6.3.6. Manmade Objects Equal to or Greater than 200 Feet Above Ground Level (AGL)

The AGL elevation shall be determined for manmade objects equal to, or greater than, 200 feet AGL. The AGL shall be measured from the highest point of ground in contact with either the object or the structure on which the object rests. This AGL requirement applies only to representative objects that normally would be carried on AOC survey products and does not necessarily require measuring all manmade objects in the survey area that are equal to or greater than 200 feet AGL.

6.3.7. Supplemental Obstructions

An obstruction survey of a supplemental OIS shall be accomplished when specifically requested by appropriate FAA authorities. This survey shall be accomplished in addition to the survey specified in FAR-77 for existing conditions. Penetrations of the supplemental OIS are supplemental obstructions. The supplemental OIS shall conform to one of the OIS standards defined in FAR-77. Criteria for the selection of supplemental obstructions shall be the same as the criteria for the selection of other obstructions.

6.3.8. Obstruction Exemptions

The following obstructions are not required to be measured or carried on AOC products:

- Vegetation that is both obstructing by less than three feet and with a maximum cross sectional diameter no greater than one-half inch where transected by an obstruction surface.

- Annual vegetation, such as annual weeds, corn, millet, and sugar cane.

- Frangible objects under the control of airport authorities with locations fixed by function. Examples are runway and taxiway signs, and many approach light structures.

- Roads with restricted public access that are intended for airport/facility maintenance only. This exemption does not apply to airport service roads associated with other airport operations, such as, food, fuel, and freight transportation.

- Construction equipment and debris, including dirt piles and batch plants, that are: (1) temporary in nature, (2) under the control of airport authorities, and (3) located on airport property.

- Vessels. However, if a possible obstructing condition exists, a note shall be entered on AOC survey products cautioning that vessels may obstruct certain FAR-77 surfaces at certain times and that further investigation by the product 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 AOC shall show paved aircraft movement and apron areas and approximate locations of unpaved tiedown areas. However, the location and maximum elevation of individual parked aircraft cannot be determined and shall not be provided under AOC surveys. This exemption does not apply to aircraft permanently parked for display purposes.

6.4. SELECTION

Obstruction selection shall include a representation of objects that penetrated the FAR-77 OIS's at the time of the field survey. These surfaces shall be identified for the survey by appropriate FAA authorities. In addition, certain nonobstructing objects may be required in the first 2,000 feet of an 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 2.3)

  The highest obstruction outward from the runway end.

  The highest obstruction and the highest non man-made obstruction in each 3,000 foot (approximately) section of the primary area on each side of the runway.

- Approach Surface (See Figure 2.4 and Figure 2.5)

  The highest object that is both within the first 2,000 feet of an approach area and higher than the runway approach end. This object may or may not penetrate the approach surface and may be a nonobstructing EME point.

  The most penetrating obstruction in the first 2,000 feet of an approach area.

  The highest approach obstruction in: (1) first 10,000 feet, (2) first 20,000 feet, (3) first 30,000 feet, (4) first 40,000 feet, and (5) the approach area.

- Transition Surfaces (See Figure 2.6)

  The highest obstruction in each 3,000 feet (approximately) of each primary transition to the horizontal surface.

  The highest obstruction in each approach transition to the horizontal surface.

  The highest obstruction in each approach transition in the first 20,000 feet beyond the horizontal surface.

  The highest obstruction in each approach transition beyond the horizontal surface.

- Horizontal and Conical Surfaces

  The highest obstruction in either the horizontal or conical area in each quadrant of the FAR-77 survey area as defined by the meridian and parallel intersecting at the Airport Reference Point.

- Obstructing Areas (See Figure 2.7)

  An obstruction representation within the limits of each obstructing area to be compiled on the AOC. This representation shall include the following:

  The highest obstruction within each obstructing area.

  The highest obstruction within that portion of an obstructing area that penetrates an approach surface.

  The highest obstruction within that portion of an obstructing area that penetrates a primary surface.

Note that required objects may be EME points for mobile object areas.

In some cases, strict adherence to the object selection criteria listed above may result in congestion or inadequate obstruction representation. To minimize these situations, the following guidelines shall be followed in object selection:

- If objects that are required in the primary area or first 10,000 feet of an approach area are located within 100 feet of each other, the lower object may be omitted.

- If objects that are required outside the primary or first 10,000 of an approach area are located within 500 feet of each other, the lower object may be omitted. (Note: Required primary or

approach objects shall not be omitted because of the close proximity of higher objects outside of the primary or approach areas).

- When a required object is omitted because of congestion, a replacement object/objects shall be selected if possible that meets the spacing criteria.

- Occasionally, additional obstruction information may be useful in representing certain obstructing conditions. While rigorous selection criteria is not practical, information useful to obstruction clearing activities should be considered in the selection.

7. METEOROLOGICAL APPARATUS

Meteorological apparatus is not required unless it is to be carried for its elevation value.

8. PLANIMETRIC DETAIL

Planimetric detail to be provided by AOC surveys includes the following:

- All usable runways located on the AOC airport.

- Runways with specially prepared hard surfaces that are not located on the AOC airport but fall within the AP limits on the published AOC.

- Seaplane landing areas when associated with the AOC airport.

- Paved helipads that are isolated from other apron areas. These helipads may or may not be painted as helipads. Helipads on other apron areas need not be identified.

- Closed runways if they are sufficiently prominent to be of value to a pilot in airport identification.

- Aprons and taxiways with specially prepared hard surfaces.

- Approximate limits of non-SPHS tiedown areas if permanent tiedown fixtures are present and any portion of the area is located within 200 feet of a primary or approach obstruction identification surface. If any portion of the area meets these criteria, the entire tiedown area will be delineated.
- Traverse ways, dikes, transmission lines, fence lines, or other linear features having obstruction or landmark value.

- A selection of roads, especially in the airport vicinity, to assist the AOC user in geographic orientation.

- The terminal building complex, plus hangars, maintenance facilities, and other buildings directly associated with aircraft operations and directly connected to the apron.

- Approximate limits of obstructing areas.

- Coastlines, lakes, rivers, major highways and buildings, or other features of landmark value that aid in geographic orientation.

Elevation information is not required for planimetric detail charted only for its planimetric value. Features selected for their elevation as well as their planimetric value, such as, transmission lines, shall carry a representative spot elevation.

See Subsection 10. for proper depiction of planimetric detail on AOC survey products.

9. MISCELLANEOUS

AIRPORT REFERENCE POINT

The Airport Reference Point (ARP) shall be computed using the centerline end positions of all usable runways. However, since runways without specially prepared hard surfaces are often not required to be surveyed, the ARP position for these airports will be approximate. The ARP will be tagged with the year of the most recent runway end survey used in the ARP computation, such as, "ARP (1995)."

Procedures for computing ARP are presented in Appendix 2.

10. DATA DELIVERY

AOC survey data shall be furnished on the Airport Obstruction Chart or in ASCII files in the Universal Data Delivery Format (UDDF)

The content, portrayal, and format for each of these products is presented in this subsection.

10.1. AIRPORT OBSTRUCTION CHART (AOC)

10.1.1. DESCRIPTION

The AOC is a 1:12,000 scale graphic depicting Federal Aviation Regulations Part 77 (FAR-77) Obstruction Identification Surfaces (OIS), a representation of objects that penetrate these surfaces, aircraft movement and apron areas, navigational aids, prominent airport buildings, and a selection of roads and other planimetric detail in the airport vicinity. Also included, are tabulations of runway and other operational data. AOC data is current as of the date of the field survey.

The AOC consists of four sections:

- Airport Plan (AP)
- Runway Plans and Profiles (RPP)
- Tabulated Operational Data (TOD)
- Notes and Legends (NL)

Contents, portrayal, and general format shall conform to the style sheet (OC 000) presented in Appendix 7.

10.1.2. MATERIALS AND FORMAT

The AOC shall be published on E50 chart paper, or equivalent, as defined by the Joint Committee on Printing. Border dimensions in inches for the published chart shall be either 30x42 or 30x48. The long dimension in each case may be either in the north/south or east/west direction, depending on individual charting requirements. In addition, approximately 3/4 of an inch should exist between the border and the paper trim line. In those cases where the AP and the RPP will not fit on the front of the chart, the RPP shall be printed on the chart back. When this front/back format is used, a 1:12,000 scale runway layout diagram showing runway numbers and north arrow shall be included on the chart back.

10.1.3. AIRPORT PLAN (AP)

Unless specifically modified because of special charting requirements, the AP shall be published at a horizontal scale of 1:12,000. Contents, portrayal, and general format shall conform to the style sheet (OC 000) presented in Appendix 7. The following items further define or clarify certain AP requirements.

10.1.3.1. RUNWAYS/STOPWAYS/BLAST PADS

This subsection lists the requirements for the graphic depiction of runway data on the AP.

Depiction on the AP depends on surface type and whether an obstruction survey was accomplished. Depiction shall comply with the following conventions:

A. Specially Prepared Hard Surface (SPHS) Runways with an Obstruction Survey (see Figure 2.10 and Figure 2.11)

- Outline solid.
- Length and width labeled in whole feet.
- Surface type labeled "PAVED" if paved and labeled "UNPAVED" for all other surface types.
- Displaced Threshold (DTHLD)

  Solid line perpendicular to runway centerline at the DTHLD but not touching runway outline.

Elevation depicted by 1 mm filled circle placed tangent to touchdown side of DTHLD line and labeled to one decimal place in feet.

Labeled "DISPLACED THRESHOLD" with length labeled to whole feet.

Use leader pointing to DTHLD with label, such as, "400 FT. DISPLACED THRESHOLD."

- Physical End Elevation

Depicted by a 1 mm filled circle placed tangent to touchdown side of runway end line

Elevation labeled to one decimal place in feet.

- Airport Elevation

Depicted by a 1 mm filled circle placed at airport elevation location.

Labeled to one decimal place in feet

Elevation enclosed in a solid line box.

- Touchdown Zone Elevation (TDZE)

The TDZE shall not be depicted on the AP. (The TDZE shall be indicated in the Tabulated Operational Data section of the AP but only for SPHS runways with a landing length equal to, or greater than, 3,000 feet).

- Supplemental Profile Points

Depicted by a 1 mm filled circle on runway centerline.

Selected so that a straight line between any two adjacent published runway/stopway points shall not be greater than one foot from the runway/stopway surface.

Labeled to one decimal place in feet.

- Magnetic Bearing

Shown in whole degrees with direction arrow near each runway end.

- Runway Numbers

Shown in their true locations as painted on runway at the time of the field survey. If no number is painted on runway, runway number published in the United States Government flight information publication "U.S. Terminal Procedures" current at the time of the field survey shall be shown on runway with the base of the number approximately 100 feet from the threshold.

B. SPHS Runways Without an Obstruction Survey

Depiction shall be the same as for SPHS runways with an obstruction survey.

C. Non-Specially Prepared Hard Surface (non-SPHS) Runways with an Obstruction Survey

Depiction shall be the same as for SPHS runways with an obstruction survey except outline shall be dashed and runway always labeled "UNPAVED".

D. Non-SPHS Runways Without an Obstruction Survey

Depiction shall be the same as for SPHS runways with an obstruction survey except outline shall be dashed, runway always labeled "UNPAVED," and airport elevation shall be only elevation point shown.

E. Blast Pads

Outline dashed.

Labeled "BLAST PAD."

Leader used as required in congested areas.

F. Stopways

Outline dashed

Labeled "PAVED STOPWAY" if paved and "UNPAVED STOPWAY" for all other surface types.

Length labeled to whole feet.

End elevation depicted with a 1 mm filled circle placed tangent to runway side of stopway end line and labeled to one decimal place in feet.

Leader used as required in congested areas.

Supplemental profile points selected so that a straight line between any two adjacent runway/ stopway points shall not be greater than one foot from the runway/stopway surface and labeled to one decimal place in feet.

The FAR-77 primary surface terminates at the runway end for non-SPHS runways and 200 feet beyond the physical runway end for SPHS runways.

Short Takeoff and Landing (STOL) runways shall be treated as other runways except that they shall be labeled "STOL" on the AP.

10.1.3.2. OBSTRUCTIONS

This subsection lists the requirements for the graphic depiction of obstructions on the AP.

Obstructions to be depicted on the AP and special considerations regarding obstructions are identified in Subsection 6.

Obstructions to a FAR-77 specified OIS shall be depicted with a 1 mm filled circle. Obstructions to a supplemental OIS only shall be depicted with an 2 mm open circle and superimposed cross. Nonobstructions and objects with no elevation information shall be depicted with a 1 mm open circle.

Estimated Maximum Elevations

Objects with estimated maximum elevations (EME), such as, catenaries, mobile objects, and some cranes, shall be shown with its EME, as in the following example:

"CATENARY
EME 344"

See Subsection 10.1.3.5. for delineation of linear features as planimetric detail.

Obstructing Areas (See Figure 2.7)

In areas of scattered obstructions, a representation of individual obstructions shall be shown. However, in areas considered to be continuously obstructing, such as, wooded areas, congested building areas, or ground, the entire obstructing area shall be indicated by an obstructing area symbol and a representation of individual obstructions within the area shall be shown.

Obstructing Mobile Objects (See Figures 2.8 and 2.9)

The obstructing travel limits of mobile obstructions shall be delineated by a dashed line and labeled with the EME of the area, as in the following example:

"OBSTRUCTING MOBILE CRANE AREA
EME 219"

If different EME's apply to different parts of the area, the area shall be subdivided with the appropriate EME note applied to each subarea.

If a nonobstructing mobile object is outward from the runway end, is higher than the runway end, and is the highest object in the primary surface or first 2,000 feet of an approach surface, an EME point, without an area limit, shall be provided on the AP at the point nearest to the runway centerline end. This EME point for nonobstructing mobile objects shall be a 1 mm open circle.

Obstructing travel limits of vessels shall not be delineated. However, the following note shall be

conspicuously placed on the AP cautioning the AOC user of possible obstructing vessels:

"POSSIBLE OBSTRUCTING VESSEL AREA CONTACT LOCAL AUTHORITIES FOR VESSEL INFORMATION"

(See Figure 2.8 and Figure 2.9)

Leadered Obstructions

Obstructions located beyond the AP limits on the published AOC shall be leadered. Obstructions penetrating a FAR-77 approach surface, including a supplemental surface, and obstructions penetrating the horizontal or conical surface only but located within the limits of the approach area, shall be leadered from the approach physical end of that runway. All other obstructions shall be leadered from the Airport Reference Point (ARP). Leadered distances shall be shown to the nearest whole foot.

10.1.3.3. NAVIGATIONAL AIDS

This subsection lists the requirements for the graphic depiction of electronic and visual navigational aids (NAVAIDS) on the AP. If the NAVAID is also an obstruction, Subsection 6. requirements also apply.

Both electronic and visual NAVAIDS identified in Subsection 5. and located within the limits of the AP on the published AOC shall be depicted on the AP and labeled with the NAVAID type. NAVAIDS located beyond the limits of the AP on the published AOC shall not be shown.

The horizontal survey point for electronic NAVAIDS shall be plotted. The plot point for visual NAVAIDS shall be plotted. In addition, approach light systems shall be symbolized between the plot points. (See Subsection 5 for visual NAVAID plot points).

An elevation shall not be shown unless the NAVAID is also to be carried for its obstruction value. In this case, only the top elevation shall be shown.

If no elevation is indicated, or the NAVAID does not obstruct, it shall be depicted with a 1 mm open circle. If an elevation is shown and the NAVAID obstructs, it shall be depicted with a 1 mm filled circle.

10.1.3.4. METEOROLOGICAL APPARATUS

Meteorological apparatus is not required unless it is to be depicted for its elevation value. In this case, it shall be treated as other objects.

10.1.3.5. PLANIMETRIC DETAIL

This subsection lists requirements for the graphic depiction of planimetric detail on the AP. See Appendix 7 for samples of these depictions.

Planimetric detail to be depicted in the AP section of the AOC shall include the following:

- All usable runways located on the AOC airport. Runways with specially prepared hard surfaces shall be delineated with a solid line. Runways without specially prepared hard surfaces shall be delineated with a dashed line. Paved runways shall be labeled "PAVED." All other runways shall be labeled "UNPAVED."

- Runways with specially prepared hard surfaces that are not located on the AOC airport but fall within the AP limits on the published AOC. These runways shall be delineated with a solid line and will include the airport name if available.

- Seaplane landing areas when associated with the AOC airport. These areas shall be labeled "SEAPLANE LANDING AREA" with no delineation.

- Paved helipads that are isolated from other apron areas. These areas shall be delineated with a solid line and labeled "HELIPAD." Helipads on other apron areas need not be identified.

- Closed runways if they are sufficiently prominent to be of value to a pilot in airport identification. Closed runways with specially prepared hard surfaces shall be delineated with a solid line. Closed runways without specially prepared hard surfaces shall be delineated with a dashed line. In both cases the runway shall be labeled "CLOSED RUNWAY."

- Aprons and taxiways with specially prepared hard surfaces. These items shall be delineated with a solid line.

- Approximate limits of non-SPHS tiedown areas if permanent tiedown fixtures are present and any portion of the area is located within 200 feet of a primary or approach obstruction identification surface. If any portion of the area meets these criteria, the entire area shall be delineated with a dashed line and labeled "UNPAVED TIEDOWN AREA."

- Traverse ways, dikes, transmission lines, fence lines, or other linear features having obstruction or landmark value. Feature delineation should be sufficient to allow positive feature identification by the chart user.

- A selection of roads, especially in the airport vicinity, to assist the AOC user in geographic orientation.

- The terminal building complex, plus hangars, maintenance facilities, and other prominent buildings directly associated with aircraft operations and directly connected to the apron. These items shall be hatched.

- Approximate limits of obstructing areas. These areas shall be depicted with an obstructing area symbol.

- Coastlines, lakes, rivers, major highways and buildings, or other features of landmark value that aid in geographic orientation.

Elevation information is not required for planimetric detail charted only for its planimetric value. Features selected for their elevation value as well as their planimetric value, such as, transmission lines, shall carry a representative spot elevation.

10.1.3.6. MISCELLANEOUS

This subsection lists the requirements for the graphic depiction of miscellaneous information on the AP.

Miscellaneous information to be depicted in the AP section of the AOC shall include the following:

- The latitude, longitude projection. The projection interval for all geographic areas, except Alaska, shall be one minute. In Alaska, the longitude projection interval shall be two minutes.

- The Airport Reference Point

- A compass rose oriented to geodetic north showing both geodetic north and magnetic north arrows. The magnetic variation at the time of the field survey shall be labeled along the magnetic arrow to the nearest tenth (0.1) of a degree. The official source for magnetic variation for the AOC and related products is the U. S. Geological Survey, Branch of Global Seismology and Geomagnetism, Denver CO.

- Specified FAR-77 OIS limits dashed.

- Supplemental OIS corners ticked and labeled "S."

- Runway centerline extended locator depicted.

- Elevation of floor of control tower cab shown in whole feet.

10.1.4. RUNWAY PLANS AND PROFILES (RPP)

The RPP content, portrayal, and general format shall conform to the style sheet (OC 000) presented in Appendix 7. The following items further define or clarify certain RPP requirements.

- Orientation

  The RPP shall be oriented so that for each runway the runway end with the highest longitude shall be to the left on the published AOC.

- Scale

  Horizontal scale shall be the same as the AP. Vertical scale shall be 1 inch = 100 feet.

- Area of Coverage

The extent of the RPP shall be limited to the primary and approach surface areas, including supplemental approach surface, as depicted in the AP. The longitudinal extent of the RPP will depend on obstruction locations in the approaches and the available space for the RPP on the published AOC.

The following guidelines should be followed, when practical, to determine RPP longitudinal limits:

- Extend the RPP at least 2,000 feet beyond the near runway end.

- Extend the RPP to a 1,000 foot multiple + 500 feet, such as, 5,500 feet, 8,500 feet etc. from the opposite runway end.

- Extend the RPP at least 500 feet beyond the last obstruction that penetrates the approach. If this extension is not practical, the RPP should be terminated at a convenient point that meets the criteria above. All approach obstructions located beyond this point shall be leadered with distances shown to the nearest whole foot.

- Content and Portrayal in Plan

The Plan portion of the RPP shall include:

The runway outline

Objects carried on the AP with a spot elevation.

EME points for obstructing mobile object areas. (The area but not the EME point is shown on the AP). EME point(s) shall be selected at: (1) the point nearest to the runway centerline end for primary surface penetrations, (2) the most penetrating point for approach surface penetration, and (3) as appropriate to represent the area. (See Figure 2.8 and Figure 2.9)

Taxiways and other planimetric detail carried in the AP shall not be shown in the RPP.

Objects that penetrate the approach or supplemental approach surface of the profiled runway and are located beyond the published limits of the RPP shall be leadered from the runway end with distances shown to the nearest whole foot. Objects within the limits of the approach or supplemental approach areas but penetrating the horizontal or conical surface only, shall not be leadered.

A runway centerline extended locator shall be placed in each approach in the Plan portion of the RPP.

- Content and Portrayal in the Profile

The profile shall include all objects carried in the Plan with spot elevations, including leadered obstructions.

If profiling all objects results in congestion in the Profile, lower objects may be omitted.

The line portrayal of objects in the Profile shall be 0.5 inch in length or extend to 0.1 inch below the elevation of the runway end, whichever is shorter.

The runway, and stopways when present, shall be depicted in the Profile portion of the RPP with the elevation of each profile point labeled.

Each Profile shall portray the specified approach surface and supplemental approach surface, if present. In addition, the Profile for specified PIR approaches shall depict a 34:1 surface in addition to the specified PIR surface.

- 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.

- AOC edition number shown at lower left corner of chart, outside of the margin.

- Date of survey shown at lower left corner of chart, outside of the margin.

- Date of publication shown at lower left corner of chart, outside of the margin.

- Data source paragraph shown at lower left corner of chart, outside of the margin.

- Amendment data box shown at lower left corner of chart, inside of the margin.

- Airport name and associated city and state shown in upper center and lower right of chart, both outside of the margin.

- AOC number shown in upper left and lower right of chart, outside of the margin.

- Department of Commerce logo shown in upper center of chart, inside of the margin.

- Publication credit shown at lower center of chart, outside of the margin.

- "National Ocean Service" shown at upper right of chart, outside of the margin.

10.2. UNIVERSAL DATA DELIVERY FORMAT

10.2.1. DESCRIPTION

The Universal Data Delivery Format (UDDF) is a digital delivery system which provides aeronautical and other data, including airport, runway, navigational aid, and obstruction information in a standard ASCII format. This information can be easily read into user data files and data bases.

10.2.2. CONTENT AND FORMAT

General UDDF content, portrayal, and format information are presented in Appendix 1.

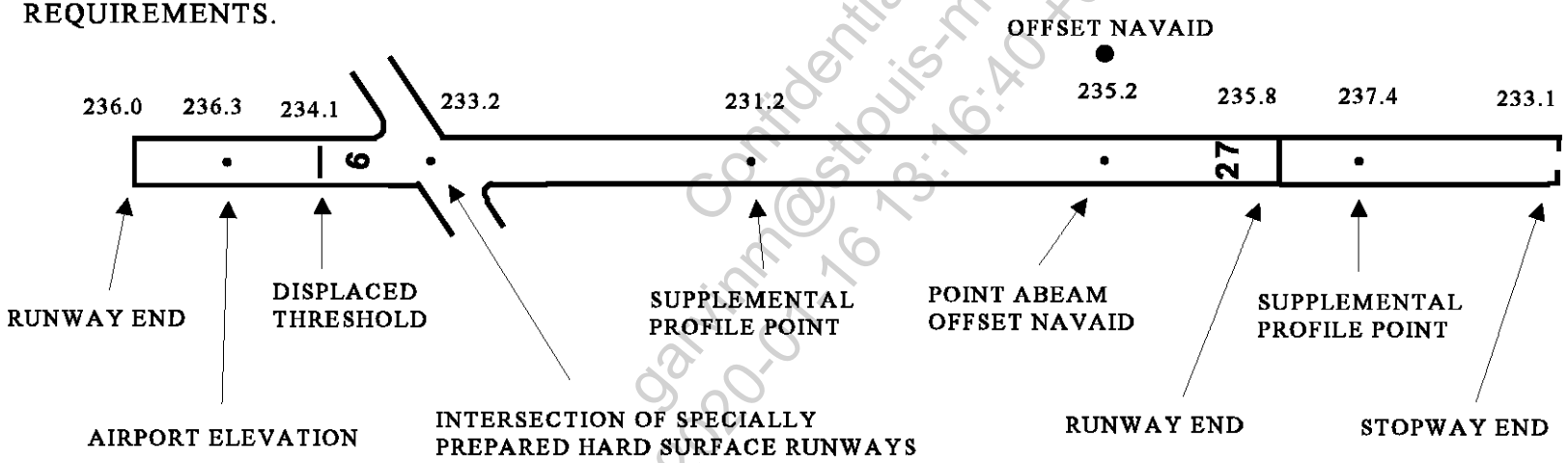
POSITIONS AND/OR ELEVATIONS (SEE TABLE 2.1) SHALL BE PROVIDED FOR: (1) RUNWAY ENDS, (2) DISPLACED THRESHOLDS, (3) TOUCHDOWN ZONES (ELEV ONLY), (4) RUNWAY INTERSECTIIONS, (5) AIRPORT ELEVATION, (6) POINT ABEAM CERTAIN OFFSET NAVAIDS, AND (7) STOPWAY ENDS.

TOUCHDOWN ZONE ELEVATIONS ARE REQUIRED ONLY FOR SPECIALLY PREPARED HARD SURFACE RUNWAYS WITH A USABLE LANDING LENGTH OF AT LEAST 3,000 FEET.

SEE TEXT AND TABLE 2.1 FOR NON-SPECIALLY PREPARED HARD SURFACE RUNWAY/STOPWAY REQUIREMENTS.

POSITIONS AND ELEVATIONS SHALL ALSO BE PROVIDED FOR SUPPLEMENTAL PROFILE POINTS, SELECTED SO THAT A STRAIGHT LINE BETWEEN ANY TWO ADJACENT PUBLISHED RUNWAY/STOPWAY POINTS WILL BE NO GREATER THAN ONE FOOT FROM THE RUNWAY/STOPWAY SURFACE.

RUNWAYS SHALL BE IDENTIFIED BY THE NUMBER PAINTED ON THE RUNWAY AT THE TIME OF THE FIELD SURVEY. IF A NUMBER IS NOT PAINTED ON THE RUNWAY, THE RUNWAY NUMBER PUBLISHED IN THE "U.S. TERMINAL PROCEDURES" CURRENT AT THE TIME OF THE FIELD SURVEY SHALL BE USED.



THIS FIGURE EXPLAINS OR CLARIFIES CERTAIN DATA REQUIREMENTS -SEE TEXT AND STYLE SHEET OC 000 FOR COMPLETE STANDARDS

DIMENSIONS ARE IN FEET

NOT TO SCALE

FIGURE 2.1

RUNWAY NUMBERS AND REQUIRED POINTS FOR SPECIALLY PREPARED HARD SURFACE RUNWAYS/STOPWAYS

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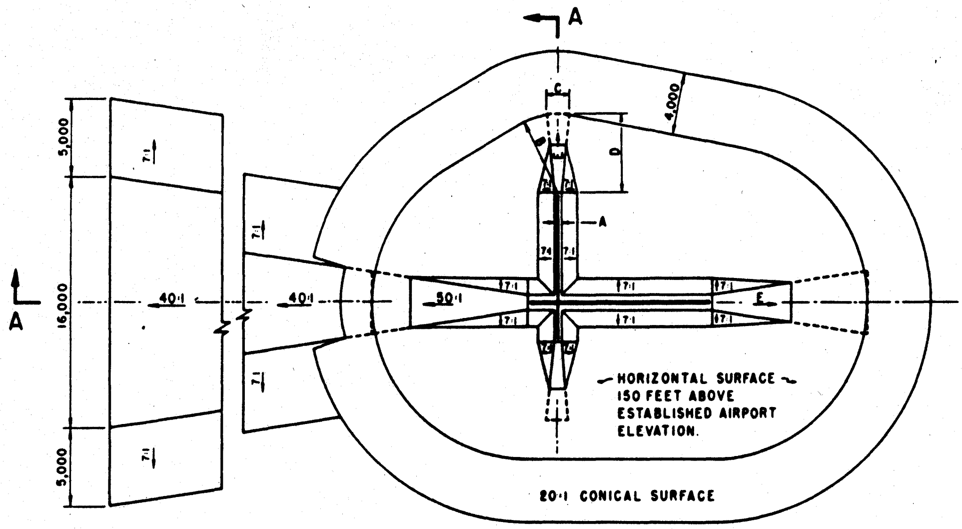
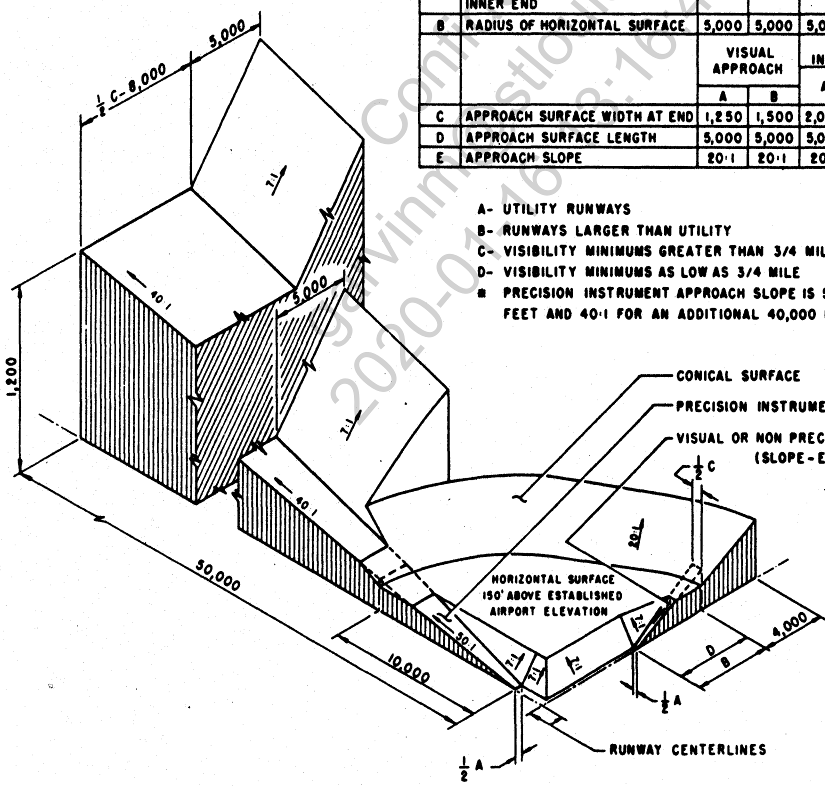


DIM	ITEM	DIMENSIONAL STANDARDS (FEET)					
		VISUAL RUNWAY		NON – PRECISION INSTRUMENT RUNWAY			PRECISION INSTRUMENT RUNWAY
		A	B	A	B		
					C	D	
A	WIDTH OF PRIMARY SURFACE AND APPROACH SURFACE WIDTH AT INNER END	250	500	500	500	1,000	1,000
B	RADIUS OF HORIZONTAL SURFACE	5,000	5,000	5,000	10,000	10,000	10,000
		VISUAL APPROACH		NON – PRECISION INSTRUMENT APPROACH			PRECISION INSTRUMENT APPROACH
		A	B	A	B		
					C	D	
C	APPROACH SURFACE WIDTH AT END	1,250	1,500	2,000	3,500	4,000	16,000
D	APPROACH SURFACE LENGTH	5,000	5,000	5,000	10,000	10,000	*
E	APPROACH SLOPE	20:1	20:1	20:1	34:1	34:1	*

A- UTILITY RUNWAYS
B- RUNWAYS LARGER THAN UTILITY
C- VISIBILITY MINIMUMS GREATER THAN 3/4 MILE
D- VISIBILITY MINIMUMS AS LOW AS 3/4 MILE
* PRECISION INSTRUMENT APPROACH SLOPE IS 50:1 FOR INNER 10,000 FEET AND 40:1 FOR AN ADDITIONAL 40,000 FEET



ISOMETRIC VIEW
OF SECTION A-A

FIGURE 2.2

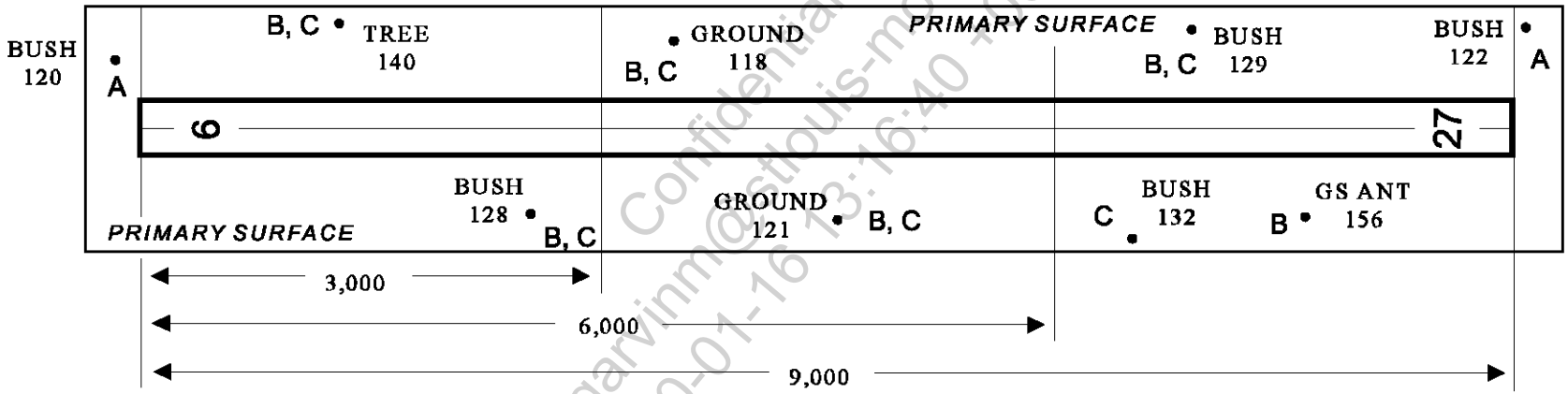
OBSTRUCTION IDENTIFICATION SURFACES FEDERAL AVIATION REGULATIONS PART 77

OBSTRUCTION REPRESENTATION IN THE PRIMARY AREA SHALL INCLUDE THE:

A- HIGHEST OBSTRUCTION OUTWARD FROM THE RUNWAY END
B- HIGHEST OBSTRUCTION IN EACH 3,000 FOOT (APPROXIMATELY) PRIMARY SECTION ON EACH SIDE OF THE RUNWAY
C- HIGHEST NON-MANMADE OBSTRUCTION IN EACH 3,000 FOOT (APPROXIMATELY) PRIMARY SECTION ON EACH SIDE OF THE RUNWAY

SEE TEXT WHEN OBJECT/OBSTRUCTION CONGESTION OCCURS.

SEE TEXT AND FIGURE 2.7 FOR OBSTRUCTING AREA REQUIREMENTS



THIS FIGURE EXPLAINS OR CLARIFIES CERTAIN DATA REQUIREMENTS - SEE TEXT AND STYLE SHEET OC 000 FOR COMPLETE STANDARDS

DIMENSIONS ARE IN FEET

NOT TO SCALE

FIGURE 2.3

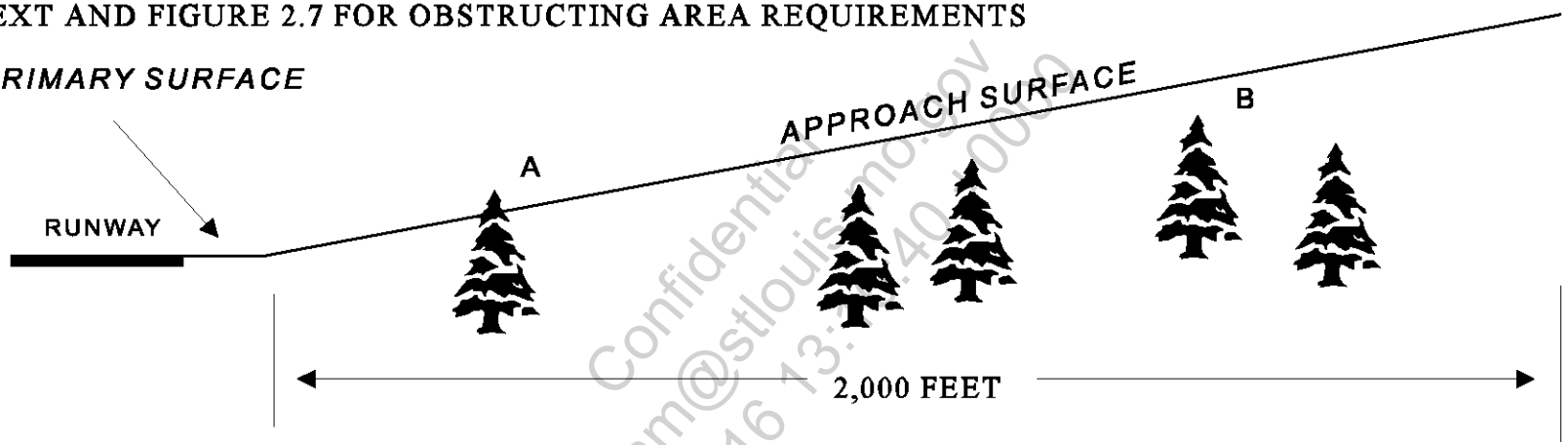
OBSTRUCTION REPRESENTATION IN THE PRIMARY AREA

OBJECT REPRESENTATION IN THE FIRST 2,000 FEET
OF AN APPROACH AREA SHALL INCLUDE THE:

A- MOST PENETRATING OBSTRUCTION
B- HIGHEST OBJECT ABOVE THE RUNWAY END
(THIS OBJECT MAY NOT PENETRATE APPROACH)

SEE TEXT WHEN OBJECT/OBSTRUCTION CONGESTION OCCURS

SEE TEXT AND FIGURE 2.7 FOR OBSTRUCTING AREA REQUIREMENTS



THIS FIGURE EXPLAINS OR CLARIFIES CERTAIN DATA REQUIREMENTS - SEE TEXT AND STYLE SHEET OC 000 FOR COMPLETE STANDARDS

DIMENSIONS ARE IN FEET

NOT TO SCALE

FIGURE 2.4

OBJECT REPRESENTATION IN THE FIRST 2,000 FEET OF AN APPROACH AREA

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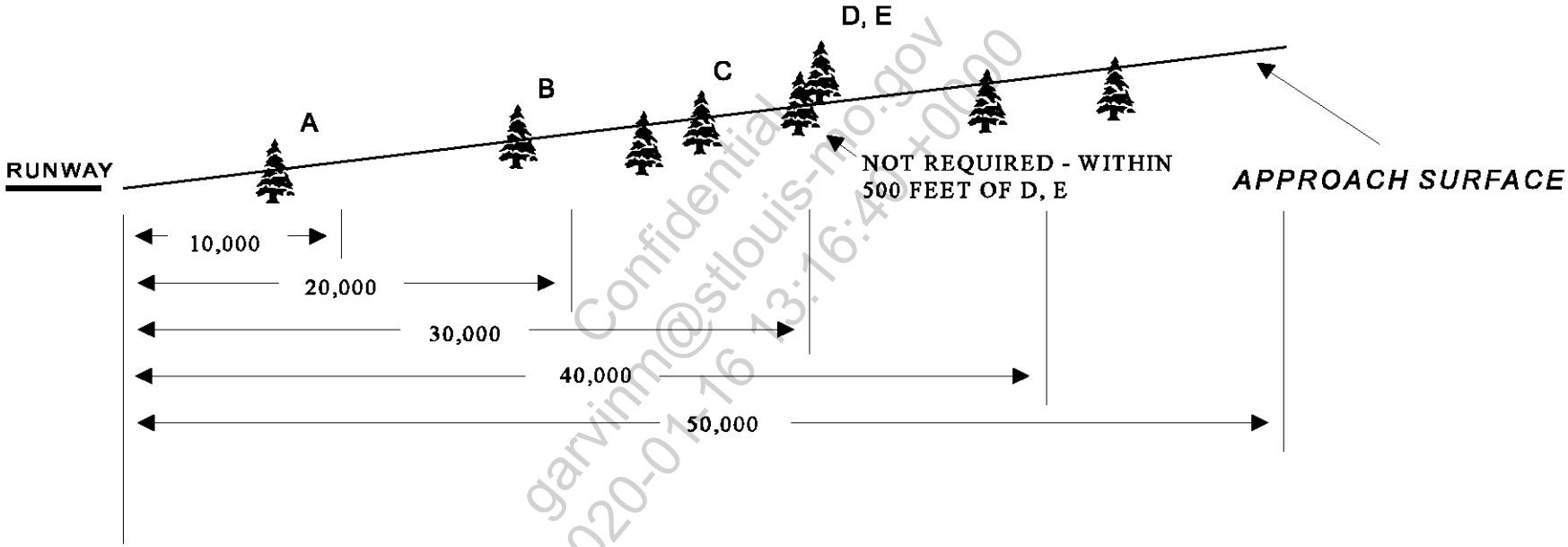
OBSTRUCTION REPRESENTATION IN AN APPROACH AREA SHALL INCLUDE THE HIGHEST APPROACH OBSTRUCTION IN THE:

A- FIRST 10,000 FEET OF THE APPROACH AREA
B- FIRST 20,000 FEET OF THE APPROACH AREA
C- FIRST 30,000 FEET OF THE APPROACH AREA
D- FIRST 40,000 FEET OF THE APPROACH AREA
E- APPROACH AREA

SEE TEXT WHEN OBJECT/OBSTRUCTION CONGESTION OCCURS

SEE TEXT AND FIGURE 2.7 FOR OBSTRUCTING AREA REQUIREMENTS



THIS FIGURE EXPLAINS OR CLARIFIES CERTAIN DATA REQUIREMENTS - SEE TEXT AND STYLE SHEET OC 000 FOR COMPLETE STANDARDS

DIMENSIONS ARE IN FEET

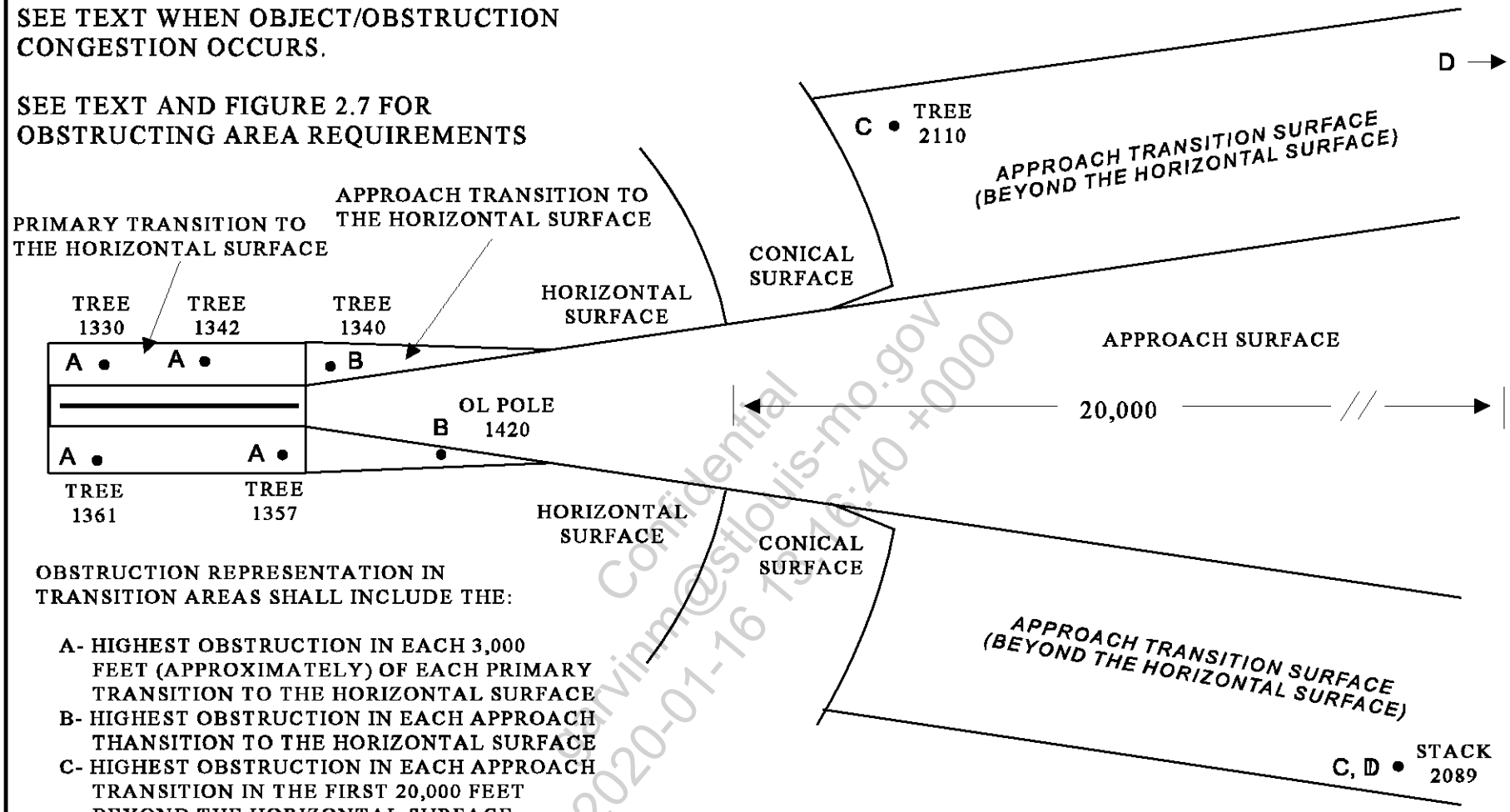
NOT TO SCALE

FIGURE 2.5

OBSTRUCTION REPRESENTATION IN AN APPROACH AREA

SEE TEXT WHEN OBJECT/OBSTRUCTION CONGESTION OCCURS.

SEE TEXT AND FIGURE 2.7 FOR OBSTRUCTING AREA REQUIREMENTS



OBSTRUCTION REPRESENTATION IN TRANSITION AREAS SHALL INCLUDE THE:

A- HIGHEST OBSTRUCTION IN EACH 3,000 FEET (APPROXIMATELY) OF EACH PRIMARY TRANSITION TO THE HORIZONTAL SURFACE
B- HIGHEST OBSTRUCTION IN EACH APPROACH THANSITION TO THE HORIZONTAL SURFACE
C- HIGHEST OBSTRUCTION IN EACH APPROACH TRANSITION IN THE FIRST 20,000 FEET BEYOND THE HORIZONTAL SURFACE
D- HIGHEST OBSTRUCTION IN EACH APPROACH TRANSITION BEYOND THE HORIZONTAL SURFACE

DIMENSIONS ARE IN FEET

THIS FIGURE EXPLAINS OR CLARIFIES CERTAIN DATA REQUIREMENTS - SEE TEXT AND STYLE SHEET OC 000 FOR COMPLETE STANDARDS

NOT TO SCALE

FIGURE 2.6

OBJECT REPRESENTATION IN TRANSITION AREAS

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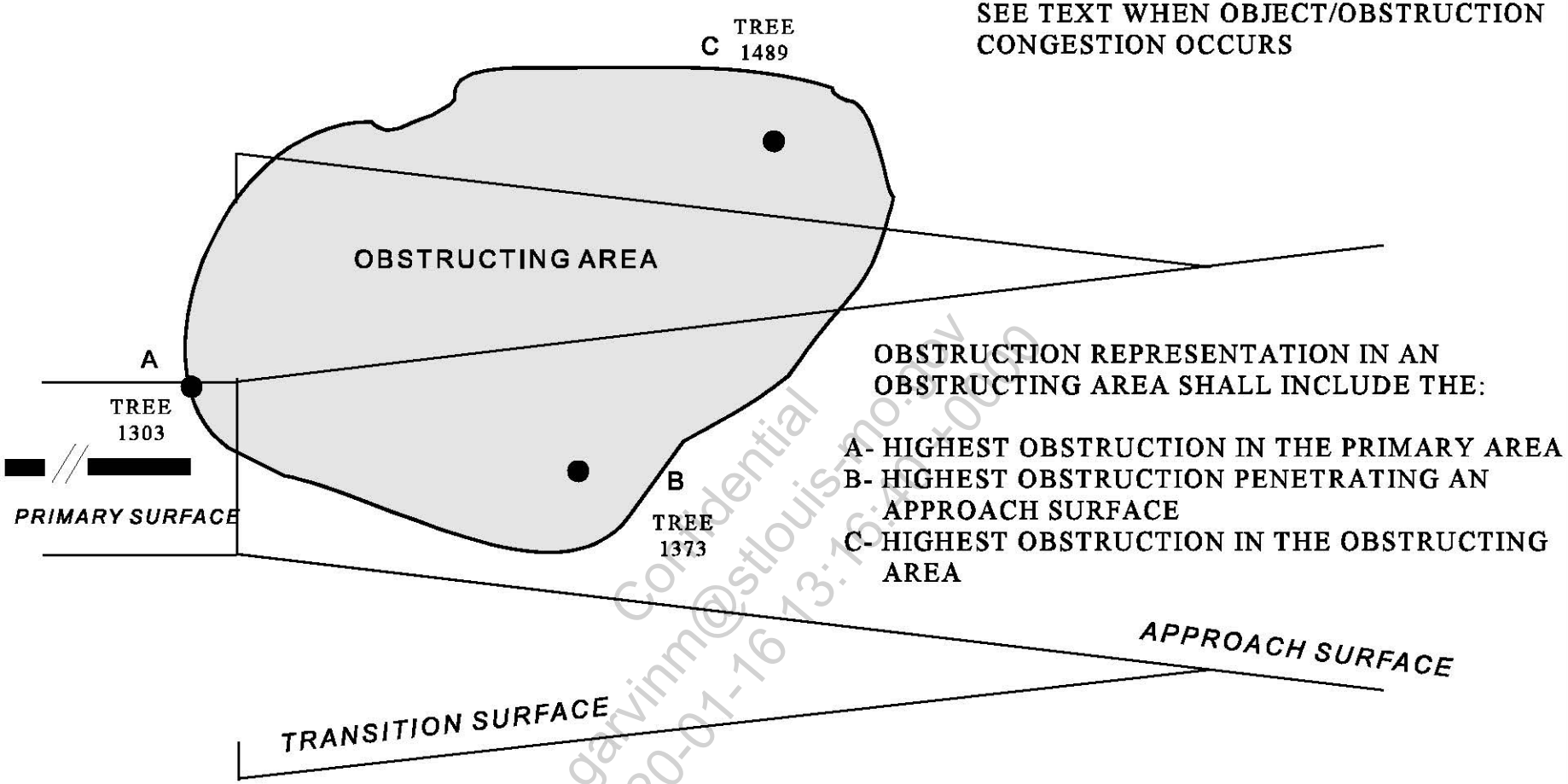

DIMENSIONS ARE IN FEET

NOT TO SCALE

THIS FIGURE EXPLAINS OR CLARIFIES CERTAIN DATA REQUIREMENTS - SEE TEXT AND STYLE SHEET OC 000 FOR COMPLETE STANDARDS

FIGURE 2.7

OBSTRUCTION REPRESENTATION IN OBSTRUCTING AREAS ON THE AIRPORT PLAN

9/1/96

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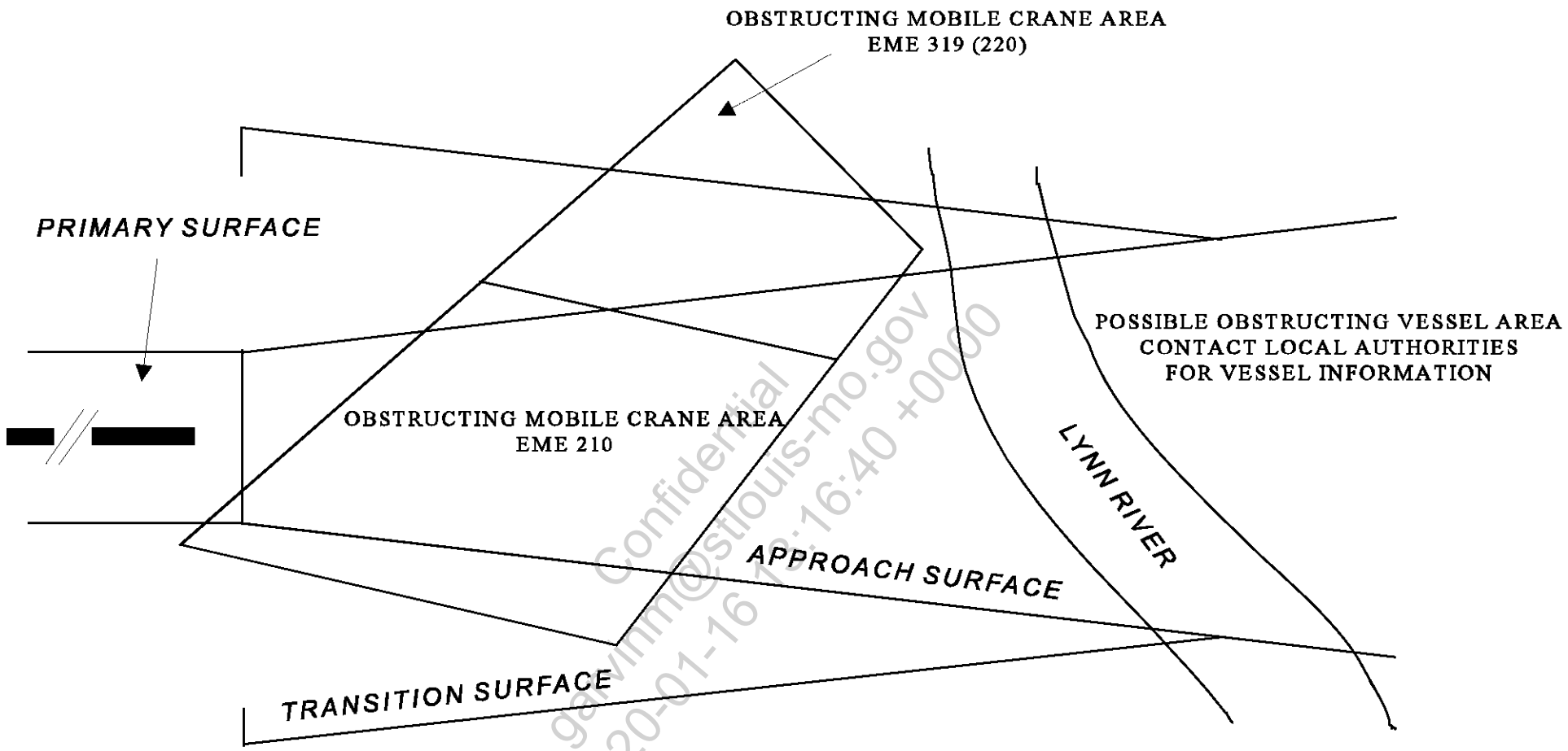


THIS FIGURE EXPLAINS OR CLARIFIES CERTAIN DATA REQUIREMENTS - SEE TEXT AND STYLE SHEET OC 000 FOR COMPLETE STANDARDS

DIMENSIONS ARE IN FEET

FIGURE 2.8

NOT TO SCALE

OBSTRUCTING VESSEL AND MOBILE OBJECT AREA DEPICTIONS AND ASSOCIATED NOTES ON THE AIRPORT PLAN

9/1/96

FAA NO. 405

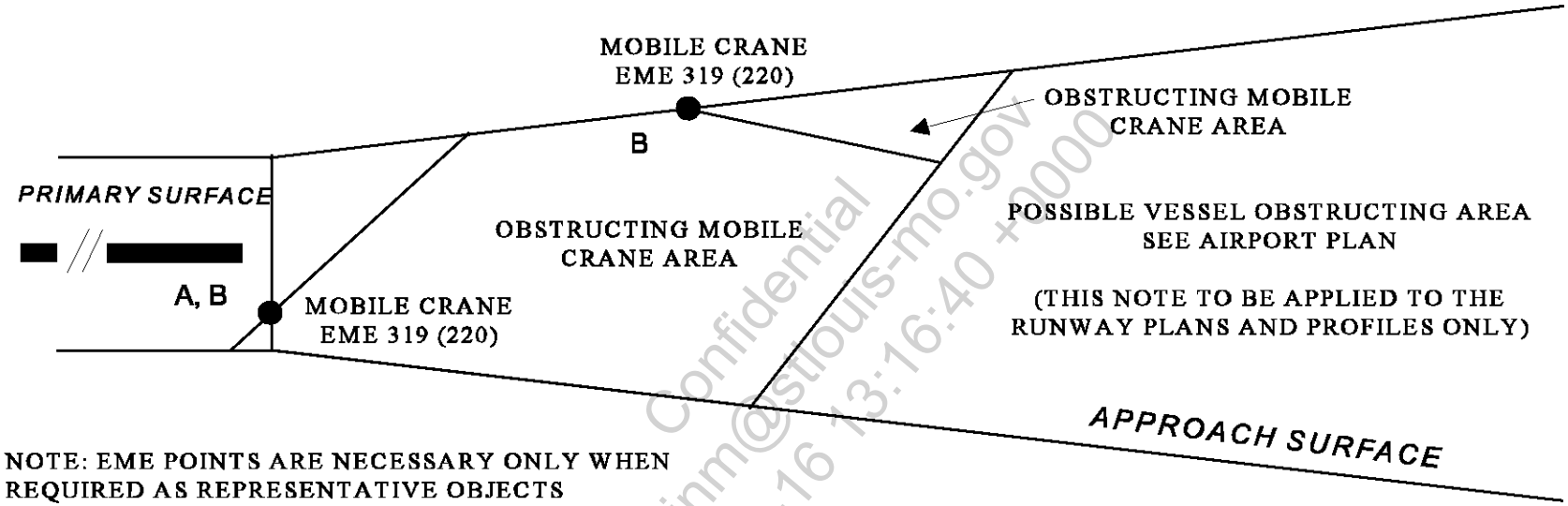
EME POINTS SHALL BE SELECTED FOR THE RUNWAY PLANS AND PROFILES AND AOC SURVEY DIGITAL PRODUCTS AT THE:

A- POINT NEAREST TO THE RUNWAY CENTERLINE END FOR PRIMARY SURFACE PENETRATIONS

B- MOST PENETRATING POINT FOR APPROACH SURFACE PENETRATIONS

C- AS APPROPRIATE TO REPRESENT THE AREA

AN EME POINT SHALL NOT BE CARRIED ON THE AIRPORT PLAN UNLESS IT IS THE HIGHEST OBJECT OUTWARD FROM THE RUNWAY END, IS HIGHER THAN THE RUNWAY END, AND IS LOCATED IN THE PRIMARY OR FIRST 2,000 FEET OF AN APPROACH.



NOTE: EME POINTS ARE NECESSARY ONLY WHEN REQUIRED AS REPRESENTATIVE OBJECTS

NOTE: AREA LIMITS ARE NOT SHOWN ON THE RUNWAY PLANS AND PROFILES. THEY ARE ILLUSTRATED HERE FOR ORIENTATION ONLY.

THIS FIGURE EXPLAINS OR CLARIFIES CERTAIN DATA REQUIREMENTS - SEE TEXT AND STYLE SHEET OC 000 FOR COMPLETE STANDARDS

DIMENSIONS ARE IN FEET

FIGURE 2.9

NOT TO SCALE

OBSTRUCTING VESSEL AND OBSTRUCTING MOBILE OBJECT AREA ESTIMATED MAXIMUM ELEVATION (EME) POINTS FOR RUNWAY PLANS AND PROFILES AND DIGITAL PRODUCTS

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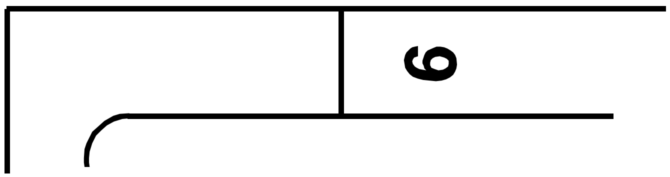
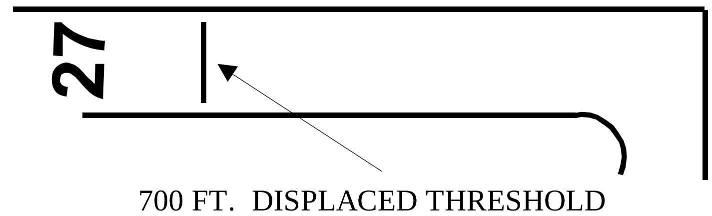
RELOCATED THRESHOLD



LEADERS MAY BE USED AS REQUIRED WITH BLAST PADS AND STOPWAYS - ALWAYS LEADER DISPLACED THRESHOLDS

DISPLACED THRESHOLD



BLAST PAD
(ALWAYS DASHED)

RUNWAY NUMBERS SHALL BE DEPICTED AS PAINTED ON THE RUNWAY AT THE TIME OF THE FIELD SURVEY. IF A NUMBER IS NOT PAINTED ON THE RUNWAY, THE RUNWAY NUMBER PUBLISHED IN THE “U.S. TERMINAL PROCEDURES” CURRENT THE TIME OF THE FIELD SURVEY WIL BE DEPICTED WITH THE BASE OF THE NUMBER APPROXIMATELY 100 FEET FROM THE THRESHOLD.

STOPWAY
(ALWAYS DASHED)

STOPWAY SURFACE TYPE SHALL BE LABELED “PAVED” FOR PAVED SURFACES AND “UNPAVED” FOR ALL OTHER SURFACE TYPES

DISPLACED THRESHOLD AND STOPWAY LENGTHS SHALL BE LABELED IN WHOLE FEET

THIS FIGURE EXPLAINS OR CLARIFIES CERTAIN DATA REQUIREMENTS - SEE TEXT AND STYLE SHEET OC 000 FOR COMPLETE STANDARDS

DIMENSIONS ARE IN FEET

FIGURE 2.10

NOT TO SCALE

THRESHOLD, STOPWAY, BLAST PAD, AND
RUNWAY NUMBER DEPICTIONS ON THE AIRPORT PLAN

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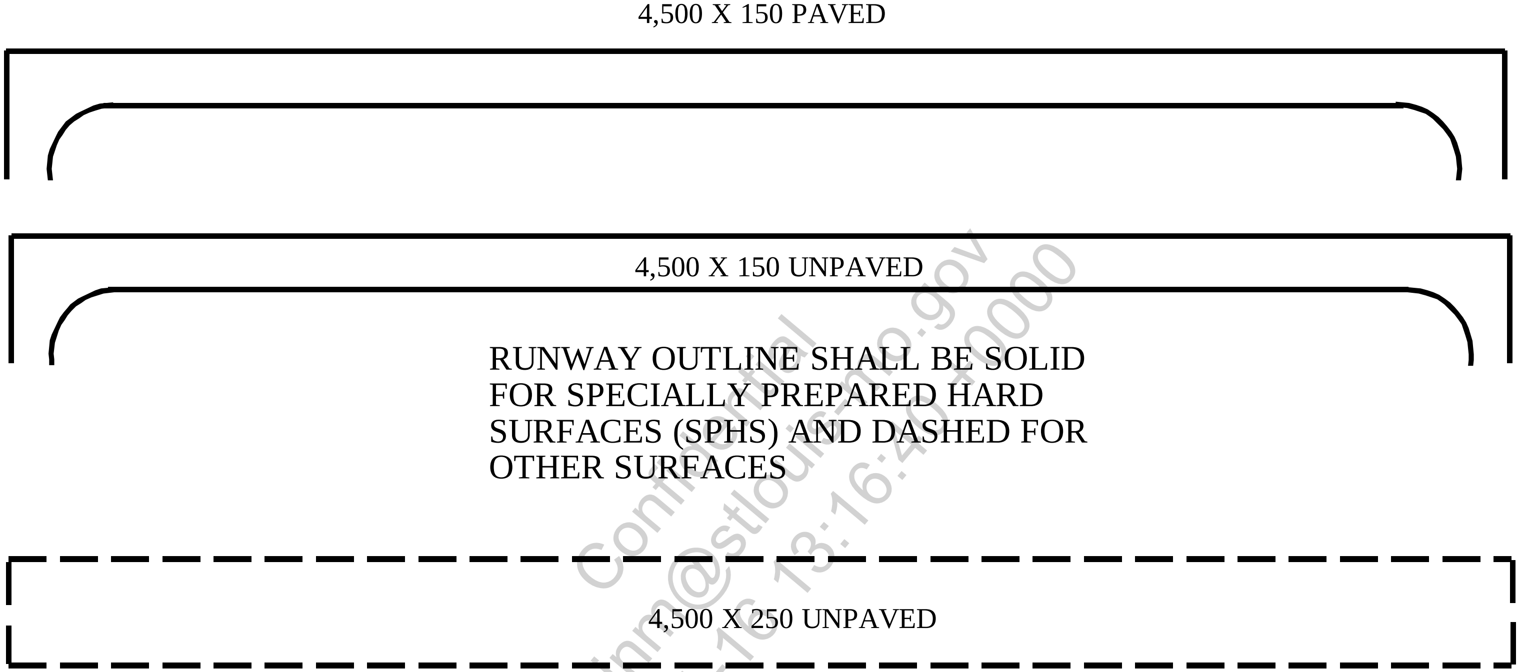
RUNWAY SURFACE TYPE SHALL BE LABELED "PAVED" FOR PAVED SURFACES AND "UNPAVED" FOR OTHER SURFACE TYPES

RUNWAY LENGTH AND WIDTH SHALL BE LABELED IN WHOLE FEET



RUNWAY OUTLINE SHALL BE SOLID FOR SPECIALLY PREPARED HARD SURFACES (SPHS) AND DASHED FOR OTHER SURFACES

FAR - 77 PRIMARY SURFACE ENDS 200 FEET BEYOND RUNWAY FOR SPHS RUNWAYS AND AT RUNWAY END FOR NON-SPHS RUNWAYS

THIS FIGURE EXPLAINS OR CLARIFIES CERTAIN DATA REQUIREMENTS - SEE TEXT AND STYLE SHEET OC 000 FOR COMPLETE STANDARDS

DIMENSIONS ARE IN FEET

NOT TO SCALE

FIGURE 2.11

RUNWAY LENGTH AND SURFACE TYPE DEPICTIONS ON THE AIRPORT PLAN

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