U.S. Department
of Transportation
Federal Aviation Administration

Advisory Circular

Subject: General Guidance and Specifications for Submission of Aeronautical Surveys to NGS: Field Data Collection and Geographic Information System (GIS) Standards

Date: 3/29/2006

Initiated by: AAS-100

AC No: 150/5300-18

a. Purpose of this Advisory Circular (AC).

This AC provides the specifications for the collection of airport survey data through field and office methodologies in support of aeronautical information and airport engineering surveys. It also explains how to submit data to the Federal Aviation Administration (FAA), which will forward the data to the National Geodetic Survey (NGS) for quality control purposes. The primary purpose of these general guidelines and specifications is to list the requirements for aeronautical surveys conducted at airports in support of the Federal Aviation Administration (FAA) Airport Surveying–GIS Program. The FAA's Office of Airport Safety and Standards (AAS-1) administers this program. The surveys covered in this document provide critical information to the operation and safety of the National Airspace System (NAS) and are classified as critical by the International Civil Aviation Organization (ICAO). ICAO defines data as critical when "there is a high probability when using corrupted critical data that the continued safe flight and landing of an aircraft would be severely at risk with the potential for catastrophe." The information furnished under these standards includes runway and stopway data, navigational aid (NAVAID) data, obstruction data, and data on various airport features, including taxiways, aprons, and landmark features. Most of this information is source data, which is acquired by field survey and/or remote sensing methods.

b. Application.

FAA and the NGS Aeronautical Survey Program (ASP) recommend the guidance and specifications in this AC for all airport projects. This AC describes an acceptable means, but not the only means, of collecting and submitting airport survey and Geographic Information System (GIS) data in support of aeronautical information surveys. Airport projects receiving Federal grant-in-aid assistance must use these standards. At certificated airports, the guidance and specifications may be used to satisfy specific requirements of Title 14, Code of Federal Regulations (CFR), Part 139, Certification of Airports.

David L. Bennett
Director, Office of Airport Safety and Standards

This page intentionally blank

TABLE OF CONTENTS

PART 1. GENERAL INFORMATION AND SPECIFICATIONS

CHAPTER 1. INTRODUCTION

This information collected according to these standards and specifications is used in part to complete the following tasks;

- Develop instrument approach and departure procedures
- Certify airports for certain types of operations
- Determine maximum takeoff weights
- Update aeronautical publications
- Provide geodetic control for engineering projects
- Assist in airport planning and land use studies, and for other miscellaneous activities.

FAA and the National Geodetic Survey (NGS) developed these specifications for surveys at airports in support of the FAA Airport Surveying–GIS Program. These requirements and standards must be complied with, without deviation, until amended by formal FAA/NGS specification action.

Refer all questions about the interpretation and use of these standards to the Manager, Airport Engineering Division (AAS-100), Office of Airport Safety and Standards, Federal Aviation Administration, Washington, DC 20591.

CHAPTER 2. ADMINISTRATION

2-1. SPECIFICATIONS

This document provides general specifications, standards, and guidelines for conducting airport surveys. FAA and NGS developed these specifications for capturing the data used in selected U.S. Government aeronautical data and related products. In addition, the contractor may be issued a Statement of Work (SOW) in the contract agreement for each airport. The SOW will provide detailed and often unique survey information about the individual airport survey requirements. The SOW will take precedence over these General Specifications where they differ. However, the requirements for reporting deviations, unusual circumstances, etc. described in the following paragraphs apply to both the General Specifications and to the SOW.

2-2. CONVENTIONS

The following conventions have been adopted for these guidelines and specifications.

- The verbs “will” and “must” mean compliance is mandatory.
- The verb “should” implies that compliance is strongly recommended but not required.
- The contraction “N/A” means not applicable.
- The term “position” means horizontal position (latitude and longitude) unless specified otherwise.
- The term “elevation” means the distance of a point above a specified datum, measured along the vertical direction of gravity.

- The term “vertical” refers to the direction in which the force of gravity acts.
- The term “height” means the distance, measured along a perpendicular, between a point and a datum (refer to Chapter 3, National Spatial Reference System).
- The term “observation” means the survey observations resulting in a position and/or elevation for the survey mark in question, whether it is pre-existing or newly set.
- The term “set” means physically constructed.
- Use the U.S. Survey Foot (3.280833333… feet = 1 meter) for any length conversions. If required by state law to use another value, identify this requirement in the project plan.
- “Airport Authority” refers to the administrators at an airport awarding the contract or their designated representatives.

2-3. CONTRACTOR GENERAL REQUIREMENTS

The contractor will provide all labor, equipment, supplies, material, and transportation to produce and deliver data and related products as required under these General Specifications. The contractor will be responsible for ensuring that all employees (including sub-contractors) meet all airport security requirements and that employees follow any other Airport Authority requirements, including making arrangements for escorts, radios, and training.

2-4. U.S. GOVERNMENT GENERAL REQUIREMENTS

The Government will provide the contractor with the following:

2-4-1. Receipt Acknowledgement

NGS Aeronautical Survey Program (ASP) Point of Contact (POC) will acknowledge receipt of both the Survey and Quality Control Plan (refer to Chapter 5) and the Final Project Report within 2 working days. This acknowledgment, typically via an e-mail from NGS ASP POC to the contractor and FAA Airport Surveying–GIS Program Manager, will also signify the start of the NGS ASP review.

2-4-2. Survey and Quality Control Plan Review

NGS ASP will provide the contractor and FAA Airport Surveying–GIS Program Manager with an approval or comment letter, via email, as soon as possible, normally within 5 working days. If the NGS ASP approves the plan, the contractor may then perform the airport survey. If the plan is rejected, the contractor must make corrections and resubmit the plan.

2-4-3. Final Report

NGS ASP will perform a quality assurance assessment of the submitted data, review the Final Project Report, and complete a final written report. The report will include the findings of a remotely sensed analysis and list any discrepancies discovered relating to these specifications. NGS ASP will deliver the final report electronically to the Airport Authority and FAA within 10 working days. FAA will determine the course of action following the receipt of this report.

2-4-4. Aeronautical Data Collection and Analysis Tool (ADCAT)

The contractor will download the latest version of the ADCAT software from the FAA Airport Surveying–GIS Program website at http://airports-gis.faa.gov . This software is designed to standardize field survey data collection and compile standardized output for delivery to FAA.

The software will allow the user to dynamically analyze obstacles relative to the specified Obstruction Identification Surfaces (OIS)—for example, CFR Part 77, the software will provide the surveyor the ability to use functions in the surface model library and provide tools that will provide analysis information to ensure that the minimum requirements have been met.

2-5. MODIFICATIONS

The contractor must submit all requests for modifications in writing to the FAA Airport Surveying–GIS Program Manager and airport authority as soon as the contractor becomes aware of them and no later than 1 week prior to the Task Order due date.

2-6. UNUSUAL CIRCUMSTANCES

The contractor will notify the FAA Airport Surveying–GIS Program Manager of any unusual circumstances occurring during the performance of these General Specifications that might affect the deliverables or their quality. The Airport Surveying–GIS Program Manager will then contact and/or consult with the NGS POC and Airport Authority about these circumstances. Any deviation, except those specified in the SOW, must be noted.

2-7. MAINTENANCE AND CALIBRATION

All surveying equipment used will have maintenance logs showing routine preventive maintenance and repairs. The Final Project Report will include equipment model and serial numbers and Electronic Distance Measuring Instrument (EDMI) calibrations. If a hand–held EDMI is used, its distance-measuring accuracy will be compared to a distance measured with a calibrated EDMI and the results also reported in the Final Project Report.

2-8. REPORTS

Thorough reporting is required. The contractor must submit a Survey and Quality Control Plan prior to beginning any fieldwork (refer to Chapter 5, Survey and Quality Control Plan) and a Final Project Report (refer to the individual “survey type” sections for more details) to the FAA Airport Surveying–GIS Program Manager and the NGS POC. The prime contractor’s firm name must be included on all reports.

2-8-1. Project Status Report

In addition to the two reports listed above, the contractor must submit a project status report via email to the FAA Airport Surveying-GIS program Manager and NGS POC every Monday by 2:00 P.M. Eastern Time, from the date of the task order until the work is completed. These reports must include the percentage complete for each of the major portions of the work, the status of ongoing work (with expected completion dates), with the date work is completed, and any unusual circumstances and/or deviations from these General Specifications. Status reports should be brief and contain the current information in the text of the email.

2-9. ORIGINAL DATA

Original[0] observation logs, exchange files, and other records generated during a project are legal records that must be retained for data accountability by the Airport Authority.

Always submit the original version of the data to the Airport Authority, not a handmade copy, a photocopy, or a digital copy. The contractor will provide NGS a copy of the original data for quality assurance purposes. Original logs and records must be legible, neat, clear, accurate, and fully completed in indelible black ink. All available entries on the recording forms should be completed or indicated as N/A. Original data will be saved, unmodified, whether in handwritten or computer recorded form.

2-9-1. Corrections or Revisions to Data

In the original records (paper or digital), nothing is to be erased or obliterated. If a mistake is made on a form, draw a single line through the mistake (i.e. ~~through the mistake~~) and write the correction above or to the side. If space is too limited to permit a field correction, restart with a new log sheet; however, do not recopy the form in the office in order to make a "clean" copy. An explanatory note should be made for all corrections to the original recorded figures. All editing of computer recorded data will be done on a copy of the original.

CHAPTER 3. NATIONAL SPATIAL REFERENCE SYSTEM (NSRS)

All surveying and positioning must be tied to the NSRS.

3-1. HORIZONTAL CONTROL

Provide horizontal control referenced to the North American Datum of 1983 and year of the latest observations [abbreviated NAD83 (YYYY)]. Note: The year of observations is on the NGS Data Sheet next to the latitude and longitude.

3-2. VERTICAL REFERENCE

Provide vertical control referenced to the North American Vertical Datum of 1988 (NAVD 88). Infomration regarding NAVD 88 is located at the following website. http://www.ngs.noaa.gov/PUBS_LIB/NAVD88/navd88report.htm.

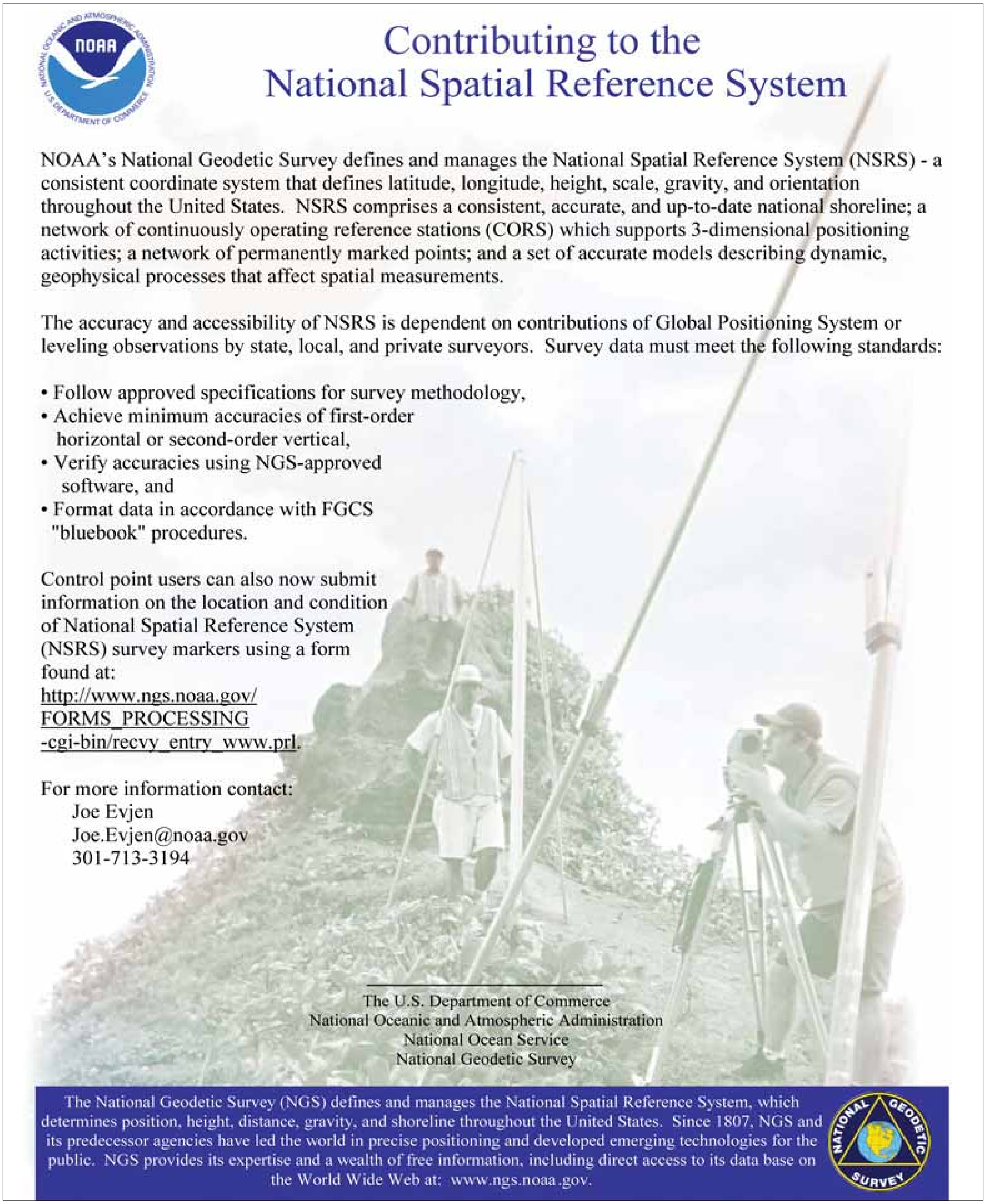
Reference all Ellipsoidal Heights to NAD 83 (GRS 80) realization.

Note: In Alaska and other areas outside the continental United States where NAVD 88 bench marks are not available, the contractor must make the global positioning system (GPS) ties to tidal bench marks within the project area.

3-3. GEOID MODEL

Use the most recent NGS model, which is currently GEOID03. For information regarding GEOID03 refer to the follwing website http://www.ngs.noaa.gov/GEOID/GEOID03/. Note: GEOID heights derived from the GEOID03 model are only reliable within Continental United States (CONUS).

Note: Coordinates for North Carolina High Accuracy Reference Network (HARN) stations are not available from NGS. To obtain the HARN coordinates for these stations, contact the State of North Carolina at (919) 733-3836.



Contributing to the National Spatial Reference System

NOAA's National Geodetic Survey defines and manages the National Spatial Reference System (NSRS) - a consistent coordinate system that defines latitude, longitude, height, scale, gravity, and orientation throughout the United States. NSRS comprises a consistent, accurate, and up-to-date national shoreline; a network of continuously operating reference stations (CORS) which supports 3-dimensional positioning activities; a network of permanently marked points; and a set of accurate models describing dynamic, geophysical processes that affect spatial measurements.

The accuracy and accessibility of NSRS is dependent on contributions of Global Positioning System or leveling observations by state, local, and private surveyors. Survey data must meet the following standards:

- Follow approved specifications for survey methodology,
- Achieve minimum accuracies of first-order horizontal or second-order vertical,
- Verify accuracies using NGS-approved software, and
- Format data in accordance with FGCS "bluebook" procedures.

Control point users can also now submit information on the location and condition of National Spatial Reference System (NSRS) survey markers using a form found at: http://www.ngs.noaa.gov/FORMS_PROCESSING-cgi-bin/recvy_entry_www.prl.

For more information contact:
Joe Evjen
Joe.Evjen@noaa.gov
301-713-3194

The U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Ocean Service
National Geodetic Survey

The National Geodetic Survey (NGS) defines and manages the National Spatial Reference System, which determines position, height, distance, gravity, and shoreline throughout the United States. Since 1807, NGS and its predecessor agencies have led the world in precise positioning and developed emerging technologies for the public. NGS provides its expertise and a wealth of free information, including direct access to its data base on the World Wide Web at: www.ngs.noaa.gov.

Figure 1.1. The National Spatial Reference System

CHAPTER 4. ACCURACIES

The data collected for the FAA Airport Surveying–GIS Program is critical to the operation and safety of the National Airspace System. Data collected may include any one or a combination of the following:

- Runway end positions
- Runway vertical profiles
- Positions and elevations of navigational aids (NAVAIDs)
- Positions and elevations of obstructions
- Airport features

The geographic coordinate accuracies of this data must meet or exceed the requirements specified in these General Specifications and in the following documents:

- AC 150/5300-16, *General Guidance and Specifications for Aeronautical Surveys: Establishment of Geodetic Control and Submission to the National Geodetic Survey*

- AC 150/5300-17, *General Guidance and Specifications for Aeronautical Surveys: Airport Imagery Acquisition and Submission to the National Geodetic Survey*

The aeronautical data may be collected by a combination of remotely sensed and field survey methods. When determining the best method of collection, take into account accuracy and efficiency. Remote sensing techniques do not currently meet the accuracy requirements of some aeronautical features and therefore must be collected by field survey. Most linear features, some obstacles, and visual NAVAIDs are usually more efficiently collected by remote sensing techniques than by using traditional field surveying methods. NGS has found the most accurate product is produced when image control points are established, imagery is geo-referenced, geospatial vector files are compiled, and field verification is performed within 12 months of the imagery acquisition. This timeframe allows the field survey to validate all point features within the data logger (ADCAT) using the OIS model.

4-1. GEODETIC CONTROL

The permanent survey monuments established in the airport vicinity must meet all accuracy requirements and other criteria specified in AC 150/5300-16, *General Guidance and Specifications for Aeronautical Surveys: Establishment of Geodetic Control and Submission to the National Geodetic Survey*. These monuments and their accurate connections to the NSRS assure accurate relativity between all surveyed points on an airport and the National Airspace System, including navigation satellites.

4-2. IMAGERY

The georeferenced imagery of the survey area must meet the accuracy requirements specified in AC 150/5300-17, *General Guidance and Specifications for Aeronautical Surveys: Airport Imagery Acquisition and Submission to the National Geodetic Survey.*

4-3. REMOTELY SENSED SURVEYS

Geospatial vector features extracted from remote sensing technologies must have spatial accuracies reported in ground distances at the 95-percent confidence level. Root-mean-square error (RMSE) should be used to estimate spatial accuracies. Testing is the preferred method of reporting accuracy, where the RMSE is computed by taking the square root of the average of the set of squared differences between twenty or more check point coordinate values and the coordinate values from an independent source of higher accuracy. However, if less than twenty check points are available for testing, then accuracy must be reported as a deductive estimate based on knowledge of errors in each production step. For deductive estimates, Federal Geographic Data Committee (FGDC) compliant metadata and the Survey and Quality Control report should include a reference to complete calibration tests and must describe assumptions about error propagation.

4-3-1. Accuracy Requirements
The accuracy for geospatial vector airport features (taxiway, aprons, ramps, buildings, etc.) must be within 5 feet horizontally and 10 feet vertically. Geospatial features used for geographic orientation (major highways and roads, lakes, rivers, coastline, and other items of landmark value) must be within 20 feet horizontally and 10 feet vertically relative to the NSRS. Derived elevations must be within 10 feet vertically. No point will fall outside the accuracy requirements identified in these General Specifications.

4-3-2. Feature Extraction
Due to the critical nature of aeronautical data, it is important that features are both positioned and attributed accurately. The spatial resolution and vertex spacing must be adequate to guarantee accurate representation of features and not compromise the accuracies stated above. Resolution is defined within this document as the smallest spacing between two display elements, expressed as dots per inch, pixels per line, or lines per millimeter. Also consider the attribute accuracy. Collecting and identifying attributes from imagery requires skill and knowledge of interpreting aeronautical features. The user must be familiar with the feature classes, attributes, and valid record entries used to identify spatial features contained within this Advisory Circular.

4-4. FIELD SURVEYS

Each type of field survey (Airport Obstruction Chart, Area Navigation Approach, Navigational Aid, etc.) has its own unique requirements; although some requirements might be common to two or more of the survey types. For example, Airport Obstruction Chart (AOC), Area Navigation Approach (ANA), and NAVAID surveys all have the same accuracy requirements for positioning navigational aids. Refer to the appropriate section in these General Specifications for the accuracy requirements of a particular survey type.

CHAPTER 5. SURVEY AND QUALITY CONTROL PLAN

5-1. GENERAL REQUIREMENTS

The contractor must check all data to ensure that it is complete, reliable, and accurate. The contractor's personnel will become thoroughly familiar with these General Specifications, the Appendices, the definitions of aeronautical and surveying terms, and the material covered in other cited references and publications, as required. In addition, before beginning any field work, the contractor will submit a proposed Survey and Quality Control Plan to the FAA Airport Surveying–GIS Program Manager and NGS POC. NGS highly recommends that the contractor perform the remote sensing survey before the field survey portion of the project.

5-2. REMOTE SENSING AND FIELD SURVEY

The Survey and Quality Control Plan should include the remote sensing, field survey, data collection, and data processing methods and procedures; the survey instrumentation (models and specifications), and the observing plan to be used for the project. NGS recommends that a combination of remote sensing and ground survey techniques be employed to accomplish the survey. The plan must include a report on the combinations of methods to be used and discuss how results will be compared. The plan should indicate how discrepancies between the remote sensing survey and ground survey will be resolved. The contractor must report any deviation from the original plan to the FAA Airport Surveying–GIS Program Manager immediately.

The plan may include, but is not limited to, the following:

- Geo-referencing: Describe in detail the plan for utilizing geo-referenced (aero-triangulated) imagery with acceptable accuracies.
- Feature Extraction: Detail methodologies for collecting airport features, such as airport buildings, the aircraft movement areas, landmark features, and obstructing area limits (3D), with the required horizontal and vertical accuracies.
- Obstruction Analysis: Provide a detailed description of the remote sensing and field survey methods used to identify, locate, and observe the required obstacles relative to the specified Obstruction Identification Surfaces as stated in these General Specifications. The contractor needs to describe the data collection methods with the required horizontal and vertical accuracies.
- Prior Survey Data: Describe the procedure to use previous airport survey data if available and specify the source of the previous data.
- Field Survey Methods: Identify the methods for data collection and processing to be used for observing required features. Include a description of the methods of analysis in the report.
- Geodetic Control: Describe a plan for connecting to and verifying all existing airport control to be used during the survey. The Primary Airport Control Station (PACS) and Secondary Airport Control Stations (SACS) must be used.
- Runway Data: Describe the methods for the ground survey and data collection to be used for identifying, locating, and observing all required runway data.
- NAVAID Data: Describe the survey techniques and procedures used for identifying, locating, and observing the required navigational aids associated with the airport.
- Airport Feature Data: Provide a detailed description of the procedures and methods that will be used for identifying, locating, and observing the required airport feature data associated with the airport.

- Equipment Listing: Provide a complete listing of the equipment to be used in the survey, including model and serial numbers, calibration reports, and equipment maintenance reports. This will include field survey and remote sensing hardware and software.

5-3. QUALITY CONTROL

The Survey and Quality Control Plan must include the quality control (including error analysis) procedures and practices to be followed during data collection and provide traceability and adherence to the requirements of these General Specificationis standard. At a minimum, the plan will include the following:

- Brief summary of methods to be used to help ensure high-quality data.
- Description of the quality control measures in place to ensure that all data will be checked, complete, and reliable and meet the accuracy requirements in these General Specifications.
- Evidence that the methods used to collect the various types of features will meet the desired accuracies.
- Description of data back up and archive procedures and methods to be used to ensure that the original data will not be modified.
- Explanation of the method that will be used to check all file formats and a summary of the file-naming convention for all electronic files.

CHAPTER 6. DATA FORMATS

All data collected must be submitted to the Airport Authority and the FAA Airport Surveying–GIS Program. All geospatial digital data must be inventoried in the Final Project Report and identify the physical file formats. In order to facilitate communication and exchange of information, the following standard formats will be used:

6-1. GROUND CONTROL DATA

Newly established ground control data should be submitted to NGS for inclusion into the National Spatial Reference System (NSRS). This data must be formatted to meet NGS blue book standards as required by AC 150/5300-16, *General Guidance and Specifications for Aeronautical Surveys: Establishment of Geodetic Control and Submission to the National Geodetic Survey*.

6-2. DIGITAL IMAGES FROM HAND-HELD CAMERA

Use the JPEG (Joint Photographic Experts Group) format for digital images taken with a hand-held digital camera. This includes the required images of photo points.

6-3. DOCUMENTS OR SKETCHES

Provide reports and diagrams, such as Runway End sketches, in Portable Document Format (PDF).

6-4. GEOSPATIAL VECTOR FILES

The Airport Surveying–GIS Program will initially support the following 3D geospatial vector file formats:

- DWG/DXF (Autodesk AutoCAD)
- SHP (ESRI Shapefile)
- DGN (MicroStation Design File V7/V8)

The contractor must submit requests to use other geospatial vector file formats in writing to the FAA Airport Surveying–GIS Program Manager. All geospatial vector files must conform to the data content specified in Part 2 and Appendix 3, Section 3-1, of this AC.

6-5. EXCHANGE FILE

The output of the data logger (ADCAT) will conform to the Exchange File Format specified in Appendix 2, Section 2-5, Exchange File Format.

CHAPTER 7. SURVEY METHODOLOGY

7-1. REMOTELY SENSED SURVEY METHODOLOGY

Using some method of geo-referencing, either analytical (such as an analytical plotter) or digital (softcopy remote sensing workstation), the user must generate a geo-referenced stereo model[1] of the area encompassed by the Obstruction Identification Surface (OIS) in order to perform a remotely sensed obstruction analysis and to extract cartographic features.

7-1-1. Obstruction Analysis

Quite often, features that cannot be detected by a field survey party are detectable through remote sensing. A stereo model referenced to the OIS model is an ideal method to—

- Analyze features relative to the OIS.
- Verify all required obstacles.
- Collect any required obstacles that were not determined by the field survey.
- Delineate areas of obstructing ground, trees, or buildings.

7-1-2. Feature Extraction (Vector Collection)

When the type of survey requires cartographic features—such as obstacles, airport movement areas, buildings, roads, and water areas—they may be extracted from a stereo model. These features must be collected in three dimensions (x, y, and z). The format must be a 3D ESRI shapefile, MicroStation design file, or AutoCAD drawing file, which can be imported into the Airport Surveying–GIS Program Geographic Information System Database. The attribution must conform to Part 2 and/or Appendix 3, Sections 3-1 or 3-2.

---

[1] The mental impression of an area or object seen as being in three dimensions when viewed stereoscopically on photographs, also called spatial model, stereoscopic image or stereoscopic model. Department of Defense, Glossary of Mapping, Charting and Geodetic Terms, 4th Edition, 1981.

7-2. FIELD SURVEY METHODOLOGY

The methods of locating and establishing the coordinate values for the required features may consist of various surveying methods. All methods require proper equipment operation as defined by the manufacturer's operating instructions and will adhere to proper and ethical survey techniques and analysis. Field survey methodology may include conventional, GPS, and/or other surveying techniques. New methodologies must be approved and fully explained in the Survey and Quality Control Plan. All methodologies must meet the horizontal and vertical surveying accuracy requirements in these General Specifications, which range from 1.2 inches (3 cm) to 100 feet (30.5 m).

CHAPTER 8. SURVEY WORK

8-1. PURPOSE

The primary objective is to collect field survey data critical to the operation and safety of the NAS. The data collected is used to develop instrument approach and departure procedures, certify airports for certain types of operations, determine maximum takeoff weights, update aeronautical publications, provide geodetic control for engineering projects, assist in airport planning and land use studies, and conduct other miscellaneous activities.

8-2. DATA

The project will include accurate positions and elevations of specific points along runways, runway vertical profiles, positions and elevations of NAVAIDs, positions and elevations of obstructions, and positions and elevations of certain non-obstructing obstacles. For some survey types, data portraying aircraft movement and apron areas, prominent airport buildings, selected roads and other traverse ways, cultural and natural features of landmark value, and miscellaneous and special request items will also be acquired. The accuracy of this data must meet the standards published in this AC.

8-3. PREPARATION

The first step involves evaluating the requirements as stated in the supplemental instructions within the SOW. A careful review of all available data and images will enable the survey team to begin the survey work in an efficient way and to conduct all necessary interviews in a positive and professional manner. The following list will enable the survey team to prepare for the survey. If each item listed below is addressed, the survey team will be ready to begin the survey:

- Ensure a thorough understanding of the OIS to be surveyed, as well as the specifications and requirements outlined in this AC and applicable SOW.
- Note specified and supplemental runway end conditions.
- Note the specific items required for collection by the specific survey requirements or supplemental instructions such as runway data, new NAVAIDs, changes in threshold location etc.
- Check for special requirements for NAVAIDs.
- Review imagery and USGS quadrangles of the airport (a terrain analysis tool).
- Prepare a list of questions for interviews.

- Review Geodetic Control Station descriptions (PACS and SACS) in the NGS Database.
- Review the U.S. Terminal Procedures and airport diagrams at http://avn.faa.gov/index.asp?xml=naco/online/d_tpp or http://avn.faa.gov/index.asp?xml=naco/onlineproducts.
- Review the Airport/Facility Directory.
- Review FAA Form 5010, Airport Master Record, at http://www.gcr1.com/5010web/.
- Coordinate with airport authorities.

Appendix 1 contains additional information and references for review.

8-4. CONTACT WITH AIRPORT AUTHORITIES

Close communication with airport management is critical. Appointments with airport management should be made well in advance to ensure a qualified airport representative is available to discuss the survey. Proper clearances to work in the aircraft operations areas must be obtained prior to performing any work at an airport. A security and safety briefing may be required before field crews are allowed access to the airfield. Follow standard safety procedures and equip all vehicles with flashing yellow lights and radios capable of receiving Air Traffic Control ground and aircraft frequencies. Contact with the airport traffic control tower is mandatory during surveys at controlled airports unless an escort is provided.

8-5. INTERVIEWS

During the interviews, specific questions should be asked (see lists below) and required forms must be signed. In addition, discuss with airport authorities the runway/stopway data published in the latest editions of the Airport/Facility Directory (A/FD), and U.S. Terminal Procedures (TPP), both U.S. Government Flight Information Publications.

During the survey, additional meetings may be required to discuss unusual circumstances, problems, or newly determined runway lengths that differ from those published. Include in the final report a summary of all such meetings.

Upon completion of the survey, the airport authorities may require a final meeting. Turn in any badges, passes, or keys; discuss any significant and/or unusual findings; and notify the airport authorities of your departure. Avoid discussing specific obstruction problems at this time since the data has not been verified. Especially avoid any statements about approaches being “clear,” since the data is unverified and the requirements for instrument procedure can vary.

Conduct interviews with the following personnel if possible:
- Airport manager/operations
- Airport engineering
- FAA Air Traffic Control
- FAA Airway Facilities

Note that smaller airports might not have persons in all of these areas of expertise or they may not be located at the airport.

8-5-1. Airport Manager/Operations
In this interview, obtain permission to enter the airfield for the survey. This interview can also provide valuable information about recent, ongoing, and future construction; obstruction changes; clearing; and operational considerations (scheduled runway closures or special events, high-security areas on the field, etc.). The name of the airport manager/operations person interviewed must be included on the Runway Data Sheet and in the Final Project Report. The Airport Manager/Operations Checklist below is provided as guidance for conducting the interview.

8-5-2. Airport Engineering
This interview will only be necessary or helpful at larger airports. The Engineering Department can provide specific information about runway dimensions, construction projects, and control stations. They can sometimes be helpful in scheduling runway work. It is helpful to include the Engineering Department point of contact in the Final Project Report in case questions arise after the survey.

8-5-3. FAA Air Traffic Control
If an Airport Traffic Control Tower (ATCT) will be in operation during the time of survey, the survey must be discussed with Chief Control Tower Operator or representative. This interview can provide information on operational factors and facilitate the working relationship between the surveying firm and the controllers. The Tower Chief/Watch Supervisor Checklist below is provided as guidance for conducting the interview.

8-5-4. FAA Airway Facilities Personnel
An interview with FAA Airway Facilities personnel is necessary on any airport with FAA navigational facilities. In some cases, the personnel who maintain the facilities for the airport being surveyed might be located at another site and portions of the interview might need to be done by telephone. The first purpose of the interview is to determine all pertinent facilities and changes to navigational aids within 10 nautical miles surrounding the airport. It might be necessary, as well, to schedule a technician to accompany the contractor to certain facilities to let them through a gate or monitor an alarm while survey personnel are within critical areas of the site. Include the contact information for the assigned FAA Airway Facilities POCt in case questions arise after the survey. The FAA Airway Facilities Personnel Checklist below is provided as guidance for conducting the interview.

AIRPORT INTERVIEW CHECKLISTS

<table>
<tr><th colspan="5">Airport Manager/Operations Interview</th><th colspan="2"></th></tr>
<tr><th colspan="5">Interview Tasks</th><th>Date Completed</th><th>Initials of Survey Party Chief</th></tr>
<tr><td>1.</td><td colspan="4">Introduce team and explain purpose of the survey.</td><td></td><td></td></tr>
<tr><td>2.</td><td colspan="4">Provide a copy of the proposed survey schedule, with work areas identified—preferably on an airport map or diagram. Obtain approval of schedule especially for runway time.</td><td></td><td></td></tr>
<tr><td rowspan="4">3.</td><td rowspan="4">Request permission to work on the airfield and note each of the following items:</td><td>Item</td><td>Yes</td><td>No</td><td rowspan="4"></td><td rowspan="4"></td></tr>
<tr><td>Escort required?</td><td></td><td></td></tr>
<tr><td>Radio required?[2]</td><td></td><td></td></tr>
<tr><td>Other required item(s)[3]</td><td></td><td></td></tr>
<tr><td>4.</td><td colspan="4">Runways – discuss any changes in length, width, or repaving since the last survey. Make note of any items identified on the reverse of or as an addendum to the checklist.</td><td></td><td></td></tr>
<tr><td>5.</td><td colspan="4">Runways – discuss any planned future changes to the runway(s).</td><td></td><td></td></tr>
<tr><td>6.</td><td colspan="4">Obtain and review the current airport obstruction chart or airport layout plan and ask for comments. Make notes directly on the document for field team use.</td><td></td><td></td></tr>
<tr><td>7.</td><td colspan="4">Discuss any questions identified in the contract supplementary instructions.</td><td></td><td></td></tr>
<tr><td>8.</td><td colspan="4">Discuss changes to planimetry, construction, and facilities.</td><td></td><td></td></tr>
</table>

[2] Required Radio Frequency is _________ MHz and preferred call sign is __________________ .
[3] List other required items from line 3 above:

Airport Manager/Operations Interview						
Interview Tasks					Date Completed	Initials of Survey Party Chief
9.	Discuss obstructions relating to the airport.	Discussion Item	Yes	No		
		Has any obstruction clearing been conducted?[4]				
		Are there any plans for obstruction clearing?				
		Are there any new obstructions in the airport vicinity?				
		Request a current engineering drawings or plans for the airport.				
10.	Obtain/verify the airport manager's contact information.	First Name				
		Last Name				
		Address Line 1				
		Address Line 2				
		City				
		State				
		Zip Code				
		Office Telephone Number				
		Cell Number				
		Fax Number				
		Email Address				
11.	Are there any specific requirements for airfield driving.		Yes	No	Date	Initials
12.	Request keys for gates, as required, or obtain point of contact information for field access.	POC Name				
		POC Telephone				
		POC Cell Number				
		Additonal Contact Person Information	Name			
			Number			

[4] Obstruction clearing completed by ______________________________ in (month) ______________ (year) ______ .

Obstruction clearing is planned for (month) ______________ (year) ______ .

Airport Manager/Operations Interview (cont.)

Interview Tasks					Date Completed	Initials of Survey Party Chief
13.	Ask about known survey control on the airport.	Discussion Item	Yes	No		
		Installed PACS and SACS in good condition?				
		Is the manager aware of the importance of the PACS and SACS?				
		Are there any other survey control points on the airport?				
		Are there any future airport changes that may endanger survey marks?				
14.	Request introduction to Tower Chief or other airport officials.					
15.	Request taxiway designation diagram					
16.	Request a current drawing of the airport					

Name of Survey Party Chief		Date
Signature of Survey Party Chief		
Name of Airport Manager or Designee		Date
Signature of Airport Manager or Designee		

<table>
<tr><td colspan="6">Tower Chief/Watch Supervisor Interview</td></tr>
<tr><td colspan="4">Interview Tasks</td><td>Date Completed</td><td>Initials of Survey Party Chief</td></tr>
<tr><td>1.</td><td colspan="3">Discuss radio procedures, call sign, radio communications failure procedures</td><td></td><td></td></tr>
<tr><td>2.</td><td colspan="3">Provide a copy of the proposed survey schedule, with work areas identified - preferably on an airport map or diagram. Obtain approval of schedule especially for runway time.</td><td></td><td></td></tr>
<tr><td>3.</td><td colspan="3">Discuss taxiway designations</td><td></td><td></td></tr>
<tr><td>4.</td><td colspan="3">Inquire about restricted areas, radio and visual blind spots</td><td></td><td></td></tr>
<tr><td rowspan="11">5.</td><td rowspan="11">Obtain/verify the Tower Chief’s contact information.</td><td>First Name</td><td colspan="3"></td></tr>
<tr><td>Last Name</td><td colspan="3"></td></tr>
<tr><td>Address Line 1</td><td colspan="3"></td></tr>
<tr><td>Address Line 2</td><td colspan="3"></td></tr>
<tr><td>City</td><td colspan="3"></td></tr>
<tr><td>State</td><td colspan="3"></td></tr>
<tr><td>Zip Code</td><td colspan="3"></td></tr>
<tr><td>Office Tel. Number</td><td colspan="3"></td></tr>
<tr><td>Cell Number</td><td colspan="3"></td></tr>
<tr><td>Fax Number</td><td colspan="3"></td></tr>
<tr><td>Email Address</td><td colspan="3"></td></tr>
<tr><td rowspan="6">6.</td><td rowspan="6">Request information regarding FAA Airway Facilities personnel.</td><td>POC Name</td><td></td><td></td><td></td></tr>
<tr><td>POC Telephone</td><td></td><td></td><td></td></tr>
<tr><td>POC Cell Number</td><td></td><td></td><td></td></tr>
<tr><td rowspan="3">Other Contact Information</td><td>Contact Name</td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>Contact Number</td><td></td><td></td></tr>
<tr><td colspan="3">Name of Survey Party Chief</td><td colspan="2"></td><td>Date</td></tr>
<tr><td colspan="3">Signature of Survey Party Chief</td><td colspan="2"></td><td></td></tr>
<tr><td colspan="3">Name of Tower Chief or Designee</td><td colspan="2"></td><td>Date</td></tr>
<tr><td colspan="3">Signature of Tower Chief or Designee</td><td colspan="2"></td><td></td></tr>
</table>

<table>
<tr><th colspan="4">FAA Airway Facilities Personnel Interview</th></tr>
<tr><th colspan="2">Interview Tasks</th><th>Date Completed</th><th>Initials of Survey Party Chief</th></tr>
<tr><td>1.</td><td>Discuss changes to NAVAID systems.</td><td></td><td></td></tr>
<tr><td>2.</td><td>Discuss any plans for NAVAID changes in the future.</td><td></td><td></td></tr>
<tr><td>3.</td><td>Provide a copy of the proposed survey schedule, with work areas identified—preferably on an airport map or diagram. Obtain approval of schedule, especially for NAVAID critical areas.</td><td></td><td></td></tr>
<tr><td>4.</td><td>Discuss Inventory of Electronic and Visual NAVAIDs serving the airport</td><td></td><td></td></tr>
<tr><td>5.</td><td>Ask about location, accessibility, and associated requirements and obtain directions to any outlying facilities.</td><td></td><td></td></tr>
<tr><td colspan="2">Name of Survey Party Chief</td><td></td><td>Date</td></tr>
<tr><td colspan="2">Signature of Survey Party Chief</td><td></td><td></td></tr>
<tr><td colspan="2">Name of FAA Airway Facilities Manager or Designee</td><td></td><td>Date</td></tr>
<tr><td colspan="2">Signature of Airway FAA Facilities Manager or Designee</td><td></td><td></td></tr>
<tr><td colspan="4">Additional Remarks:</td></tr>
</table>

8-6. RECONNAISSANCE

The survey reconnaissance should include the following:

- Gathering all available data about the airport.
- Testing and determining that geodetic control monumentation meets requirements.
- Selecting temporary stations sites.
- Collecting terrain information.
- Arranging for access to private or government property.

If the airport authority offers a "familiarization ride" around the airport, it is generally a good idea to accept it both as a gesture of good faith and to learn any shortcuts, trouble areas, or unique characteristics of the airport. The first independent reconnaissance should include recovering control stations (PACS/SACS). and verifying the inventory of navigational facilities. The contractor should use current photographs, the airport diagram, or the Airport Layout Plan (if available) to compare and identify new navigational facilities, new or changed taxiways and aprons, and obvious clearing of obstructions (such as tree cutting). Any differences or changes should be noted for inclusion in the Final Project Report and discussion with airport officials.

8-6-1. Recovery of Existing Survey Marks

The contractor will recover the PACS and two SACS at each airport. Each airport should have these three NGS survey marks in place and may have other, older National Oceanic and Atmospheric Administration (NOAA) marks. A listing of airports with PACS and SACS and the dates they were observed is available at the following NGS website.

http://www.ngs.noaa.gov/AERO/pacsacstat/pacsacstat.htm.

PACS are set to meet high-stability standards and are positioned to meet high-accuracy standards using two, 4+ hour static GPS sessions from the nearest NGS Continuously Operating Reference Station (CORS). SACS have slightly less stringent stability and positioning specifications. For full requirements for PACS and SACS, refer to AC 150/5300-16, *General Guidance and Specifications for Aeronautical Surveys: Establishment of Geodetic Control and Submission to the National Geodetic Survey.* The PACS and SACS at each airport will be used as starting control for all surveys at the airports.

Other NGS, National Ocean Service (NOS), and/or U.S. Coast and Geodetic Survey (USC&GS) survey control may also exist on the airport. In addition, control set by other agencies may exist. Any mark selected must meet all site and stability requirements as identified in AC 150/5300-16, *General Guidance and Specifications for Aeronautical Surveys: Establishment of Geodetic Control and Submission to the National Geodetic Survey* and have been tied to the PACS.

If the PACS and/or either of the SACS is not found, is destroyed, is damaged, or is not usable for some other reason, contact the FAA Surveying–GIS Program Manager immediately. The FAA Surveying–GIS Program will review the situation and may reschedule the contract work at this airport.

8-6-2. Verification or Survey Marks

Verification of the PACS and SACS is required. The verification of each control station will include a physical visit to each control station to determine its usability by checking its identity;

ascertaining its unmoved position; determining its condition, stability, visibility; and the submission of recovery information to NGS.

Two independent GPS sessions must be observed, each at least 10 minutes long with a 5-second collection interval, between the PACS and each SACS, or the distance between the PACS and each SACS must be measured using a calibrated EDMI, and an inverse distance computed. Using the NGS program INVERS3D (available on the NGS website at http://www.ngs.noaa.gov/TOOLS/), compute the inverse distance between the published positions of the PACS and each SACS. The newly measured distances or inverse distances (from new observations) must then be compared against the distances determined from the published positions. Elevation checks must be obtained either from GPS observations or from spirit levels. The distances must agree within 3 cm; the difference in ellipsoidal height must agree to +/– 4 cm, and the difference in orthometric height must agree to +/– 5 cm.

A Recovery Form to submit recovery information for the PACS and SACS to the NGS is available at http://www.ngs.noaa.gov/FORMS_PROCESSING-cgi-bin/recvy_entry_www.prl.

Verification is not required if the contractor performing the survey also established the monumentation by satisfying the requirements of AC 150/5300-16, *General Guidance and Specifications for Aeronautical Surveys: Establishment of Geodetic Control and Submission to the National Geodetic Survey*, for the same airport as part of the same contract.

PART 2. GEOSPATIAL SPECIFICATIONS AND STANDARDS

CHAPTER 9. GEOSPATIAL DETAIL REQUIREMENTS

Geospatial detail collected with remotely sensed or field survey methods consists of airport features such as NAVAIDs, taxiways, and aprons as well as obstacle features and features of landmark value used for general orientation, including shorelines, roads, and railroads. The collection of the linear features must adhere to cartographic rules to ensure topological integrity. These features will be entered into the FAA Airport Surveying–GIS Program Database for GIS analysis and to provide the content with which to create various charts.

9-1. GEOMETRIC REQUIREMENTS

9-1-1. Feature Types

These specifications focus on the definition of 101 geographic features required to depict an airport and its surrounding environment. These include features unique to airports, such as runways and taxiways, as well as more generic features, such as roads and buildings. Each of these 101 types of geographic features is referred to as a Feature Type. A specific instance of a Feature Type is referred to as a Feature Instance. For example, Runways is a Feature Type, but Runway 15R/33L at Boston's Logan International Airport is a Feature Instance. For simplicity in data development and transfer, this standard associates a single geometry with each Feature Type.

9-1-2. Geometry

For the purposes of these specifications, points, lines, and polygons describe geometry. Refer to Part 2, Chapter 10, Collection of Airport Features, and Appendix 3, Section 3-1 (GIS) or 3-3 (CADD) for specific requirements for each feature type.

9-1-2-1. A **point** is the smallest unit of geometry and has no spatial extent. Points are described by two-dimensional (2D) or three-dimensional (3D) coordinates. All feature types except the Airport Reference Point will be collected in 3D coordinates.

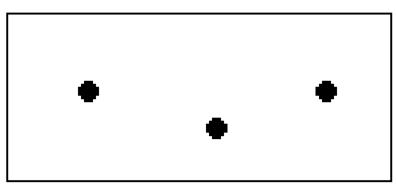


Figure 2-1: Typical depiction of a point

9-1-2-2. A **line** or polyline consists of a connected sequence of points. Start and end points of a line are referred to as start and end nodes. Connecting points that are in between start and end nodes are referred to as vertices. Vertices are intermediate points that define the line structure, curvature, or shape. A start-node and an end-node define a line's directionality. A line can only change direction at vertices and only direction (in 2D or a single plane).

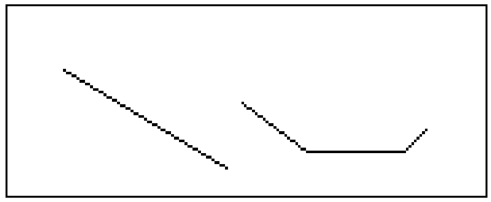


Figure 2-2: Depicts typical examples of a line

9-1-2-3. A **polygon** is a closed figure, or surface, bounded by lines (i.e. a series of lines whose start-node is coincident with another's end-node). These lines form the outer edge of the surface.

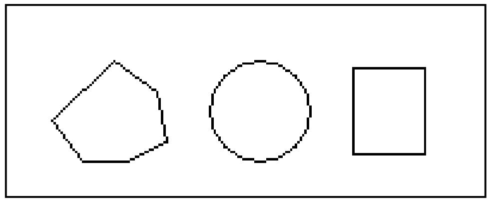


Figure 2-3: Depicts some typical polygon examples

9-1-2-4. Complex Geometry Types, such as arcs, circles, and ellipses, are not included in this standard. This is intended to facilitate data exchange between software handling these complex data types differently. If, in a CADD drawing for example, arcs are used, they must first be broken into a line with vertices placed at intervals sufficient to maintain the accuracy requirements described.

9-1-3. Topological Integrity

The placement of geometric elements (i.e. Feature Instances) in juxtaposition to one another (i.e. next to, connected to, and on top of) is referred to as topology. Topology rules establish requirements for the placement of instances of a Feature Type in relation to one another and in relation to instances of other Feature Types.

To ensure topological integrity, the following guidelines must be followed:

9-1-3-1. Lines

(1). Start-nodes and end-nodes of adjacent line segments belonging to a single feature type must be identical (collocated).

(2). Intersections of lines of the same feature type must be defined by a vertex/node shared by the intersecting lines.

(3). All unintentional dangles (line segments extending beyond the intended end point) and gaps (spaces between line segments that were intended to connect) between lines must be eliminated.

(4). Lines should contain one or more line segments with vertices placed at intervals required so the line feature does not stray from the actual feature by more than the half accuracy limit defined in Part 2 or Appendix A for the Feature Type, as shown below in Figure 2-5.

(5). For lines not naturally joined by physical features (e.g., marking lines), place beginning and ending nodes where an attribute or other property change occurs.

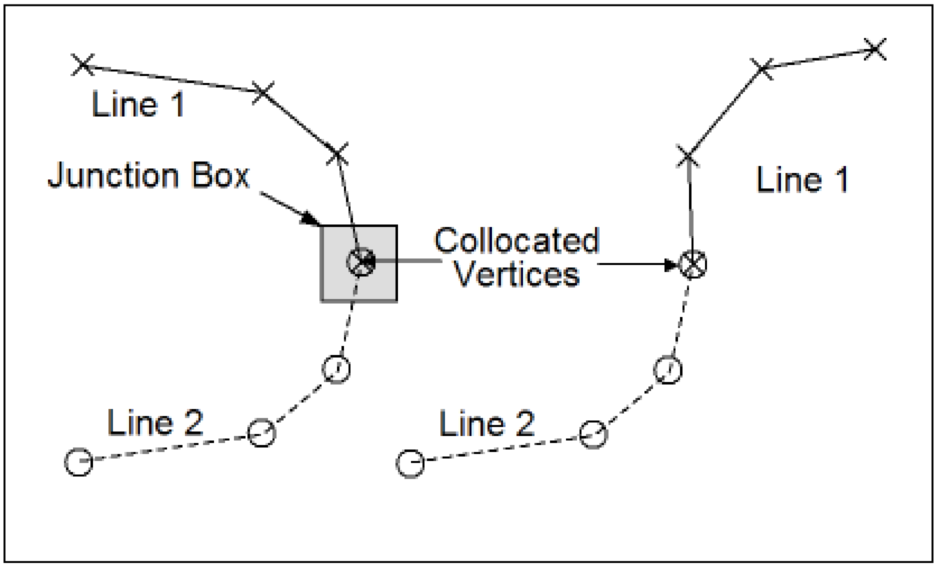


Figure 2-4: Depicts the topology rules for line segments

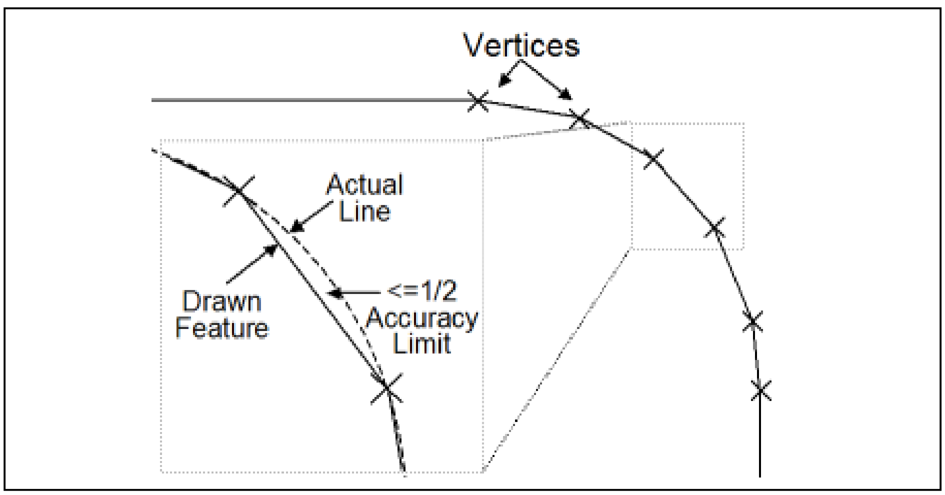


Figure 2-5: Depicting the placement of vertices along a curve

9-1-3-2. Polygons

(1). Geospatial locations of the start-node and end-node of any line forming the edge of a polygon must be identical (coincident) as in Figure 2-6a.

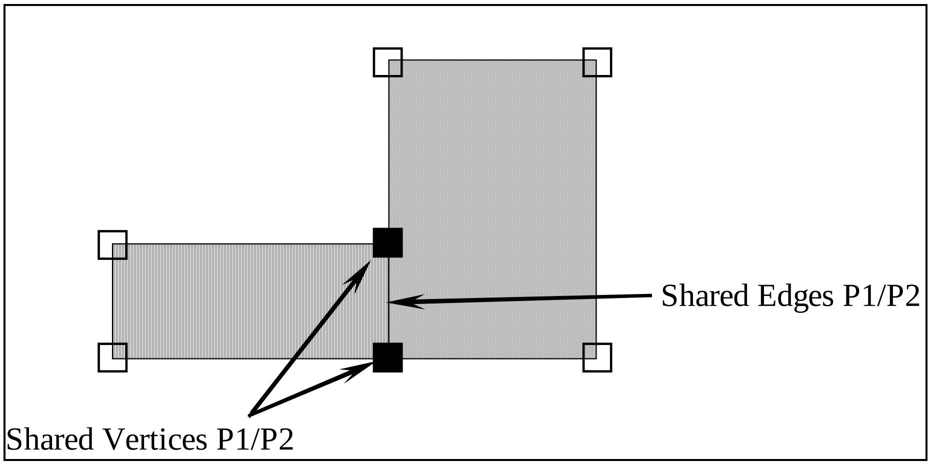


Figure 2-6a: Illustrates the shared edges and shared vertices topological rule

(2). Polygons that share an edge (see Figures 2-6a and 2-6b) must share all vertices along this edge. This must be applied for features of the same feature type and for features of different feature types.

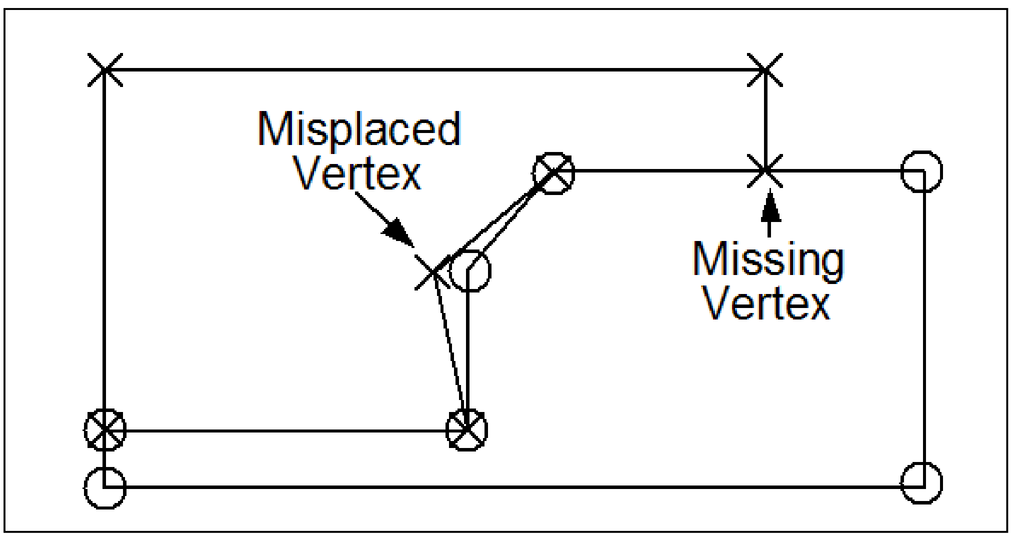


Figure 2-6b: Depicts an example of the placement of vertices of adjacent polygons with misplaced vertices

(3). No polygon will overlap or intersect another polygon of the same type (see Figure 2-7), except for the Runway feature type, for which overlapping polygons are allowed.

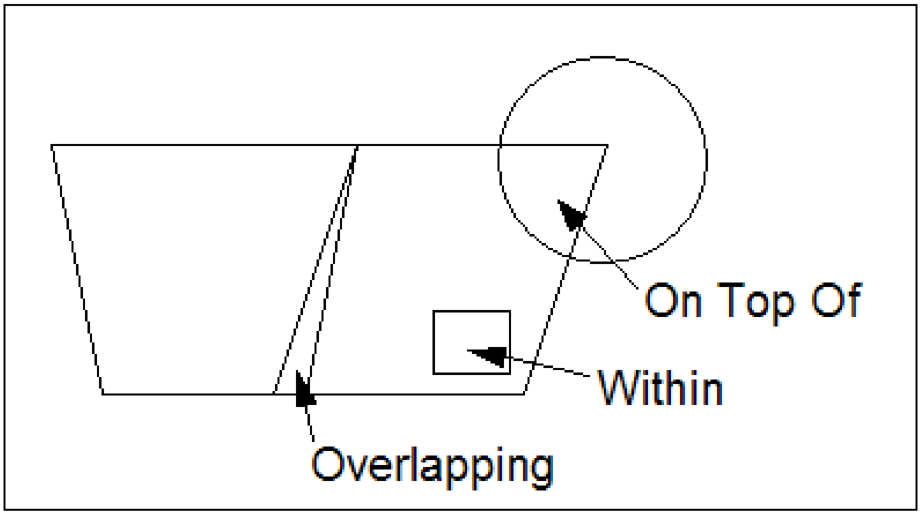


Figure 2-7: Illustrates the topological rule of overlapping polygons of the same feature type

(4). Polygons must always be closed, meaning all vertices must be shared by two adjacent line segments forming the edges of the polygon, as shown in Figure 2-8.

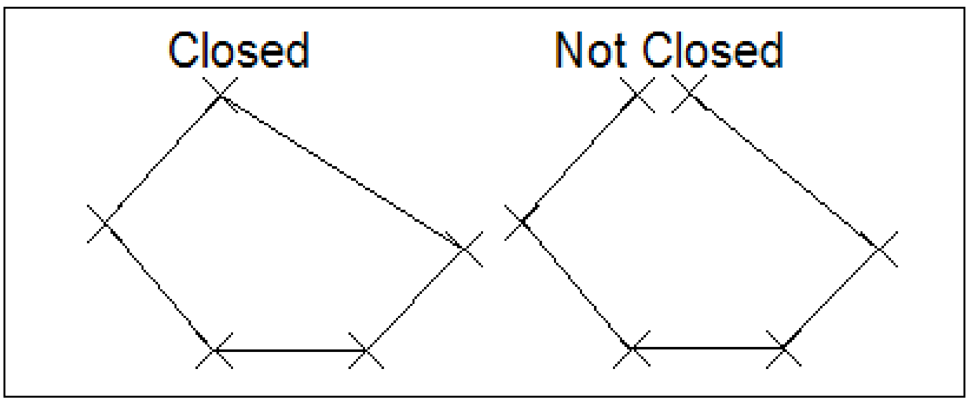


Figure 2-8: Illustrates the difference between closed and unclosed polygons

9-2. LAYERING OF FEATURE TYPES

Each Feature Type corresponds to a single GIS layer and one or more CADD layers in this standard. GIS and CADD software superimpose layers on top of one another to form a map or drawing, as shown in Figure 2-9 below.

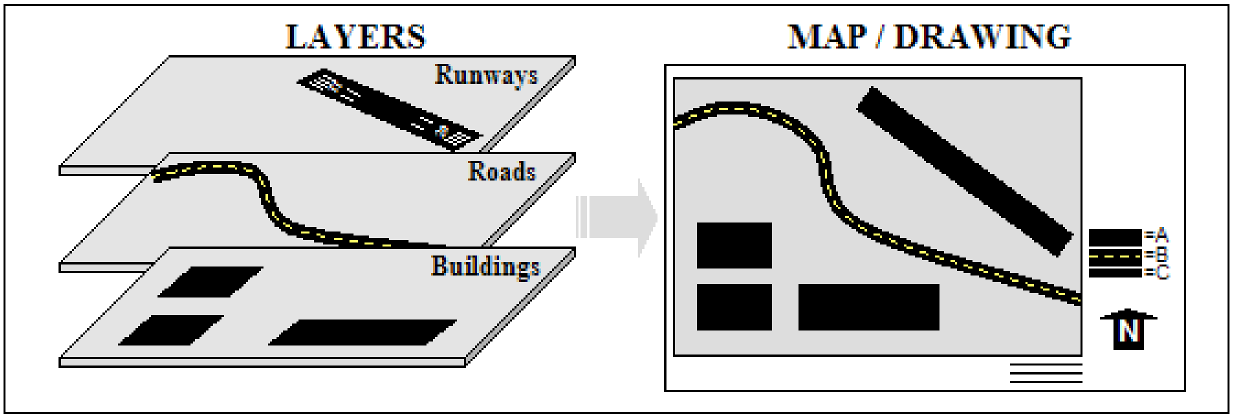


Figure 2-9: Portrays the layering of feature types to form a map or drawing

Because layers are a fundamental element of GIS and CADD software, layers are often associated with tables that contain attributes (e.g., width, material type, condition, etc.), metadata (e.g., accuracy, source, date of relevance, etc.), and properties (i.e. color, line type, etc.). These are covered, respectively, in more detail in the following sections.

9-2-1. Feature Type Layering in GIS Software

GIS software provides a great deal of flexibility when distinguishing, rendering, and annotating different types of features (i.e. Feature Instances) within a single layer (i.e. Feature Type) of a map. Because of this flexibility, features that have the same properties and attributes but have minor differences, such as type and status, can be grouped onto a single layer but still be displayed differently. The result is that fewer layers can be used to represent more real world situations. Currently in this standard, 37 GIS layers are used to represent all of the features deemed relevant to Airport Obstruction Chart and Airport Layout Plan applications. However, additional features are defined in Appendix 3, Section 3-1, which may also be used in airport GIS applications.

9-2-2. Feature Type Layering in CADD Software

In this standard, 763 CADD layers are used to represent the features deemed relevant to airport GIS applications. These layers can be used as a means to structure the data defined by this standard in CADD software. Each CADD layer is consistent with the layer name format used in the A/E/C CADD Standards and the National CADD Standard, which are based on recommendations made in the American Institute of Architects CAD Layer Guidelines (AIA 2001). Please refer to Appendix 3, Section 3-2, for more information about CADD layers associated with the Feature Types defined in this standard.

9-2-3. Relationship of GIS and CADD Layers

Because many more CADD layers can be used to represent the same features represented on far fewer GIS layers, there is a natural many-to-one matching of CADD to GIS layers. In this standard, the CADD layers associated with each GIS layer are listed in Appendix 3, Section 3-2.

9-3. ATTRIBUTES

Attributes add alphanumeric descriptors to the geometry of a feature. Attributes can contain information such as the name, type, or condition of a feature. For example, the attributes of a runway include its designator (e.g., 15R/33L), material type (e.g., concrete) and length (e.g., 6,500 feet). Figure 2-10 below shows a typical list of attributes associated with a Feature Type.

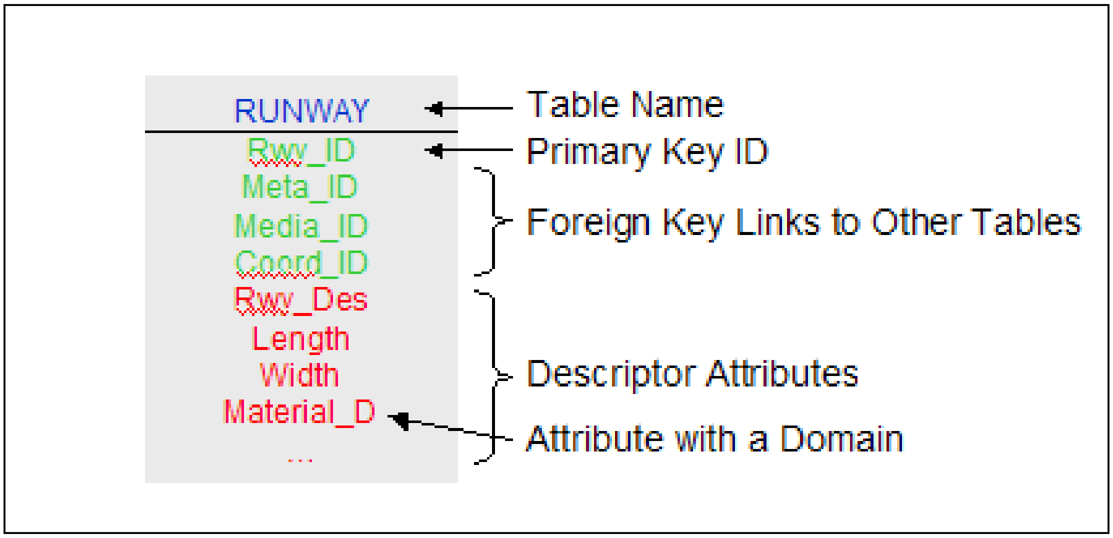


Figure 2-10: Sample Attribute Table for a Feature Type

9-3-1. Domain Values

The values assigned to an attribute are sometimes limited. The range of acceptable values is referred to as the domain for that attribute. Domains limiting attribute values to a range of numeric or date values are referred to as range domains. List domains limit values to a selection of choices. If users can add values to a list of acceptable values and still be compliant with the standard, the list is referred to as a code list. If users cannot add to the list, it is referred to as an enumeration. In this standard, most of the list domains are enumerations, and the name of each attribute with a domain ends with "_D". For each such attribute, there is an associated table in Appendix 3, Section 3-2, listing the acceptable values and their definitions.

9-3-2. Primary Key Identifiers

Primary Keys are attributes used by the system to uniquely identify each record (i.e. feature instances). Primary key values must be globally unique, meaning that there is no other record in the FAA Airports GIS system or any other systems that will exchange data with the FAA Airports GIS system that have the same identifier. Maintaining this uniqueness is critical to ensuring long-term data integrity of the system. To help establish uniqueness, a numeric ID that contains the FAA region, airport location ID, feature type, date, and a timestamp is used. Since FAA region, airport location, and feature type are text values, corresponding numeric values have been assigned in the domain tables found in Appendix 3, Section 3-2.

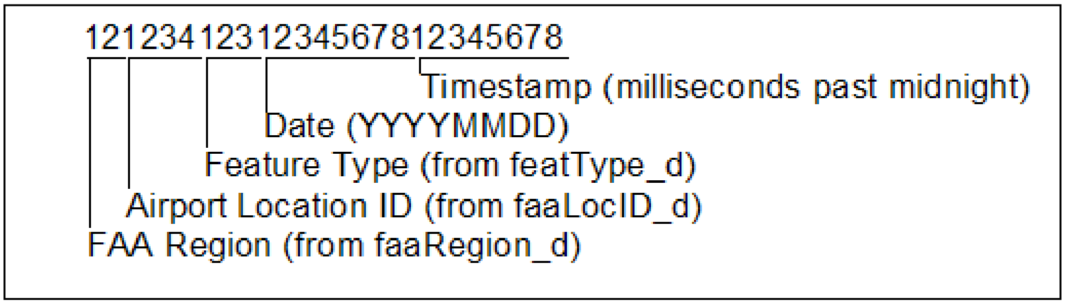


Figure 2-11: Format for globally unique primary keys

9-3-3. Foreign Key Identifiers

Attributes containing primary key values of related records in other Feature Type tables are called foreign key identifiers. Foreign key identifiers provide a link between different types of features with logical relations. For example, a taxiway leading to a runway might carry a foreign key to the runway table populated with the primary key value for that runway.

9-4. METADATA

Metadata is information about the data itself, such as its source, accuracy, and the dates during which it is valid. Metadata values take the form of alphanumeric descriptors of the data and, in this way, are very similar to attributes. For clarity and because they are stored separately, metadata descriptors are referred to in this standard as metadata elements and not as attributes.

Metadata elements can be applied at various levels of data aggregation. They can describe a collection of data submitted at one time. A collection may comprise one or more drawings that contain several layers, such as those that make up an Airport Layout Plan; several individual shape files each representing a layer; a single layer stored in a drawing or shape file; or any other combination of allowable data sets. Metadata elements can also describe all geometry and attributes on a given layer or Feature Type, as is the case with traditional FGDC-compliant metadata. This level of metadata applies if different layers within a collection have different metadata. Next, metadata elements can describe a given feature instance. This level applies when individual features or groups of features within a layer have different metadata. Finally, they can describe the geometry and each attribute of a given feature instance separately.

For this standard, metadata is required at the collection level when data is submitted. The standard also accommodates metadata elements at the feature type, feature instance, and attribute levels. More detailed metadata increases the usefulness of the data provided. Accordingly, data providers are encouraged to submit metadata at the most detailed level possible. This standard uses metadata elements defined by International standards Organization's (ISO) Geographic Information–Metadata Standard (ISO 19115). Of the 409 elements defined in ISO 19115, only 29 are used by this standard because many of the elements defined in ISO are classified as optional or conditional and do not apply to this standard. Furthermore, some of the mandatory elements in the ISO standard are redundant with the specifications of this standard and are therefore not necessary for data exchange. For example, the security classification code is a mandatory ISO element, but since this standard sets the classification code based on the Feature Type, it is not necessary to convey the security classification code in metadata. Figure 2-13 lists each metadata element used in this standard along with the level of applicability. Further details about these metadata elements are provided in Appendix 3, Section 3-4.

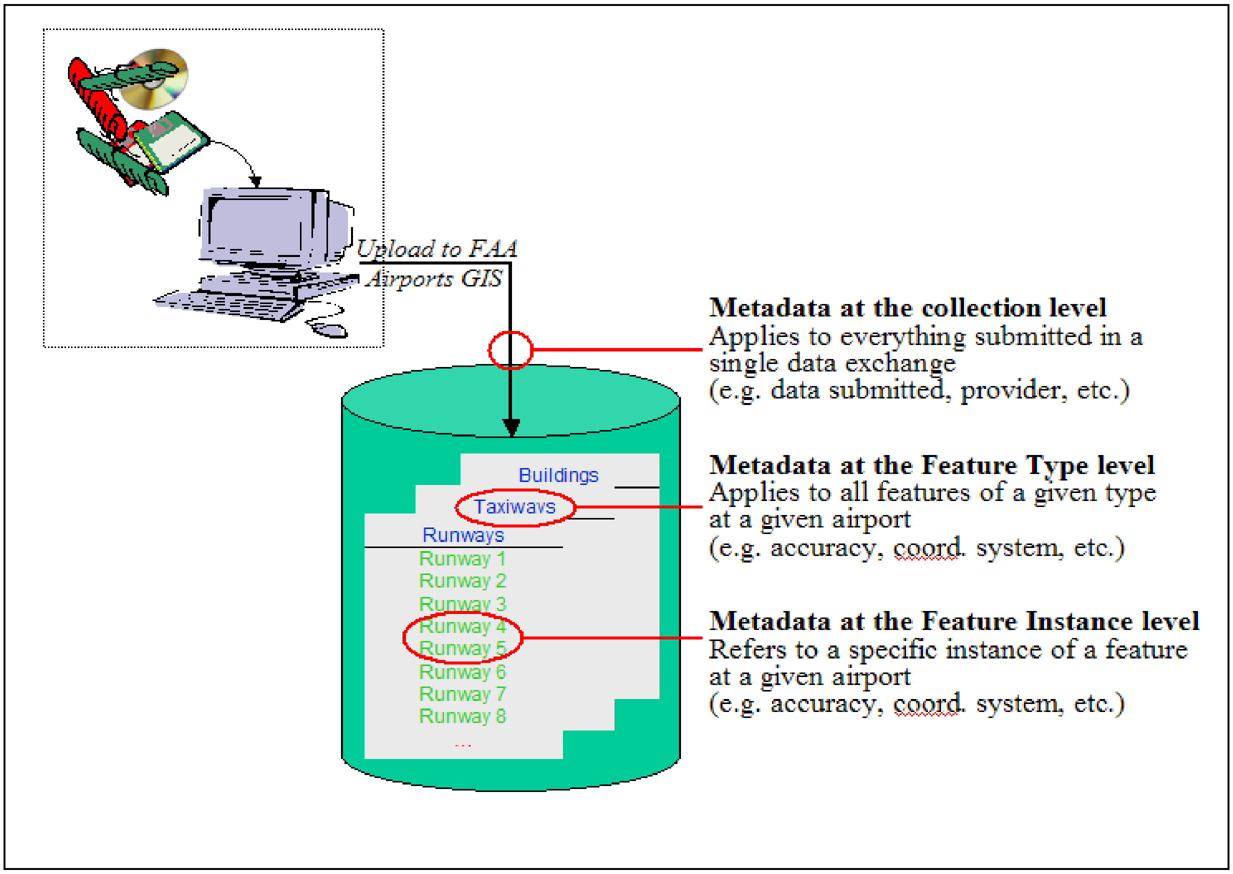


Figure 2-12: MetaData elements have different levels of aggregation

	Collection	Set	Feature
Overview			
Abstract	X	X	X
Status	X	X	X
GeometricObjectCount	X	X	
Scope			
Dataset	X		
Features	X	X	
Attributes			X
Usage			
SpecificUsage	X	X	X
BegusageDateTime	X	X	X
EndUsageDateTime	X	X	X
Source			
Statement	X		
IndividualName	X		
OrganizationName	X		
PositionName	X		
DeliveryPoint	X		
City	X		
AdministrativeArea	X		
PostalCode	X		
ElectronicMailAddress	X		
VoicePhoneLine	X		
Coordinate System			
Projection	X	X	
HorizontalDatum	X	X	
VerticalDatum	X	X	
Code	X	X	
Data Quality			
HorizontalAccuracy	X	X	X
VerticalAccuracy	X	X	X
EvaluationMethodName	X	X	X
EvaluationMethodDescription	X	X	X
Pass	X	X	X
GroundSampleDistance	X	X	X

Table 2-13: List of MetaData elements

9-4-1. Temporal Relevance

One of the most critical metadata elements to the aviation industry is time. With the changes in technology it is possible for data to become outdated. As such spatial data needs to carry an indication of the time period for which it is valid. An aircraft's location along a flight path might only be valid for a moment, whereas the existence of a runway might be valid from when it was authorized for use until further notice. This standard defines the beginning and ending date and the time for which each feature instance is valid. All features must carry a beginning date (i.e. data is valid until further notice), an ending date (i.e. the data expires at a specified time) or both (i.e. the data is valid only during the period specified). These values are held in the begUsageDateTime and endUsageDateTime defined in Appendix 3, Section 3-4. Dates and times should be recorded based on Aeronautical Information Regulation and Control (AIRAC) requirements defined in ICAO Annex 15–Aeronautical Information Services (AIS).

9-4-2. Accuracy

One metadata element particularly important to airport GIS applications is accuracy. Accuracy is broadly defined as the quality of nearness to the true value. For the exchange of data as specified in this standard, it is important to be more specific. This standard, therefore, provides limits for the absolute horizontal positional accuracy of each Feature Type. These limits are described as a maximum number of feet (or metric equivalent) between a feature's actual position and the position indicated in the data provided. The actual position is defined as the feature's true location on the specified datum or ellipsoid. Since the earth's surface has many variations, it is approximated by what is referred to as a GEOID. Furthermore, the difference between a feature's true and recorded positions is required at a 95 percent confidence level. This means that statistically, 95 percent or more of the features provided fall within the required accuracy limit. For some features types, vertical accuracy limits are also provided. These accuracies are expressed as the maximum number of feet a feature's recorded elevation can differ from its actual elevation. Again, the actual elevation is measured from the GEOID elevation at that location. Elevations are also to be provided at a 95 percent confidence level. Accuracy requirements are driven by how the data is to be used. The location of an airport on a map used for aircraft navigation must be much more accurate than its location on a national map of airports intended for informational purposes. This standard provides accuracy guidelines for maps used for Airport Layout Plans and Airport Obstruction Charts. The accuracy guidelines provided in this standard have been derived from several sources and compiled here for standardization. Further information on accuracy definitions and methods to assess the accuracy of existing data can be found in FGDC's Geospatial Positioning Accuracy Standards, Part 3: National Standard for Spatial Data Accuracy (FGDC-STD-007.3-1998).

9-4-3. Security Sensitivity Levels

Another important metadata element is sensitivity level. Because spatial data can be used for nefarious purposes, it is important to protect it from unauthorized users. The Title 49, Code of Federal Regulations, Part 1520, defines Sensitive Security Information (SSI) and how it should be protected. Based on this definition, many forms of spatial data can be considered SSI. Protecting sensitive spatial data is therefore not just good practice, it is the law, however, being too protective of data can unnecessarily limit its usefulness. The challenge is to restrict data to users having an operational need to know and whose credentials the data provider has qualified. With spatial data this challenge is particularly complex because there is such a wide variety of data users and ways in which they need to use the data. One of the more efficient ways of restricting access to spatial data is to apply specific restrictions at the Feature Type level. This standard applies one of the following sensitivity levels to each Feature Type. These are based on classifications listed in the MD_ClassificationCode list in ISO 19115.

- Unclassified data is available for general disclosure.
- Restricted data is not available for general disclosure.
- Confidential data is available to persons who can be entrusted with the information.
- Secret data is to be kept private, unknown, or hidden from all but a select group of people.
- Top Secret data is of the highest secrecy restricting access to only those requiring access to perform their jobs.

Since sensitivity levels are established for each Feature Type by this standard (see Part 2, Chapter 10, Collection of Airport Features, and Appendix 3, Sections 3-1 (GIS) and 3-3 (CADD)), it is not necessary to carry this information (i.e. a classification code in ISO terminology) in the metadata itself.

9-5. COORDINATE SYSTEMS

Spatial data can be provided in a variety of coordinate systems using a variety of datum and units of measure. For the purposes of data exchange, any combination of the following alternatives is acceptable.

9-5-1. Acceptable Coordinate Systems

To be compliant with this standard, spatial data must be submitted in either a latitude/longitude (i.e. projected) or a standard state plane (i.e. grid based) coordinates system.

9-5-1-1. Latitude/longitude data must be provided decimal degrees with negative value longitudes for data in the Western hemisphere.

9-5-1-2. State plane data must provide data in U.S. survey feet as defined by any of the accepted U.S. State Plane Coordinate System definitions.

9-5-2. Acceptable Datum

With regard to spatial data, a datum is a reference to an approximation of the earth's surface or a GEOID. The following datum should be used for spatial data that is submitted in compliance with this standard.

9-5-2-1. All horizontal data must be submitted referenced to mustthe North American Datum of 1983 (NAD83).

9-5-2-2. All vertical data must be referenced to the North American Vertical Datum of 1988 (NAVD88).

9-6. ACCEPTABLE DATA FORMATS

Submit Airport spatial data defined in this standard to FAA by uploading one or more of the following file types at the FAA Airport Surveying–GIS Program website (http://airports-gis.faa.gov/).

9-6-1. Airport Survey Data

This data must be submitted using the FAA/NGS-developed Aeronautical Data Collection and Analysis Tool (ADCAT). This software program is available from the FAA Airport Surveying–GIS Program website (http://airports-gis.faa.gov/).

9-6-2. Airport Layout Plan Data

Digital versions of Airport Layout Plans and other vector data defined in this standard should be submitted in one of the following formats.

- Autodesk DWG format (version 2002 or later) with attributes defined as object data.
- Microstation DGN format (version X or later).
- ESRI Shape File format with attributes and metadata elements provided as attributes within each shape file.
- Level 0 Profile of Geographic Markup Language (GML) (version 3) and in compliance with the Air Model of the FGDC Framework Data Standards.

9-6-3. Raster Imagery

Raster data is a form of spatial data where rectangular cells each carrying a value are organized into rows and columns. One of the most common forms of raster data is digital imagery in which each cell or pixel of the image carries a grayscale value in the case of black-and-white photographs or red/green/blue values in the case of color photographs. Images taken from aerial or satellite platforms can be orthorectified, meaning that the cells or pixels of the image are positioned to represent their true position on the face of the earth (i.e. removing distortions caused by camera angle, terrain, etc.). Figure 2-14 provides an example of an orthorectified raster image of an airport. Orthorectified raster imagery can be uploaded to the FAA Airport Surveying–GIS Program website (http://airports-gis.faa.gov/). Imagery requirements are specified in AC 150/5300-17.

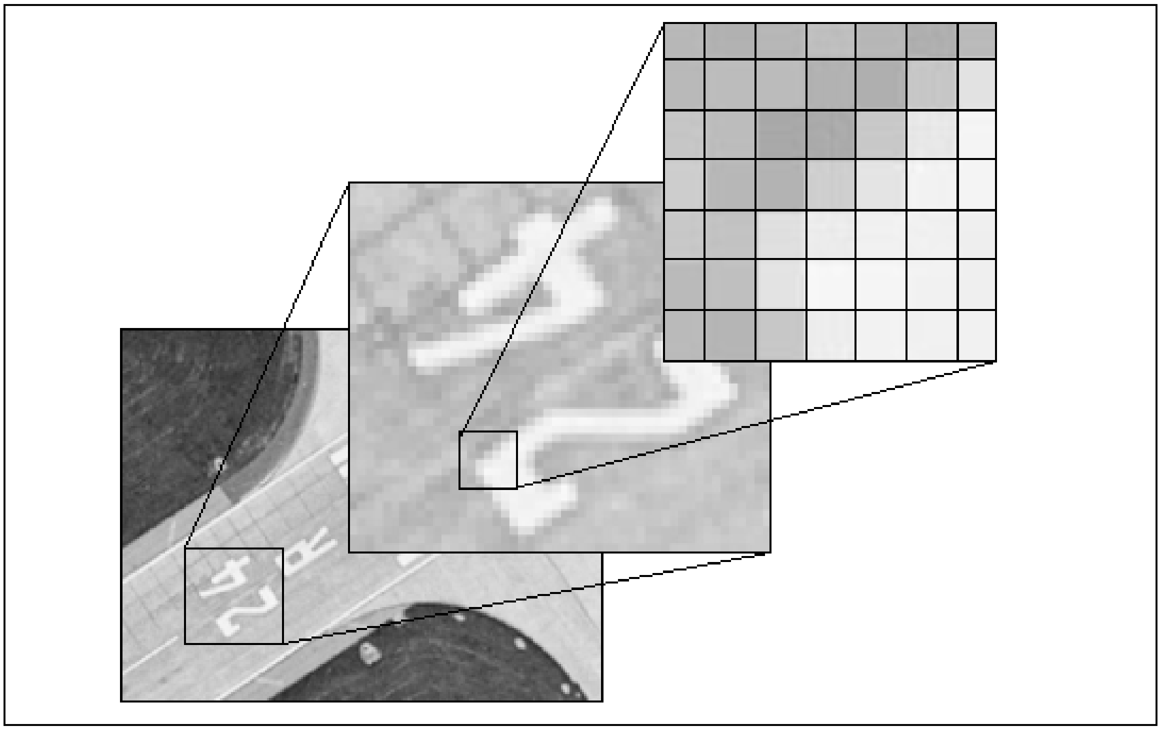


Figure 2-14: Example of Raster Imagery

CHAPTER 10. COLLECTION OF AIRPORT FEATURES

The following is a list of airport features that may be collected either through remote sensing and/or field survey methods. There is an additional category of required features where the collection methodology is not specified. Each feature is described by geometry type, feature group, sensitivity, requirements, positional accuracy, data capture rule, and the attributes required to provide the content for either an Airport Obstruction Chart or an Airport Layout Plan. The features are subdivided into three categories of collection methodology—*remotely sensed*, *field survey*, or *combination of remotely sensed and field survey*—depending on accuracy requirements and efficiency. Additional features defined and contained within the Airport Surveying–GIS Program database are defined in Appendix 3, Section 3-1 (GIS) and associated CADD Layers in Section 3-3 for other airport GIS applications.

10-1. REMOTELY SENSED FEATURES

The first category of airport features comprises those features most efficiently collected by remote sensing methods. These features include all landmark segment (refer to feature type landmark segment below) features collected as vector data and obstacles. Verify all obstacles collected by remote sensing methods by field survey methods.

10-1-1. Apron

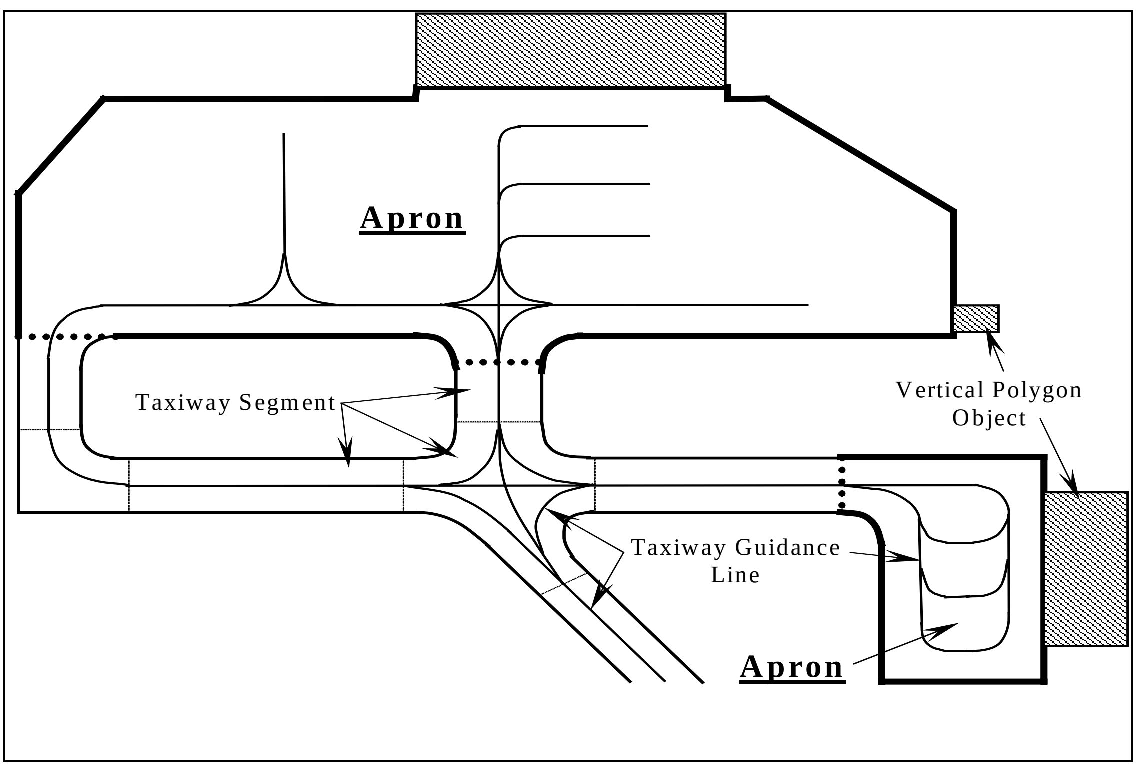


Figure 2-15: Illustrates the collection of the airport apron

10-1-1-1. Definition: A defined area on an airport or heliport, paved or unpaved, intended to accommodate aircraft for purposes of loading or unloading passengers or cargo, refueling, parking, or maintenance.

10-1-1-2. Geometry Type: 3D Polygon

10-1-1-3. Feature Group: Airfield

10-1-1-4. Sensitivity: Restricted

10-1-1-5. Requirements: Aircraft accessible apron areas—including helipads, parking stand areas, parking stand taxiways, deicing areas, and apron taxiways—must be collected as individual polygon objects. Unpaved tiedown areas must also be collected as individual polygon objects 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 collected.

10-1-1-6. Positional Accuracy:

(1). Horizontal: maximum 5 feet

(2). Vertical: maximum each vertex 10 feet with no position along line segment greater than 20 feet from its true elevation

10-1-1-7. Data Capture Rule: An apron may consist of multiple polygons. Boundaries of adjacent apron polygons must coincide with the center of any painted ground markings. No boundaries of adjacent apron polygons may occur without a coincident painted ground marking. These areas must be attributed as unpaved in the "surfaceType_d" attribute and labeled "UNPAVED TIEDOWN AREA" in the "feat_desc" attribute. It is recommended that the surveyor verify and/or sketch the unpaved tiedown areas to ensure the correct limits are determined during compilation.

10-1-1-8. Required Element For: ALP/AOC

10-1-1-9. SDSFIE Equivalent Type: airfield_surface_type

10-1-1-10. Attributes:

Attribute	**Description**
air_sur_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type.
apronType_d (Enumeration)	A classification of the typical use for the apron
feat_name (String30)	The name of the feature [Source: SDSFIE Feature Table]
feat_desc (String255)	Description of the feature
tiedowns (Integer)	The approximate number of tiedowns in the surface [Source: SDSFIE Feature Table]

status_d (Enumeration)	A temporal description of the operational status of the feature. This attribute is used to describe real-time status.
surfaceType_d (Enumeration)	A classification of airfield pavement surfaces for Airport Obstruction Charts [Source: NGS]
surfaceMaterial_d (Enumeration)	A code indicating the composition of the related surface [Source: NFDC]
pavementClassificationNumber	A number that expresses the relative load-carrying capacity of a pavement in terms of a standard single wheel load [Source: AC 150/5335-5]
surfaceCondition_d (Enumeration)	A description of the serviceability of the pavement [Source: NFDC]
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

10-1-2. Building

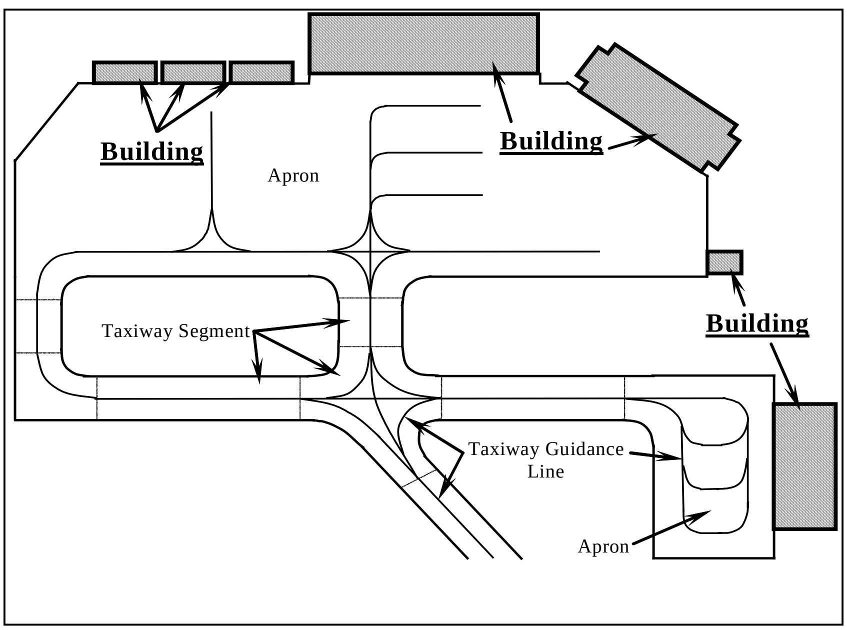


Figure 2-16: Illustrates the collection of an airport building

10-1-2-1. Definition: A three-dimensional structure (i.e. hangars, terminals, etc.) modeled with a bounding polygon.

10-1-2-2. Geometry Type: 3D Polygon

10-1-2-3. Feature Group: Manmade Structures

10-1-2-4. Sensitivity: Restricted

10-1-2-5. Requirements: The terminal building complex, plus hangars, maintenance facilities, and other prominent buildings directly associated with aircraft operations and directly connected to the apron, must be determined as individual polygon objects. Recently constructed and/or completed buildings that are not visible on imagery and meeting the above criteria must be collected by field survey methods.

10-1-2-6. Positional Accuracy:
- (1). Horizontal: maximum 5 feet
- (2). Vertical: Maximum each vertex 10 feet with no position along line segment greater than 20 feet from its true elevation.

10-1-2-7. Data Capture Rule: The building footprints must be collected when possible. All top elevations must be determined at the highest point of the corresponding building. The height of the polygon is determined as the difference between the base elevation and top elevation.

10-1-2-8. SDSFIE Equivalent Type: structure_existing_site

10-1-2-9. Required Element For: ALP/AOC

10-1-2-10. Attributes:

Attribute	**Description**
buildng_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type.
buildng_no (String16)	The code indicating the number of the building [Source: SDSFIE Feature Table]
name (String40)	Name of the feature.
narrative (String240)	A description or other unique information concerning the subject item, limited to 240 characters [Source: SDSFIE Feature Table]
str_type_d (String16)	The type of structure [Source: SDSFIE Feature Table]
str_stat_d (String16)	Discriminator. This value differentiates structure entities by operational status [Source: SDSFIE Feature Table]
no_occup (Real)	Number of persons currently occupying the structure [Source: SDSFIE Feature Table]
areaInside (Real)	Total inside area of structure [Source: SDSFIE Feature Table]
structHght (Real)	Maximum height of structure [Source: SDSFIE Feature Table]
areaFloor (Real)	Total inside floor area [Source: SDSFIE Feature Table]

lightingType_d (Enumeration)	A description of the lighting system. Lighting system classifications are Approach, Airport, Runway, Taxiway, and Obstruction.
markingFeatureType_d	The type of the marking
color_d (Enumeration)	The color of the marking
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

10-1-3. Construction Area

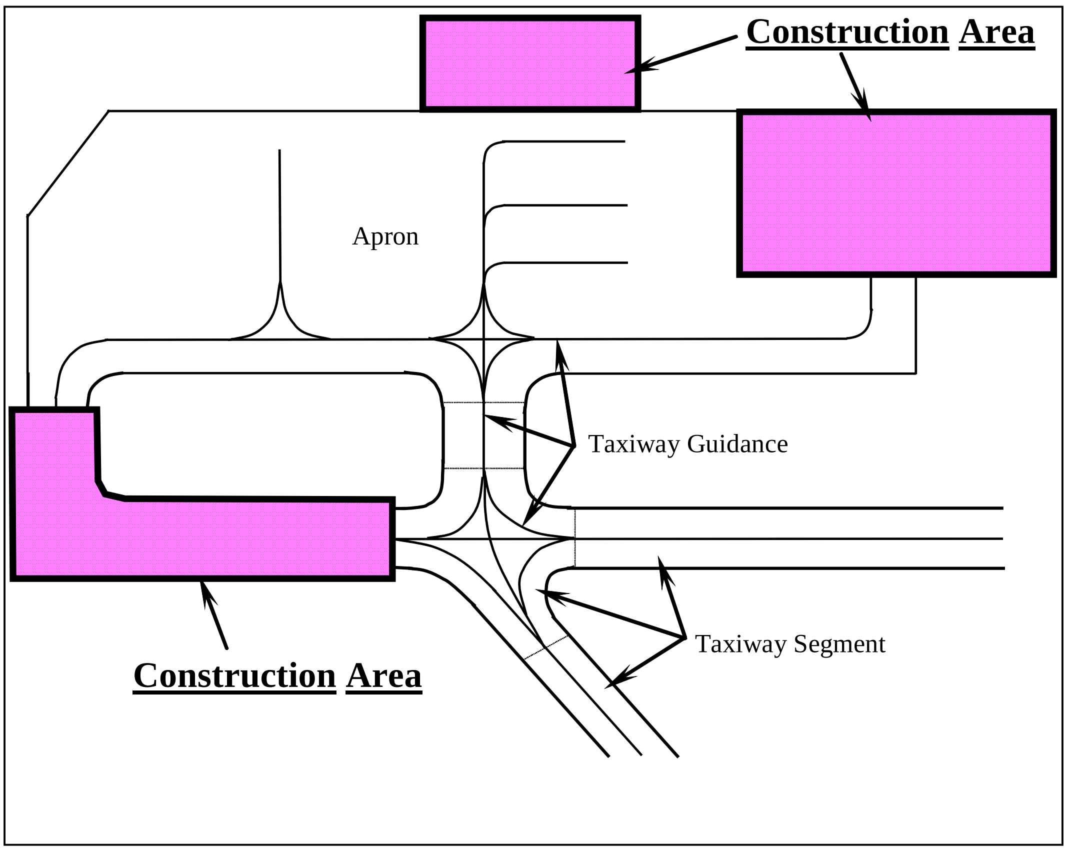


Figure 2-17: Illustrates the collection of an airport construction area

10-1-3-1. Definition: A defined area that is under construction, not intended for active use until authorized by the concerned authority. The area defines a boundary for personnel, material, and equipment engaged in the construction activity.

10-1-3-2. Geometry Type: 3D Polygon

10-1-3-3. Feature Group: Manmade Structures

10-1-3-4. Sensitivity: Restricted

10-1-3-5. Requirements: All airport-related buildings and aircraft movement areas under construction at the time of survey must be determined as individual polygon objects. Areas under construction that are not visible on imagery must be indicated on a sketch and/or photograph by the field surveyor with dimensions that are referenced to existing points on the imagery.

10-1-3-6. Positional Accuracy:
(1). Horizontal: maximum 50 feet
(2). Vertical: maximum each vertex 10 feet with no position along line segment greater than 20 feet from its true elevation

10-1-3-7. Data Capture Rule: The outer edges of an area under construction must be captured.

10-1-3-8. SDSFIE Equivalent Type: construction_site

10-1-3-9. Required Element For: ALP/AOC

10-1-3-10. Attributes:

Attribute	**Description**
conproj_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type.
const_name (String30)	Name of the construction area [Source: SDSFIE Feature Table]
const_desc (String60)	Description of the construction area [Source: SDSFIE Feature Table]
projectName (String60)	The name of the construction project
projectStatus_d (Enumeration)	The status of the construction project
CoordinationContact (String75)	Airport, emergency, airline, tenant, and contractor personnel who are responsible for coordinating on-airport construction work
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

10-1-4. Deicing Area

10-1-4-1. Definition: An aircraft deicing facility is a facility where: (1) frost, ice, or snow is removed (deicing) from the aircraft in order to provide clean surfaces and/or (2) clean surfaces of the aircraft receive protection (anti-icing) against the formation of frost or ice and accumulation of snow or slush for a limited period of time [Source: AC 150/5300-13].

10-1-4-2. Geometry Type: 3D Polygon

10-1-4-3. Feature Group: Airfield

10-1-4-4. Sensitivity: Unclassified

10-1-4-5. Requirements: Capture each designated deicing area as a separate polygon if the areas are not collocated.

10-1-4-6. Positional Accuracy:
(1). Horizontal: maximum 50 feet
(2). Vertical: maximum each vertex 10 feet with no position along line segment greater than 20 feet from its true elevation

10-1-4-7. SDSFIE Equivalent: None

10-1-4-8. Data Capture Rule: Deicing areas may consist of a single or multiple polygons, capturing the outer edges of area(s).

10-1-4-9. Required Element For: ALP

10-1-4-10. Attributes:

Attribute	**Description**
aircraftdeicingarea_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type.
name (String40)	Name of the feature.
area_desc (String254)	A brief description of the area and any special characteristics [Source: SDSFIE Attribute Table]
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

10-1-5. Helipad TLOF

10-1-5-1. Definition: A load-bearing, generally paved area, normally centered in the Final Approach and Takeoff Area FATO, on which a helicopter lands or takes off. The Touchdown and Lift-off Area TLOF is frequently called a helipad or helideck.

10-1-5-2. Geometry Type: 3D Polygon

10-1-5-3. Feature Group: Airfield

10-1-5-4. Sensitivity: Unclassified

10-1-5-5. Requirements: All paved helipads (TLOF) that are isolated from other apron areas must be collected as individual polygon objects. For purposes of the AOC, helipads on other aircraft movement areas (i.e. from taxiways, aprons, etc.) do not need to be identified.

10-1-5-6. Positional Accuracy:

(1). Horizontal: maximum 5 feet

(2). Vertical: maximum each vertex 10 feet with no position along line segment greater than 20 feet from its true elevation

10-1-5-7. Data Capture Rule: The center of the white paint stripes along the outer edges of the TLOF must be captured as a solid line and labeled “HELIPAD.” When there are no outer paint stripes, the outer edges of the TLOF pavement must be collected. All TLOFs located on the aircraft movement areas may be collected at compiler’s discretion.

10-1-5-8. SDSFIE Equivalent: None

10-1-5-9. Required Element For: ALP/AOC

10-1-5-10. Attributes:

Attribute	**Description**
helipad_design (String30)	The name of the feature [Source: SDSFIE Feature Table]
elevation (Real0)	The elevation of helipad referenced to NAVD88 level (MSL) [Source: NGS]
status_d (Enumeration)	A temporal description of the operational status of the feature. This attribute is used to describe real-time status.
feat_len (Real)	The overall length of the airfield surface [Source: SDSFIE Feature Table]
feat_width (Real)	The overall width of the airfield surface [Source: SDSFIE Feature Table]
surfaceType_d (Enumeration)	A classification of airfield pavement surfaces for Airport Obstruction Charts [Source: NGS]
surfaceCondition_d (Enumeration)	A description of the serviceability of the pavement [Source: NFDC]
surfaceMaterial_d (Enumeration)	A code indicating the composition of the related surface [Source: NFDC]

pavementClassificationNumber	A number that expresses the relative load carrying capacity of a pavement in terms of a standard single wheel load [Source: AC 150/5335-5]
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

10-1-6. Landmark Segment

10-1-6-1. Definition: Geographic features that provide geographic orientation near the airport vicinity. The features may or may not have obstruction value. These may include objects such as roads, railroads, fences, utility lines, shoreline, levees, quarries, etc.

10-1-6-2. Geometry Type: 3D Line

10-1-6-3. Feature Group: None

10-1-6-4. Sensitivity: Unclassified

10-1-6-5. Requirements: All geographic features of landmark value aiding in geographic orientation must be collected as individual polyline objects. These features include, but are not limited to, the following:

(1). A selection of roads (i.e. major highways, primary roads, etc.) and railroads, especially in the airport vicinity, to assist the user in geographic orientation.
(2). Shoreline (i.e. coastlines, lakes, rivers, etc.) of landmark value that aid in geographic orientation.
(3). Utility lines (i.e. transmission lines), levees, fence lines, or other linear features having obstruction or landmark value.
(4). Buildings or other features of landmark value that aid in geographic orientation.
(5). Runways with specially prepared hard surfaces that are not located on the airport being surveyed, but fall within the survey limits.
(6). Closed runways if they are sufficiently prominent to be of value to a pilot in airport identification.

10-1-6-6. Positional Accuracy:
(1). Horizontal: maximum 20 feet
(2). Vertical: maximum each vertex 10 feet with no position along line segment greater than 20 feet from its true elevation

10-1-6-7. Data Capture Rule: Be sure that the attribute field for “landmarkType_d” correctly identifies the linear object being drawn. Each landmark type feature has its own data capture rule. All top elevations must be collected at the highest point above ground level for each corresponding object.

(1). Roads: On a two-lane road, the centerline must be collected. For divided highways and interstates, the centerline of each opposing road direction must be collected.

(2). Railroads: The centerline between two parallel rails must be collected. For railroad yards, the centerline of each of the outer railroads must be collected.

(3). Shoreline: The line where land (and manmade structures) and water meet must be collected as a single polyline. The Shoreline attribute polyline represents the land/water interface. The beginning vertex and last vertex of the polyline must be coincident for small bodies of water (i.e. lakes, ponds, etc.) that are contained inside the OIS.

(a). When large bodies of water (i.e. oceans, lakes, rivers, etc.) continue outside the OIS, the Shoreline attribute polyline representing the land/water interface must be drawn. In addition, the Shoreline Feature Boundary attribute must be utilized to draw the back side of the shoreline coincident to the OIS or reasonable cutoff point to complete the polyline. The Shoreline Feature Boundary attribute is an imaginary line used to close the linear feature. In the case of a river, a reasonable cut off point may be drawn at the ends of the shoreline to complete the polyline.

(b). The beginning or end vertex of the Shoreline attribute polyline must be coincident with the beginning or end vertex of the Shoreline Feature Boundary attribute polyline in order to close the shoreline feature.

(4). Utility Lines: The center of the pole and/or tower must be located to indicate a corresponding utility line. A representative obstacle must be identified along the feature if it was collected for obstruction purposes.

(5). Levee: The highest points along the levee must be located. A representative obstacle must be identified along the feature if it was collected for obstruction purposes.

(6). Fence: The fence polyline must be located in the center of the corresponding fence line. A representative obstacle must be identified along the feature if it was collected for obstruction purposes.

(7). Quarries: A quarry determined to be of landmark value in geographic orientation must be collected along the outline (or outer edge) of each pit belonging to that quarry. The beginning vertex and last vertex of the polyline must be coincident.

(8). Non-AOC Related Runways: Specially prepared hard surface runways not associated with the AOC airport but that fall within the AOC OIS surfaces must be collected along the outline of the runway. The beginning vertex and last vertex of the polyline must be coincident.

(9). Closed Runway: Closed AOC related runways that are sufficiently prominent to be of landmark value to a pilot must be collected along the outline of the runway. The beginning vertex and last vertex of the polyline must be coincident.

(10). Other: Any other linear feature used for geographic orientation must be collected along the outline (outer edge) of a closed linear feature or along the centerline of a linear feature. The beginning vertex and last vertex of the polyline must be coincident for closed linear features.

10-1-6-8. SDSFIE Equivalent: None

10-1-6-9. Required Element For: AOC

10-1-6-10. Attributes:

Attribute	**Description**
landmarksegment_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type.
name (String40)	Name of the feature
feat_desc (String255)	Description of the feature
landmarkType_d (Enumeration)	Type of landmark feature
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

10-1-7. Obstruction Area

10-1-7-1. Definition: Areas penetrating the plane of specified or supplemental obstruction identification surface (OIS). The type of obstructing area is determined by the predominantly obstructing element in the grouped area. Penetrating groups of trees, ground, buildings, urban areas, mobile cranes, and agricultural area are the most common types of area limits found within the surfaces of a 14 CFR 77 survey.

10-1-7-2. Geometry Type: 3D Polygon

10-1-7-3. Feature Group: Airfield

10-1-7-4. Sensitivity: Restricted

10-1-7-5. Requirements: Clusters of obstacles greater than approximately 1 acre (43,560 square feet) must be captured as individual polygon objects. The highest obstruction in each area limit and the highest obstruction in the approach and primary portion of each area limit must be determined and/or verified. Refer to Paragraph 16-5, Obstacle Selection, for more details.

10-1-7-6. Positional Accuracy:
(1). Horizontal: maximum 5 feet
(2). Vertical: maximum each vertex 10 feet with no position along line segment greater than 20 feet from its true elevation

10-1-7-7. SDSFIE Equivalent: airspace_obstruction_navaid_point

10-1-7-8. Data Capture Rule: The line where obstructing and non-obstructing obstacles meet must be collected as single polygon. The Shoreline attribute polyline represents the land/water interface. Each obstruction area must be collected according to its outline (or outer edge) when possible. The outline is where obstructing and non-obstructing obstacles meet. All elevations penetrating the OIS must be collected within the area.

10-1-7-9. Required Element For: AOC

10-1-7-10. Attributes:

Attribute	**Description**
air_obs_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type.
obs_number (String20)	An obstruction number, as shown on a map, which is assigned to the waiver, deviation, etc. [Source: SDSFIE Feature Table]
obs_typ_d (Enumeration)	Description of Obstruction Area type
name (String40)	Name of the feature
feat_desc (String255)	Description of the feature
oisSurfaceCondition_d (Enumeration)	The Obstruction Identification Surface that Obstructing Area represents
dispostn_d (String16)	The disposition of the airspace obstruction [Source: SDSFIE Feature Table]
faa_d (Boolean)	A Boolean indicating whether the obstruction has received FAA coordination or review [Source: SDSFIE Feature Table]
feat_ht (Real)	The overall height (measured at the highest point) of the obstruction from the surface of the earth [Source: SDSFIE Feature Table]
feat_len (Real)	The overall length of the obstruction [Source: SDSFIE Feature Table]

feat_width (Real)	The overall width of the obstruction [Source: SDSFIE Feature Table]
frangibl_d (Boolean)	A Boolean indicating whether the obstruction is easily broken [Source: SDSFIE Feature Table]
narrative (String240)	A description or other unique information concerning the subject item, limited to 240 characters [Source: SDSFIE Feature Table]
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity an should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s)

10-1-8. Obstruction Identification Surface

10-1-8-1. Definition: A derived imaginary surface defined by FAA [Source: NGS]

10-1-8-2. Geometry Type: 3D Polygon

10-1-8-3. Feature Group: Airspace

10-1-8-4. Sensitivity: Restricted

10-1-8-5. Requirements: Identify the obstruction identification surface required by the utilization type for the runway.

10-1-8-6. Positional Accuracy:
(1). Horizontal: maximum 5 feet
(2). Vertical: maximum each vertex 10 feet with no position along line segment greater than 20 feet from its true elevation

10-1-8-7. SDSFIE Equivalent: airfield_imaginary_surface_area

10-1-8-8. Required Element For: AOC/ALP

10-1-8-9. Data Capture Rule: Depict the horizontal limits of the appropriate obstruction imaginary surface.

10-1-8-10. Attributes:

Attribute	**Description**
spc_zon_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type.
zone_name (String30)	A commonly used name for the zone [Source: SDSFIE Feature Table]
feat_desc (String255)	Description of the feature
oisSurfaceType_d (Enumeration)	Surface Type refers to the general type of surface used to analyze features. Surfaces of the same type usually are similar in nature with respect to certain aspects of the surface definition or may merely be representative of different programs within the airport charting community.
oisZoneType_d (Enumeration)	Specifies zones within Obstruction Identification Surfaces (OIS)
oisSurfaceCondition_d (Enumeration)	The Obstruction Identification Surface that Obstructing Area represents
safety_reg (String20)	An identifier for the safety regulations in effect within the zone [Source: SDSFIE Feature Table]
zone_use (String50)	A description of the use of the zone [Source: SDSFIE Feature Table]
approachType_d (Enumeration)	Specific approach type used to analyze features. The approach types must be an approach of the general surface type specified in the AirportSurfaceType attribute.
grad_lo_hi (Real)	The low to high gradient within the airspace [Source: SDSFIE Feature Table]
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

10-1-9. Noise Contour

10-1-9-1. Definition: An area that describes the noise attributed to operations. For aircraft operations, the Day/Night average sound level (Ldn) descriptor is typically used to categorize noise levels. [Source: 14 CFR 150]

10-1-9-2. Geometry Type: 3D Polygon

10-1-9-3. Feature Group: Environmental

10-1-9-4. Sensitivity: Confidential

10-1-9-5. Requirements: None

10-1-9-6. Positional Accuracy:
(1). Horizontal: maximum 1 foot
(2). Vertical: maximum each vertex 5 feet with no position along line segment greater than 10 feet from its true elevation

10-1-9-7. SDSFIE Equivalent: noise_contour_line

10-1-9-8. Required Element For: ALP

10-1-9-9. Data Capture Rule: AS required to ensure accurate information.

10-1-9-10. Attributes:

Attribute	**Description**
noi_zon_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type.
contourValue (Real)	The decibel level of the contour line
zone_desc (String60)	A description for the noise zone [Source: SDSFIE Feature Table]
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

10-1-10. Runway Arresting Area

10-1-10-1. Definition: Any FAA-approved high energy absorbing material of a specific strength that will reliably and predictably bring an aircraft to a stop without imposing loads that exceed the aircraft's design limits, cause major structural damage, or impose excessive force on its occupants. Currently, the only FAA- approved material is EMAS (Engineering Material Arresting System) [Source: AC 150/5220-22].

10-1-10-2. Geometry Type: 3D Polygon

10-1-10-3. Feature Group: Airfield

10-1-10-4. Sensitivity: Confidential

10-1-10-5. Requirements: None

10-1-10-6. Positional Accuracy:

(1). Horizontal: maximum 5 feet

(2). Vertical: maximum each vertex 10 feet with no position along line segment greater than 20 feet from its true elevation

10-1-10-7. SDSFIE Equivalent: airfield_linear_safety_feature_line

10-1-10-8. Required Element for: ALP

10-1-10-9. Data Capture Rule: As required to ensure appropriate accuracy.

10-1-10-10. Attributes:

Attribute	**Description**
safety_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type.
surfaceMaterial_d (Enumeration)	A code indicating the composition of the related surface [Source: NFDC]
feat_len (Real)	The overall length of the feature [Source: SDSFIE Feature Table]
feat_width (Real)	The overall width of the feature.
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

10-1-11. Runway Label

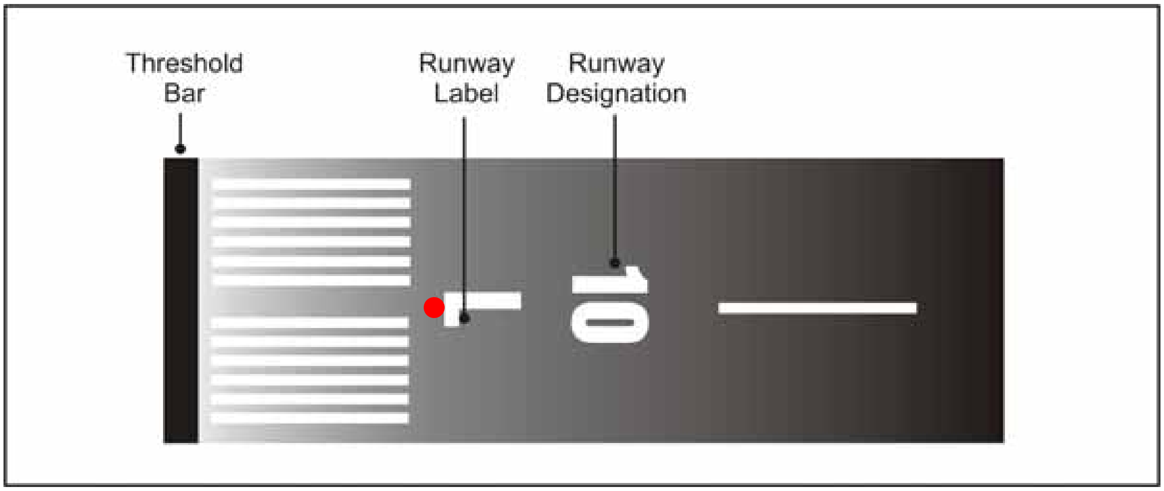


Figure 2-18: Illustrates the collection of the runway label

10-1-11-1. Definition: The bottom center position of the runway designation marking as indicated by the red dot in Figure 2-18 and 2-19.

10-1-11-2. Geometry Type: 3D Point

10-1-11-3. Feature Group: Airfield

10-1-11-4. Sensitivity: Restricted

10-1-11-5. Requirements: All runway labels must be collected as individual point objects and shown in their true locations as painted on the runway at the time of the field survey.

10-1-11-6. Positional Accuracy:

(1). Horizontal: maximum 5 feet

(2). Vertical: maximum each vertex 10 feet with no position along line segment greater than 20 feet from its true elevation

10-1-11-7. SDSFIE Equivalent: None

10-1-11-8. Required Element For: AOC

10-1-11-9. Data Capture Rule: A point located at the base of the true location of each painted runway number on the runway centerline must be captured for each end of a runway. If a runway number is not painted on the runway, a point on the runway number published in the U.S. Government flight information publication “U.S. Terminal Procedures” current at the time of the field survey must be determined at the base of the number approximately 100 feet from the threshold.

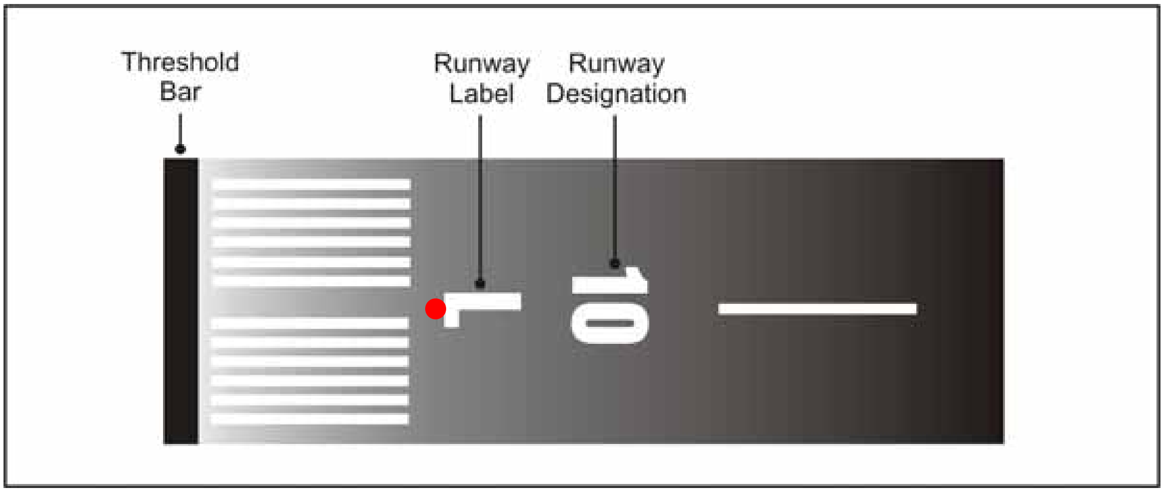


Figure 2-19: Illustrates the runway label for a parallel runway designation

10-1-11-10. Attributes:

Attribute	Description
runwaylabel_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type.
rwy_desg (String3)	The designator of the associated runway
feat_desc (String255)	Description of the feature
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

10-1-12. Taxiway Intersection

10-1-12-1. Definition: The point of intersection of taxiway guidance line markings or marking continuations where marking is uninterrupted (Source: D0-272); a junction of two or more taxiways (Source: ICAO Annex 14, Volume 1, Aerodromes, Chapter 1, page 5).

10-1-12-2. Geometry Type: 3D Point

10-1-12-3. Feature Group: Airfield

10-1-12-4. Sensitivity: Restricted

10-1-12-5. Requirements: All intersections of taxiway guidance markings on specially prepared hard surfaces associated with the project airport must be determined as individual point objects.

10-1-12-6. Positional Accuracy:

(1). Horizontal: maximum 5 feet
(2). Vertical: maximum 5 feet from its true elevation

10-1-12-7. SDSFIE Equivalent: None

10-1-12-8. Required Element For: ALP

10-1-12-9. Data Capture Rule: Capture the point where the taxiway guidance lines meet, intersect, or connect in some manner with the guidance lines of another taxiway.

10-1-12-10. Attributes:

Attribute	**Description**
pavementsection_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type.
name (String40)	Name of the feature
pavement_condition_index (Integer)	Pavement Classification Number Code [Source: SDSFIE Feature Table]
feat_desc (String255)	Description of the feature
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

11- 10-1-13. Taxiway Segment

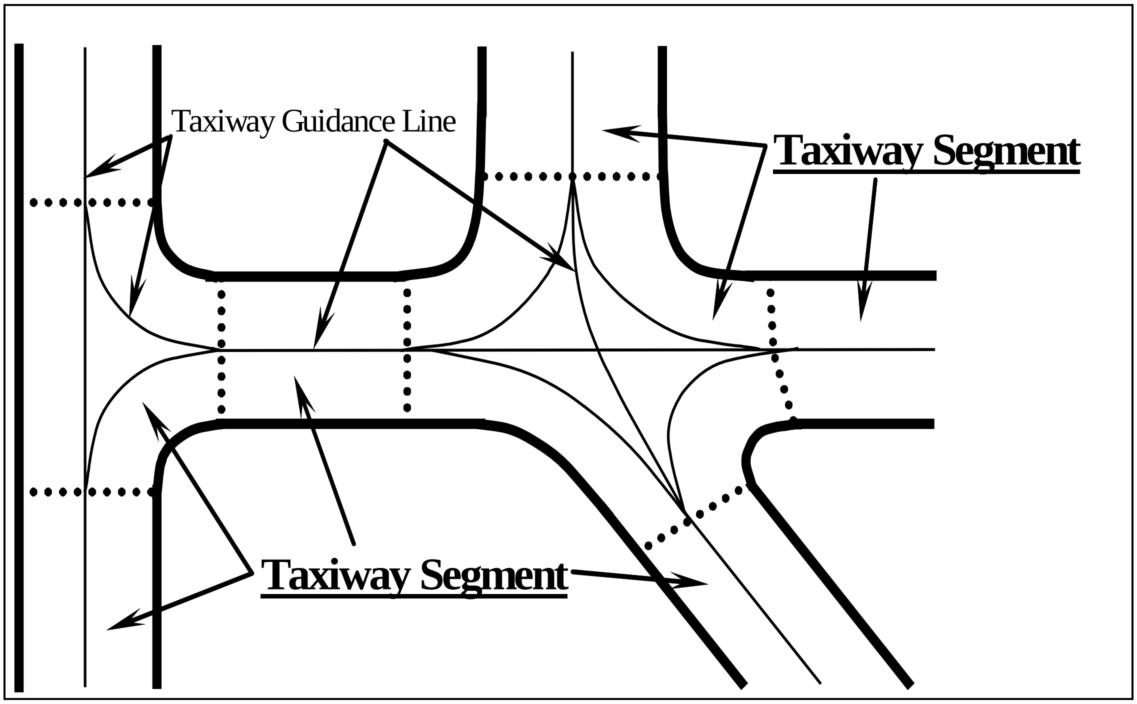


Figure 2-20: Illustrates the collection of a taxiway segment

10-1-13-1. Definition: Defined paths on an airport established for the taxiing of aircraft (excluding apron taxilanes) and intended to provide a link between one part of the airport and another. The taxiway segment feature is used for taxiways, apron taxiways, rapid exit taxiway, taxiway intersections, and aircraft stand taxilane surface.

10-1-13-2. Geometry Type: 3D Polygon

10-1-13-3. Feature Group: Airfield

10-1-13-4. Sensitivity: Restricted

10-1-13-5. Requirements: All taxiways with specially prepared hard surfaces associated with the project airport must be determined as individual polygon objects.

10-1-13-6. Positional Accuracy:
- (1). Horizontal: maximum 5 feet
- (2). Vertical: maximum each vertex 10 feet with no position along line segment greater than 20 feet from its true elevation

10-1-13-7. SDSFIE Equivalent: airfield_surface_site

10-1-13-8. Required Element For: ALP/AOC

10-1-13-9. Data Capture Rule: The taxiway segment features may consist of multiple polygons. The center of the yellow paint stripes along the outer edges of the taxiway must be collected as individual polygon objects. When there are no outer paint stripes, the outer edges of the taxiway pavement must be collected. Taxiway segments must not overlap. All taxiway segment polygons must be attached to the adjacent taxiway polygon by way of shared lines.

10-1-13-10. Attributes:

Attribute	**Description**
air_sur_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type.
taxi_desgn (String75)	Taxiway segment name. The name should be identical to the corresponding taxiway name. Multiple taxiway segments can have the same name. If two or more taxiways intersect the taxiway segment intersection will be named after the predominant taxiway. If two taxiways on the same level intersect, the segment can be named arbitrarily after one of the taxiways.
status_d (Enumeration)	A temporal description of the operational status of the feature. This attribute is used to describe real-time status.
taxiwayType_d (Enumeration)	The type of taxiway
surfaceMaterial_d (Enumeration)	A code indicating the composition of the related surface [Source: NFDC]
feat_len (Real)	The overall length of the airfield surface [Source: SDSFIE Feature Table]
feat_width (Real)	The overall width of the airfield surface [Source: SDSFIE Feature Table]
designGroup_d (Enumeration)	A grouping of airplanes based on wingspan [Source: AC 150/5300-13]
wingspan (Real)	The quantity representing the maximum wingspan that can be accommodated by the airfield surface [Source: SDSFIE Feature Table]
directionality_d (Enumeration)	An indicator as to whether operations can be conducted in one or two directions
maxSpeed (Real)	The maximum speed permitted
pavementClassificationNumber	A number that expresses the relative load-carrying capacity of a pavement in terms of a standard single wheel load [Source: AC 150/5335-5]
surfaceCondition_d (Enumeration)	A description of the serviceability of the pavement [Source: NFDC]

user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

10-2. FIELD SURVEYED AND/OR REMOTELY SENSED FEATURES

The second category of features could be collected by either remote sensing or field survey methods. FAA recommends geospatial features required by these General Specifications be collected by remote sensing methods and then verified by field survey methods, but does not make this sequence mandatory. This sequence should contribute to more efficient and prompt deliverables.

10-2-1. Airport Sign

10-2-1-1. Definition: Signs at an airport other than surface painted signs. [Source: AC 150/5340-18]

10-2-1-2. Geometry Type: 3D Point

10-2-1-3. Feature Group: Airfield

10-2-1-4. Sensitivity: Restricted

10-2-1-5. Requirements: None

10-2-1-6. Positional Accuracy:

(1). Horizontal: maximum 3 feet
(2). Vertical: maximum each vertex 5 feet with no position along line segment greater than 10 feet from its true elevation

10-2-1-7. Data Capture Rules:

(1). Remote Sensing: As required to meet the required accuracy
(2). Field Survey: As required to meet the required accuracy

10-2-1-8. SDSFIE Equivalent: general_improvement_feature_point

10-2-1-9. Required Element For: ALP

10-2-1-10. Attributes:

Attribute	**Description**
feature_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type.
signTypeCode_d (Enumeration)	The type of sign
message (String254)	The text message that appears on the sign.
feat_desc (String60)	A description of the improvement feature [Source: SDSFIE Feature Table]
feat_ht (Real)	The overall height of the feature [Source: SDSFIE Feature Table]
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

10-2-2. Marking Line

10-2-2-1. Definition: An element of marking whose geometry is a line. [Source: AC 150/5340-1 and RTCA DO-272]

10-2-2-2. Geometry Type: 3D Line

10-2-2-3. Feature Group: Airfield

10-2-2-4. Sensitivity: Restricted

10-2-2-5. Requirements:None

10-2-2-6. Positional Accuracy:
- (1). Horizontal: maximum 2 feet
- (2). Vertical: maximum each vertex 5 feet with no position along line segment greater than 10 feet from its true elevation

10-2-2-7. Data Capture Rules:
- (1). Remote Sensing: As required to meet accuracy
- (2). Field Survey: As required to meet accuracy

10-2-2-8. SDSFIE Equivalent: airfield_surface_marking_line

10-2-2-9. Required Element For: ALP

10-2-2-10. Attributes:

Attribute	Description
mark_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type.
markingFeatureType_d	The type of the marking
color_d (Enumeration)	The color of the marking
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

10-2-3. Marking Area

10-2-3-1. Definition: An element of marking whose geometry is a polygon. [Source: AC 150/5340-1 and RTCA DO-272]

10-2-3-2. Geometry Type: 3D Polygon

10-2-3-3. Feature Group: Airfield

10-2-3-4. Sensitivity: Unclassified

10-2-3-5. Requirements: None

10-2-3-6. Positional Accuracy:
(1). Horizontal: maximum 2 feet
(2). Vertical: maximum each vertex 5 feet with no position along line segment greater than 10 feet from its true elevation

10-2-3-7. Data Capture Rules:
(1). Remote Sensing: As required to meet accuracy
(2). Field Survey: As required to meet accuracy

10-2-3-8. SDSFIE Equivalent: airfield_surface_marking_area

10-2-3-9. Required Element For: ALP

10-2-3-10. Attributes:

Attribute	Description
mark_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type.
markingFeatureType_d	The type of the marking
color_d (Enumeration)	The color of the marking
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

10-2-4. Movement Area

10-2-4-1. Definition: Runways, taxiways, and other areas of an airport which used for taxiing or hover taxiing, air taxiing, takeoff, and landing of aircraft, exclusive of loading ramps and aircraft parking areas [Source: 14 CFR Part 139]

10-2-4-2. Geometry Type: 3D Polygon

10-2-4-3. Feature Group: Airfield

10-2-4-4. Sensitivity: Unclassified

10-2-4-5. Requirements: None

10-2-4-6. Positional Accuracy:
(1). Horizontal: maximum 20 feet
(2). Vertical: maximum each vertex 10 feet with no position along line segment greater than 20 feet from its true elevation

10-2-4-7. Data Capture Rules:
(1). Remote Sensing: As required to meet accuracy
(2). Field Survey: As required to meet accuracy

10-2-4-8. SDSFIE Equivalent: airfield_surface_marking_area

10-2-4-9. Required Element For: ALP

10-2-4-10. Attributes:

Attribute	Description
featureID (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type.
Feature name (string30)	Name of the feature
feat_desc (string254)	Description of the feature
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

10-2-5. Runway BlastPad

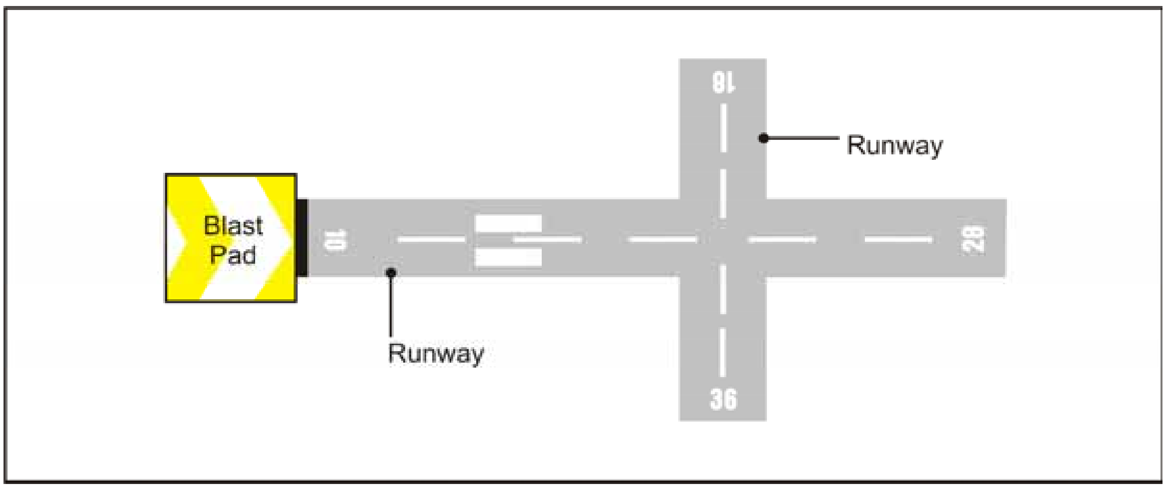


Figure 2-21: Illustrates the collection of a blast pad

10-2-5-1. Definition: A specially prepared surface placed adjacent to the end of a runway to eliminate the erosive effect of the high wind forces produced by airplanes at the beginning of their takeoff rolls.

10-2-5-2. Geometry Type: 3D Polygon

10-2-5-3. Feature Group: Airfield

10-2-5-4. Sensitivity: Restricted

10-2-5-5. Requirements: All paved areas beyond the runway ends that are classified as blast pad(s) must be determined as an individual polygon object. Blast pads must be collected by either remote sensing or field survey methods.

10-2-5-6. Positional Accuracy:

(1). Horizontal: maximum 5 feet

(2). Vertical: maximum each vertex 10 feet with no position along line segment greater than 20 feet from its true elevation

10-2-5-7. Data Capture Rules: Blast pads are typically adjacent to the runway end. The two methods of collection are described below.

(1). Remote Sensing: A blast pad must be attached to the adjacent runway or stopway by way of shared lines. If a painted line (threshold bar) separates the runway shoulder from the blast pad, the pavement beyond the painted line should be collected as part of the blast pad polygon.

(2). Field Survey: A point at the outer edge of the pavement on centerline end extended must be collected. The point will contain the longitude, latitude, and elevation for the blast pad end. The width of the blast pad must also be measured and entered into the data logger (ADCAT). Both point and measured width will be coincident to the outer edges of the pavement. An algorithm will calculate the position of the four corners of the blast pad based on the surveyed runway end point, the blast pad end point, and the measured width.

10-2-5-8. SDSFIE Equivalent: airfield_linear_safety_feature_line

10-2-5-9. Required Element For: AOC

10-2-5-10. Attributes:

Attribute	**Description**
surfaceType_d (Enumeration)	A classification of airfield pavement surfaces for Airport Obstruction Charts [Source: NGS]
feat_len (Real)	The overall length of the feature [Source: SDSFIE Feature Table]
status_d (Enumeration)	A temporal description of the operational status of the feature. This attribute is used to describe real-time status.
pavementClassificationNumber	A number that expresses the relative load carrying capacity of a pavement in terms of a standard single wheel load [Source: AC 150/5335-5]
surfaceCondition_d (Enumeration)	A description of the serviceability of the pavement [Source: NFDC]
surfaceMaterial_d (Enumeration)	A code indicating the composition of the related surface [Source: NFDC]
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.

meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

10-2-6. Navaid Equipment

10-2-6-1. Definition: Any ground-based visual or electronic device providing point-to-point guidance information or position data to aircraft in flight.

10-2-6-2. Geometry Type: 3D Point

10-2-6-3. Feature Group: Navigational Aids

10-2-6-4. Sensitivity: Unclassified

10-2-6-5. Requirements: All navigational aids (NAVAIDs) associated with the project airport as described by Part 3, Chapter 15, Navigational Aids, will be determined as individual points. For purposes of the AOC, NAVAIDs are broken into two subtypes: electronic and visual. Both have specific rules for collection and verification. If any NAVAID is also an obstruction, the obstruction requirements also apply.

10-2-6-6. Positional Accuracy:

(1). Horizontal: Refer to Part 3, Chapter 15, Table 3-3

(2). Vertical: Refer to Part 3, Chapter 15, Table 3-3

10-2-6-7. Data Capture Rule: The data capture rules for the two subtypes of NAVAIDs are described below.

(1). Electronic NAVAIDs must be collected by field survey methods. Refer to Part 3, Paragraph 15-1, Electronic NAVAIDs, for data capture rules and accuracies.

(2). Visual NAVAIDs are also surveyed; however, they may be positioned by remote sensing methods if identified by some means other than field survey methods (i.e. Sketch, Photo-identified, etc.). The position of a representative point(s) must be determined for certain visual NAVAIDs. The representative position may be the center of the NAVAID or, when the NAVAID is composed of more than one unit, the center of the unit array may be the representative point. In the case of an approach light system, the first and last lights must be the representative points. Refer to Part 3, Section15-2, Visual NAVAIDs, for more details.

10-2-6-8. SDSFIE Equivalent: navigational_aid_point

10-2-6-9. Required Element For: AOC

10-2-6-10. Attributes:

Attribute	Description
faaLocID (Char4)	ID of the associated facility. Note that the Facility ID for NAVAIDs associated with an ILS/MLS references the associated ILS/MLS system identifier. [Source: NGS]
name (String40)	Name of the feature
narrative (String240)	A description or other unique information concerning the subject item, limited to 240 characters [Source: SDSFIE Feature Table]
navaidEquipTypeCode_d	Specifies the type of NAVAID [Source: NGS]
use_code_d (String16)	The code that represents the airspace structure in which the aeronautical navigational aid is utilized [Source: SDSFIE Feature Table]
antToThreshDist (Integer)	The distance in feet that the antenna is from the runway threshold
centerlineDist (Integer)	NAVAID along centerline distances (distance between the NAVAID perpendicular point (PP) and the runway approach or stop-end, depending on the NAVAID type)
offsetDist (Integer)	The distance in feet that the feature is offset from the runway centerline.
lightingConfigType (Enumeration)	The configuration type of visual navigational aid systems (use only when NavaidEquipTypeCode_d is set to “Visual”)
latitude (Real)	Latitude in decimal degrees with negative numbers used for Western Hemisphere
longitude (Real)	Longitude in decimal degrees with negative numbers used for Western Hemisphere
status_d (Enumeration)	A temporal description of the operational status of the feature. This attribute is used to describe real-time status.
owner (String75)	The owner of the facility
refElevation (Real)	The Base Elevation for most NAVAIDs. For ILS DME, the elevation is the center of the antenna cover. For MLSAZ, MLSEL, and End Fire Type Glide Slope Antennas, the elevation is the phase center of the reference point. [Source: NGS]
refEllipsoidHeight (Real)	The Base Ellipsoid Height for most NAVAIDs. For ILS DME, the elevation is the center of the antenna cover. For MLSAZ, MLSEL, and End Fire Type Glide Slope Antennas, the elevation is the phase center of the reference point. [Source: NGS]

rwyEndID (String3)	The runway end associated with the NAVAID equipment (if any). This is the same as the runway identification number painted on the runway at the time of the survey.
downWindBarElev (Real)	
downWindBarThreshold (Real)	
refPointThreshold (Real)	Distance from the VGSI runway reference point to the threshold [Source: [FAA AAS-100]]
thresholdCrossHeight (Real)	
highAngle (Real)	Maximum approach light vertical angle [Source: FAA AAS-100]
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s)

10-2-7. Obstacle

10-2-7-1. Definition: All fixed (whether temporary or permanent) and mobile objects, or parts thereof, that are located on an area intended for the surface movement of aircraft or that penetrate or represent the Obstruction Identification Surface.

10-2-7-2. Geometry Type: 3D Point

10-2-7-3. Feature Group: Airspace

10-2-7-4. Sensitivity: Restricted

10-2-7-5. Requirements: Details on required obstacles and related accuracies are found in Part 3, Paragraph 16-3, Obstacle Accuracies, and Part 3, Table 3-23, Obstacle Accuracies. NGS recommends that remote sensing methods be utilized to determine the required obstacles before performing the field survey. Field survey methods will then be used to verify or re-determine those obstacles that require more stringent accuracies. All field surveyed points should be verified by remote sensing to ensure correct position and elevation.

10-2-7-6. Positional Accuracy:
- (1). Horizontal: refer to Part 3, Table 3-23, Obstacle Accuracies
- (2). Vertical: refer to Part 3, Table 3-23, Obstacle Accuracies

10-2-7-7. Data Capture Rule: Obstacles in an OIS that require accuracies more stringent than 50 feet horizontally or 20 feet vertically must be field surveyed. The OISs that require less stringent accuracy requirements may be positioned by remote sensing methods. Refer to Part 3, Paragraph

16-3, Obstacle Accuracy, and Part 3, Table 3-23, Obstacle Accuracies, for more details on data capture rules and accuracies.

10-2-7-8. SDSFIE Equivalent: None

10-2-7-9. Required Element For: AOC

10-2-7-10. Attributes:

Attribute	Description
obstacle_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type. [Source: FAA Airports GIS]
obstacle_type_d (Enumeration)	The type of obstacle
feat_desc (String254)	Description of the feature.
aboveGroundLevel (Real)	The vertical distance from the ground to the top of the obstacle
ellipsoidElevation (Real)	The height above the reference ellipsoid, measured along the ellipsoidal outer normal through the point in question.
FromDTHLDDist (Integer)	Distance measured along runway centerline or centerline extended from a Displaced Threshold to point abeam the obstacle. A negative distance indicates that the obstacle is on the touchdown side of the runway approach end. This data is not provided for obstacles penetrating the horizontal, conical and transitional surfaces
FromRwyCenterlineDist (Integer)	Shortest distance from the runway centerline or centerline extended to the obstacle. "L" (LEFT) or "R" (RIGHT) is relative to an observer facing forward in a landing aircraft. This data is not provided for obstacles penetrating the horizontal, conical and transitional surfaces
FromRwyEndDist (Integer)	Distance measured along runway centerline or centerline extended from the physical end to point abeam the obstacle. A negative distance indicates that the obstacle is on the touchdown side of the runway approach end. This data is not provided for obstacles penetrating the horizontal, conical and transitional (HCT) surfaces
groupCode (String75)	A text code indicating that the obstacle consists of a group of obstacles of the same type. For example, a group of trees, a group of buildings, a group of antennas, etc [Source: AIXM]
heightAboveAirport (Integer)	Height above airport the official airport elevation point [Source: NGS]

heightAboveRunway (Integer)	Height above runway physical end for obstructions located underneath the approach surface [Source: NGS]
heightAboveTdz (Integer)	Height above touchdown zone elevation for obstructions located underneath the approach surface [Source: NGS]
latitude (Real)	Latitude in decimal degrees with negative numbers used for Western Hemisphere
lightCode (Boolean)	A code indicating that the obstacle is lighted [Source: AIXM]
longitude (Real)	Longitude in decimal degrees with negative numbers used for Western Hemisphere
markingFeatureType_d	The type of the marking
penVal_Specified (Integer)	The elevation difference between the height of the obstacle and the specified approach surface. [Source: NGS]
penVal_Supplemental (Integer)	The elevation difference between the height of the obstacle and the supplemental approach surface. [Source: NGS]
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

10-2-8. Restricted Access Boundary

10-2-8-1. Definition: A restricted area boundary defines aircraft movement area that is strictly reserved for use by authorized personnel only.

10-2-8-2. Geometry Type: 3D Line

10-2-8-3. Feature Group: Airfield

10-2-8-4. Sensitivity: Confidential

10-2-8-5. Requirements: Restricted Access Boundaries must be collected and included as individual line objects in the data set. The restricted access boundary features may consist of one or more lines. Each line represents the boundary between restricted and non-restricted aircraft movement areas.

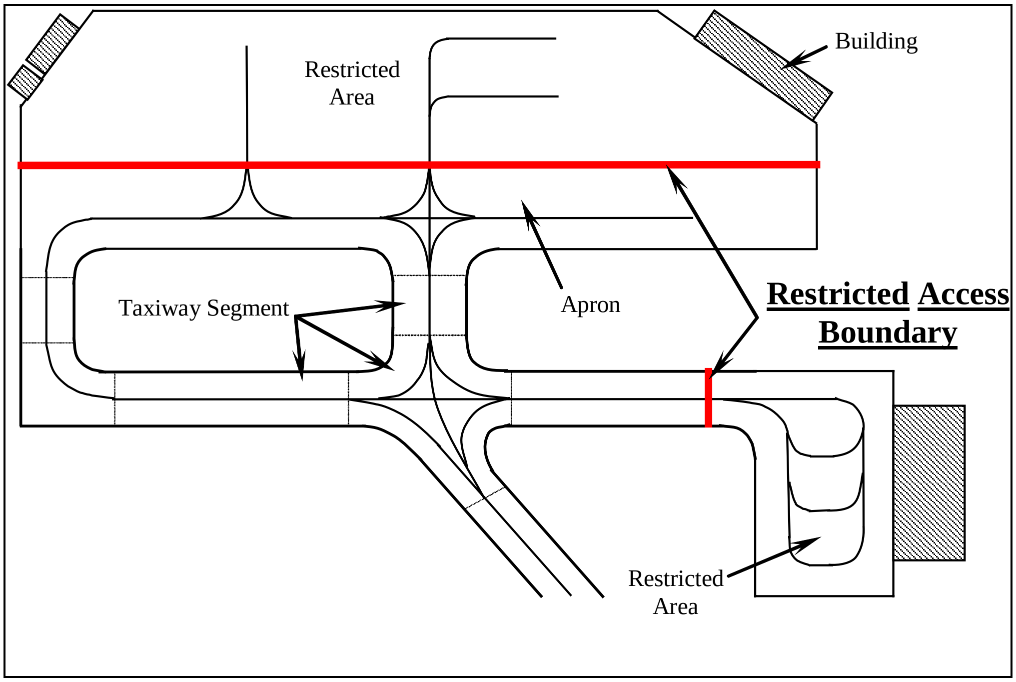


Figure 2-22: Illustrates the collection of a restricted area boundary

10-2-8-6. Positional Accuracy:

(1). Horizontal: maximum 5 feet

(2). Vertical: maximum each vertex 10 feet with no position along line segment greater than 20 feet from its true elevation

10-2-8-7. Data Capture Rule: Restricted areas are demarcated by a gate or a painted red line, which may extend across a taxiway or along an apron. The center of the gate or red line will be used to capture the restricted access boundary limit.

10-2-8-8. SDSFIE Equivalent: military_restricted_access_area

10-2-8-9. Required Element For: AOC

10-2-8-10. Attributes:

Attribute	Description
area_name (String30)	A common name for the restricted area [Source: SDSFIE Feature Table]
area_desc (String254)	A description of the restricted area [Source: SDSFIE Feature Table]
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.

meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

10-3. FIELD SURVEYED FEATURES

This category of airport features are those that must be field surveyed using the FAA-approved Aeronautical Data Collection and Analysis Tool (ADCAT). Features that require more stringent accuracies or those that cannot be detected by remote sensing must be collected using field survey methods. These features should be verified by remote sensing methods after they have been collected by ADCAT for the quality control analysis.

10-3-1. Airport Boundary

10-3-1-1. Definition: A polygon, or a set of polygons, that encompasses all property owned or controlled by the airport for aviation purposes. [Source: AC 150/5300-13, Appendix 7, Order 5190.6A, Section 5]

10-3-1-2. Geometry Type: Polygon

10-3-1-3. Feature Group: Airfield

10-3-1-4. Sensitivity: Restricted

10-3-1-5. Requirements: None

10-3-1-6. Positional Accuracy: As required by other State or National standards for this type of data.

10-3-1-7. Data Capture Rule: None

10-3-1-8. SDSFIE Equivalent: airfield_area

10-3-1-9. Required Element For: ALP

10-3-1-10. Attributes:

Attribute	Description
airfld_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type.
faaSiteNr (String8)	This is a number that contains a one-letter suffix. The number is assigned to the airport in ascending order, depending on the state and the associated city. The number is stored in a computer for the purpose of producing computer reports of airports in alphabetical order by state and associated city. The suffix indicates the primary use of the facility.

	Valid suffixes include: A = Airport, B = Balloonport, C = Seaplane Base, G = Gliderport, H = Heliport, S = Stolport, and U = Ultralight Flightpark [Source: FAA AC 150/5200-35]
faaLocID (Char4)	The location identifier assigned to the feature by FAA
iataCode (String4)	The location identifier assigned to the feature by International Air Transport Association (IATA)
icaoCode (String4)	The location identifier assigned to the feature by the ICAO
feat_name (String50)	The name of the airfield [Source: SDSFIE Feature Table]
feat_desc (String255)	Description of the feature
airportFacilityType_d (Enumeration)	The type of airfield
operationsType_d (Enumeration)	The type of operations permitted on the airfield
owner_d (Enumeration)	The type of owner of the airfield
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

10-3-2. Airport Control Point

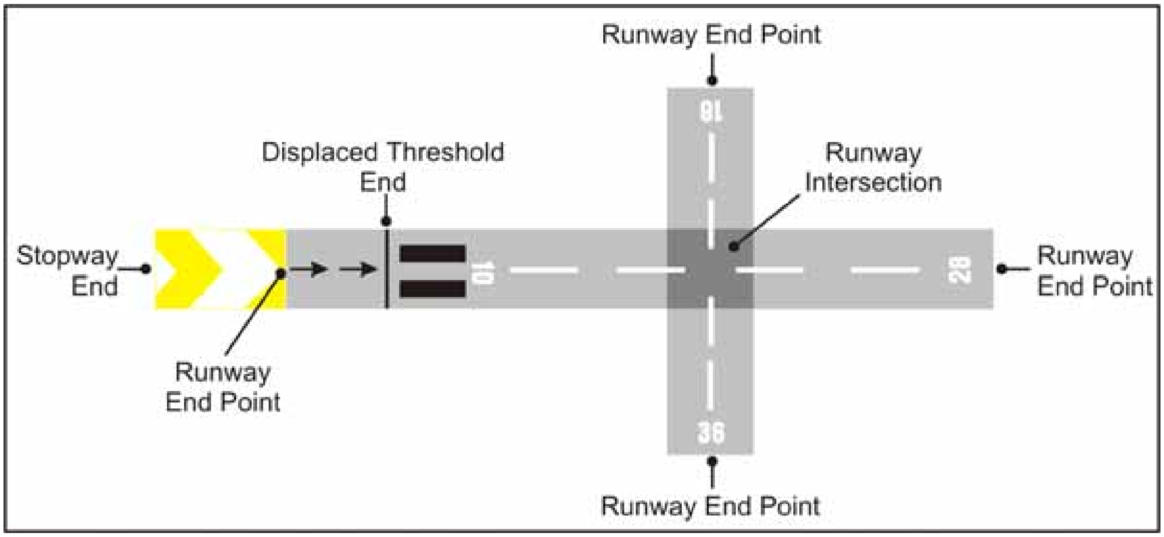


Fig 2-23: Illustrates the collection of a runway point

10-3-2-1. Definition: Points located on the straight line between the runway end points. This feature is used for Displaced Thresholds, Runway Intersections, Airport Elevation, Point Abeam Certain Offset NAVAIDs, Stopway Ends, Supplemental Profile Points, and the Touchdown Zone Elevation (TDZE).

10-3-2-2. Geometry Type: 3D Point

10-3-2-3. Feature Group: Geotechnical

10-3-2-4. Sensitivity: Restricted

10-3-2-5. Requirements: Refer to Part 3, Paragraph 13-3, Tables 3-1 and 3-2 and Figure 3-2, for required runway/stopway data.

10-3-2-6. Positional Accuracy: Varies based on type of point.

(1). Refer to Part 3, Paragraph 13-3, Tables 3-1 and3-2 and Figure 3-2, for required runway/stopway data.

(2). Refer to Part 3, Table 3-3, for NAVAID accuracy information data.

10-3-2-7. Data Capture Rule: A direct field survey of the runway end, displaced threshold ends, stopway ends, and supplemental profile points ensures accurate positioning of those runway points. Refer to Part 3, Chapter 3, Runway and Stopway Points. An algorithm within the ADCAT calculates the position of the other supplemental profile points along the centerline of the runway based on the surveyed runway/displaced threshold end points along with profile points obtained through GPS and/or conventional leveling techniques. A supplemental profile point is a runway/stopway point selected so a straight line between any two adjacent published runway/stopway points will be no greater than 1 foot vertical from the runway/stopway surface.

10-3-2-8. SDSFIE Equivalent: control_point

10-3-2-9. Required Element For: AOC

10-3-2-10. Attributes:

Attribute	**Description**
monumnt_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type.
permanentId (String6)	Permanent point identifier assigned by NGS to PACS and SACS [Source: NGS]
pointType_d (Enumeration)	Contains the allowable values of a point type used by the ControlPoint feature. The point types may be supplementally provided as subtypes of ControlPoints for ease of use and clarification.
feat_name (String50)	Any commonly used name for the control point. [Source: SDSFIE Feature Table]
mon_typ_d (String16)	The type of monument as defined by the Corps of Engineers EM 110-1-1002. [Source: SDSFIE Feature Table]
mon_desc (String254)	The monument description. [Source: SDSFIE Feature Table]
elevation (Real)	Elevation of the point relative to the selected vertical datum. [Source: NGS]
ellipsoidElevation (Real)	The height above the reference ellipsoid, measured along the ellipsoidal outer normal through the point in question. Also called the geodetic height. [Source: NGS]
latitude (Real)	Latitude in decimal degrees with negative numbers used for Western Hemisphere
longitude (Real)	Longitude in decimal degrees with negative numbers used for Western Hemisphere
yearOfSurvey (Integer)	The year of the most recent runway end survey used to compute the ARP
date_recov (Date)	The date the monument was last field recovered. Format for date is YYYYMMDD (i.e. September 15, 1994 = 19940915). [Source: SDSFIE Feature Table]
recov_cond (String30)	The condition and type of the marker (witness post) used to identify the location

	of the monument. [Source: SDSFIE Feature Table]
fld_book (String254)	The field book. [Source: SDSFIE Feature Table]
gps_suit_d (Boolean)	A Boolean indicating GPS suitability. [Source: SDSFIE Feature Table]
spcszone_d (String16)	The State Plane Coordinate System Code. [Source: SDSFIE Feature Table]
stmpd_desg (String50)	The designation stamped into the bottom of the monument. [Source: SDSFIE Feature Table]
epoch (String10)	Survey epoch used to establish the control point. [Source: SDSFIE Feature Table]
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

10-3-3. Airport Parcel

10-3-3-1. Definition: A tract of land within the airport boundary that was acquired from surplus property, Federal funds, local funds, etc. Easement interests in areas outside the fee property line should also be included as an airport parcel. [Source AC 150/5300-13, Appendix 7; FAA Order 5190.6, Chapter 5]

10-3-3-1. Geometry Type: Polygon

10-3-3-1. Feature Group: Cadastral

10-3-3-1. Sensitivity: Restricted

10-3-3-1. Requirements: None

10-3-3-1. Positional Accuracy: As required by other State or national standards for this type of data.

10-3-3-1. Data Capture Rule: None

10-3-3-1. SDSFIE Equivalent: None

10-3-3-1. Required Element For: ALP

10-3-3-1. Attributes:

Attribute	Description
airportparcel_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type.
authority (String75)	The owner of the airport parcel
name (String40)	Name of the feature
feat_desc (String255)	Description of the feature
acquisitionType (String20)	The type of acquisition used to acquire the parcel
costToAcquire (Real)	The amount paid to the owner in U.S. dollars for the parcel
dateAcquired (Date)	The date the parcel was acquired. Format for date is YYYYMMDD (i.e. September 15, 1994 = 19940915).
grantProjectNumber (String30)	The grant number if Federal funds were used to acquire the parcel
howAcquired (String50)	The manner in which the parcel was acquired
landUse (String20)	The land use of the parcel when it was acquired
marketValue (Real)	The assessed market value of the parcel in U.S. dollars when it was acquired
yearAssessed (Date)	The year in which the market value assessment was made
yearBuilt (Date)	The year in which the most recent structure(s) were built on the parcel
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

10-3-4. Clearway

10-3-4-1. Definition: An area beyond the takeoff runway under control of airport authorities within which terrain or fixed obstacles may not extend above specified limits. These areas may be required for certain turbine-powered operations, and the size and upward slope of the clearway will differ depending on when the aircraft was certificated.

10-3-4-2. Geometry Type: Polygon

10-3-4-3. Feature Group: Airspace

10-3-4-4. Sensitivity: Restricted

10-3-4-5. Requirements: None

10-3-4-6. Positional Accuracy: None

10-3-4-7. Data Capture Rule: Refer to Appendix 2, Section 2-4, Runway End, Stopway End, and Displaced Threshold Identification, for identifying and properly positioning the clearway. The width of the clearway must be measured from the outer edge of the clearway and entered into the ADCAT. An algorithm calculates the position of the four corners of the clearway based on the surveyed runway and clearway end points along with a measured width.

10-3-4-8. SDSFIE Equivalent: None

10-3-4-9. Required Element For: AOC/ALP

10-3-4-10. Attributes

Attribute	Description
clearwayLength (Integer)	The length of clearway as reported by the FAA Airport/Facility Directory and the Aeronautical Information Publication (AIP) for international airports
featureID (Integer)	A unique feature identifier, usually a sequence number from database (persistence)
Name (String)	Name of the feature
Description (String)	Description of the feature
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

10-3-5. Displaced Threshold

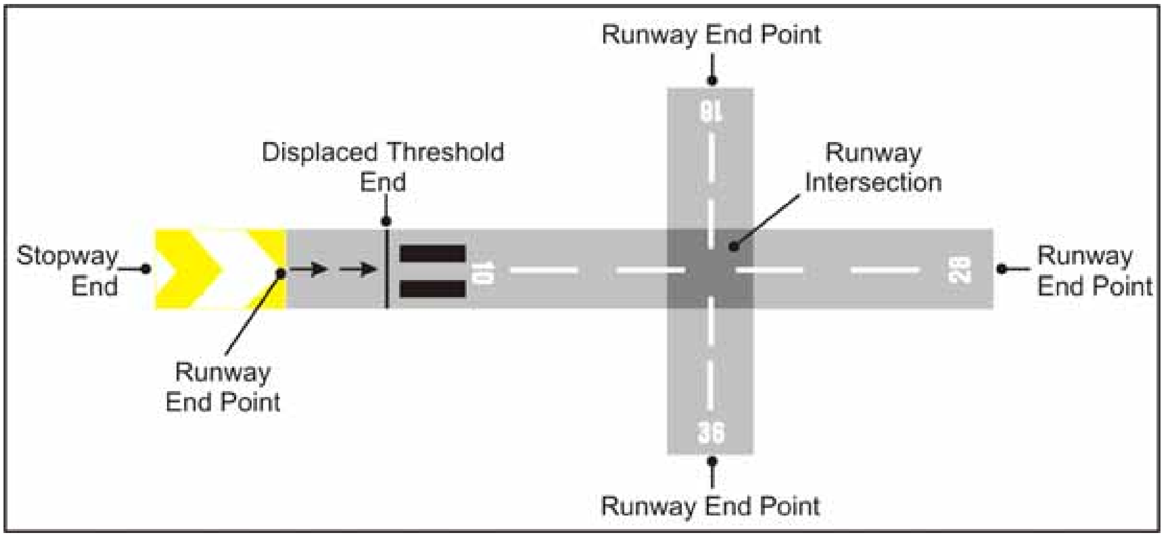


Fig 2-24: Illustrates the collection of a runway point

10-3-5-1. Definition: The beginning of that portion of the runway available for landing when it is located at a point other than the physical end of the runway.

10-3-5-2. Geometry Type: Point

10-3-5-3. Feature Group: Airfield

10-3-5-4. Sensitivity: Restricted

10-3-5-5. Requirements: The centerline position of a displaced threshold must be collected by GPS survey methods. The position and elevation must be entered into the data logger (ADCAT).

10-3-5-6. Positional Accuracy: Refer to Chapter 3, Tables 3-1 and 3-2.

10-3-5-7. Data Capture Rule: Refer to Appendix 2, Section 2-4, Runway End, Stopway End, and Displaced Threshold Identification, for identifying and properly positioning displaced thresholds.

10-3-5-8. SDSFIE Equivalent: None

10-3-5-9. Required Element For: AOC/ALP

10-3-5-10. Attributes:

Attribute	**Description**
displacedthreshold_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type.

pointType_d (Enumeration)	Contains the allowable values of a point type used by the ControlPoint feature. The point types may be supplementally provided as subtypes of ControlPoints for ease of use and clarification.
elevation (Real)	Elevation of the point relative to the selected vertical datum [Source: NGS]
ellipsoidElevation (Real)	The height above the reference ellipsoid, measured along the ellipsoidal outer normal through the point in question. Also called the geodetic height. [Source: NGS]
latitude (Real)	Latitude in decimal degrees with negative numbers used for Western Hemisphere
longitude (Real)	Longitude in decimal degrees with negative numbers used for Western Hemisphere
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

10-3-6. NAVAID Site

10-3-6-1. Definition: The parcel, lease, or right-of-way boundary for a NAVAID or facility that is located off airport property.

10-3-6-2. Geometry Type: 3D Polygon

10-3-6-3. Feature Group: Navigational Aids

10-3-6-4. Sensitivity: Unclassified

10-3-6-5. Requirements: None

10-3-6-6. Positional Accuracy: As required by local, State, or national standards for this type of data.

10-3-6-7. Data Capture Rule: As required to meet accuracy.

10-3-6-8. SDSFIE Equivalent: airfield_facility_surface_site

10-3-6-9. Required Element For: ALP

10-3-6-10. Attributes:

Attribute	Description
navaidsite_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type.
faaLocID (Char4)	The location identifier assigned to the feature by FAA
fac_typ_d (String16)	The type of facility or feature related to airfield operations [Source: SDSFIE Feature Table]
facil_desc (String60)	A brief description of the facility and any special characteristics [Source: SDSFIE Feature Table]
PropertyCustodian (String50)	The regional property management office responsible for ownership of the site
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

10-3-7. Runway

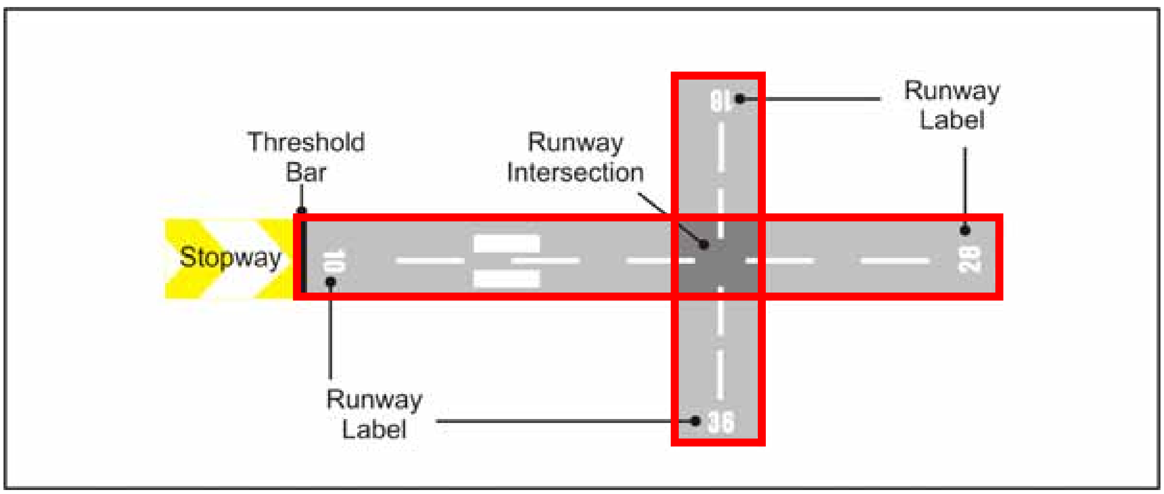


Figure 2-25: The red lines encompassing the runway illustrate the collection of the runways at an airport

10-3-7-1. Definition: A defined rectangular area on an airport prepared for the landing and takeoff of aircraft.

10-3-7-2. Geometry Type: 3D Polygon

10-3-7-3. Feature Group: Airfield

10-3-7-4. Sensitivity: Restricted

10-3-7-5. Requirements: The width and centerline ends of each runway must be collected by field survey methods. Refer to Part 3, Paragraph 13-2, Runway Length and Width, for more details.

10-3-7-6. Positional Accuracy: Refer to Part 3, Tables 3-1 and 3-2.

10-3-7-7. Data Capture Rule: In addition to the requirements for runway end collection described in Part 3, Paragraph 13-2, the width of the runway must be measured from the outer edge of the runway edge painting, excluding runway shoulders or stopways, and entered into the ADCAT. If there are no painted runway edge markings, then the narrowest section of runway measured should be reported as the runway width. An algorithm within the ADCAT will calculate the position of the four corners of the runway based on the surveyed runway end points and the measured width.

10-3-7-8. SDSFIE Equivalent: airfield_surface_site

10-3-7-9. Required Element For: ALP/AOC

10-3-7-10. Attributes:

Attribute	**Description**
runway_num (String7)	Designator of the runway based on the magnetic bearing and position in relation to parallel runways (e.g. 33R/15L) [Source: AC 150/5340-1]
surfaceType_d (Enumeration)	A classification of airfield pavement surfaces for Airport Obstruction Charts [Source: NGS]
status_d (Enumeration)	A temporal description of the operational status of the feature. This attribute is used to describe real-time status.
feat_len (Real)	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. [Source: FAA Specification 405]
feat_width (Real)	A perpendicular line to the surface centerline, extending to the edge of the runway pavement on both sides of the runway, through a runway end-point. If the runway width is less than 100 feet, the width is rounded up to the nearest 5 feet. If the runway width is more than 100 feet, the width is rounded to the nearest 10 feet. If the rounded width is different from the published width, NGS should be contacted for further advice. [Source: NGS]
pavementClassificationNumber	A number that expresses the relative load carrying capacity of a pavement in terms of a standard single wheel load [Source: AC 150/5335-5]

surfaceCondition_d (Enumeration)	A description of the serviceability of the pavement [Source: NFDC]
surfaceMaterial_d (Enumeration)	A code indicating the composition of the related surface [Source: NFDC]
feat_desc (String255)	Description of the feature
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

10-3-8. Runway End

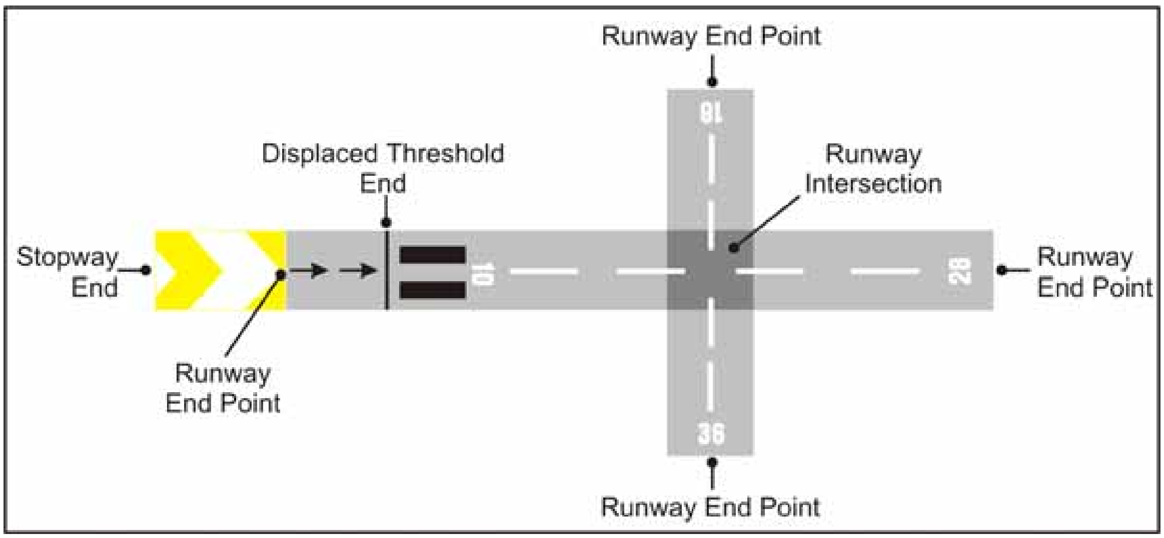


Figure 2-26: The dot illustrates the collection of the runway end

10-3-8-1. Definition: The end of the runway surface suitable for landing or takeoff runs of aircraft. Runway Ends are related to and describe the approach and departure procedure characteristics of a runway threshold. Runway End is the same as the runway threshold when the threshold is not displaced.

10-3-8-2. Geometry Type: 3D Point

10-3-8-3. Feature Group: Airfield

10-3-8-4. Sensitivity: Restricted

10-3-8-5. Requirements: The centerline ends of a runway marking the runway threshold must be collected by GPS survey methods. The positions and elevations must be entered into the data logger (ADCAT).

10-3-8-6. Positional Accuracy: Refer to Chapter 3 Tables 3-1 and 3-2.

10-3-8-7. Data Capture Rule: Refer to Appendix 2, Section 2-4, Runway End, Stopway End, and Displaced Threshold Identification, for identifying and properly positioning runway ends.

10-3-8-8. SDSFIE Equivalent: airfield_surface_site

10-3-8-9. Required Element For: ALP/AOC

10-3-8-10. Attributes:

Attribute	**Description**
name (String40)	Name of the feature
feat_desc (String255)	Description of the feature
status_d (Enumeration)	The predominant status of the airfield facility surface site [Source: SDSFIE Feature Table]
approachCat_d (Enumeration)	A grouping of aircraft based on 1.3 times their stall speed in the landing configuration at the certificated maximum flap setting and maximum landing weight at standard atmospheric conditions [Source: AC 150/5300-13]
precisionApproachGuidance_d	
elevation (Real)	Elevation of the point relative to the selected vertical datum [Source: NGS]
ellipsoidElevation (Real)	The height above the reference ellipsoid, measured along the ellipsoidal outer normal through the point in question. Also called the geodetic height. [Source: NGS]
asDistAvail (Real)	Accelerate Stop Distance Available (ASDA): The runway plus stopway length declared available and suitable for the acceleration and deceleration of an airplane aborting a takeoff [Source: AC 150/5300-13]
brngMagnetic (Real)	Magnetic runway bearing corresponding to threshold location valid at the day of data generation [Source: RTCA DO-272]
brngTrue (Real)	True bearing corresponding to the landing direction [Source: ICAO Annex 14]
designGroup_d (Enumeration)	A grouping of airplanes based on wingspan [Source: AC 150/5300-13]
displacedDist (Integer)	The distance from the runway end to the landing threshold. When the thresholdType is normal

	threshold. When the thresholdType is normal, displacedDist = 0.
landingDistAvail (Real)	Landing Distance Available (LDA): The runway length declared available and suitable for a landing airplane [Source: AC 150/5300-13]
latitude (Real)	Latitude in decimal degrees with negative numbers used for Western Hemisphere
longitude (Real)	Longitude in decimal degrees with negative numbers used for Western Hemisphere
RunwayEndDesg (String3)	The designator for the runway end (i.e. 32L)
rwySlope (Real)	Runway slope corresponding to landing direction [Source: RTCA DO-272]
takeOffDistAvail (Real)	Take-off Distance Available (TODA): The TORA plus the length of any remaining runway clearway beyond the far end of the TORA [Source: AC 150/5300-13]
takeOffRunAvail (Real)	Take-off Run Available (TORA): The runway length declared available and suitable for the ground run of an airplane taking off [Source: AC 150/5300-13]
tdzElevation (Real)	The highest elevation in the Touchdown Zone. The Touchdown Zone is the first 3,000 feet of the runway beginning at the threshold. [Source: FAA Specification 405]
tdzSlope (Real)	The longitudinal slope of the first 3000 feet of the runway beginning at the threshold [Source: FAA Specification 405]
thresholdType_d (Enumeration)	A description of the landing threshold: either normal or displaced
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

10-3-9. Runway Safety Area Boundary

10-3-9-1. Definition: The boundary of the Runway Safety Area (RSA) for which the Airport Authority has maintenance responsibility.

10-3-9-2. Geometry Type: Polygon

10-3-9-3. Feature Group:Unassigned

10-3-9-4. Sensitivity: Unclassified

10-3-9-5. Requirements: None

10-3-9-6. Positional Accuracy:
(1). Horizontal: 10 feet
(2). Vertical: maximum each vertex 10 feet with no position along line segment greater than 20 feet from its true elevation

10-3-9-7. Data Capture Rule: A Runway Safety Area Boundary must be collected as a single polygon.

10-3-9-8. SDSFIE Equivalent: None

10-3-9-9. Required Element For: ALP

10-3-9-10. Attributes:

Attribute	Description
Determination (string)	A formal declaration of the RSA condition with respect to standards and any requirement improvements
determinationDate (Date)	The date the RSA determination was approved
featureID (integer)	A unique feature identifier, usually a sequence number from database (persistence)
Name (String)	Name of the feature
Description (string)	Description of the feature
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

10-3-10. Shoulder

10-3-10-1. Definition: An area adjacent to the edge of paved runways, taxiways, or aprons providing a transition between the pavement and the adjacent surface; support for aircraft running off the pavement, enhance drainage, and blast protection. [Source: AC 150/5300-13]

10-3-10-2. Geometry Type: 3D Polygon

10-3-10-3. Feature Group: Airfield

10-3-10-4. Sensitivity: Restricted

10-3-10-5. Requirements: None

10-3-10-6. Positional Accuracy:

(1). Horizontal: 5 feet

(2). Vertical: maximum each vertex 5 feet with no position along line segment greater than 10 feet from its true elevation

10-3-10-7. Data Capture Rule: A Shoulder may consist of multiple polygons. When there are no painted ground markings, the outer edges of the area designated as shoulder must be collected.

10-3-10-8. SDSFIE Equivalent: airfield_surface_site

10-3-10-9. Required Element For: ALP

10-3-10-10. Attributes:

Attribute	**Description**
air_sur_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type.
shl_type_d (String20)	Code for whether this is a runway shoulder or taxiway shoulder [Source: SDSFIE Attribute Table]
surfaceMaterial_d (Enumeration)	A code indicating the composition of the related surface [Source: NFDC]
feat_width (Real)	The overall width of the airfield surface [Source: SDSFIE Feature Table]
feat_len (Real)	The overall length of the airfield surface [Source: SDSFIE Attribute Table]
status_d (Enumeration)	A temporal description of the operational status of the feature. This attribute is used to describe real-time status.
restricted (Boolean)	An indicator as to whether access to the feature is restricted
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

10-3-11. Stopway

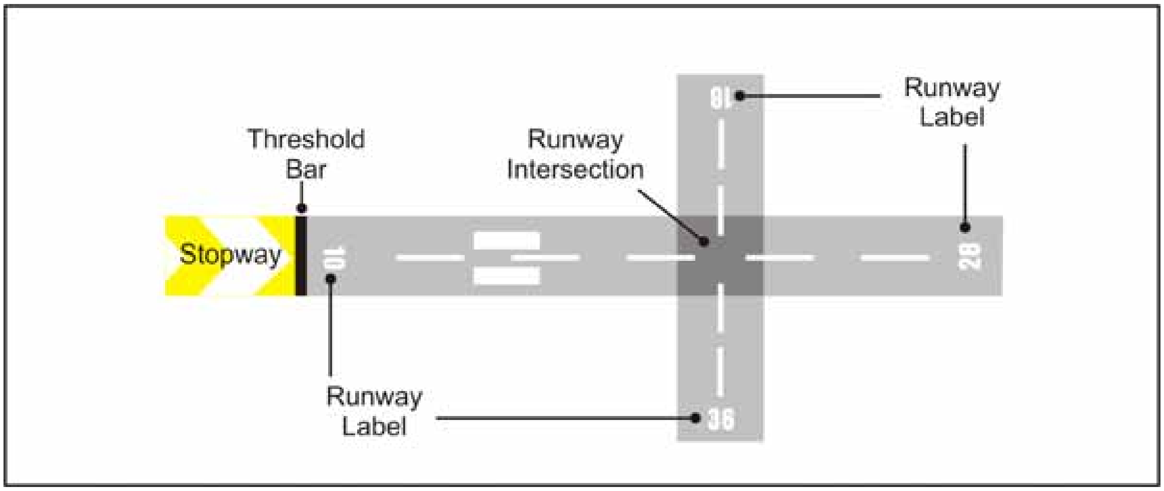


Figure 2-27: Illustrates the collection of the stopway

10-3-11-1. Definition: An area beyond the takeoff runway, no less wide than the runway and centered upon the extended centerline of the runway, able to support the airplane during an aborted takeoff without causing structural damage to the airplane. It is designated by the airport authorities for use in decelerating the airplane during an aborted takeoff.

10-3-11-2. Geometry Type: 3D Polygon

10-3-11-3. Feature Group: Airfield

10-3-11-4. Sensitivity: Restricted

10-3-11-5. Requirements: The width and centerline end of each stopway must be collected by field survey methods.

10-3-11-6. Positional Accuracy: Refer to Part 3, Tables 3-1 and 3-2.

10-3-11-7. Data Capture Rule: Refer to Appendix 2, Section 2-4, Runway End, Stopway End, and Displaced Threshold Identification, for identifying and properly positioning the stopway end. The width of the stopway must be measured from the outer edge of the yellow painted chevrons and entered into the ADCAT. An algorithm calculates the position of the four corners of the stopway based on the surveyed runway and stopway end points along with a measured width.

10-3-11-8. SDSFIE Equivalent: None

10-3-11-9. Required Element For: AOC

10-3-11-10. Attributes:

Attribute	Description
stopway_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type.
status_d (Enumeration)	A temporal description of the operational status of the feature. This attribute is used to describe real-time status.
feat_len (Real)	The length of the designated stopway from the end of the runway
feat_width (Real)	The overall width of the feature
surfaceMaterial_d (Enumeration)	A code indicating the composition of the related surface [Source: NFDC]
surfaceType_d (Enumeration)	A classification of airfield pavement surfaces for Airport Obstruction Charts [Source: NGS]
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

10-4. UNSPECIFIED COLLECTION METHODOLOGY

10-4-1. The elevation of the Air Traffic Control Tower (ATCT) cab must be determined for each operational ATCT on the airport. The “Cab Floor” refers to the operating cab of the ATCT, which is usually the top floor in the tower. This is the level where the air traffic controllers use air/ground communications, visual signaling, and other devises to provide air traffic control services to aircraft operating in the vicinity of an airport or on the movement area. This elevation may be measured with trigonometric levels, tape measure, etc. Note there is no position determination or specific spot.

10-4-2. Airport Reference Point. The Airport Reference Point is computed based on the ultimate locations of the runways. Refer to Airport Control Point feature for requirements. Compute the Airport Reference Point according to Appendix 2, Section 2-1, of this AC.

PART 3. AIRPORT OBSTRUCTION CHART SURVEYS

CHAPTER 11. INTRODUCTION

The Airport Obstruction Chart (See figure 3-1) (AOC) survey is an extensive field/remote sensing operation, providing 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 (NAVAIDs)
- 14 CFR Part 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 already) geodetic control in the airport vicinity based on permanent survey marks accurately connected to the National Spatial Reference System (NSRS) in accordance with AC 150/5300-16, *General Guidance and Specifications for Aeronautical Surveys: Establishment of Geodetic Control and Submission to the National Geodetic Survey*. This control and the associated NSRS connection assures accurate relativity between surveyed points on the airport and between these points and other surveyed points in the NAS, including navigation satellites.

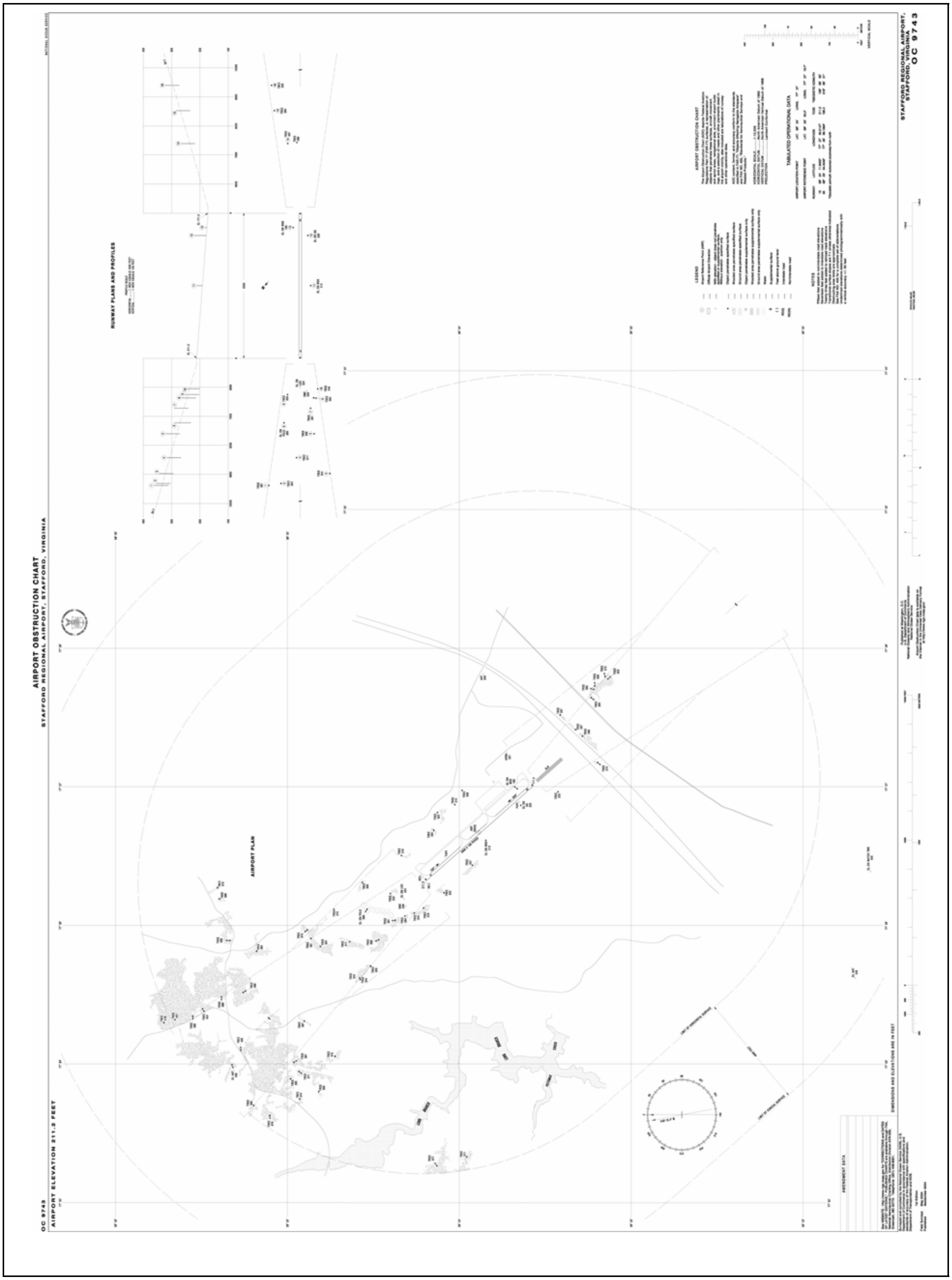


Figure 3-1: Illustrates a typical Airport Obstruction Chart

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 14 CFR Part 139
- Update official U.S. Government aeronautical publications
- Provide geodetic control for engineering projects related to runway/taxiway construction, NAVAID sighting, 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 one-time projects

Standards for AOC survey products are described in detail in Chapter 18. Unless otherwise stated, all data provided in accordance with this part must be current at the time of the AOC field survey.

CHAPTER 12. DATUM TIE AND LOCAL CONTROL

Surveys accomplished in accordance with these standards must be tied to the NSRS. Reference determined positions to the North American Datum of 1983 (NAD 83), which is operationally equivalent to and may be used as World Geodetic System of 1984 (WGS 84) values for charting and navigation purposes. Refer to http://www.ngs.noaa.gov/faq.shtml#Transform for clarification of WGS 84 conversions. Reference orthometric heights (MSL elevations) to the North American Vertical Datum of 1988 (NAVD 88).

CHAPTER 13. RUNWAY AND STOPWAY POINTS

Runway location and orientation are paramount to airport safety, efficiency, economics, and environmental impact. This section provides guidance on the location and marking of runway/stopway ends as well as the determination of profile points along the runway. It is extremely important that the runway ends are properly selected, since runway lengths and azimuths are determined from the established positions of the ends. Aircraft safety during takeoff and landing as well as airfield restrictions is dependent upon accurate information derived from the survey of runway ends. The identification of certain points (positions and elevations) along the runway is critical for landings, take-offs, and navigation. (Refer to Appendix 2, Section 2-4, Runway, Stopway, and Displaced Threshold End Identification.)

13-1. DESCRIPTION

Provide runway/stopway data for all runways and stopways with a specially prepared hard surface (SPHS) existing at the time of the field survey. Provide the data for non-specially prepared hard surface (non-SPHS) runways/stopways existing at the time of the field survey if—

- They are depicted in the version of the U.S. Government flight information publication *U.S. Terminal Procedures* current at the time of the field survey,
- The runway/stopway was specially requested by appropriate FAA authorities, or
- The stopway was officially designated a stopway by appropriate airport authorities.

Important points to bear in mind about stopways:

- A stopway is an area beyond the runway, with sufficient strength to support a decelerating aircraft in all weather conditions. It is not a runway safety area.
- A stopway must be designated as such. This means the airport owner/operator determines that a stopway exists and commits to maintaining the area as a stopway, including the appropriate lighting.
- The existence of a stopway means that the runway has a declared accelerate/stop distance, even though it may not be published.

Unless otherwise stated, all runway/stopway points must be on the runway/stopway centerline. Refer to Appendix 2, Section 2-4, Runway, Stopway, Displaced Threshold, End Identification, for detailed descriptions. The number painted on the runway at the time of the field survey must identify runways. Use the runway number published in *U.S. Terminal Procedures* (version current at the time of the field survey) if a number is not painted on the runway.

13-2. RUNWAY LENGTH AND WIDTH

Runway length does not include blast pads or stopway surfaces located at one or both ends of a runway; however, the displaced threshold is included in the physical length of the runway. When the ends of the runway surface have been determined, mark the positions (nail and washer, chisel square, or paint if possible) with a distinctive inscription to ensure future identification. In the runway end sketch, specify the inscription method used.

Runway lengths are determined from the positions of the runway ends. Determine the runway end positions using GPS methodologies. Compute runway lengths using the Aeronautical Data Collection and Analysis Tool (ADCAT) software. Compute the runway(s) length at the airport and compare the computed length(s) to the lengths published in the Airport Facility Directory. If the computed length, rounded to the nearest foot, is shorter than the published length and the difference cannot be attributed to a runway change, the points identified as the runway ends should be reviewed with the airport authority.

Measure the runway width from the outer edge of the runway, excluding runway shoulders and stopways. The narrowest section of runway should be measured. (Refer to Appendix 2, Section 2-4, Runway, Stopway, Displaced Threshold, End Identification.)

The runway width is the physical width extending over the entire length of the rectangle. Runway widths should be measured to the nearest tenth of a foot (0.1 ft) and the dimension included on the runway end sketch. Discuss the determined runway and associated displaced threshold, stopway, and blast pad dimensions with the airport manager or designated representative and resolve any disagreements or discrepancies in the values before departing the site.

13-3. REQUIRED RUNWAY DATA

Required data for SPHS and non-SPHS runways and stopways are presented in the table below and Figure 3-2.

Table 3-1: Required runway and stopway data

Runway/Stopway Point	Required data							
	SPHS Runway				Non-SPHS Runway			
	Lat	Lon	Elev	Dist	Lat	Lon	Elev	Dist
Airport Elevation			✓	✓[1]			✓	✓[1]
Runway Ends	✓	✓	✓		✓	✓	✓	
Intersection of SPHS Runways			✓	✓[2]				
Displaced Thresholds	✓	✓	✓		✓	✓		
Touchdown Zone			✓					
Stopway Ends			✓	✓[3]			✓	✓[3]
Supplemental Profile Points			✓	✓[2]				
Point Abeam Glideslope	✓	✓	✓					
Point Abeam MLS Elevation Antenna	✓	✓	✓					
Point Abeam Offset Localizer	✓	✓						
Point Abeam Offset LDA	✓	✓						
Point Abeam Offset SDF	✓	✓						
Point Abeam Offset MLS Azimuth	✓	✓						
Note:	When an obstruction survey is performed on a runway with a Non-SPHS the required runway/stopway data will be the same as for a SPHS runway. The touchdown zone elevation is required only for SPHS runways with a landing length equal to or greater than 3,000 feet. A facility is considered offset if located more than 10 feet from the runway centerline/centerline extended.							
Distance:	Distance from runway's— [1] Near end for airport elevation [2] Approach end for runway intersections and supplemental profile points [3] Stop end for stopways							
A facility is considered offset if located more than 10 feet from the runway centerline/centerline extended.								

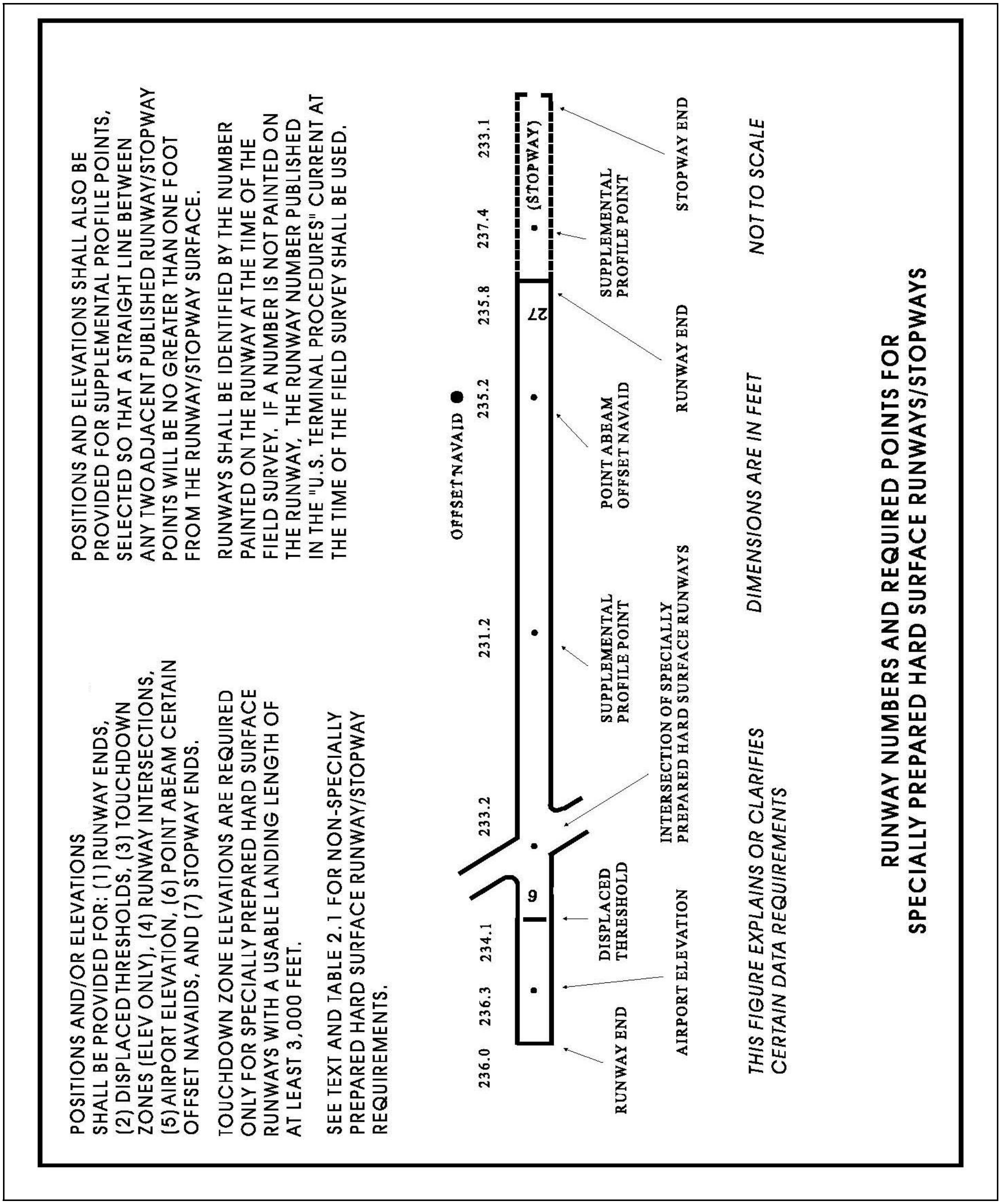


Figure 3- 2: Illustrates the runway numbers and required points for specially prepared hard surface runways/stopways

13-4. REQUIRED ACCURACIES FOR RUNWAY/STOPWAY DATA TABLE

Table 3-2: Runway and stopway data accuracy requirements

Item (Values are in Feet)	Horizontal	Vertical	Ellipsoid
Physical End	1.00	0.25	0.20
Displaced Threshold	1.00	0.25	0.20
Threshold Zone Elevation (TDZE)	N/A	0.25	0.20
Intersection of SPHS Rwys	20.00	0.25	0.20
Supplemental Profile Points	20.00	0.25	0.20
Point Abeam GS	1.00	0.25	0.20
Point Abeam MLSEL	1.00	0.25	0.20
Point Abeam Offset LOC	1.00	N/A	N/A
Point Abeam Offset LDA	1.00	N/A	N/A
Point Abeam Offset SDF	1.00	N/A	N/A
Point Abeam Offset MLSAZ	1.00	N/A	N/A
Stopway Length	2.00	N/A	N/A
Stopway End	N/A	0.25	0.20
Airport Elevation	20.00	0.25	0.20

13-5. RUNWAY/STOPWAY PROFILE

Positions and elevations (on the runway centerline) are required at certain marked points abeam various NAVAIDs and at intermediate points along the runway to establish the elevation of the airport and to define the gradients of the runway.

Runway/stopway profiles may be obtained from GPS observations (static, kinematic, and/or real-time kinematic) or from spirit level/EDM observations. In either case, profiles must begin and end on the runway end points. If GPS is used to determine runway profile, data will be collected twice. If GPS is collected while in motion (i.e. kinematic and/or real-time kinematic GPS) the following requirements apply:

(1). A minimum of five satellites will be used.
(2). Collect one data set in each direction; each data set will be a separate file.
(3). Collect elevations and positions every 50 feet or less along the runway, and interpolate the required intermediate points.
(4). Mean the two data sets.
(5). Provide a graph displaying the two collects. All points will meet the accuracies as stated in Table 3-2.

(6). If a static or a “Stop and Go” GPS technique is used, the following requirements apply:

- A minimum of five satellites will be used.
- Positions and elevations will be collected for all required points (refer to Table 3-1 above).
- Point spacing will be no greater than 600 feet.
- Any points of apparent change in grade are required.
- All points will be collected twice; each data set will be a separate file.
- Mean/average the two data sets.
- Provide a graph displaying the two collects.
- Provide a sketch showing the location of the profile points.
- All points will meet the accuracies as stated in Table 3-2.

(7). If spirit levels are used to collect elevations and positions, the following requirements apply:

- All spirit leveling will be run forward and backward or run in a closed loop.
- The spirit leveling will be referenced to a high accuracy benchmark or the PACS, SACS, or temporary survey mark (TSM). Include at least two such reference elevations to ensure the required check to datum.
- Positions and elevations will be collected at all required points (refer to Table 3-1 above).
- Point spacing will be no greater than 600 feet.
- Any points of apparent change in grade are required.
- Submit a graph displaying the collected data.
- Provide a sketch showing the location of the profile points.
- All points will meet the accuracies as stated in Table 3-2.

13-6. PHOTOGRAPHS AND SKETCHES

Three digital photographs must be taken, as described in below, of all survey nails and washers (those marking runway ends and thresholds).

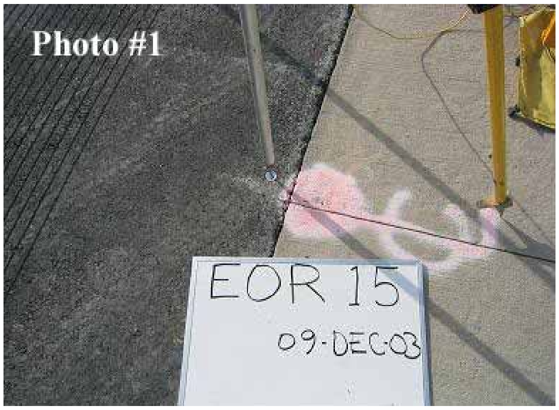


Figure-3-3: Photograph Type #1 (Eye Level). Photo taken from above the mark, showing an area around the mark about 1 meter in diameter.

Figure 3-4: Photograph Type #2 (Approach). Photo showing tripod over the mark in foreground and approach in the background.

Figure 3-5: Photograph Type #3 (Across Runway). Photo taken from the side of the runway looking across the end of the runway, with a tripod or arrow indicating the end point; include any features used to identify the runway end.

Figure 3-6: Signs should be put in photograph types #1 through #3 showing the runway end designation (name) in large and clearly printed letters. In photograph #3, the cardinal direction (N, NE, etc.) in which the camera is pointed should be included.

CHAPTER 14. DIGITAL PHOTOGRAPH AND FILE NAMING CONVENTIONS

14-1. NAMING CONVENTION

Use the following file naming convention: the airport designator, runway end designator, photo number, and date, followed by the file type extension, as in the example below. Separate each section of the file name with an underscore—except the photo number, which should be preceded by a dash.

Sample File Name	
For runway end point:	LAX_CL_END_RWY_12R-3_04MAY2001.jpg

For the runway end example, “LAX”=location identifier, “CL END RWY 12R”=runway end designator [CL=centerline, END=end, RWY= runway, 12=runway number, and R=right (or C=center, or L=left)], dash, “3”= photo number, and date.

14-2. CAPTION

Provide a caption for each photograph. The caption should include the following information:

- Airport location identifier (LID)
- Runway end designator
- Photo number
- Date the photo was taken

For example, LAX, 12R, 3, 23 Aug 2004. In addition, the caption for photo #2 will include the cardinal direction (N, NE, E, SE, etc.) the camera is pointing.

14-3. SKETCHES

The contractor will complete the following tasks.

- Make a sketch of all runway ends, stopways, and blast pads.
- A field sketch must contain a schematic diagram of the runway end, surface markings, lights, connecting taxiways, stopways, blast pads, and other information.
- Clearly annotate all pertinent lengths and distances on runway end sketches.
- The surveyor is responsible for verifying the information depicted, including all lengths and distances.
- Prepare a sketch of each runway. The sketch must include dimensions and explanations necessary to clarify any possible ambiguities between the actual runway surface and the runway as it appears on the photograph or sketch.

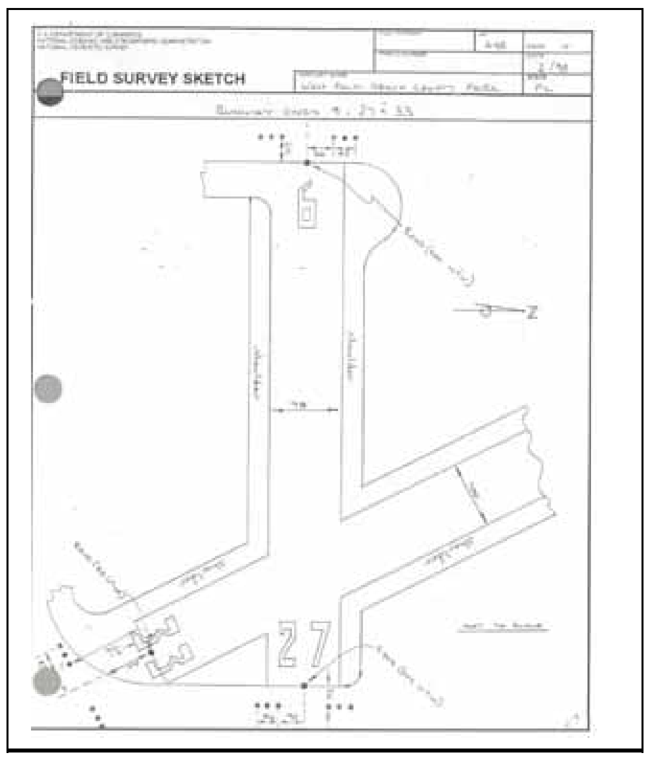


Figure 3-7: Illustrates a prepared sketch of each runway end at an airport

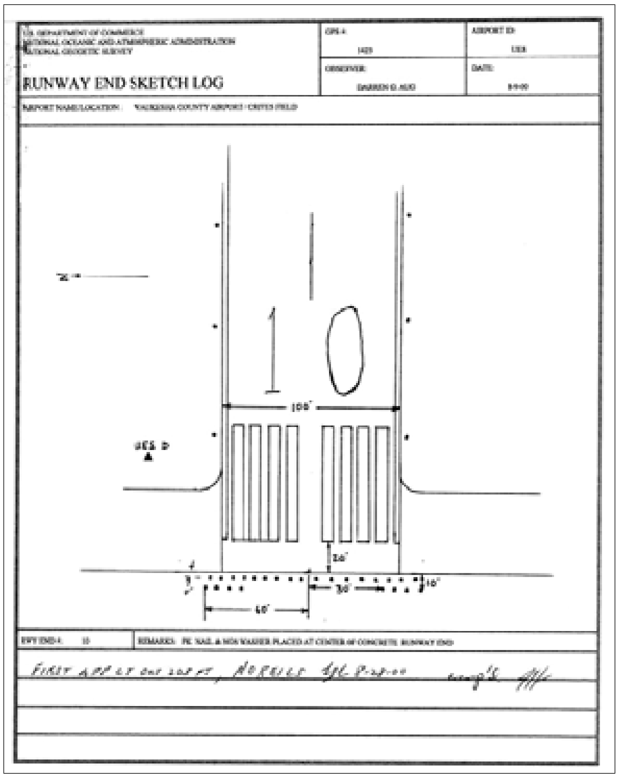


Fig 3-8: Illustrates the proper method of depicting a specific runway end

- On the sketch show the usable portion of the surfaced runway if it differs from the surface extent of the runway in either length or width. Consult the airport manager or other designated representative of the airport authority when making this determination.
- The sketch also needs to show the dimensions of any area near or off the runway end designated as “blast pad” or “stopway”. Discuss with the airport authorities the definition, use, and designation of these areas if it is unclear.
- Show dimensions and measurements to clarify the relationship of such areas to the physical end of the runway if these areas do not exist.
- Clarify the sketch with notes and dimensions to identify discrepancies between the physical runway ends as they exist on the ground and as they appear on the imagery.
- Depict the runway numbers painted on the runways in the sketch. Show the approximate relationship between the runway number and the runway end threshold point on the sketch.
- Date each sketch and include the line painted under the runway number if it exists. It should be noted if numbers are not painted on the runway. Additional examples of airports sketches are available for reference in Appendix 2, Section 2-3.

CHAPTER 15. NAVIGATIONAL AIDS

An integral part of the airport system is the visual and electronic navigational aids (NAVAIDs) to assist pilots in navigating both on the airport and en route. A NAVAID is any visual or electronic device, airborne or on the surface, providing point-to-point guidance information or position data to aircraft in flight. FAA operates over 4,000 ground-based electronic NAVAIDs, each broadcasting navigation signals within a limited area. FAA also provides a variety of approach lighting systems to assist the pilot in transitioning from instrument reference to visual reference for landing. A NAVAID survey is the process of determining the position and/or elevation of one or more NAVAIDs and adjunctive points on associated runways or runway centerlines extended. A NAVAID survey may be combined with other aeronautical surveys, or it may be entirely independent. For certain electronic and visual NAVAIDs, the position of the established horizontal survey point must be determined. The horizontal survey point may be determined by either field survey or remotely sensed means. The horizontal survey point may be the center of the NAVAID or, when the NAVAID is composed of more than one unit, the center of the array. A position is required if, and only if, the NAVAID is associated with the airport being surveyed. If the NAVAID is also an obstruction, the obstruction requirements and accuracies also apply.

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

- The NAVAID is listed in Table 3-3 below.
- The NAVAID is located within 10 nautical miles of the Airport Reference Point. See Appendix 2, Section 2-1, Airport Reference Point Computation.
- The NAVAID is associated with an instrument approach procedure for the airport being surveyed and the procedure is published in the version of the U.S. Government flight information publication *U.S. Terminal Procedures* current at the time of the field survey.

In addition to the NAVAIDs identified above, Airport Surveillance Radars and Air Route Surveillance Radars located within 14 CFR Part 77 limits for the airport being surveyed, and not located on a military aerodrome, must be surveyed. For any NAVAID off the airfield, a sketch is required, with dimensions, showing the NAVAID and its compound (area) and the point surveyed. Table 3-4 identifies what data must be collected and reported for each type of NAVAID. If a NAVAID is encountered that is not listed, contact the FAA Airport Surveying–GIS Program Manager for guidance.

15-1. ELECTRONIC NAVAIDS

Determine the position (and sometimes the elevation, depending on the NAVAID) for electronic NAVAIDs associated with the airport. The accuracy requirements for electronic NAVAIDs vary; refer to Table 3-3, Navigational Aids, for the required accuracy of the NAVAID being surveyed.

15-2. VISUAL NAVAIDS

To enhance visual information during the day when visibility is poor and at night, it is essential to provide visual aids that are as meaningful to pilots as possible. These aids provide visual clues to the pilot about the aircraft's alignment and height in relation to the airport or runway. Visual NAVAIDs consist of a variety of lighting and marking aids used to guide the pilot both in the air and on the ground. Determine the position of the horizontal survey point for the visual aids as defined in Table 3-3. The position of the horizontal survey point may be the center of the NAVAID, the center of the unit array when the NAVAID is composed of more than one unit, or, in the case of approach light systems, the first and last lights.

Table 3-3 lists the Horizontal Survey Point (HSP), Vertical Survey Point (VSP), and accuracy requirements for the electronic and visual NAVAIDS normally found on and around airports. The accuracy values are in feet and are relative to the nearest PACS, SACS, or TSM. Paragraph 15-3 provides sample images of most typical NAVAIDs. These images depict the horizontal and vertical survey points for each of the identified NAVAIDs.

Table 3-3: Navigational Aids

ELECTRONIC NAVAIDS					
NAVAID	Horizontal Survey Point (HSP)	Vertical Survey Point (VSP)	Vertical		
			HORZ	ORTHO	ELLIP
Air Route Surveillance Radar (ARSR)	**(1)**	**(2)**	20.00 **(5)**	100.00	100.00
Airport Surveillance Radar (ASR)	**(1)**	**(2)**	20.00 **(5)**	10.00	10.00
Distance Measuring Equipment (DME):	Center of Antenna Cover	Center of Antenna Cover	1.00	1.00	1.00
Frequency Paired with LOC **(3)**	Center of Antenna Cover	Center of Antenna Cover	1.00	1.00	1.00
Frequency Paired with MLSAZ **(3)**	Center of Antenna Cover	**(2)**	20.00 **(5)**	20.00	20.00
Frequency Paired with NDB	Center of Antenna Cover	**(2)**	20.00 **(5)**	20.00	20.00
Frequency Paired with VOR Not Frequency Paired	Center of Antenna Cover	**(2)**	20.00 **(5)**	20.00	20.00
Fan Marker (FM)	Center of Antenna Array	**(2)**	20.00 **(5)**	20.00	20.00
Localizer (LOC) **(4)**	Center of Antenna Supporting Structure	**(2)**	1.00	1.00	1.00
Glide Slope (GS)	Center of Antenna Supporting Structure	**(2)**	1.00	0.25	0.20
End Fire Type (GS)	Phase Center Reference Point	Phase Center Reference Point	1.00	0.25	0.20
Inner Marker (IM)	Center of Antenna Array	**(2)**	20.00	20.00	20.00
Middle Marker (MM)	Center of Antenna Array	**(2)**	20.00	20.00	20.00
Outer Marker (OM)	Center of Antenna Array	**(2)**	50.00	20.00	20.00
Back Course Marker (BCM)	Center of Antenna Array	**(2)**	50.00	20.00	20.00

Table 3-3: Navigational Aids (continued)					
ELECTRONIC NAVAIDS					
NAVAID	Horizontal Survey Point (HSP)	Vertical Survey Point (VSP)	Vertical[5]		
			HORZ	ORTHO	ELLIP
Localizer Type Directional Aid (LDA)	Center of Antenna Supporting Structure	**(2)**	1.00	1.00	1.00
MLS Azimuth Guidance (MLSAZ)	Phase Center Reference Point	Phase Center Reference Point	1.00	1.00	1.00
MLS Elevation Guidance (MLSEL)	Phase Center Reference Point	Phase Center Reference Point	1.00	0.25	0.20
Non-directional Beacon (NDB)	Center of Antenna Array	**(2)**	20.00 **(5)**	20.00	20.00
Simplified Directional Facility (SDF)	Center of Antenna Supporting Structure	**(2)**	1.00	1.00	1.00
Tactical Air Navigation (TACAN)	Center of Antenna Cover	**(2)**	20.00 **(5)**	100.00	100.00
VHF Omni Directional Range (VOR)	Center of Antenna Cover	**(2)**	20.00 **(5)**	100.00	100.00
VOR/TACAN (VORTAC)	Center of Antenna Cover	**(2)**	20.00 **(5)**	100.00	100.00
VISUAL NAVAIDS					
Airport Beacon (APBN)	**(1)**	**(2)**	20.00 **(5)**	20.00	20.00
Visual Glide Slope Indicators	Center of Antenna Array	**(2)**	20.00	10.00	10.00
REIL	Center of Light	**(2)**	20.00	10.00	10.00
Approach Lights (ALS)	Center of first and last lights	**(2)**	20.00	10.00	10.00

Notes:

(1) The HSP will be the axis of antenna rotation if possible. If the antenna is covered, the HSP will be the center of the antenna cover.

(2) The VSP for these items will be the intersection of the ground, gravel, concrete pad, or other base and plumb line through the HSP. When access to this point is impractical, elevation of the VSP will be approximated.

(3) DME mid-point elevations are required only when the DME is frequency paired with an Instrument Landing System or Microwave Landing System.

(4) When LOC clearance and course array antennas are both present, only the course array antenna will be surveyed.

(5) The horizontal accuracy requirement for these items is 50 feet when not located on a public use airport or military field.

* A compass locator within 50 feet of an Instrument Landing System marker is considered collocated at the position of the marker. Other NAVAIDs are not considered collocated unless their HSPs are the same.

[5] When the navigational aid is an obstruction (penetrates an imaginary or obstruction surface), it must be surveyed to the accuracy standard as an obstruction, which might be higher.

Table 3-4: Electronic NAVAIDs					
NAVAID	NAVAID RWY &/or ID [6]	ABEAM POINT	LAT	LONG	ELEV
Air Route Surveillance Radar (ARSR)	ID	N/A	Y	Y	Y
Airport Surveillance Radar (ASR)	ID	N/A	Y	Y	Y
Distance Measuring Equipment (DME)	RWY#_ID	N/A	Y	Y	Y
Glide Slope (GS)	RWY#_ID	Y	Y	Y	Y
Glide Slope-End Fire type (GS)	RWY#_ID	Y	Y	Y	Y
Localizer (LOC)	RWY#_ID	Y	Y	Y	Y
Middle Marker (MM)	RWY#_ID	N/A	Y	Y	Y
Locator/Outer Marker (LOM/OM)	RWY#_ID	N/A	Y	Y	Y
Inner Marker (IM)	RWY#_ID	N/A	Y	Y	Y
Back Course Marker (BCM)	RWY#_ID	N/A	Y	Y	Y
Fan Marker (FM)	ID	N/A	Y	Y	Y
Localizer Type Directional Aid (LDA)	RWY#_ID	Y	Y	Y	Y
MLS Azimuth Guidance (MLSAZ)	RWY#_ID	Y	Y	Y	Y
MLS Elevation Guidance (MLSEL)	RWY#_ID	Y	Y	Y	Y
Non-Directional Beacon (NDB)	ID	N/A	Y	Y	Y
Simplified Directional Facility (SDF)	RWY#_ID	Y	Y	Y	Y
Tactical Air Navigation (TACAN)	ID	N/A	Y	Y	Y
VHF Omni Directional Range (VOR)	ID	N/A	Y	Y	Y
VOR/TACAN (VORTAC)	ID	N/A	Y	Y	Y

[6] Explanation and examples: ID – the facility lettered identifier i.e. ASR **[DDD]** and RWY#_ID – the runway end number (for which the facility serves) underscore the facility identifier: **LOM! (12_RTE).**

Table 3-5: Visual NAVAIDs					
NAVAID	NAVAID RWY &/or ID	ABEAM POINT	LAT	LONG	ELEV
Airport Beacon	NA	N/A	Y	Y	Y
ALS	RWY#	N/A	Y	Y	Y
REIL	RWY#	N/A	Y	Y	Y
VASI	RWY#	N/A	Y	Y	Y
PAPI	RWY#	N/A	Y	Y	Y
PLASI	RWY#	N/A	Y	Y	Y
PVASI	RWY#	N/A	Y	Y	Y
TVASI	RWY#	N/A	Y	Y	Y
TRCV	RWY#	N/A	Y	Y	Y
TDR	RWY#	N/A	Y	Y	Y

Note:
Visual NAVAIDs are associated with the runway end they serve; the Airport Beacon is an exception (i.e. ALS! (12); APBN).

15-3. NAVIGATIONAL AID HORIZONTAL AND VERTICAL SURVEY POINT REFERENCE INFORMATION

NAVIGATIONAL AID DESCRIPTION

Airport Beacon (APBN)

Airport Beacon is a visual navigational aid; they are used to guide pilots to lighted airports with a sequence of yellow, green, and/or white light. A beacon is normally operated from dusk until dawn. If the beacon is on during other hours it typically indicates that the airport is operating under instrument flight rules

DESCRIPTION OF POINT OBSERVED

The horizontal survey point is located at the center of rotation axis. The no vertical survey point is required.

PHOTO

NAVIGATIONAL AID

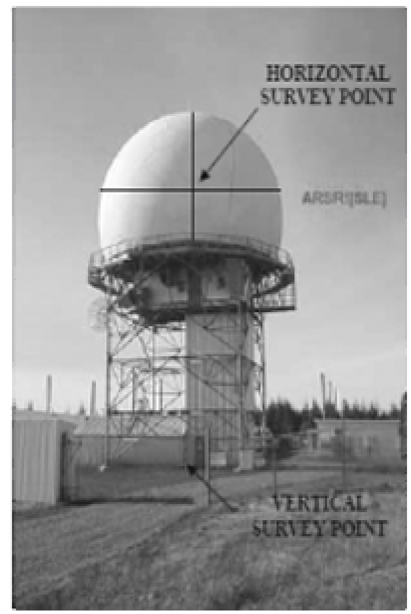
Air Route Surveillance Radar (ARSR)

The long-range radar equipment used in controlled airspace to manage traffic is the air route surveillance radar (ARSR) system. There are approximately 100 ARSR facilities to relay traffic information to radar controllers throughout the country. Each air route surveillance radar site can monitor aircraft flying within a 200-mile radius of the antenna.

DESCRIPTION OF POINT OBSERVED

The horizontal survey point (HSP) is the center of the radar dome. The vertical survey point (VSP) is the ground at the base of the tower.

PHOTO



NAVIGATIONAL AID DESCRIPTION

Air Surveillance Radar (ASR)

Air Surveillance Radar is designed to provide relatively short-range coverage in the airport vicinity and to serve as an expeditious means of handling terminal area traffic. The ASR detects and displays an aircraft's position in the terminal area. ASR provides range and azimuth information but does not provide elevation data. Coverage of the ASR can extend up to 60 nautical miles.

DESCRIPTION OF POINT OBSERVED

The horizontal survey point is located at the center of rotation axis. The vertical survey point is located at ground level on a centerline of the horizontal survey point.

PHOTO

NAVIGATIONAL AID

Distance Measuring Equipment (DME)

Distance measuring equipment – DME measures the distance directly from the aircraft to the ground station. This measurement is referred to as slant range distance. The difference between a measured distance on the surface and the DME slant range is greatest when an aircraft is directly over the station, at which time it actually measures altitude. DME is often co-located with other navigational systems.

DESCRIPTION OF POINT OBSERVED

The horizontal and vertical survey point is located at center of antenna cover NOTE: Elevation is only needed when frequency paired with ILS or Microwave landing system.

PHOTO

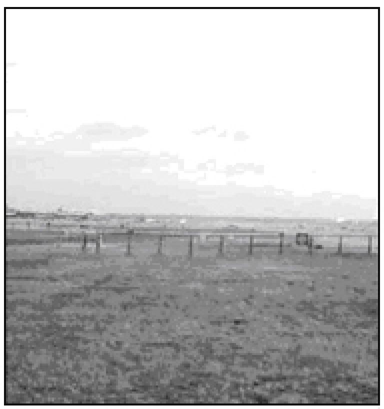
NAVIGATIONAL AID

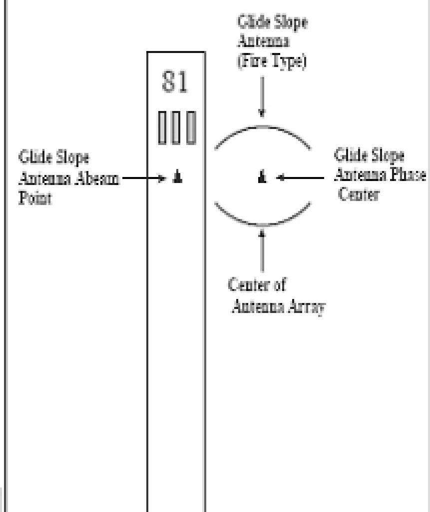
INSTRUMENT LANDING SYSTEM (FIRE TYPE)

DESCRIPTION OF POINT OBSERVED

The horizontal and vertical survey point on the glide slope is the top center of antenna array for obstruction purposes. Note: the antenna phase center is computed by taking the mean between each antenna array and computed at ground level. Note: abeam points must be computed in conjunction with all glide slope antennas. Abeam points are located on the centerline of the runway, perpendicular to the glide slope antenna.

PHOTO





NAVIGATIONAL AID

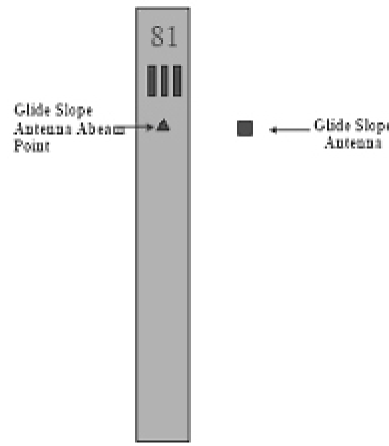
Glide Slope Antenna (Non Fire Type)

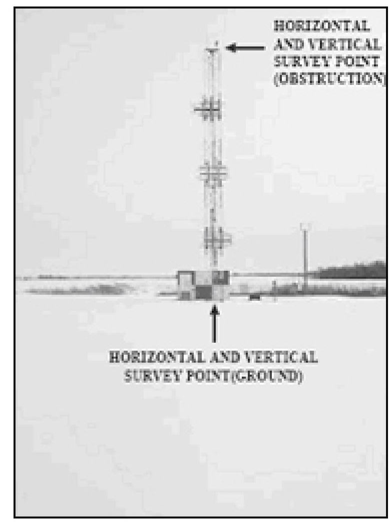
The Glide Slope informs the pilot with the airplane's vertical position relative to the ideal approach. The Glide Slope antenna is located off one side of the runway, approximately abeam the touchdown point (typically 1000 feet past the approach end of the runway). The standard glide-slope path is 3 degrees slope.

DESCRIPTION OF POINT OBSERVED

The horizontal and vertical survey point observed on the glide slope is the top center of supporting structure (for obstruction purposes), and an additional vertical survey point is at ground level center of supporting structure. NOTE: abeam points must be computed in conjunction with all glide slope antennas. Abeam points are located on the centerline of the runway, perpendicular to the glide slope antenna.

PHOTO





NAVIGATIONAL AID

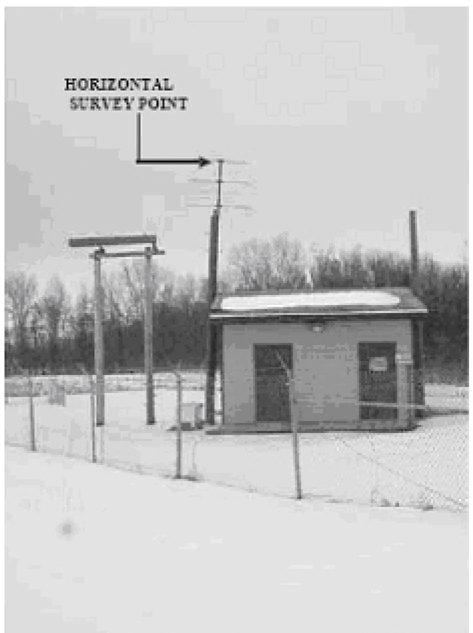
Inner Marker

Inner Marker is used only for Category II operations. Marker Beacons are to alert the pilot that an action is needed. This information is presented to the pilot by audio and visual cues.

DESCRIPTION OF POINT OBSERVED

The horizontal survey point for the inner marker is the center of the antenna array. There is no vertical survey point requirement.

PHOTO



NAVIGATIONAL AID DESCRIPTION

LOCALIZER (LOC)

The Localizer informs the pilot with the airplane's horizontal position relative to runway centerline. The Localizer broadcasts from beyond the departure end of the runway with a horizontal antenna array. Course width is adjusted to provide full-scale deflection left or right at 350 feet off centerline when over the approach end of the runway. Course width varies with runway length.

DESCRIPTION OF POINT OBSERVED

The Horizontal and Vertical Survey Point is located at the center of antenna supporting structure.

PHOTO

NAVIGATIONAL AID DESCRIPTION

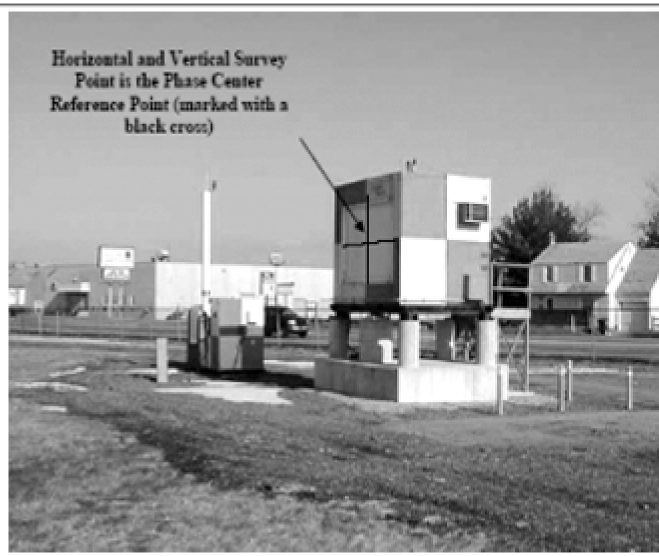
MLSAZ

The MLS is a precision approach and landing guidance system which provides position information and various ground-to-air data. The position information is provided in a wide coverage sector and is determined by an azimuth angle measurement (MLSAZ)

DESCRIPTION OF POINT OBSERVED

The Horizontal and Vertical Survey Point is located at the phase center reference point.

PHOTO



NAVIGATIONAL AID DESCRIPTION

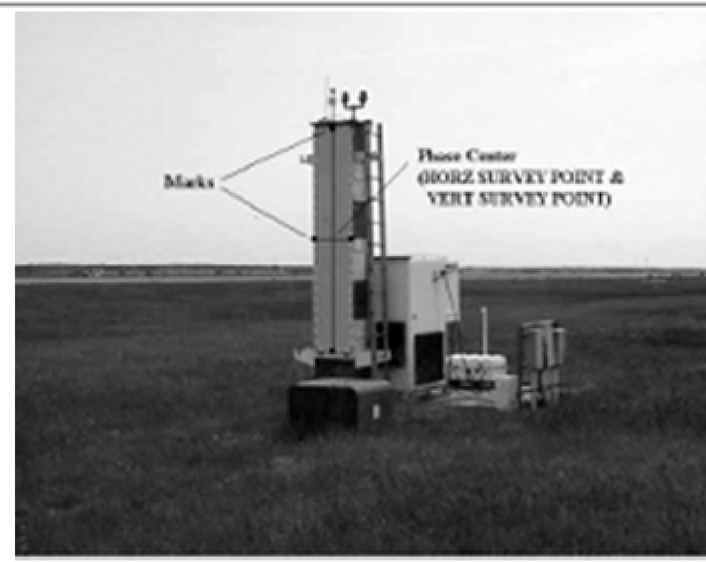
MLS ELEVATION GUIDANCE (MLSEL)

The elevation station transmits signals on the same frequency as the azimuth station. A single frequency is time-shared between angle and data functions. The elevation transmitter is normally located about 400 feet from the side of the runway between runway threshold and the touchdown zone.

DESCRIPTION OF POINT OBSERVED

The Horizontal and Vertical Survey Point is located at the Phase Center Reference Point.

PHOTO



NAVIGATIONAL AID DESCRIPTION

NONDIRECTIONAL BEACON (NDB)

Non-Directional Beacon (NDB) is another ground-based navigational aid used throughout the United States. The NDB system is the oldest form of electronic navigation still in regular use. By transmitting low to medium frequencies to an automatic direction finder located in the aircraft, pilots can use the NDB system to navigate to and from the ground-based station. NDB's may be co-located with an ILS system. NDB's may also provide a non-precision approach

DESCRIPTION OF POINT OBSERVED

The horizontal survey point is located at the Center of Antenna Array. No vertical required.

PHOTO

NAVIGATIONAL AID DESCRIPTION

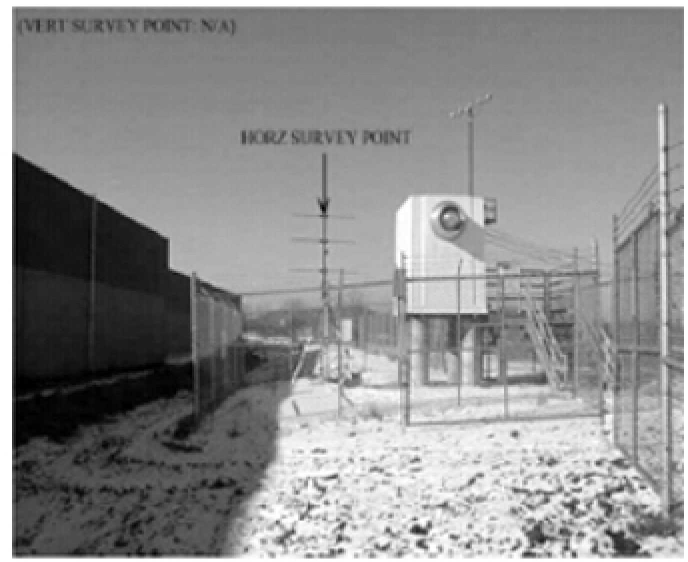
MIDDLE MARKER (MM)

Middle Marker (MM) beacon is located 2,000 to 6,000 feet (600 to 1 800 m) from the runway threshold. The middle marker defines a point along the glideslope of an ILS normally located at or near the point the point of decision height.

DESCRIPTION OF POINT OBSERVED

The Horizontal Survey Point is located at the Center of Antenna Array. No vertical required.

PHOTO



NAVIGATIONAL AID

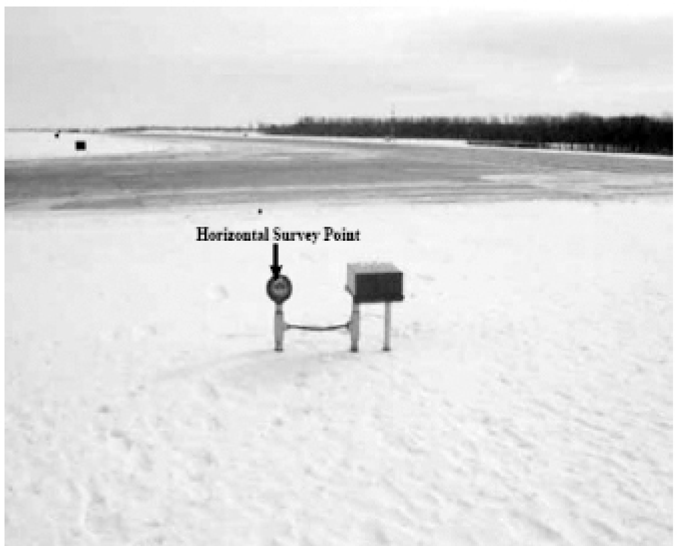
Runway End Identifier Lights (REIL)

Runway End Identifier Lights (REIL) consists of high intensity white strobe lights placed on each side of the runway to enable rapid and positive identification of the runway threshold. REILs are typically installed on runways where an approach lighting system is not available.

DESCRIPTION OF POINT OBSERVED

The horizontal survey point (HSP) observed is the top center of light. No vertical required.

PHOTO



NAVIGATIONAL AID

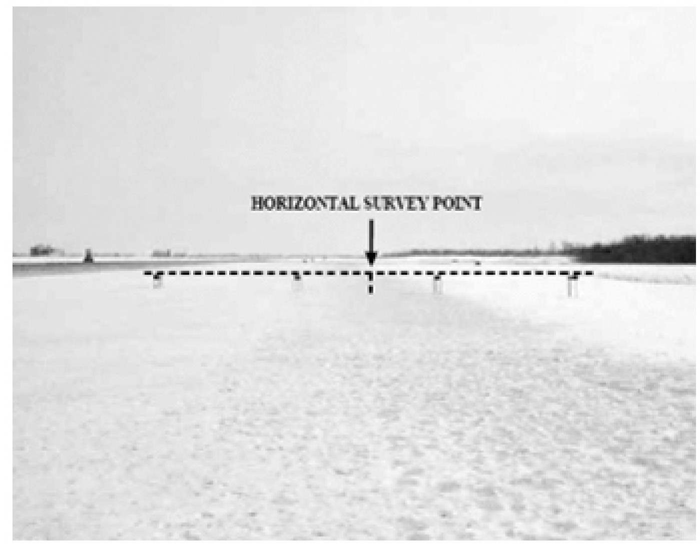
Precision Approach Path Indicators (PAPI)

Precision Approach Path Indicators is a visual-approach slope aid approved for use in the United States. This system gives indication that is more precise to the pilot of the approach path of the aircraft and utilizes only one bar. The system consists of four lights on either side of the approach runway. The PAPI are white and red lights arranged in a single row. If you are on the proper glide path, you will see two white lights on the left side of the PAPI light bar and two red lights on the right side.

DESCRIPTION OF POINT OBSERVED

The Horizontal Survey Point on PAPI lights is the center of array. No vertical is required.

PHOTO



NAVIGATIONAL AID

VASI

VISUAL APPROACH SLOPE INDICATOR (VASI) is an optical reference device located on the ground adjacent to the sides of the runway. There is a variety of VASI designs dependent upon the desired visual range and the type of aircraft utilizing the runway. The lenses split the light into red and white beams. If you are approaching the runway on the proper glide path, you see a red light above a white light.

DESCRIPTION OF POINT OBSERVED

The horizontal survey point is the center of array. The Vertical Survey Point is located at ground level on a centerline of the horizontal survey point.

PHOTO

NAVIGATIONAL AID

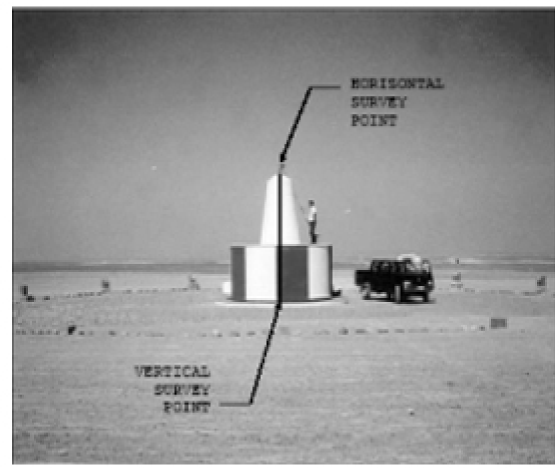
Very High Frequency Omni-directional Range Station (VOR)

VHF Omni-directional Range (VOR) – The VOR is a ground based short distance navigation aid (NAVAID) which provides continuous azimuth information in the form of 360 radials to or from a station. It is used for en route navigation as well as non-precision approaches. The VOR system is present in three slightly different navigation aids (NAVAIDs): VOR, VOR/DME, and VORTAC. By itself, it is known as a VOR, and it provides magnetic bearing information to and from the station. When DME is also installed with a VOR, the NAVAID is referred to as a VOR/DME. When military tactical air navigation (TACAN) equipment is installed with a VOR, the NAVAID is known as a VORTAC. DME is always an integral part of a VORTAC. Regardless of the type of NAVAID utilized (VOR, VOR/DME or VORTAC), the VOR indicator behaves the same.

DESCRIPTION OF POINT OBSERVED

The horizontal survey point is located on the top center of antenna cover. The vertical survey point is located at ground level center of structure.

PHOTO



NAVIGATIONAL AID

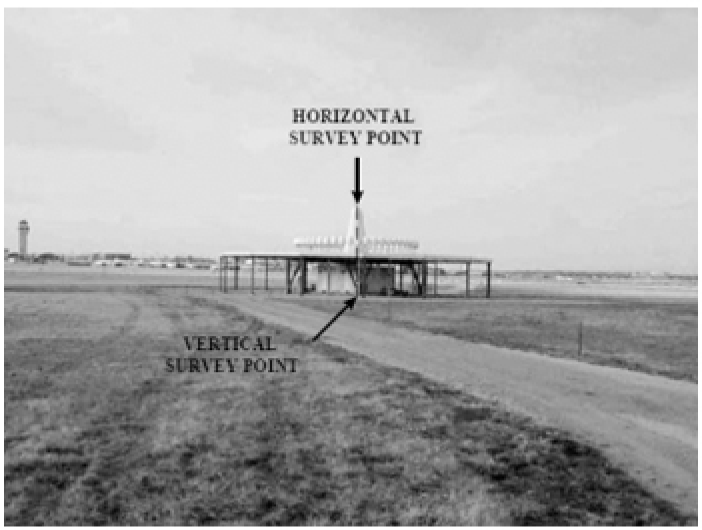
Very High Frequency Omni-directional Range Station(VOR)

VHF Omni-directional Range (VOR) – The VOR is a ground based short distance navigation aid (NAVAID) which provides continuous azimuth information in the form of 360 radials to or from a station. It is used for en route navigation as well as non-precision approaches. The VOR system is present in three slightly different navigation aids (NAVAIDs): VOR, VOR/DME, and VORTAC. By itself, it is known as a VOR, and it provides magnetic bearing information to and from the station. When DME is also installed with a VOR, the NAVAID is referred to as a VOR/DME. When military tactical air navigation (TACAN) equipment is installed with a VOR, the NAVAID is known as a VORTAC. DME is always an integral part of a VORTAC. Regardless of the type of NAVAID utilized (VOR, VOR/DME or VORTAC), the VOR indicator behaves the same.

DESCRIPTION OF POINT OBSERVED

The horizontal survey point is located on the top center of antenna cover. The vertical survey point is located at ground level center of structure.

PHOTO



NAVIGATIONAL AID / WEATHER AID DESCRIPTION

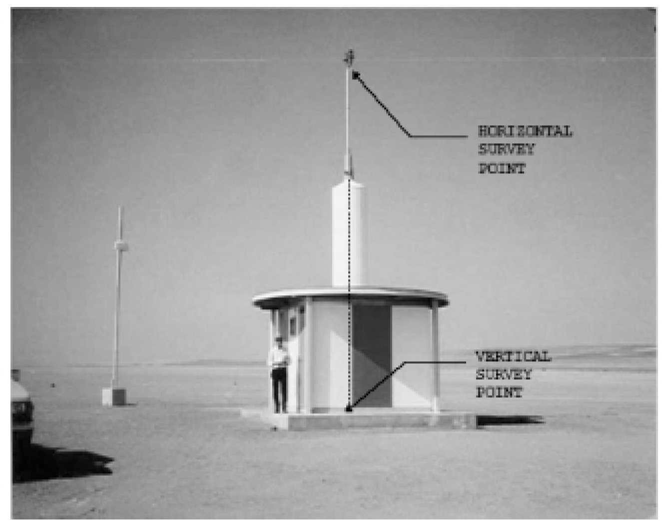
Very High Frequency Omni-directional Range Station (VOR WITH DME)

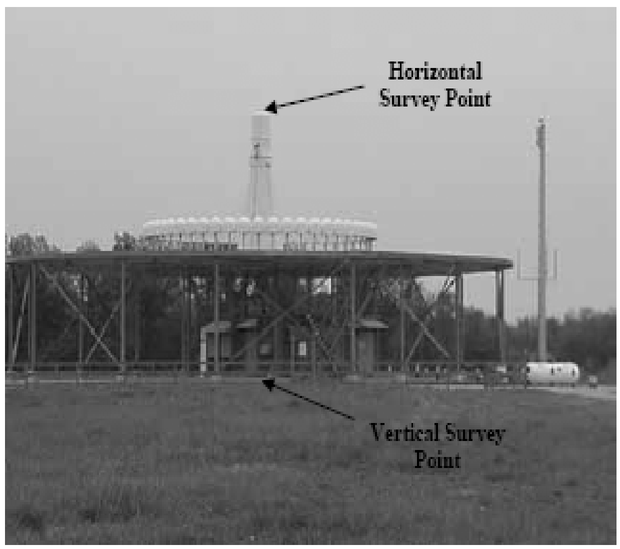
VOR/DME: If the VOR station is equipped with distance measuring equipment (DME), the signals can also be used to determine the distance to the station. It also provides navigation guidance for en route navigation and non-precision approaches.

DESCRIPTION OF POINT OBSERVED

The horizontal survey point is located on the top center of antenna cover. The vertical survey point is located at ground level center of structure.

PHOTO



NAVIGATIONAL AID
VORTAC The VORTAC is simply a VOR and TACAN co-located and providing the same navigational assistance.
DESCRIPTION OF POINT OBSERVED
The horizontal survey point is located on the top center of antenna cover. The vertical survey point is located at ground level center of structure.
PHOTO


CHAPTER 16. OBSTRUCTIONS

The airspace around an airport is comprised of several imaginary three-dimensional obstruction identification surfaces (OIS), as defined in 14 CFR Part 77. These surfaces provide the criteria for determination of obstructions to navigable airspace. The supplemental instructions provided by the contracting official in the SOW will specify the approach category (condition) to which each runway end approach must be surveyed. The specified approach category (Visual, Utility, Non-Precision, Precision) for each runway end, the position and elevation of each runway end, and the airport elevation will determine the limits of the associated Primary, Horizontal, Conical, and Transitional surfaces to be surveyed. The surveyor must provide the required obstruction representation to these surfaces. The Aeronautical Data Collection and Analysis Tool (ADCAT) available from FAA provides the capability to model the required surfaces to assist the survey team in meeting these requirements.

One reason an object is considered an obstruction to air navigation is if it penetrates one of the required surfaces. The elevation required for any obstacle to obstruct an imaginary surface depends on the location of the obstacle within the airspace of the airport. The ADCAT software will allow the surveyor to identify, verify, position, and evaluate field-determined objects relative to the various imaginary surfaces. Survey teams must develop the ability to quickly judge the location of an object in the field relative to the various imaginary surfaces. The survey team must understand the definitions and interrelations between the various imaginary surfaces.

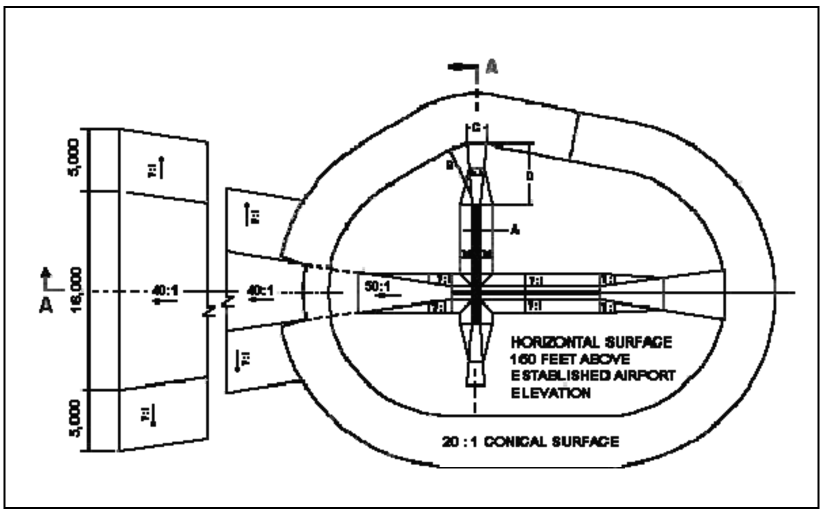


Fig 3-9: Illustrates the different 14 CFR Part 77 surfaces

16-1. DEFINITION

An obstruction, for purposes of this section, is any non-frangible obstacle penetrating an OIS, as defined in 14 CFR Part 77. A supplemental obstruction is any non-frangible obstacle penetrating an OIS defined as a supplemental OIS by appropriate FAA authorities.

16-2. OBSTRUCTION IDENTIFICATION SURFACES (OIS)

16-2-1. Precision Instrument Runway Surfaces – Category PIR

16-2-1-1. PIR Primary Surface: The primary surface is a 1,000-foot-wide rectangle centered on the runway centerline, beginning 200 feet on the approach side of a runway threshold and extending to 200 feet on the approach side of the opposite runway threshold. The transitional surfaces associated with the primary surface, extend outward and upward perpendicular to the runway centerline at a slope of 7 to 1 (14.29 percent approximately) from the edge of the primary and the approach surfaces until they intersect the horizontal or conical surface.

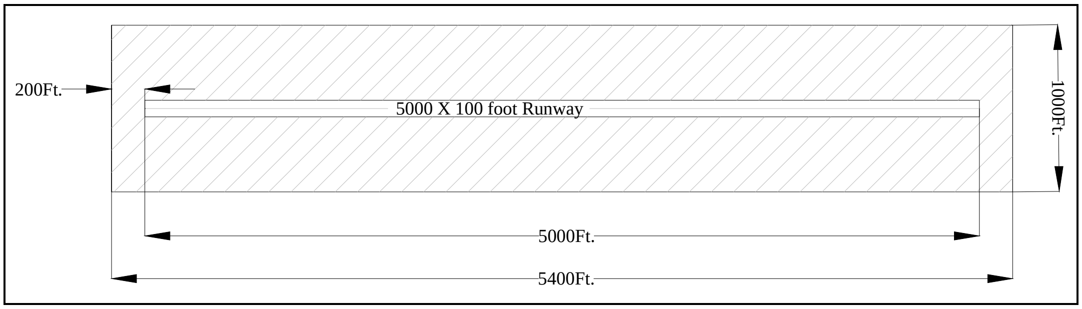


Figure 3-10: The hatched area around the runway, depicts the dimensions of the primary surface for a precision instrument runway

Table 3-6: Primary surface dimensional criteria – PIR

Surface begins:	200 feet on approach side of each runway threshold
Length:	Distance between runway thresholds plus 400 feet
Width of the surface at point of beginning:	1,000 feet (500 feet either side of centerline)
Width of surface at end point:	1,000 feet (500 feet either side of centerline)
Slope of surface:	See elevation.
Elevation:	The surface follows the contours of the runway centerline. At each threshold, the surface is at the same elevation as the threshold and continues at that elevation to the 200-foot point.

16-2-1-2. PIR Approach Surface: A PIR approach surface is longitudinally centered on the extended centerline of a PIR runway, beginning at the end of the primary surface and extending outward and upward at a slope of 50 to 1 (2.0 percent) for a horizontal distance of 10,000 feet and at a slope of 40 to 1 (2.5 percent) for an additional 40,000 feet. This surface width is 1,000 feet wide at the point of beginning and increases uniformly to a width of 16,000 feet at a distance of 50,000 feet from the end of the primary surface.

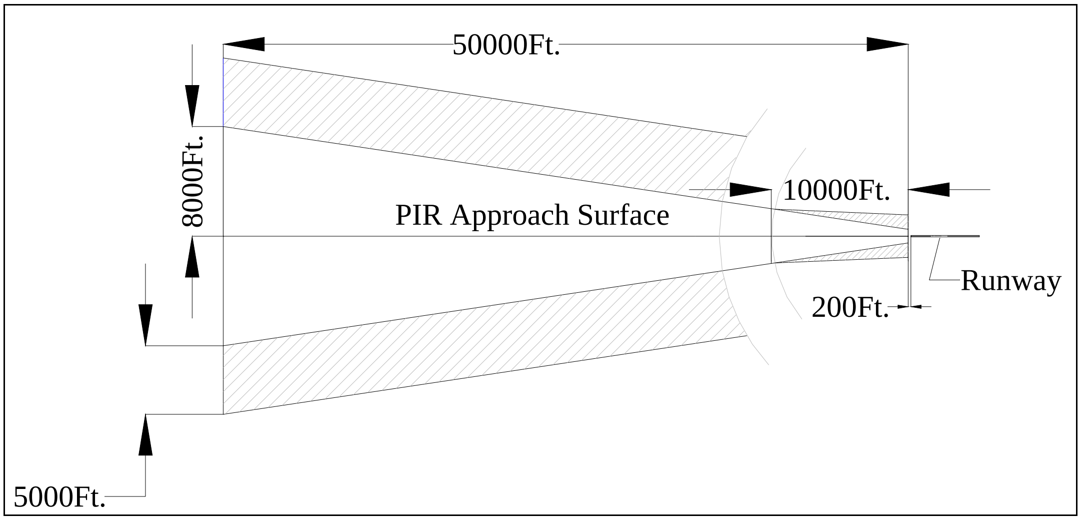


Figure 3-11: Depicts the plan view dimensional criteria of the PIR approach surface

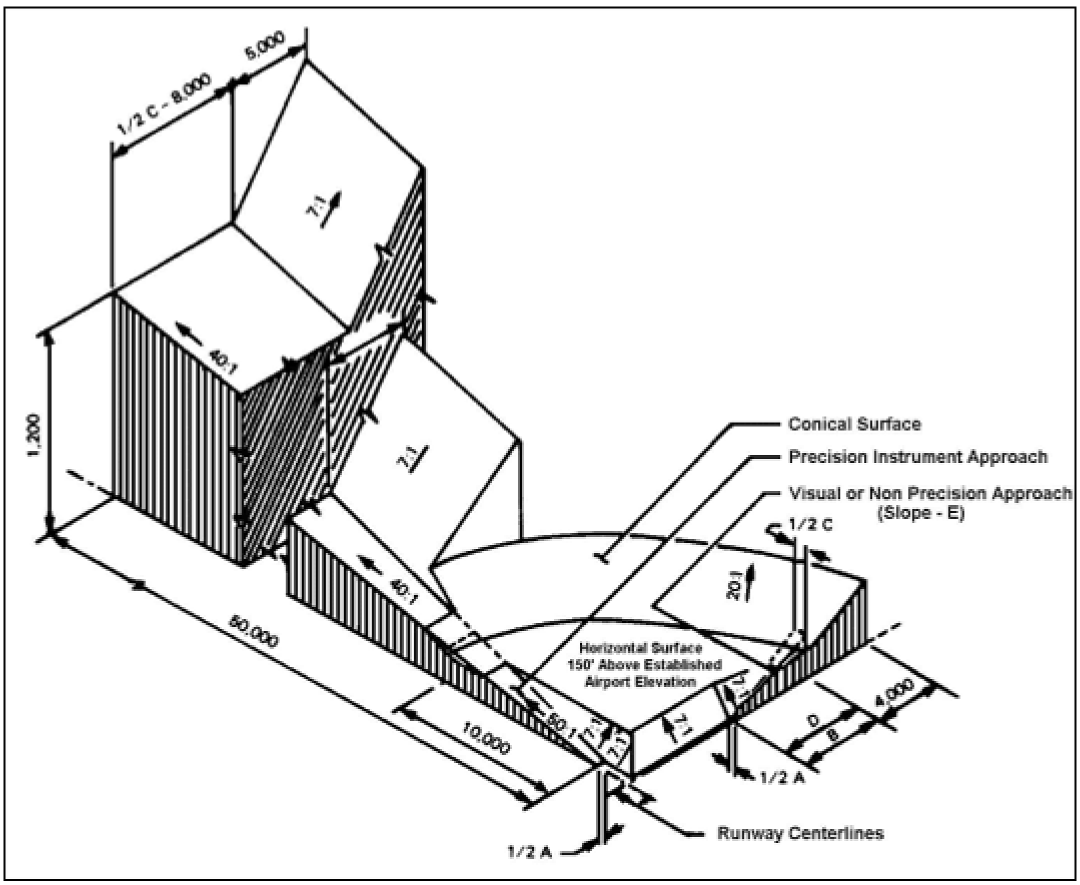


Figure 3-12: Provides an isometric view of the 14 CFR Part 77 surfaces

Table 3-7: Primary approach surface dimensional criteria – PIR

Surface begins:	200 feet on approach side of threshold (at end of primary surface)
Length:	50,000 feet
Width of the surface at point of beginning:	1,000 feet (500 feet either side of centerline)
Width of surface at end point 50,000 feet:	16,000 feet (8000 feet either side of centerline)
Slope of surface:	50:1 (2%) for first 10,000 feet 40:1 (2.5%) for last 40,000 feet
Elevation:	Beginning Elevation: Threshold Elevation Elevation at 10,000 feet: 200 feet above threshold Elevation Elevation at 50,000 feet: 1,200 feet above Threshold Elevation

16-1-1-3. PIR Transitional Surfaces: These surfaces extend outward and upward perpendicular to the runway centerline at a slope of 7 to 1 (approximately 14.29 percent) from the edge of the approach surfaces until they intersect the horizontal or conical surface. The portion of the PIR approach surface extending beyond the limits of the conical surface extends a distance of 5,000 feet measured horizontally from the edge of the approach surface. The slope is 7 to 1 (14.3 percent).

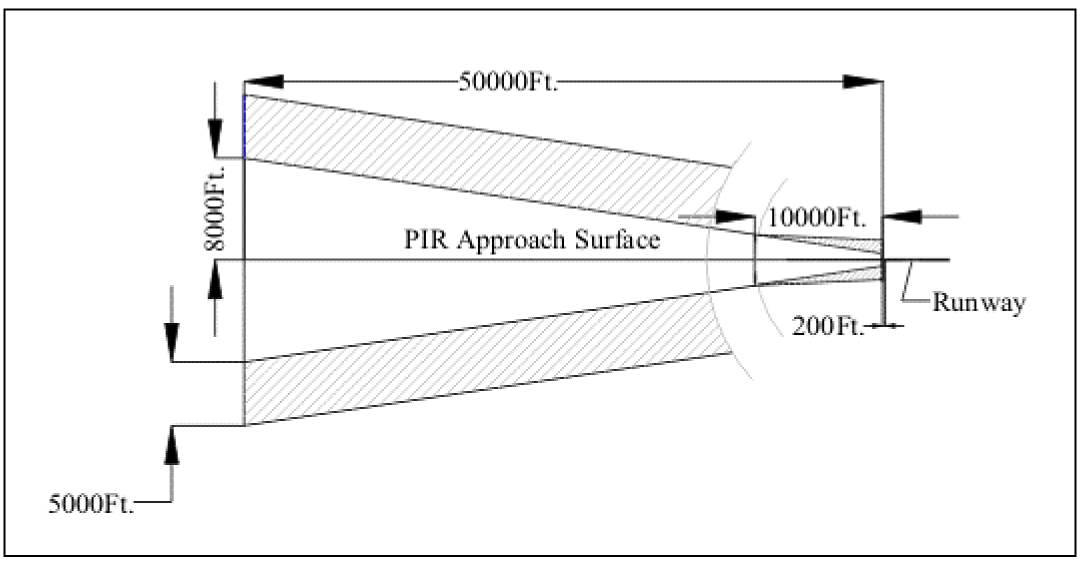


Figure 3-13: Depicts the plan view dimensional criteria of the PIR transitional surfaces (hatched areas)

Table 3-8: Transitional surface dimensional criteria – PIR

Surface begins:	200 feet. on approach side of threshold (at end of primary surface)
Length:	Computed using formula ((Airport Elev. – Runway End Elev.) + 150) ÷ 0.0200
Width of the surface at point of beginning:	Computed using formula ((Airport Elev. – Runway End Elev.) + 150) ÷ 0.1428571
Width of surface at end point 50,000 feet:	A PIR Approach Surface that project beyond the limits of the Conical Surface extends a distance of 5,000 feet measured horizontally from the edge of the Approach Surface. The slope is 7-1 (14.3 percent).
Slope of surface:	7:1 (14.28571%) perpendicular to runway centerline/centerline extended

16-2-2. Non-Precision Runway Surfaces – Category D (NP-D)

16-2-2-1. Non-Precision – D Primary Surface: The primary surface is a 1,000-foot-wide rectangle centered on the runway centerline, beginning 200 feet on the approach side of a runway threshold and extending to 200 feet on the approach side of the opposite runway threshold. The transitional surfaces associated with the primary surface extend outward and upward perpendicular to the runway centerline at a slope of 7 to 1 (approximately 14.29 percent) from the edge of the primary and the approach surfaces until they intersect the horizontal or conical surface.

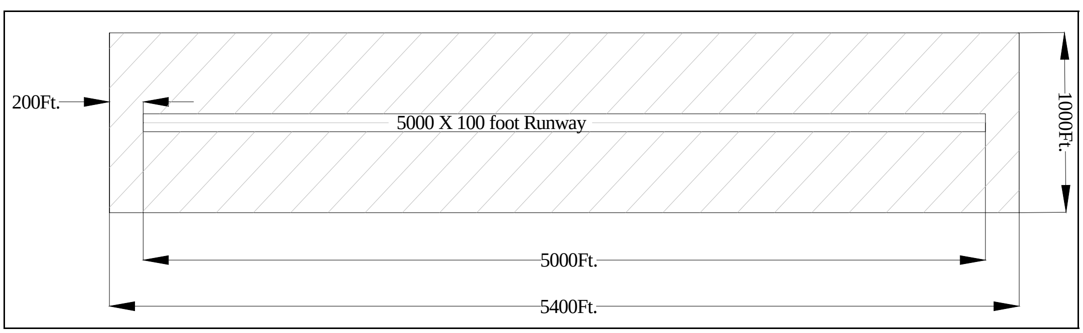


Figure 3-14: The hatched area surrounding the runway is the NP-D primary approach surface

Table 3-9: Primary surface dimensional criteria – NP-D

Surface begins:	200 feet on approach side of each runway threshold
Length:	Distance between runway thresholds plus 400 feet
Width of the surface at point of beginning:	1,000 feet (500 feet either side of centerline)
Width of surface at end point:	1,000 feet (500 feet either side of centerline)
Slope of surface:	See elevation.
Elevation:	The surface follows the contours of the runway centerline. At each threshold, the surface is at the same elevation as the threshold and continues at that elevation to the 200-foot point.

16-2-2-2. NP-D Approach Surface: This surface is longitudinally centered on the extended centerline of the runway, beginning at the end of the primary surface and with dimensions based on the permissible approach visibility minimums established for the specific runway end. The visibility minimum for the D is as low as ¾ mile. The primary surface width at end adjacent to runway end and flaring to 4,000 feet at a distance of 10,000 feet from the end of the primary surface. The surface slope is 34 to 1 (approximately 3 percent).

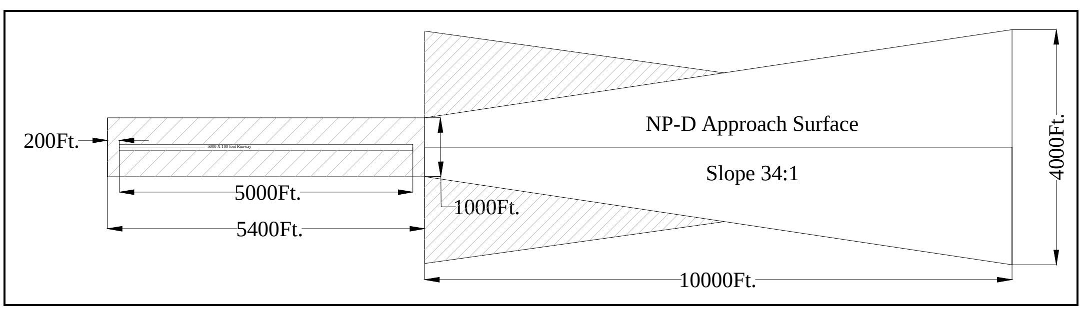


Figure 3-15: Depicts the plan view dimensional criteria of the NP-D primary approach surface

Table 3-10: Primary surface dimensional criteria – NP-D

Surface begins:	200 feet on approach side of each runway threshold
Length:	10,000 feet
Width of the surface at point of beginning:	1,000 feet (500 feet either side of centerline)
Width of surface at end point:	4,000 feet (2000 feet either side of centerline)
Slope of surface:	34:1 (2.94117%)
Elevation:	Beginning: Elevation of Threshold End Point: 294.1 feet above threshold elevation

16-2-2-3. NP-D Transitional Surfaces: These surfaces extend outward and upward perpendicular to the runway centerline at a slope of 7 to 1 (approximately 14.29 percent) from the edge of the primary and the approach surfaces until they intersect the horizontal or conical surface.

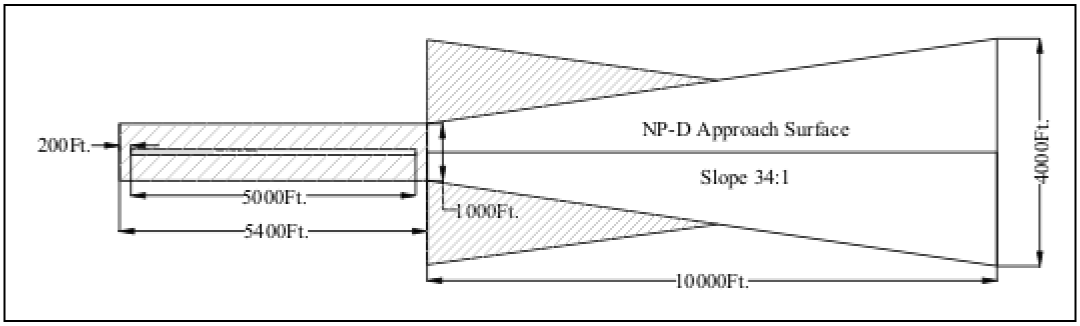


Figure 3-16: Depicts the NP-D approach surface and the transitional surfaces (hatched areas)

Table 3-11: Transitional surface dimensional criteria – NP-D

Surface begins:	200 feet on approach side of each runway threshold
Length:	Computed Using formula ((Airport Elev. – Runway Elev.) + 150) ÷ 0.0294117
Width of the surface at point of beginning:	Computed using formula ((Airport Elev. – Runway End Elev.) + 150) ÷ 0.1428571
Width of surface at end point:	The transitional surface extends until it reaches the horizontal or conical surface.
Slope of surface:	7:1 (14.28571%)

16-2-3. Non-Precision Runway Surfaces – Category C (NP-C)

16-2-3-1. NP-C Primary Surface: The primary surface is a 500-foot-wide rectangle centered on the runway centerline, beginning 200 feet on the approach side of a runway threshold and extending to 200 feet on the approach side of the opposite runway threshold. The transitional surfaces associated with the primary surface extend outward and upward, perpendicular to the runway centerline at a slope of 7 to 1 (approximately 14.29 percent) from the edge of the primary and the approach surfaces until they intersect the horizontal or conical surface.

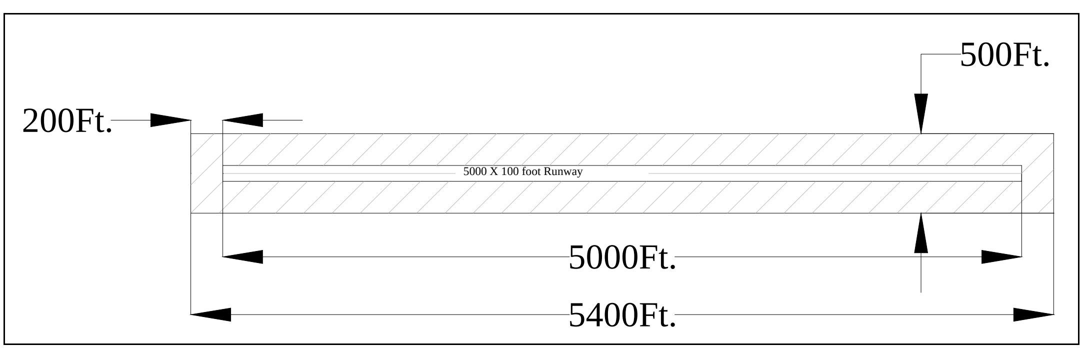


Figure 3-17: Depicts the NP-C primary surface (hatched areas)

Table 3-11: Primary surface dimensional criteria – NP-C

Surface begins:	200 feet on approach side of each runway threshold
Length:	Distance between runway thresholds plus 400 feet
Width of the surface at point of beginning:	500 feet (250 feet either side of centerline)
Width of surface at end point:	500 feet (250 feet either side of centerline)
Slope of surface:	See elevation.
Elevation:	The surface follows the contours of the runway centerline; at each threshold, the surface is at the same elevation as the threshold and continues at that elevation to the 200-foot point.

16-2-3-2. NP-C Approach Surface: A surface longitudinally centered on the extended centerline of the runway, beginning at the end of the primary surface and with dimensions based on the permissible approach visibility minimums established for the specific runway end. The visibility minimum for the NP-C is greater than ¾ mile. The NP-C approach surface is the width of the primary surface at the point of beginning and flares to 3,500 feet at a distance of 10,000 feet from the end of the point of beginning. The surface slope is 34 to 1 (3 percent).

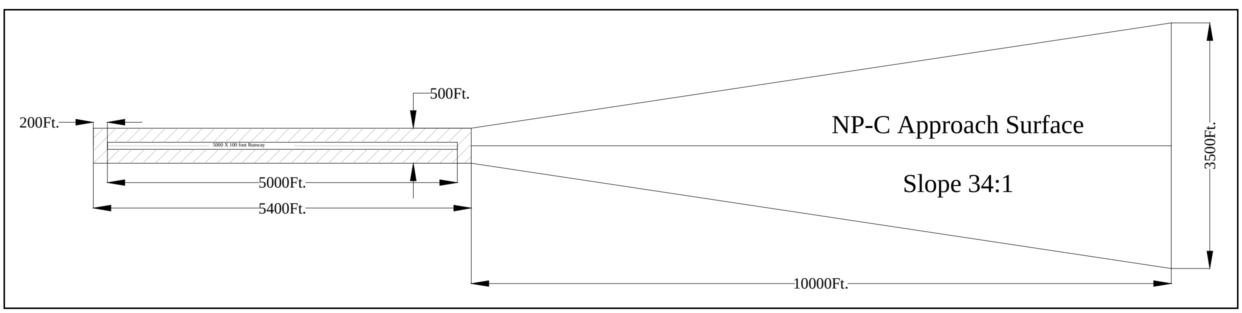


Figure 3-18: Depicts the NP-C approach surface (hatched areas)

Table 3-12: Approach surface dimensional criteria – NP-C

Surface begins:	200 feet on approach side of each runway threshold
Length:	10,000 feet
Width of the surface at point of beginning:	500 feet (250 feet either side of centerline)
Width of surface at end point:	3500 feet (1,750 feet either side of centerline)
Slope of surface:	34:1 (2.94117%)
Elevation:	Beginning: Elevation of threshold End Point: 294.1 feet above threshold elevation

16-2-3-3. NP-C Transitional Surfaces: Transitional surfaces extend outward and upward, perpendicular to the runway centerline at a slope of 7 to 1 (approximately 14.29 percent) from the edge of the primary and the approach surfaces until they intersect the horizontal or conical surface.

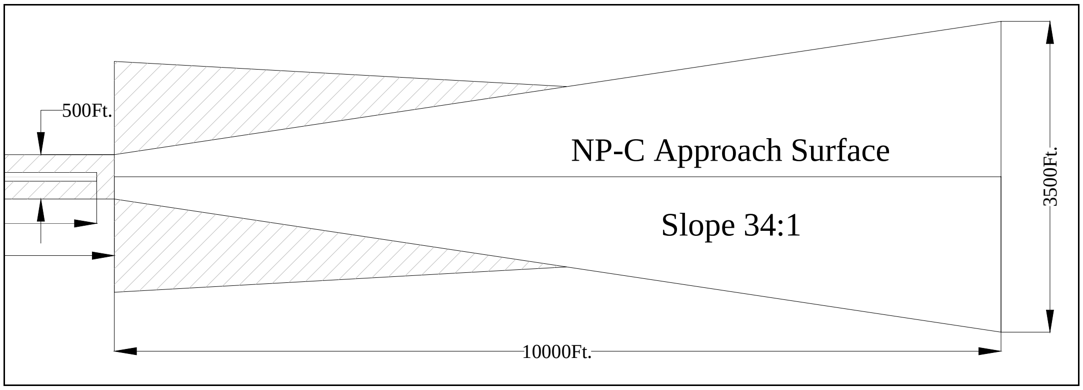


Figure 3-19: Depicts the NP-C approach and approach transitional surfaces (hatched areas)

Table 3-13: Approach transitional surface dimensional criteria – NP-C

Surface begins:	200 feet on approach side of each runway threshold
Length:	Computed using formula ((Airport Elev. – Runway Elev.) + 150) ÷ 0.0294117
Width of the surface at point of beginning:	Computed using formula ((Airport Elev. – Runway Elev.) + 150) ÷ 0.1428517
Slope of surface:	34:1 (2.94117%)

16-2-4. Non-Precision Runway Surfaces – Category ANP

16-2-4-1. ANP Primary Surface: The primary surface is a 500-foot-wide rectangle centered on the runway centerline, beginning 200 feet on the approach side of a runway threshold and extending to 200 feet on the approach side of the opposite runway threshold. The transitional surfaces associated with the primary surface, extend outward and upward perpendicular to the runway centerline at a slope of 7 to 1 (approximately 14.29 percent) from the edge of the primary and the approach surfaces until they intersect the horizontal or conical surface.

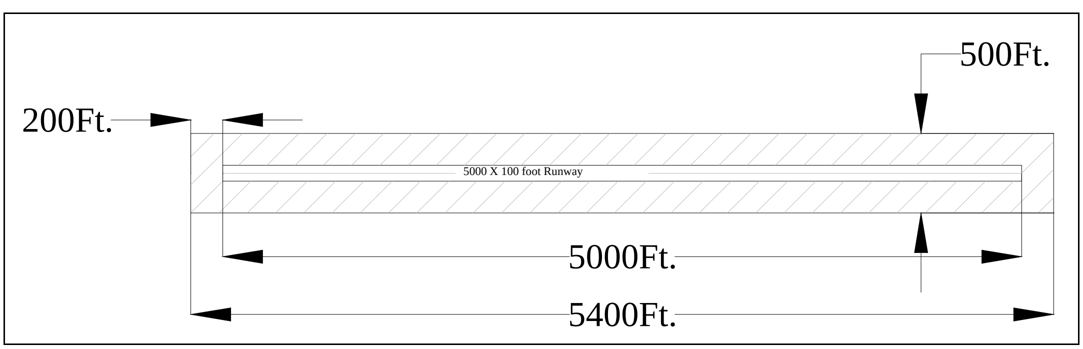


Figure 3-20: Depicts the NP-C primary surface (hatched areas)

Table 3-14: Primary surface dimensional criteria – ANP

Surface begins:	200 feet on approach side of each runway threshold
Length:	Distance between runway thresholds plus 400 feet
Width of the surface at point of beginning:	500 feet (250 feet either side of centerline)
Width of surface at end point:	500 feet (250 feet either side of centerline)
Slope of surface:	See elevation
Elevation:	The surface follows the contours of the runway centerline; at each threshold, the surface is at the same elevation as the threshold and continues at that elevation to the 200-foot point.

16-2-4-2. ANP Approach Surface: Utility runways with non-precision approach surfaces are not affected by visibility minimums. The width of these surfaces is 500 feet at the end of the primary surface and flares to a width of 2,000 feet at a distance of 5,000 feet from the end of the primary surface. The surface slope is 20 to 1 (5 percent).

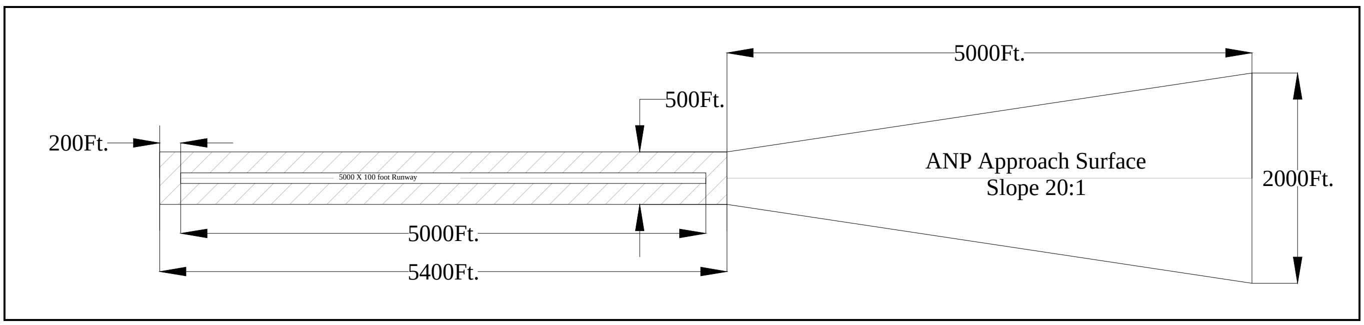


Figure 3-21: Depicts the ANP approach surface dimensions

Table 3-15: Approach surface dimensional criteria – ANP

Surface begins:	200 feet on approach side of each runway threshold
Length:	5,000 feet
Width of the surface at point of beginning:	500 feet (250 feet either side of centerline)
Width of surface at end point:	2,000 feet (1000 feet either side of centerline)
Slope of surface:	20:1 (5.000%)
Elevation:	Beginning: Elevation of threshold End Point: 250 feet above threshold elevation

16-2-4-3. ANP Approach Transitional Surfaces: Transitional surfaces extend outward and upward, perpendicular to the runway centerline at a slope of 7 to 1 (approximately 14.29 percent) from the edge of the primary and the approach surfaces until they intersect the horizontal or conical surface.

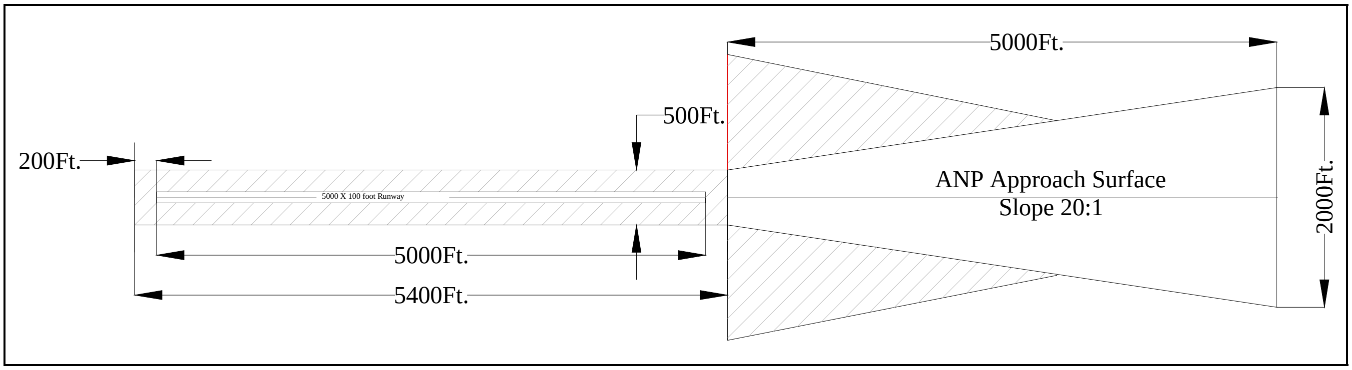


Figure 3-22: Depicts the ANP Transitional Surface Dimensions

Table 3-16: Approach transitional surface dimensional criteria – ANP

Surface begins:	200 feet on approach side of each runway threshold
Length:	Computed Using formula ((Airport Elev. – Runway Elev.) + 150) ÷ 0.0500
Width of the surface at point of beginning:	Computed Using formula ((Airport Elev. – Runway Elev.) + 150) ÷ 0.1428517
Slope of surface:	20:1 (5.00%)

16-2-5. Visual Runway Surfaces – Category BV

16-2-5-1. BV Primary Surface: The primary surface is a 500-foot-wide rectangle centered on the runway centerline, beginning 200 feet on the approach side of a runway threshold and extending to 200 feet on the approach side of the opposite runway threshold. The transitional surfaces associated with the primary surface extend outward and upward perpendicular to the runway centerline at a slope of 7 to 1 (approximately 14.29 percent) from the edge of the primary and the approach surfaces until they intersect the horizontal or conical surface.

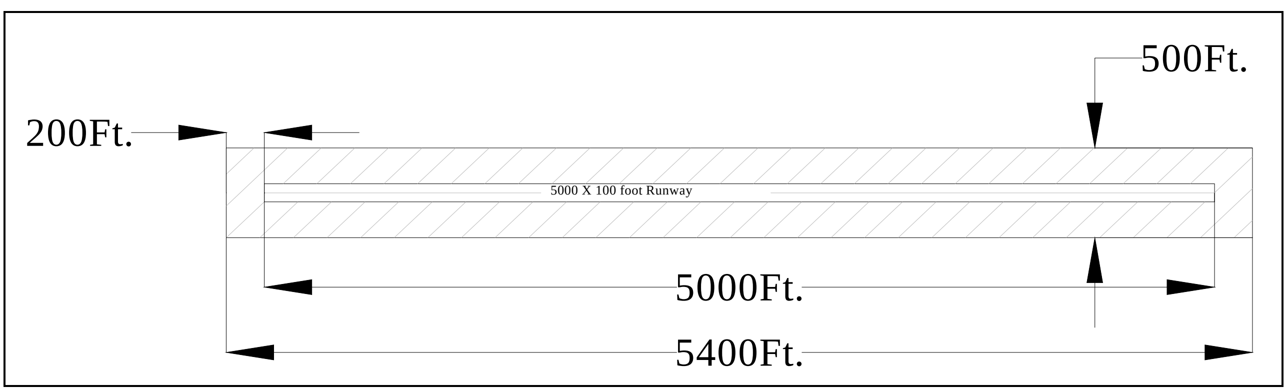


Figure 3-23: Depicts the BV primary surface (hatched areas)

Table 3-17: Primary surface dimensional criteria – BV

Surface begins:	200 feet on approach side of each runway threshold
Length:	Distance between runway thresholds plus 400 feet
Width of the surface at point of beginning:	500 feet (250 feet either side of centerline)
Width of surface at end point:	500 feet (250 feet either side of centerline)
Slope of surface:	See elevation.
Elevation:	The surface follows the contours of the runway centerline; at each threshold, the surface is at the same elevation as the threshold and continues at that elevation to the 200 foot point.

16-2-5-2. BV Approach Surface: When the runway is not a utility runway, the visual runway approach surface is centered longitudinally on the extended centerline of the runway, beginning at the end of the primary surface. The width at this point is 500 feet, and it flares to 1,500 feet at a distance of 5,000 feet from the end of the primary surface. The surface slope is 20 to 1 (5 percent).

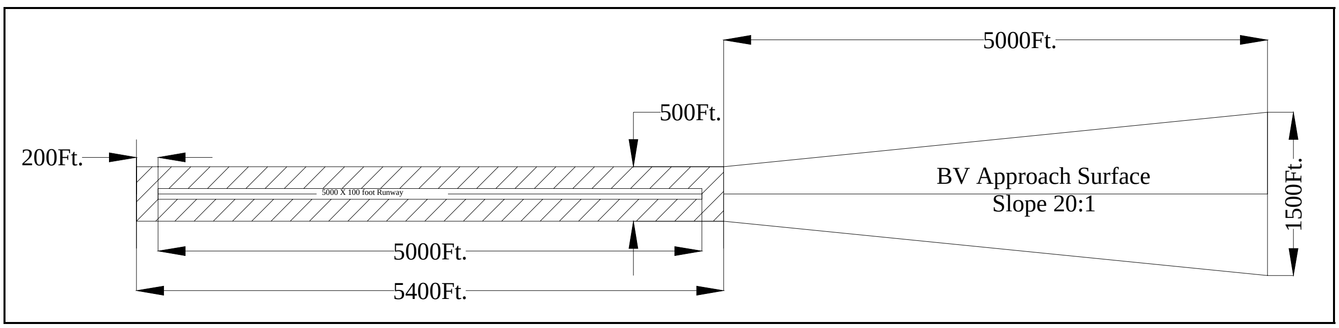


Figure 3-24: Depicts the BV approach surface

Table 3-18: Approach surface dimensional criteria – BV

Surface begins:	200 feet on approach side of each runway threshold
Length:	5,000 feet
Width of the surface at point of beginning:	500 feet (250 feet either side of centerline)
Width of surface at end point:	1,500 feet (750 feet either side of centerline)
Slope of surface:	20:1 (5.000%)
Elevation:	Beginning: Elevation of threshold End Point: 250 feet above threshold elevation

16-2-5-3. BV Approach Transitional Surface: Transitional surfaces extend outward and upward, perpendicular to the runway centerline at a slope of 7 to 1 (approximately 14.29 percent) from the edge of the primary and the approach surfaces until they intersect the horizontal or conical surface.

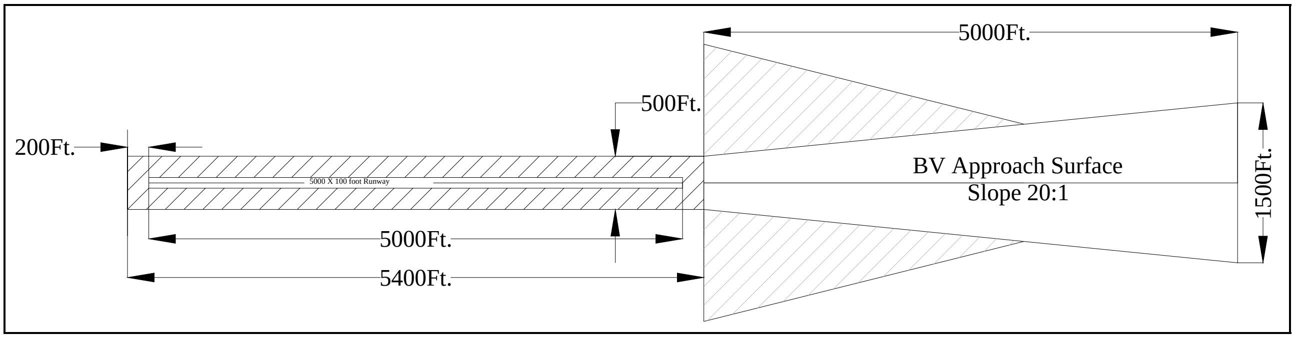


Figure 3-25: Depicts the BV approach transitional surface (hatched areas)

Table 3-19: Approach transitional surface dimensional criteria – BV

Surface begins:	200 feet on approach side of each runway threshold
Length:	Computed Using formula ((Airport Elev. – Runway Elev.) + 150) ÷ 0.0500
Width of the surface at point of beginning:	Computed Using formula ((Airport Elev. – Runway Elev.) + 150) ÷ 0.1428517
Slope of surface:	20:1 (5.00%)

16-2-6. Visual Runway Surfaces – Category AV

16-2-6-1. AV Primary Surface: The primary surface is a 250-foot-wide rectangle centered on the runway centerline, beginning 200 feet on the approach side of a runway threshold and extending to 200 feet on the approach side of the opposite runway threshold. The transitional surfaces associated with the primary surface extend outward and upward perpendicular to the runway centerline at a slope of 7 to 1 (approximately 14.29 percent) from the edge of the primary and the approach surfaces until they intersect the horizontal or conical surface.

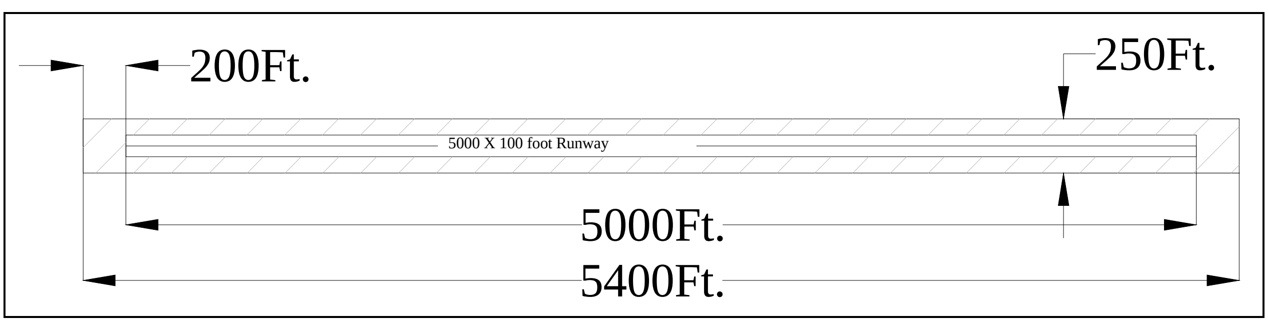


Figure 3-26: Depicts the AV primary surface (hatched areas)

Table 3-20: Primary surface dimensional criteria – AV

Surface begins:	200 feet on approach side of each runway threshold
Length:	Distance between runway thresholds plus 400 feet
Width of the surface at point of beginning:	250 feet (125 feet either side of centerline)
Width of surface at end point:	250 feet (125 feet either side of centerline)
Slope of surface:	See elevation.
Elevation:	The surface follows the contours of the runway centerline; at each threshold, the surface is at the same elevation as the threshold and continues at that elevation to the 200 foot point.

16-2-6-2. AV Approach Surface: When the runway is a utility runway, the width begins at 250 feet at the end of the primary surface and flares to a width of 1,250 feet at a distance of 5,000 feet from the end of primary surface. The surface slope is 20 to 1 (5 percent).

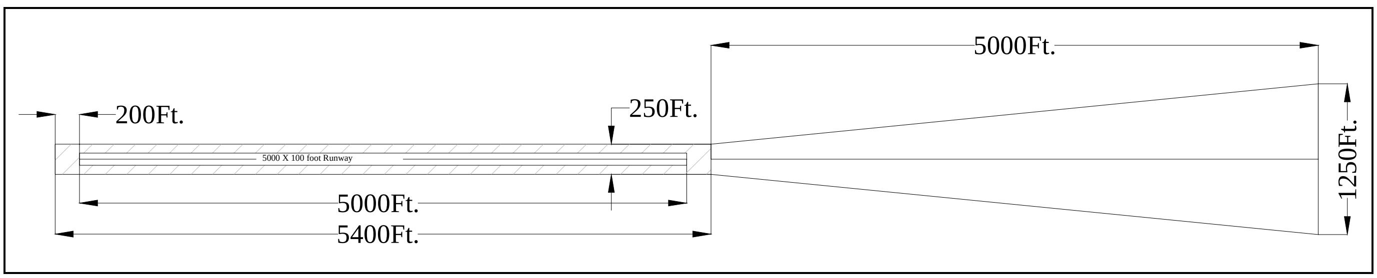


Figure 3-27: Depicts the AV approach surface

Table 3-21: Approach surface dimensional criteria – AV

Surface begins:	200 feet on approach side of each runway threshold
Length:	5,000 feet
Width of the surface at point of beginning:	250 feet (125 feet either side of centerline)
Width of surface at end point:	1,250 feet (625 feet either side of centerline)
Slope of surface:	20:1 (5.000%)
Elevation:	Beginning: Elevation of threshold End Point: 250 feet above threshold elevation

16-2-6-3. AV Approach Transitional Surfaces: These surfaces extend outward and upward, perpendicular to the runway centerline at a slope of 7 to 1 (approximately 14.29 percent) from the edge of the primary and the approach surfaces until they intersect the horizontal or conical suffice.

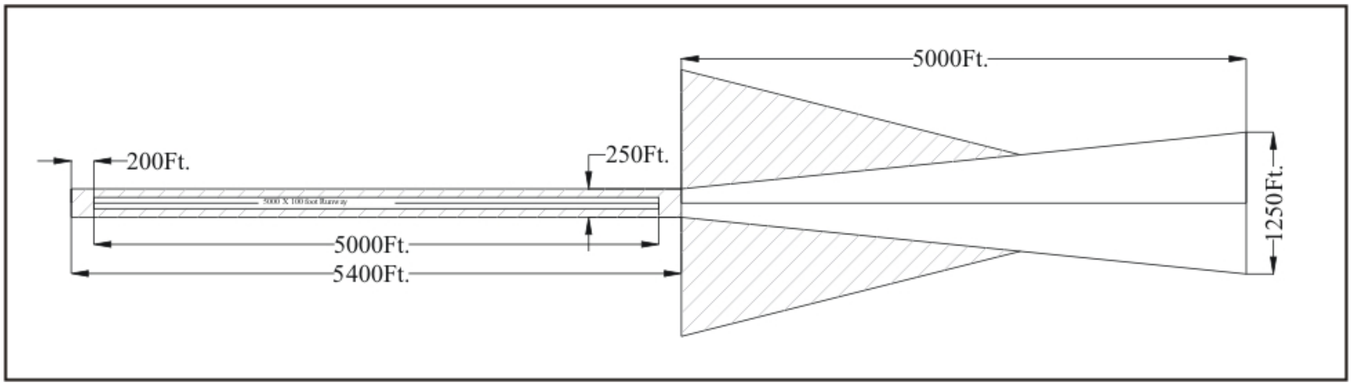


Figure 3-28: Depicts the AV approach transitional surface (hatched area)

Table 3-22: Approach transitional surface dimensional criteria – AV

Surface begins:	200 feet on approach side of each runway threshold
Length:	Computed Using formula ((Airport Elev. – Runway Elev.) + 150) ÷ 0.0500
Width of the surface at point of beginning:	Computed Using formula ((Airport Elev. – Runway Elev.) + 150) ÷ 0.1428517
Slope of surface:	20:1 (5.00%)

16-2-7. HORIZONTAL SURFACE

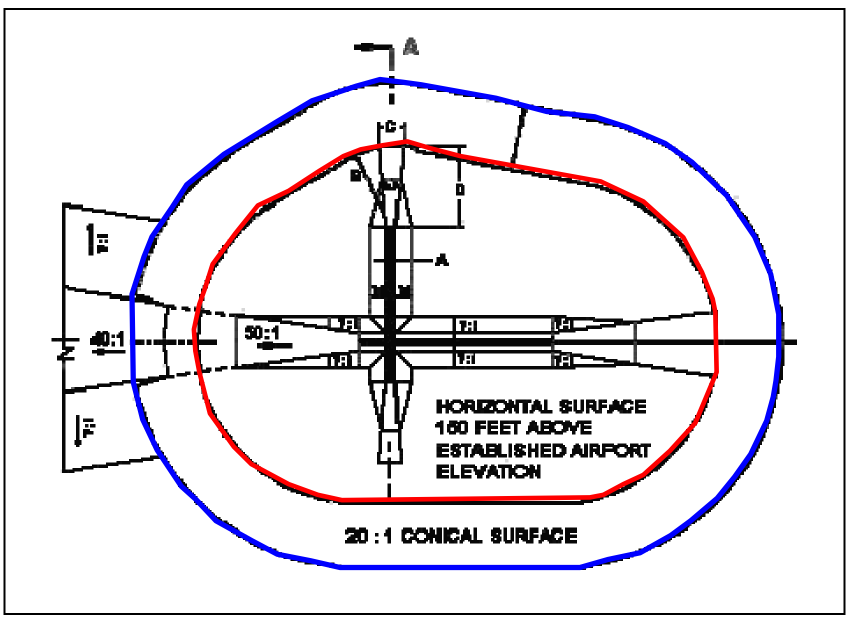


Fig. 3-30: Illustrates the outer limits of the Horizontal (red line) and Conical (blue line) Surfaces in a multi-runway configuration

A horizontal surface is a horizontal plane 150 feet above the established airport elevation, the perimeter of which is constructed by swinging arcs of specified radii from the center of each end of the primary surface of each runway. Tangents then connect the adjacent arcs. The sizes of the arcs are as follows:

- For all runways designated visual or utility, the radius of each arc is 5,000 feet.
- For precision and non-precision runways, the radius of each arc is 10,000 feet.

The radius of the arc specified for each end of a runway will have the same mathematical value, which is the highest determined value for either runway end. When tangents connecting two adjacent 10,000-foot arcs encompass a 5,000-foot arc, it must be disregarded.

16-2-8. CONICAL SURFACE

The conical surface extends upward and outward from the outer limits of the horizontal surface (for a horizontal distance of 4,000 feet). The slope of the conical surface is 20 to 1 (5 percent), measured in a vertical plane.

16-2-9. SUPPLEMENTAL SURFACES

These are surfaces applied to Airport Obstruction Charts when there is a requirement for additional obstruction data. Dimensions, slopes, etc. are the same as previously specified; however, they are used under conditions that do not meet the definitions. For example, a visual runway may be charted as both a visual runway and a non-precision runway. When such is the case, the non-precision surfaces will be designated “Supplemental Surface” on the chart. The requirement for supplemental surfaces is restricted to primary, approach, and transitional areas. The specified horizontal and conical surfaces charted are not affected by the addition of supplemental surfaces. The limits of the transitional surfaces for the supplemental data are based on the horizontal and conical surface limits associated with the supplemental approach surface.

16-3. OBSTACLE ACCURACIES

The accuracy standards for the obstructions/obstacles are presented in the table on the following page. When an obstacle is selected for its obstruction value only (for example, meteorological apparatus), obstruction accuracies apply.

Table 3-23: Obstacle accuracies

ITEM (VALUES ARE FEET)		HORZ	VERTICAL ORTHO	VERTICAL ELLIP	VERTICAL AGL
Non-manmade obstacles and manmade obstacles less than 200 feet AGL that penetrate the following Obstruction Identification Surface:					
	A Primary Surface	20	3	3	N/A
	Those areas of an Approach Surface within 10,200 feet of the runway end	20	3	3	N/A
	Those areas of Primary Transition Surface within 500 feet of the Primary Surface	20	3	3	N/A
	Those areas of an Approach Transition Surface within 500 feet of the approach surface and also within 2,766 feet of the runway end	20	3	3	N/A
	Those areas of a Primary Transition Surface further than 500 feet from the Primary Surface	50	20	20	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	20	20	N/A
	The Horizontal Surface	50	20	20	N/A
	Those areas of an Approach Surface further than 10,200 feet from the runway end	100	50	50	N/A
	Those areas of an Approach Transition Surface further than 10,200 feet from the runway end	100	50	50	N/A
	The Conical Surface	100	50	50	N/A
Manmade objects equal to or greater than 200 feet AGL that penetrate the following Obstruction Identification Surfaces:					
	A Primary Surface	20	3	3	10
	Those areas of an Approach or Approach Transition Surface within 10,200 feet of the runway end	20	3	3	10
	The Primary Transition Surface	20	3	3	10
	An Approach or Approach Transition Surface further than 10,200 feet from the runway end	50	3	3	10
	The Horizontal Surface	50	3	3	10
	The Conical Surface	50	3	3	10

Notes:
- Accuracies are relative to the nearest PACS, SACS, HRP, or TSM.
- Distances relative to the threshold or runway end are measured along the runway centerline or centerline extended to the abeam point.

16-4. SPECIAL CASES

16-4-1. Catenaries

In most cases, the position and elevation of supporting towers will adequately represent catenaries. These towers must 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, provide a position and elevation on the imaginary straight line connecting the tops of the two adjacent catenary support towers at the highest point within the OIS. Designate the elevation of this point as an estimated maximum elevation (EME).

16-4-2. Vehicular Traverse Ways

Treat a vehicular traverse way as any other potential obstruction, but include the appropriate vehicle height allowance in the elevation. Refer to Paragraph 16-4-8 for possible exemptions regarding vehicular traverse ways. Vehicle height allowances are as follows:

Non-interstate roads	**15 feet**
Interstate roads	**17 feet**
Railroads	**23 feet**

16-4-3. 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) must have their obstructing travel limits determined. Furnish an EME for each of these obstructing mobile obstacle areas. If a non-obstructing mobile obstacle is outward from the runway end, is the highest obstacle in the primary area or first 2,000 feet of an approach, and is higher than the runway end, an EME point must be provided at the point nearest to the runway centerline end. Travel limits need not be determined. Include the word **"MOBILE,"** which always implies an EME, in the obstacle name (e.g. "MOBILE CRANE AREA").

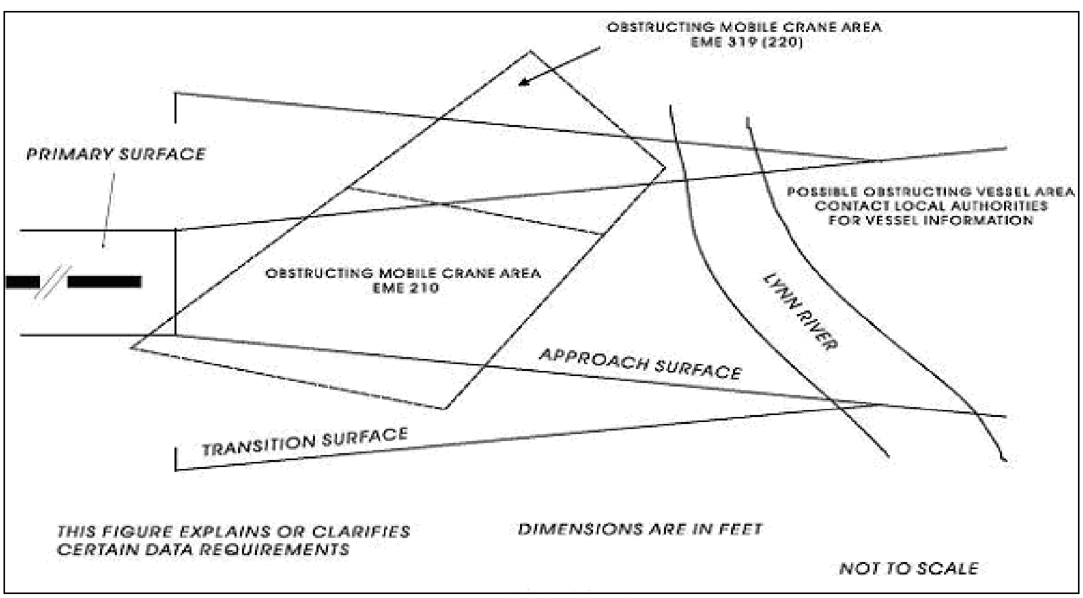


Figure 3-31: Illustrates the requirements for obstructing mobile areas

16-4-4. Obstructions Under Construction

Identify representative objects under construction (e.g. **"BUILDING UNDER CONSTRUCTION**"). Determine the elevation of the obstacle at the time of the survey. However, if a construction crane extends above the feature under construction, it is necessary and sufficient to determine the elevation and position of the crane.

16-4-5. Vessels

Because of uncertainties in determining maximum vessel heights, travel limits, and frequency of passage, vessel heights and locations are not provided. However, if a possible obstructing condition exists, an entry into the data logger (ADCAT) must be made cautioning of the possibility of vessels obstructing certain OISs at certain times and advising further investigation by the data user about maximum vessel height, travel limits, and frequency of passage.

16-4-6. Manmade Obstacles Equal to or Greater than 200 Feet Above Ground Level (AGL)

The AGL elevation must be determined for the required manmade obstacles equal to, or greater than, 200 feet AGL. Measure the height from the highest point of ground in contact with either the obstacle or the structure on which the obstacle rests.

16-4-7. Supplemental Obstructions

Accomplish an obstruction survey of a supplemental OIS when specifically requested by the appropriate airport sponsor or State aviation or FAA authorities. Accomplish the survey of supplemental obstructions in addition to the survey specified in 14 CFR Part 77 for existing conditions. Penetrations of the supplemental OIS are supplemental obstructions. The supplemental OIS must conform to one of the OIS standards defined in 14 CFR Part 77. Criteria for the selection of supplemental obstructions are the same as the criteria for the selection of other obstructions.

16-4-8. Obstruction Exemptions

The measurement and consideration of the following obstructions is not required:

(1). Vegetation that obstructs both by less than 3 feet and has a maximum cross-sectional diameter no greater than ½ inch where transected by an obstruction surface.

(2). Annual vegetation, such as annual weeds, corn, millet, and sugar cane.

(3). Frangible obstacles. Frangible obstacles are under the control of airport authorities with locations fixed by function. Frangible structures retain their structural integrity and stiffness up to a designated maximum load, but on impact from a greater load, they break, distort, or yield in such a manner as to present the minimum hazard to aircraft. Examples are runway and taxiway signs and many approach light structures.

(4). Roads with restricted public access 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.

(5). Construction equipment and debris, including dirt piles and batch plants, that are—

 (a). Temporary in nature.

(b). Under the control of airport authorities.

(c). Located on airport property

(6). Vessels. If a possible obstructing condition exists, make an entry into the data logger (ADCAT) cautioning that vessels might obstruct certain 14 CFR Part 77 surfaces (Approach or Primary versus Horizontal, Conical, or Transition OIS) at certain times and that further investigation, travel limits, and frequency of passage is advised. This exemption does not apply to vessels permanently moored.

(7). Individual parked aircraft. Show on the AOC paved aircraft movement and apron areas and approximate locations of unpaved tiedown areas. However, the location and maximum elevation of individual parked aircraft should not be determined or provided as part of an AOC survey. This exemption does not apply to aircraft permanently parked for display purposes.

16-4-8. Meteorological Apparatus

Measurement and consideration of meteorological apparatus is not required unless it is determined for its obstruction value.

16-5. OBSTACLE SELECTION

Obstruction selection must include a representation of obstacles penetrating the 14 CFR Part 77 OIS at the time of the field survey. The appropriate airport sponsor or State aviation or FAA authorities must identify the exact surfaces required for consideration for the survey. Additionally, certain non-obstructing obstacles may be required in the first 2,000 feet of an approach area. The special cases that apply to obstructions (refer to Paragraph 16-4) also apply to these required non-obstructing obstacles. Note that required obstacles may be EME points for mobile obstacle areas (refer to Figure 3-29).

16-5-1. OIS Obstacles Requirements

16-5-1-1. Determine and report the following obstructions in the primary surface.

(1). The highest obstruction outward from the runway end (the area located between the runway end and the beginning of the approach surface).

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

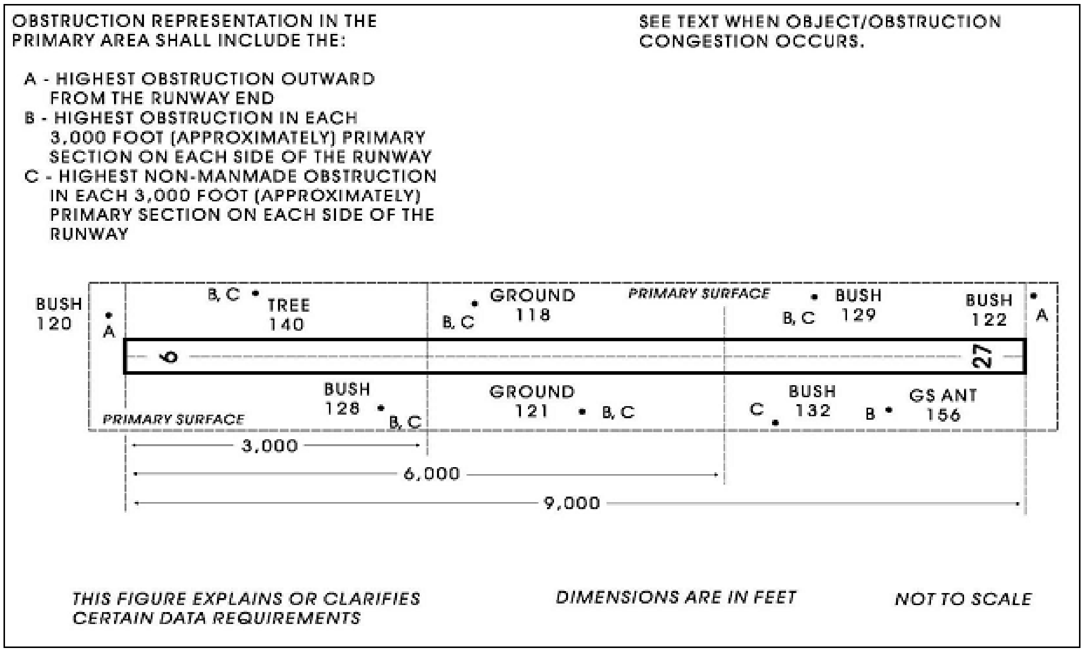


Figure 3-32: Illustrates the obstacle selection requirements in the primary surface

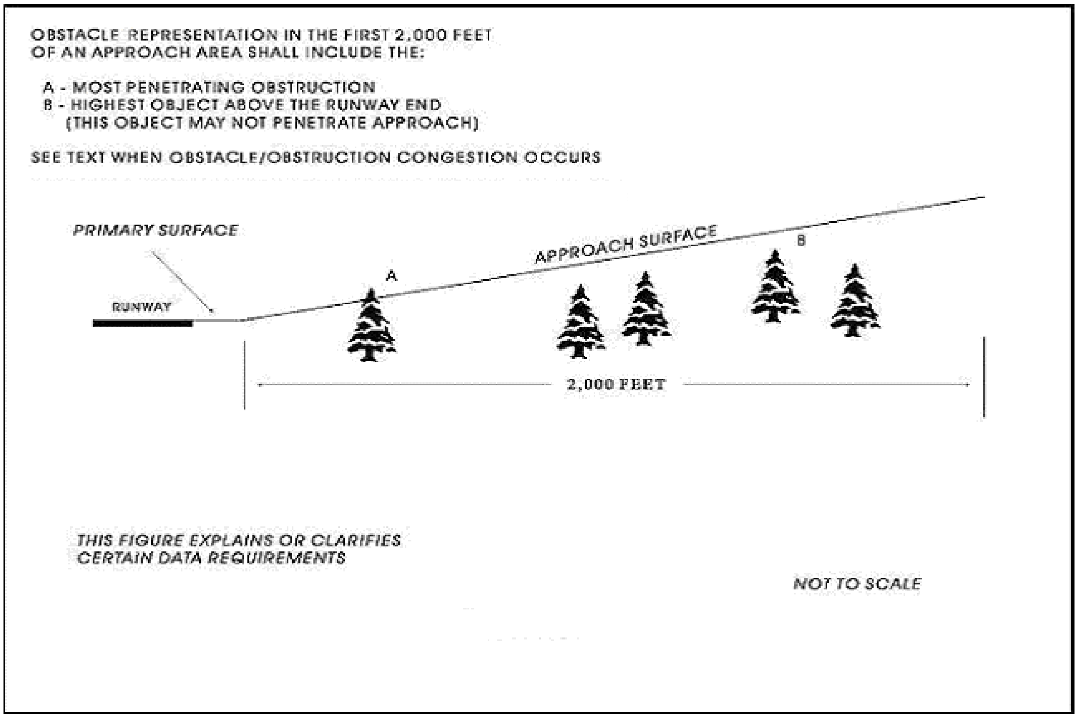
16-5-1-2. Determine and report the following obstructions in the approach surface.

(1). The highest obstacle within the first 2,000 feet of an approach area and higher than the runway approach end. This obstacle may or may not penetrate the approach surface and may be a non-obstructing EME point.

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

(3). The highest obstruction in each of the following zones of the approach:

- (a). First 10,000 feet,
- (b). First 20,000 feet,
- (c). First 30,000 feet,
- (d). First 40,000 feet, and
- (e). The approach area.



(f). Figure 3-33: Illustrates the requirements in the first 2,000 feet of the approach.

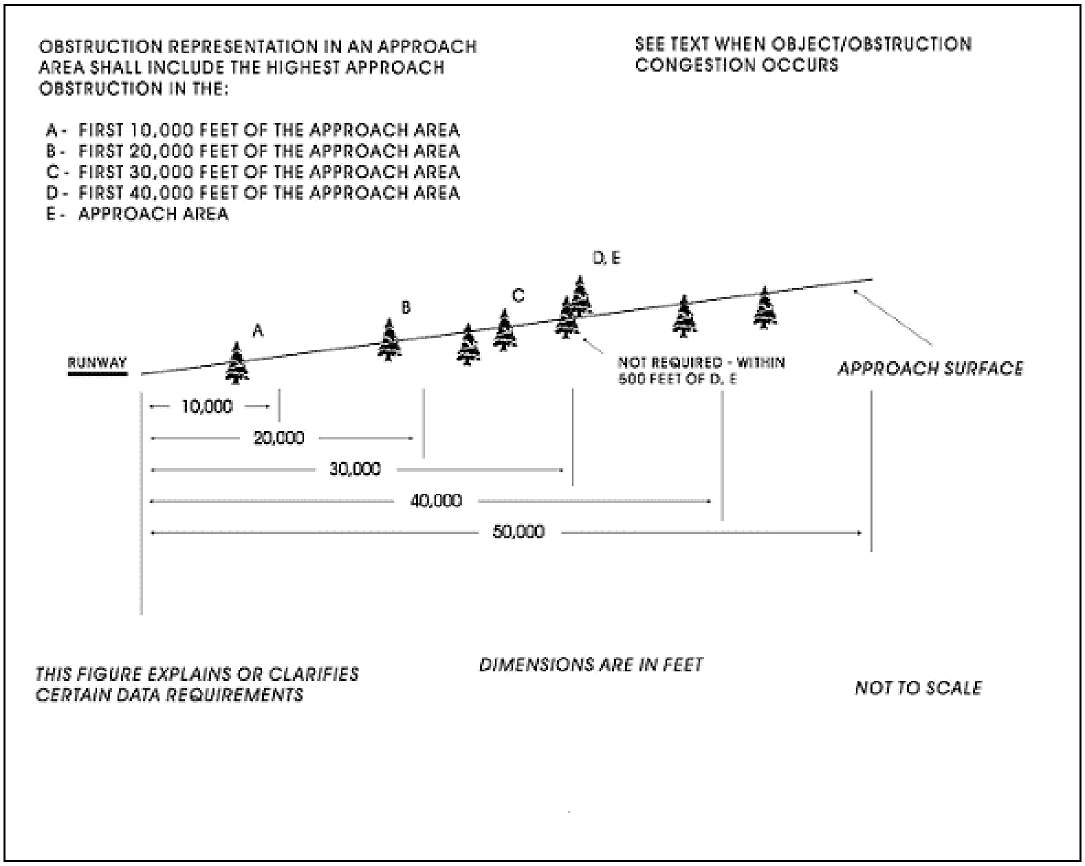


Figure 3-34: Illustrates the requirements in the approach

16-5-1-3. Determine and report the following obstructions in the Transition Surfaces:

(1). The highest obstruction in each 3,000-foot zone (approximately) of each primary transition to the horizontal surface. (The primary transition surface adjacent to the primary surface at each runway end must be extended an additional 200 feet (to cover an approximately 3,200- foot zone) to include the area adjacent to the 200-foot zone of the primary runway end. Refer to Figure 3-35.)

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

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

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

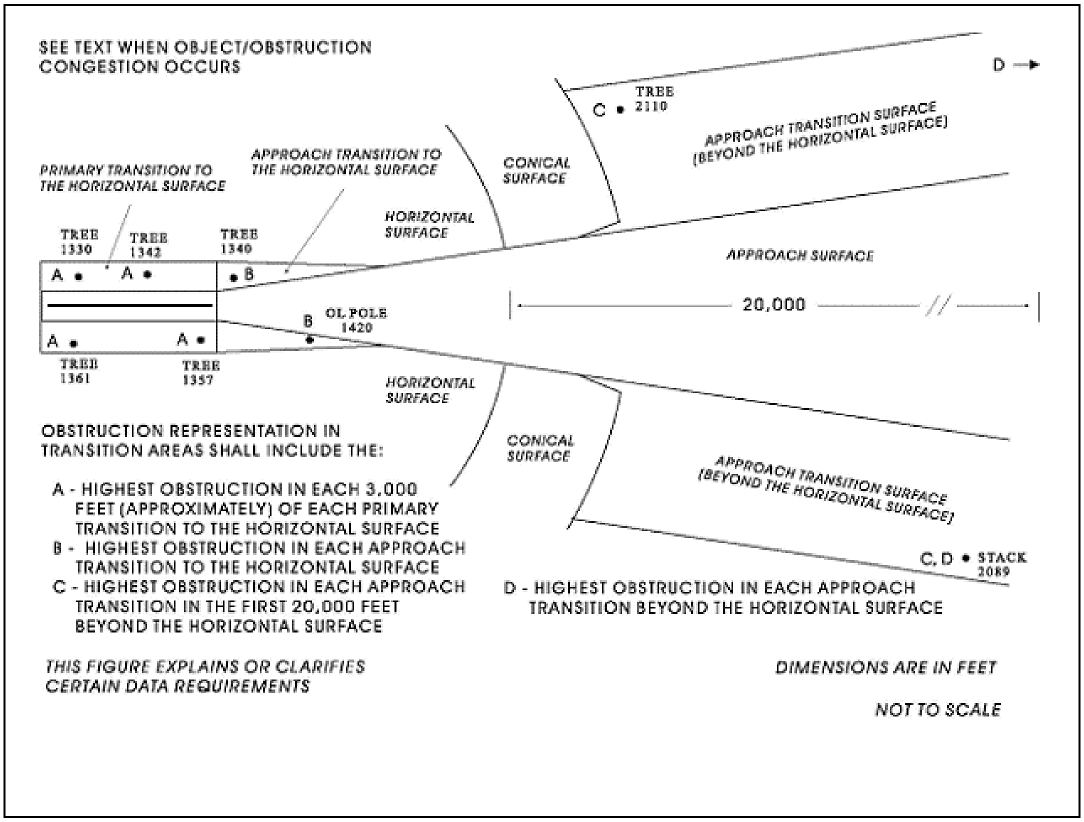


Figure 3-35: Illustrates the requirements in the transitional surfaces

16-5-1-4. Determine and report the following obstructions in the Horizontal and Conical Surfaces:

(1). The highest obstruction in either the horizontal or conical surface in each quadrant of the Part 77 survey area as defined by the meridian and parallel intersecting at the airport reference point (refer to Appendix 2, Section 2-1, to compute the airport reference point).

16-5-2. Area Limit Obstruction Requirements

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

(1). The highest obstruction within each obstructing area.

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

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

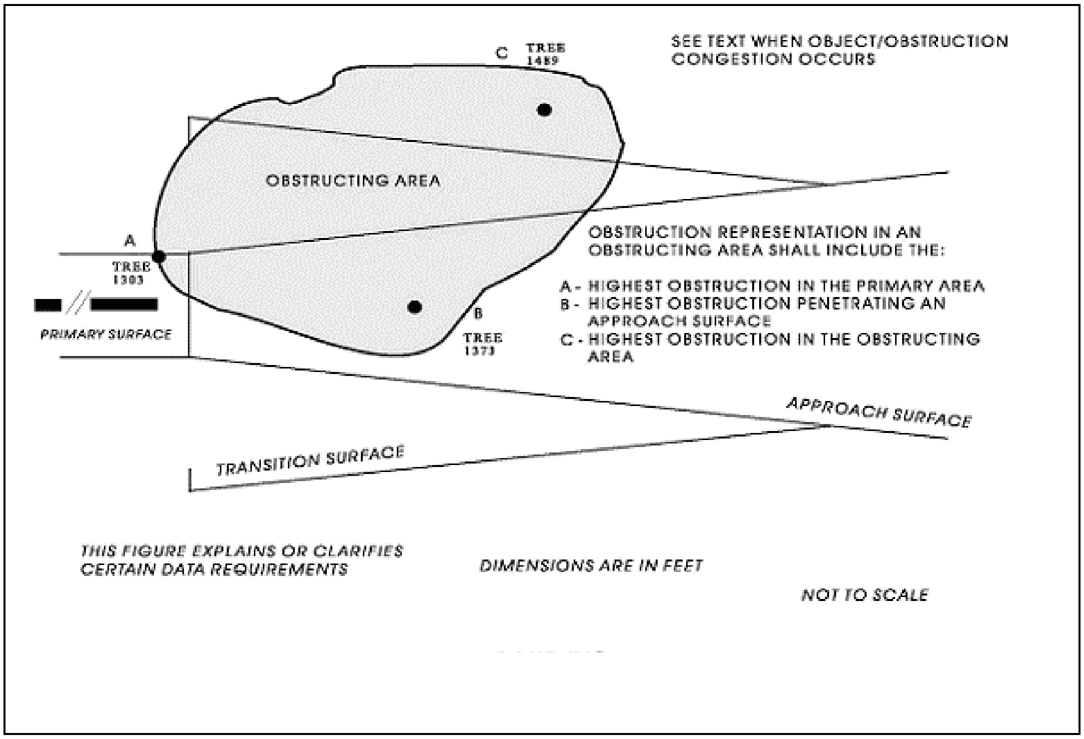


Figure 3-36: Illustrates the requirements for obstructing areas for approach, primary, and horizontal surfaces

16-5-3. Density Selection

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

(1). If obstacles 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 obstacle may be omitted.

(2). If obstacles that are required outside the primary or first 10,000 of an approach area are located within 500 feet of each other, the lower obstacle may be omitted. (Note: Required primary or approach obstacles must not be omitted because of the close proximity of higher obstacles outside of the primary or approach areas).

(3). When a required obstacle is omitted because of congestion, a replacement obstacle/obstacles must be selected, if possible, that meets the spacing criteria.

(4). Occasionally, additional obstruction information may be useful in representing certain obstructing conditions. While a rigorous selection criterion is not practical, information useful to obstruction clearing activities should be considered in the selection.

16-6. AIRPORT OBSTRUCTION CHECKLIST

The selection criteria above are the minimum requirements that must be completed to satisfy the requirements in these General Specifications. The Airport Obstruction Checklist will be generated by the data logger (ADCAT) software. This checklist or an AOC checklist (refer to Appendix 2, Section 2-2, Recommended Data Collection Forms, provides guidance to ensure that the requirements for each of the zones will be completed.

CHAPTER 17. FINAL PROJECT REPORT

A Final Project Report must be delivered after the data has been collected and processed. Describe any changes from the submitted Survey and Quality Control Plan. The following describes the content and format of the report:

17-1. INTRODUCTION

(1). Airport Obstruction Chart (AL/AOC) number. Request this information from the FAA Airport Surveying–GIS Program Manager.
(2). Location Identifier (LID)
(3). Name of airport
(4). City
(5). State
(6). Contractor point of contact, including name, company name, address, telephone number, email
(7). Details of the Statement of Work
(8). Start and end dates of project

17-2. CONDITIONS AFFECTING PROGRESS

Discuss any equipment failures, weather, scope of project, site accessibility, reconnaissance, and/or any other problems affecting progress.

17-3. REMOTE SENSING WORK

(1). Chronology: Provide a brief description of the progression of the work.
(2). Remote Sensing Methodology: Provide a brief summary and details of any changes from information included in the Survey and Quality Control Plan.
(3). Imagery and Datums: Report on the type of imagery that was used and the method used to reference the horizontal and vertical control.
(4). Data Collection: Report on the methods and types of features collected by remote sensing. Include the accuracy of the imagery and the software used with version numbers.
(5). Obstacles: Report on the obstacles that were collected to satisfy the requirements listed in Part 3, Paragraph 16-5, Obstacle Selection. Refer to the obstruction checklist in Appendix 2, Section 2-2.
(6). Unusual Circumstances: Describe unusual circumstances; explain how and why special methods and/or procedures were followed.

17-4. FIELD WORK

(1). Chronology: Provide a brief description of the progression of the work.
(2). Interviews with Airport Officials: Provide a brief summary of all meetings with airport officials (refer to Part 1, Paragraph 8-5, Interviews).
(3). Reconnaissance: Provide a listing of NOAA survey marks recovered and those not recovered. Provide a listing of any new marks set. Include descriptions of any airport changes found, such as a new NAVAID (refer to Part 1, Paragraph 8-6, Reconnaissance).

(4). Instrumentation: Provide a listing of equipment used in the survey, including model and serial numbers, and maintenance reports.

(5). Survey Methodology: Provide a brief summary and details of any changes from information included in the Survey and Quality Control Plan. List horizontal and vertical datums used and published dates of NGS survey control.

(6). Survey Work: Provide general discussion and details of any problems:

- (a). List runways where obstructions were determined/evaluated.
- (b). Discuss PACS, SACS, and any other previous control used.
- (c). Discuss runway profiling and include, at minimum, the following:
  - (i). Profile method.
  - (ii). Any problems with runway length.
  - (iii). Discussions with manager.
  - (iv). Any changes.
  - (v). Whether authorities agreed (or disagreed) with runway dimensions surveyed.
- (d). Discuss NAVAIDs: Include, at least, statement that all NAVAIDs were surveyed and descriptions of any new NAVAIDs. State any changes to NAVAIDs. For example, list NAVAIDs that are new and commissioned, new and not commissioned (estimated date to be commissioned), decommissioned, or to be decommissioned (estimated date). State the source of information.
- (e). Discuss Obstructions: State whether this was a new or revision survey, whether all obstructions included in the Exchange File were verified or marked for deletion, whether additional obstructions were determined in all specified surfaces as necessary, and if there were any other changes. Make a definitive statement that all OISs were inspected and the required data was submitted.
- (f). Advisory Information: Identify photographs containing airport features. Discuss changes to the airport since the date of photography and the photograph showing the change. Make a definitive statement that photography (with any annotations) is current and accurately depicts airport features (when applicable) and that any clearing or topping of trees/grading of obstructing ground that has occurred since the date of photography.

17-5. DATA PROCESSING

(1). Hardware

(2). Software

(3). Methodologies

(4). Quality Reviews: Provide a brief summary of methods used to help ensure high quality data and details of any changes from the Survey and Quality Control Plan. List all problems found and discuss corrective action taken.

(5). File Naming Convention

(6). File Formats and Medium

17-6. ANALYSIS OF RESULTS

Discuss the results, especially any unusual circumstances or problems, any deviation from the Statement of Work, and/or any results that exceed specifications, including those already reported in weekly email status reports.

17-7. RECOMMENDATIONS

Include any suggestions for improving future work.

17-8. SIGNATURE BLOCK

The contractor's signature is required to indicate concurrence that all requirements have been met.

17-9. ANNEXES

The following annexes are required to be submitted in the Final Project Report.

- Annex 1, Airport Survey Diagrams: A map showing the outline of the runways and the survey network at the airport with GPS vectors and angles and distances observed.

CHAPTER 18. DELIVERABLES

The following must be delivered to the NGS POC, FAA Airport Surveying–GIS Program Manager, and the Airport Authority:

18-1. LABOR, EQUIPMENT, ETC.

The contractor will provide all labor, equipment, supplies, and materials to produce and deliver the products as required under these General Specifications.

18-2. SURVEYS AND QUALITY CONTROL PLAN

Before any field work begins, the contractor will submit to NGS OC, a Survey and Quality Control Plan covering all work (refer to Part 1, Chapter 5). NGS will review this plan as soon as possible and respond with an approval or comment letter (or email) as soon as possible, normally within 5 working days. Field work will begin after the contractor receives the approval letter (or email).

18-3. PROJECT STATUS REPORTS

The contractor will submit project status reports via email to the airport authority, FAA Airport Surveying–GIS Program Manager, and NGS/FAA POCs every week until the work is complete. These reports should be brief and contain the current information in the text of the email.

18-4. FINAL PROJECT REPORT

Submit a Final Project Report covering the Airport Obstruction Chart survey (refer to Part 3, Paragraph 18-4, Final Project Report). For each airport, the contractor will submit a Final Project Report summarizing the work performed under these General Specifications and the Statement of Work (SOW), including the survey methodologies used to perform the work and a description and analysis of the quality control performed (refer to Part 1, Chapter 5, Survey and

Quality Control Plan), description of the recovered/established geodetic control (Part 1, Paragraph 8-6, Reconnaissance), and discussion of any unusual circumstances, discrepancies, and deviations from these General Specifications or the SOW.

18-5. DIGITAL FILES

The contractor will submit all original and final data in digital files on CD-ROM. At the completion of the survey, the zipped archive file compiled in data logger (ADCAT) must also be submitted. This zipped archive file must include the following files in addition to any file containing data related to the survey:

(1). Data logger (ADCAT) output:
- (a). Input Exchange and Output Exchange Files
- (b). Temporary Exchange Files
- (c). Observation Logs (both Raw Observations and Direct Edits)
- (d). Obstruction Zone Analysis
- (e). Reports (Basis Check Report, Import/Output Status Reports, and Required Feature Class Report)
- (f). AOC Checklists
- (g). ASCII Input Files (CXG and GPS files)

(2). Additional files to be included in the zip file (ADCAT archive function):
- (a). Any electronic files containing data related to a survey project (charts, checklists, notes, etc.)
- (b). Field sketches, diagrams, and plans in PDF:
  - (i). New runway end point or new runway, displaced threshold, or stopway
  - (ii). New taxi area
  - (iii). New ramp area
  - (iv). All off-field electronic NAVAIDs
  - (v). Photo reference point
  - (vi). Graphics of the runway profile points (two runs – digital file)
  - (vii). Sketch (distance from the starting end) showing the locations of the profile points (digital file)
- (c). Digital images from hand-held camera:
  - (i). New runway end point, displaced threshold, and stopways
  - (ii). NAVAIDs
- (d). Raw GPS Observation files:
  - (i). Submit original raw GPS data files in both the manufactures download format and in RINEX II format
  - (ii). Binary files containing ionosphere modeling information
- (e). Final processed data files with format:
  - (i). If GPS, include vector reduction and adjustment files
  - (ii). All files necessary to recreate the project must be included
- (f). Geospatial Vector Files

18-6. TRANSMITTAL LETTER

In the data submission package, the contractor will include a transmittal letter listing all items submitted to NGS. One copy of the transmittal letter must be forwarded to NGS, one copy to the FAA Airport Surveying-GIS Program Manager and one with the deliverables package to the airport authority..

Appendix 1 – Additional References, Glossary and Contractions

Section 1-1: References and Project Materials to Review

The contractor must become thoroughly familiar with each of the following documents and guidance.

A. The requirements in these General Specifications and attachments.

B. AC 150/5300-16 General Guidance And Specifications For Aeronautical Surveys - Establishment Of Geodetic Control And Submission To The National Geodetic Survey

C. AC 150/5300-17 General Specifications and guidance for Aeronautical Surveys - Airport Imagery Acquisition And Submission To The National Geodetic Survey

D. Input Formats And Specifications Of The National Geodetic Survey Data Base, The "Blue Book," http://www.ngs.noaa.gov/FGCS/BlueBook/

E. DOT/FAA Advisory Circular No. 150/5340-1H, "Standards For Airport Markings," 1999. This document is available as four separate Adobe Acrobat files at http://www.faa.gov/arp/150acs.cfm?cfmARPnav=acs , click on Airport Compliance, then scroll down to "150/5340-1H".

F. DOT/FAA/AC-5210-20, "Ground Vehicle Operations On Airports," 2002, http://www.faa.gov/arp/ACs/5210-20.pdf

G. DOT/FAA Advisory Circular No. 150/5340–18C, "Standards For Airport Sign Systems,"1991. This document is available as four separate Adobe Acrobat files at http://www.faa.gov/arp/150acs.cfm?cfmARPnav=acs , click on Airport Compliance, then scroll down to "150/5340-18C".

H. NGS Aeronautical Survey Program. http://www.ngs.noaa.gov/AERO/aero.html.

I. FAA Web site for location identifiers: http://www.FAA.gov/atpubs/lid/lidhme.htm.

J. FAA Web site for airport managers: http://www.faa.gov/arp/safety/5010/index.cfm?nav=safedata.

K. Listing of airports with PACS and SACS and the dates that they were observed is available at: http://www.ngs.noaa.gov/cgi-bin/airports.prl?TYPE=PACSAC

L. Aeronautical Information Manual, Official Guide to Basic Flight Information and ATC Procedures. http://www.faa.gov/ATPUBS/AIM/index.htm

APPROPRIATE PAGES FROM U.S. TERMINAL PROCEDURES

U.S. Terminal Procedures are published in 20 loose leaf or perfect bound volumes covering the conterminous U.S., Puerto Rico, and the Virgin Islands. A Change Notice is published at the midpoint between revisions in bound volume format. The latest edition of the U.S. Terminal Procedures can be obtained from FAA Aeronautical chart agents. The Terminal Procedures Publications include:

A. Instrument Approach Procedure (IAP) Charts: IAP charts portray the aeronautical data that is required to execute instrument approaches to airports. Each chart depicts the IAP, all related navigation data, communications information, and an airport sketch. Most procedures are designated for use with a specific electronic NAVAID, such as Instrument Landing System (ILS), Very High Frequency Omnidirectional Range (VOR), Nondirectional Radio Beacon (NDB), etc.

B. Airport Diagrams: Full page airport diagrams are designed to assist in the movement of ground traffic at locations with complex runway/taxiway configurations and provide information for updating geodetic position navigational systems aboard aircraft. (Note: Airport Diagrams are not available for all airports.)

APPROPRIATE PAGES FROM AIRPORT/FACILITY DIRECTORY

The Airport/Facility Directory is a manual that contains data on public use and joint use airports, seaplane bases, heliports, VFR airport sketches, NAVAIDS, communications data, weather data sources, airspace, special notices, and operational procedures. The Airport/Facility Directory includes data that cannot be readily depicted in graphic form: e.g., airport hours of operation, types of fuel available, runway data, lighting codes, etc. The Airport/Facility Directory is published every 56 days by the National Aeronautical Charting Office, FAA. The latest edition of the Airport/Facility Directory can be obtained from FAA Aeronautical chart agents.

FAA NATIONAL FLIGHT DATA DIGEST (NFDD)

A daily (except weekends and Federal holidays) publication of flight information appropriate to aeronautical charts, aeronautical publications, Notices to Airmen, or other media serving the purpose of providing operational flight data essential to safe and efficient aircraft operations.

FAA FORM 5010, AIRPORT MASTER RECORD

The FAA Form 5010 is prepared for all public-use airports. This master record contains comprehensive data on airports, including obstacles. Much of the information on FAA Form 5010 comes from unverified sources. Often, obstacle heights and positions are estimates which have not been measured and verified by instruments. For these reasons, the Airport Master Record is to be consulted for information purposes only.

Section 1-2: Glossary

Accuracy - The degree of conformity with a standard, or a value accepted as correct. Precision is the degree of uniformity of repeated measurements or events. For example, repeat measurements of the distance between two points may exhibit a high degree of precision by virtue of the relative uniformity of the measurements. However, if a "short" tape were used in the measurements, accuracy would be poor in that the measured distance would not conform to the true distance between the points. Surveying and mapping accuracy standards should include three elements: (1) a stated variation from a true value or a value accepted as correct, (2) the point to which the new value is relative, and (3) the probability that the new value will be within the stated variation. For example, "Horizontal accuracy will be 10 cm relative to the nearest Continuously Operating Reference Station (CORS) at the 95 percent confidence level."

Abeam Point - The point on a line that is nearest to an off line point. For example, a point on the runway centerline is "abeam" the Glide Slope Antenna when the distance from the centerline point to the antenna is a minimum.

Accelerate-Stop Distance Available - (ASDA) The runway plus stopway length declared available and suitable for the acceleration and deceleration of an airplane aborting a takeoff.

Aeronautical Beacon – A visual navigational aid displaying flashes of white and/or colored light to indicate the location of an airport, a heliport, a landmark, a certain point of a federal airway in mountainous terrain, or an obstruction. (refer to Airport Rotating Beacon under Airport Lighting.)

Air Navigation Facility - Any facility used in, available for use in, or designed for use in, aid of air navigation, including landing areas, lights, any apparatus or equipment for disseminating weather information, for signaling, for radio-directional finding, or for radio or other electrical communication, and any other structure or mechanism having a similar purpose for guiding or controlling flight in the air or the landing and takeoff of aircraft. (refer to Navigational Aid.)

Airport - An area on land or water that is used or intended to be used for the landing and takeoff of aircraft and includes its buildings and facilities, if any.

Airport Elevation - The highest point of an airport's usable runways measured in feet from mean sea level (technically, from the vertical datum.)

Airport Lighting - Various lighting aids that may be installed on an airport. Types of airport lighting include:

- ***Airport Rotating Beacon (APBN)*** - A visual navigational aid operated at many airports. At civil airports, alternating white and green flashes indicate the location of the airport. At military airports, the beacons flash alternately white and green, but are differentiated from civil beacons by dualpeaked (two quick) white flashes between the green flashes.

- ***Approach Light System (ALS)*** - An airport lighting facility which provides visual guidance to landing aircraft by radiating light beams in a directional pattern by which the pilot aligns the aircraft with the extended centerline of the runway on his final approach for landing. Condenser-Discharge Sequential Flashing Lights/Sequenced Flashing Lights may be installed in conjunction with the ALS at some airports.

- ***Omnidirectional Approach Light System (ODALS)*** - Seven omnidirectional flashing lights located in the approach area of a nonprecision approach. Five lights are located on the runway centerline extended with the first light located 300 feet from the threshold and extending at equal intervals up to 1,500 feet from the threshold. The other two lights are located, one on each side of the runway threshold, at a lateral distance of 40 feet from the runway edge, or 75 feet from the runway edge when installed on a runway equipped with a VASI.

- ***Precision Approach Path Indicator (PAPI)*** - A visual approach slope indicator normally consisting of light units similar to the VASI but in a single row of either two or four light units set perpendicular to the runway centerline. The row of light units is normally installed on the left side of the runway. Indications are as follows: Below glide path – all lights red; Slightly below glide path -three lights closest to runway red, other light white; On glide path - two lights closest to runway red, other two lights white; Slightly above glide path - light closest to runway red, other three lights white; Above glide path - all lights white.

- ***Pulsating Visual Approach Slope Indicator (PVASI)*** - A pulsating visual approach slope indicator normally consists of a single light unit projecting a two-color visual approach path into the final approach area of the runway upon which the indicator is installed. The on glide path indication is a steady white light. The slightly below glide path indication is a steady red light. If the aircraft descends further below the glide path, the red light starts to pulsate. The above glide path indication is a pulsating white light. The pulsating rate increases as the aircraft gets further above or below the desired glide slope.

- ***Runway Alignment Indicator Lights (RAIL)*** - Sequenced Flashing Lights which are installed only in combination with other light systems.

- ***Runway End Identifier Lights (REIL)*** - Two Synchronized flashing lights, one on each side of the runway threshold, which provide rapid and positive identification of the approach end of a particular runway.

- ***Threshold Lights –*** Fixed green lights arranged symmetrically left and right of the runway centerline identifying the runway end. When all light units are located outside the runway edge, or runway edge extended, the runway end lights are considered to be “outboard.” If any light unit is located inside the runway edge, or runway edge extended, the lights are considered to be “inboard.”

- ***Tri-Color Visual Approach Slope Indicator (TRVC)*** - A visual approach slope indicator normally consists of a single light unit projecting a three-color visual approach path into the final approach area of the runway upon which the indicator is installed. The below glide path indication is red, the above glide path indication is amber, and the on glide path indication is green.

- ***Visual Approach Slope Indicator (VASI)*** - An airport lighting facility providing vertical visual approach slope guidance to aircraft during approach to landing by radiating a directional pattern of high intensity red and white focused light beams which indicate to the pilot is ""on path" if he sees red/white, "above path" if white/white, and "below path" if red/red. Some airports serving large aircraft have three-bar VASI's which provide two visual glide paths to the same runway.

Airport Reference Point (ARP) - The approximate geometric center of all usable runways. ARP is not monumented, therefore not recoverable on the ground.

Airport Surface Detection Equipment (ASDE) - Radar equipment specifically designed to detect all principal features on the surface of an airport, including aircraft and vehicular traffic, and to present the entire image on a radar indicator console in the control tower. This is used to augment visual observation by tower personnel of aircraft and/or vehicular movements on the runways and taxiways.

Airport Surveillance Radar (ASR) - Approach control radar used to detect and display an aircraft's position in the terminal area. ASR provides range and azimuth information but does not provide elevation data. Coverage of the ASR can extend up to 60 nautical miles.

Air Route Surveillance Radar (ARSR) - Air route traffic control center (ARTCC) radar used primarily to detect and display an aircraft's position while en route between terminal areas.

Air Route Traffic Control Center (ARTCC) - A facility established to provide air traffic control service to aircraft operating on IFR flight plans within controlled airspace and principally during the en route phase of flight. When equipment and controller workload permit, certain advisory/assistance services may be provided to VFR aircraft.

Apparent Runway/Stopway Surface (ARS) – The surface that approximates a runway or stopway before the surface is squared off, shortened to good pavement, or otherwise adjusted to meet the criteria of a runway or stopway.

Apron - A defined area on an airport or heliport intended to accommodate aircraft for purposes of loading or unloading passengers or cargo, refueling, parking, or maintenance. With regard to seaplanes, a ramp is used for access to the apron from the water.

Area Navigation - A method of navigation that permits aircraft operation on any desired course within the coverage of station-referenced navigational signals or within the limits of a self-contained system capability. Area navigation systems include GPS, Inertial, and LORAN-C.

Area Navigation Approach (ANA) - An instrument approach procedure using an Area Navigation System.

Attributes or Attribute Data - are alphabetical and/or numeric information that describes particular characteristics of a geospatial feature, such as its type, dimensions, usage, occupant, etc.

Azimuth

- ***Astronomic Azimuth*** - At the point of observation, the angle measured from the vertical plane through the celestial pole and the vertical plane through the observed object. The astronomic azimuth is established directly from observations on a celestial body and is measured in the plane of the horizon. Astronomic azimuths differ from geodetic azimuths because of the deflection of the vertical which can be greater than one minute of arc in extreme cases. Astronomic azimuths may be reckoned clockwise or counter-clockwise, from either north or south, as established by convention.

- ***Geodetic*** - The angle at point A between the tangent to the meridian at A and the tangent to the geodesic from A to B whose geodetic azimuth is wanted. It may be reckoned clockwise from either geodetic north or south as established by convention. Because of earth curvature, the geodetic azimuth from A to B (forward azimuth) differs from the geodetic azimuth from B to A (back azimuth) by other than 180 degrees, except where A and B have the same geodetic longitude or where the geodetic latitude of both points is zero. The geodesic line is the shortest surface distance between two points on the reference ellipsoid. A geodetic meridian is a line on the reference ellipsoid defined by the intersection of the reference ellipsoid and a plane containing the minor axis of that ellipsoid.

- ***Grid*** - The angle in the plane of projection between a straight line and the central meridian of a plane-rectangular coordinate system. Grid azimuths may be reckoned clockwise from either geodetic north or south as established by convention.

- ***Magnetic*** - At the point of observation, the angle between the vertical plane through the observed object and the vertical plane in which a freely suspended symmetrically magnetized needle, influenced by no transient artificial magnetic disturbance, will come to rest. Magnetic azimuths are reckoned clockwise from magnetic north.

Bench Mark - A relatively permanent natural or artificial material object bearing a marked point whose elevation above or below an adopted surface (datum) is known.

Blast Fence - A barrier that is used to divert or dissipate jet or propeller blast.

Blast Pad - A specially prepared surface placed adjacent to the ends of runways to eliminate the erosive effect of the high wind forces produced by airplanes at the beginning of their takeoff rolls.

Catenary - The curve theoretically formed by a perfectly flexible, uniformly dense and thick, inextensible cable suspended from two points. Also a cable suspended between two points having the approximate shape of a catenary.

Clearway - An area beyond the takeoff runway under the control of airport authorities within which terrain or fixed obstacles may not extend above specified limits. These areas may be required for certain turbine-powered operations and the size and upward slope of the clearway will differ depending on when the aircraft was certificated.

Collection - is any combination of data submitted by a provider at a given time.

Compass Locator - A low power, low or medium frequency (L/MF) radio beacon installed at the site of the outer or middle marker of an instrument landing system (ILS). It can be used for navigation at distances of approximately 15 miles or as authorized in the approach procedure.

Control Station - A point on the ground whose position and/or elevation is used as a basis for obtaining positions and/or elevations of other points.

Continuously Operating Reference Station (CORS) - A permanent GPS facility whose GPS receiver continuously provides observables from the GPS satellites, allowing stations occupied temporarily by GPS receivers to be differentially positioned relative to it. CORS are related to the NAD 83 coordinate system at the 1-3 cm level either by being collocated at VLBI sites which were used to define the coordinate system, or by being differentially positioned relative to such a collocated GPS station.

Datum - In general, a point, line, surface, or set of values used as a reference. A geodetic datum is a set of constants specifying the coordinate system and reference used for geodetic control (refer to Control Station), i.e. for calculating coordinates of points on the earth. At least eight constants are needed to form a complete datum: three to specify the location of the origin of the coordinate system; three to specify the orientation of the coordinate system; and two to specify the dimensions of the reference ellipsoid. Any point has a unique X, Y, Z datum coordinate which can be transformed into latitude, longitude, and ellipsoid height (height relative to the ellipsoid). A horizontal control datum is a geodetic datum specified by two coordinates (latitude and longitude) on the ellipsoid surface, to which horizontal control points are referenced. A vertical datum is a theoretical equipotential surface with an assigned value of zero to which elevations are referenced. (refer to GEOID)

Datum Tie - The process of determining, through appropriate survey methods, a position (horizontal tie) or elevation (vertical tie) of a new point relative to the position/elevation of a control station with established datum values, such as, a control station in the National Spatial Reference System (NSRS). The new point may be a permanent survey monument. This process ensures that the new point will have the proper relationship to NSRS and to all other points tied to NSRS.

Direction Finder (DF) - A radio receiver equipped with a directional sensing antenna used to take bearings on a radio transmitter. Distance Measuring Equipment (DME) - Equipment (airborne and ground) used to measure, in nautical miles, the slant range distance of an aircraft from the DME navigational aid. DME is usually frequency paired with other navigational aids, such as a VOR or localizer.

Displaced Threshold - A threshold that is located at a point on the runway other than the designated runway end. The displaced area is available for takeoff or rollout of aircraft, but not for landing. A displaced threshold does not mark the end of a runway.

Ellipsoid – Refer to Reference Ellipsoid.

Ellipsoid Height - The distance, taken along the perpendicular to the ellipsoid, between a point and the reference ellipsoid. Ellipsoid heights are positive if the point is above the ellipsoid. Ellipsoid heights are the heights resulting from GPS observations. Ellipsoid height = GEOID Height + Orthometric Height.

Feature - is a manmade or natural object that appears in the real world such as a building, runway, navigational aid or river.

Feature Type - refers to a collection of all features of a given type such as all runways or all buildings. Feature Types are analogous to layers in many GIS applications and are also referred to as Entity Types and Feature Classes in other standards.

Feature Instance -refers to a specific feature such as runway 10/28 at Baltimore Washington International Airport.

Federal Base Network (FBN) - A fundamental reference network of permanently monumented control stations in the United States at a 1 degree x 1 degree nominal spacing, established, maintained, and monitored by the National Geodetic Survey, providing precise latitude, longitude, ellipsoidal height, orthometric height, and gravity values. The FBN is a very precise subset of the National Spatial Reference System.

First Good Pavement (FGP) – The first point on a paved surface through which a perpendicular line to the surface centerline can be constructed to define a runway or stopway end. While this point need not be on the runway/stopway centerline, it must be located so that the resulting runway/stopway surface is rectilinear with full structural integrity to the end. The FGP location is a fundamental factor in establishing runway/stopway length and width.

Flight Path - A line, course, or track along which an aircraft is flying or intended to be flown.

Frangible - A fixture designed to break at a predetermined point when struck by a predetermined force to minimize damage if accidentally struck by an aircraft.

GEOID - The theoretical surface of the earth that coincides everywhere with approximate mean sea-level. The GEOID is an equipotential surface to which, at every point, the plumb line is perpendicular. Because of local disturbances of gravity, the GEOID is irregular in shape.

GEOID Height - The distance, taken along a perpendicular to the reference ellipsoid, between the reference ellipsoid and the GEOID. The GEOID height is positive if the GEOID is above the reference ellipsoid. (GEOID height is negative for the conterminous United States). GEOID Height = Ellipsoidal Height - Orthometric Height.

Geospatial Data, Geospatially-Referenced Data or Geospatial Vector Data - Data that identifies the geographic location (2D or 3D coordinates) and characteristics (feature attributes) of natural or constructed features and boundaries on the earth. This information may be derived from remote sensing and surveying technologies. The features are represented by a point, line, or polygon. The position of a point feature is described by a single coordinate pair (or triplet for three dimensional data). The spatial extent of a line feature is described by a string of coordinates of points lying along the line, while the extent of a polygon feature is described by treating its boundary as a line feature. Vector data may be stored in a sequential, a chain node, or a topological data structure.

Global Positioning System (GPS) - A space-based radiopositioning, navigation, and time-transfer system. The system provides highly accurate position and velocity information, and precise time, on a continuous global basis, to an unlimited number of properly equipped users.

Ground Controlled Approach (GCA) - A radar approach system operated from the ground by air traffic control personnel transmitting instructions to the pilot by radio. The approach may be conducted with airport surveillance radar (ASR) only or with both surveillance and precision approach radar (PAR).

Helipad - A small designated area, usually with a prepared surface, on a heliport, airport, landing/takeoff area, apron/ramp, or movement area used for takeoff, landing, or parking of helicopters.

Heliport - An area of land, water, or structure used or intended to be used for the landing and takeoff of helicopters and includes its buildings and facilities if any.

Heliport Reference Point (HRP) - The geographic position of the heliport expressed in latitude and longitude at, (1) the center of the final approach and takeoff (FATO) area or the centroid of multiple FATO's for heliports having visual and nonprecision instrument approach procedures, or (2) the center of the final approach reference area when the heliport has a precision instrument approach.

Horizontal Survey Point - A point that represents the horizontal position of a feature. This point may be located on the feature or located between feature components. For example, the horizontal survey point for a Precision Approach Path Indicator (PAPI) system is the center of the light array which falls between light units.

Inboard/Outboard Lights – Used in reference to runway end and threshold lights. The light configuration is considered “inboard” if the center of any light unit in the light array is located inside the runway edge or edge extended. The light configuration is considered “outboard” if all light centers in the light array are located outside the runway edge or edge extended. In this definition, “light array” includes the lights on both sides of the runway.

Instrument Landing System (ILS) - A precision instrument approach system which normally consists of the following electronic components and visual aids:

Localizer	Middle Marker
Glide Slope	Approach Lighting
Outer Marker	

Instrument Runway - A runway equipped with electronic and visual navigational aids for which a precision or nonprecision approach procedure having straight-in landing minimums have been approved.

International Civil Aviation Organization (ICAO) - A specialized agency of the United Nations whose objective is to develop the principles and techniques of international air navigation and to foster planning and development of international civil air transport.

Landing Area - Any locality either on land, water, or structure, including airports/heliports, and intermediate landing fields, which is used, or intended to be used, for the landing and takeoff of aircraft whether or not facilities are provided for shelter, servicing, or for receiving or discharging passengers or cargo.

Landing Direction Indicator - A device, usually a tetrahedron, which visually indicates the direction in which landings and takeoffs should be made.

Leveling - The process of determining the difference in elevation between two points. In geodetic leveling, this process results in a vertical distance from a vertical datum.

- ***Direct*** - The determination of differences in elevation by means of a series of horizontal observations on a graduated rod. The leveling instrument maintains a horizontal line of sight through spirit leveling or a compensation mechanism. The rod is observed while it is resting on a point of known elevation (backsight) and then, without disturbing the elevation of the leveling instrument, is observed a second time while resting on the unknown point (foresight). The differential in rod readings is applied to the starting elevation to determine the elevation of the unknown.

- ***Indirect*** - The determination of differences in elevation by means other than differential leveling, such as, trigonometric leveling. In trigonometric leveling, the vertical angle and distance from the instrument to the point of unknown elevation are measured and the difference in elevation between the instrument and the unknown point is then computed using trigonometry.

Local Control - A control station or network of control stations in a local area used for referencing local surveys. Local control may or may not be tied to the National Spatial Reference System. (see Control Station).

Localizer (LOC) - The component of an ILS which provides course guidance to the runway.

Localizer Back Course – The course line defined by the localizer signal along the extended centerline of the runway in the opposite direction to the normal localizer approach course (front course.)

Localizer Type Directional Aid (LDA) - A navigational aid used for nonprecision instrument approaches with utility and accuracy comparable to a localizer but which is not part of a complete ILS and is not aligned with the runway.

Long Range Navigation (LORAN) - An electronic navigation system by which hyperbolic lines of position are determined by measuring the difference in the time of reception of synchronized pulse signals from two fixed transmitters. LORAN A operates in the 1750 - 1950 kHz frequency band. LORAN C and D operate in the 100 - 110 kHz frequency band.

Marker Beacon - An electronic navigational facility transmitting a 75 MHz vertical fan or boneshaped radiation pattern to be received by aircraft flying overhead. Marker beacons are identified by their modulation frequency and keying code, and when received by compatible airborne equipment, indicate to the pilot, both aurally and visually, that he is passing over the facility.

- ***Back Course Marker (BCM)* –** When installed, normally indicates the localizer back course final approach fix where approach descent is commenced.

- ***Inner Marker (IM)*** - A marker beacon, used with an ILS Category II precision approach, located between the middle marker and the end of the ILS runway and normally located at the point of designated decision height, normally 100 feet above the touchdown zone elevation, on the ILS Category II approach. It also marks progress during a ILS Category III approach.

- ***Middle Marker (MM)*** - A marker beacon that defines a point along the glideslope of an ILS, normally located at or near the point of decision height for ILS Category I approaches.

- ***Outer Marker (OM*)** - A marker beacon at or near the glideslope intercept altitude of an ILS approach. The outer marker is normally located four to seven miles from the runway threshold on the extended centerline of the runway.

Mean Sea Level (MSL) - The average location of the interface between the ocean and atmosphere, over a period of time sufficiently long so that all random and periodic variations of short duration average to zero.

Metadata - is information about the data itself such as source, accuracy, dates for which the data are valid, and security classification. Metadata is essential in helping users determine the extent on which they can rely on a given data item to make decisions.

Minimum Safe Altitude Warning (MSAW) - A function of the ARTS III computer that aids the controller by alerting him when a tracked Mode C equipped aircraft is below or is predicted by the computer to go below a predetermined minimum safe altitude.

Minimums - Weather condition requirements established for a particular operation or type of operation; e.g., IFR takeoff or landing, alternate airport for IFR flight plans, VFR flight etc.

Missed Approach - A maneuver conducted by a pilot when an instrument approach cannot be completed to a landing.

Movement Area - The runways, taxiways, and other areas of an airport/heliport which are utilized for taxiing/hover taxiing, air taxiing, takeoff, and landing of aircraft, exclusive of loading ramps and parking areas. At those airports/heliports with a tower, specific approval for entry onto the movement area must be obtained from ATC.

National Airspace System (NAS) - The common network of U.S. airspace; air navigation facilities, equipment and services, airports or landing areas; aeronautical charts, information and services; rules, regulations, and procedures, technical information, and manpower and material. Included are system components shared jointly with the military.

National Flight Data Center (NFDC) - A facility in Washington, D.C., established by FAA to operate a central aeronautical information service for the collection, validation, and dissemination of aeronautical data in support of the activities of government, industry, and the aviation community. The information is published in the "National Flight Data Digest."

National Flight Data Digest (NFDD) - A daily (except weekends and Federal holidays) publication of flight information appropriate to aeronautical charts, aeronautical publications, Notices to Airmen, or other media serving the purpose of providing operational flight data essential to safe and efficient aircraft operations.

National Spatial Reference System (NSRS) - A network of permanent survey monuments located throughout the United States with accurately determined positions (horizontal network) and/or elevations (vertical network). Gravity values, not always monumented, are also part of NSRS. Responsibility for establishing and maintaining NSRS rests with the National Geodetic Survey under the U.S. Department of Commerce. Current authority is contained in United States Code, Title 33, USC 883a as amended, and specifically defined by Executive Directive, Bureau of the Budget (now Office of Management and Budget) Circular No. A-16 Revised.

Navigable Airspace - Airspace at and above the minimum flight altitude prescribed in the FARs, including airspace needed for safe takeoff and landing.

Navigational Aid (NAVAID) - Any visual or electronic device airborne or on the surface which provides point to point guidance information or position data to aircraft in flight. (refer to Air Navigation Facility)

Nondirectional Beacon (NDB) - An L/MF or UHF radio beacon transmitting nondirectional signals whereby the pilot of an aircraft equipped with direction finding equipment can determine his bearing to or from the radio beacon and "home" or
track to or from the station. When the NDB is installed in conjunction with an Instrument Landing System marker, it is normally called a Compass Locator.

Nonprecision Approach Procedure - A standard instrument approach procedure in which no electronic glide slope is provided; e.g., VOR, TACAN, NDB, LOC, ASR, LDS, and SDF approaches.

Notice to Airmen (NOTAM) - A notice containing information (not known sufficiently in advance to publicize by other means) concerning the establishment, condition, or change in any component (facility, service, or procedure of, or hazard in the National Airspace System) the timely knowledge of which is essential to personnel concerned with flight operations.

Obstacle – Any object that has a vertical element to it and may or may not penetrate an obstruction identification surface.

Obstruction - Any object that penetrates an obstruction identification surface.

Obstruction Identification Surface (OIS) - Any imaginary surface authorized by the Federal Aviation Administration to identify obstructions. Any object that penetrates an OIS is an obstruction, by definition.

- ***Specified OIS*** - Any OIS other than a supplemental OIS.

- ***Supplemental OIS*** - An OIS designated by appropriate FAA authorities as a supplemental OIS. A supplemental OIS, when implemented, will normally lie below a specified OIS and is intended to provide additional obstruction information. An object that penetrates a supplemental OIS only is a supplemental obstruction.

Offset NAVAID - A NAVAID used during the final approach segment of a straight in instrument approach and not located on the runway centerline or centerline extended.

Orthometric Height - The distance, taken along the plumb line, between a point and the geoid. Orthometric heights are positive if the point is above the geoid. Orthometric Height = Ellipsoid Height - Geoid Height.

Orthophoto - is an aerial image that has been taken from above (either from and aircraft or a satellite) and has been spatially corrected so that features shown on the photo are displayed in their actual geographic position within a specified range of tolerance.

Outboard Lights - Refer to Inboard/Outboard Lights

Photogrammetric - refers to the process of creating vector data such as building outlines and elevation contours from stereo imagery, or pairs of images taken of the same location but at different angles.

Positional Accuracy - refers to the difference between a geospatial feature's displayed position and its actual position. Absolute positional accuracy is the difference between a geospatial feature's displayed position and its actual position on the face of the earth. Relative positional accuracy is the difference between a geospatial feature's displayed position and that of other geospatial features in the same data set.

Precision - the smallest separation that can be represented by the method employed to make the positional statement which is the number of units or digits to which a measured or calculated value is expressed and used

Precision Approach Procedure - A standard instrument approach procedure in which an electronic glideslope/glidepath is provided; e.g., GPS, ILS, and PAR approaches.

Precision Approach Radar (PAR) - Radar equipment, in some ATC facilities operated by FAA and/or the military services at joint use civil/military locations and separate military installations to detect and display azimuth, elevation, and range of aircraft on the final approach course to a runway. This equipment may be used to monitor certain nonradar approaches, but is primarily used to conduct a precision instrument approach wherein the controller issues guidance instructions to the pilot based on the aircraft's position in relation to the final approach course (azimuth), glidepath (elevation), and distance (range) from the touchdown point on the runway as displayed on the radar scope.

Primary Airport Control Station (PACS) - A control station established in the vicinity of, and usually on, an airport, and tied directly to the National Spatial Reference System. PACS must be declared PACS by the National Geodetic Survey and must meet the specific siting, construction, and accuracy requirements for PACS.

Progressive Taxi - Precise taxi instructions given to a pilot unfamiliar with the airport or issued in stages as the aircraft proceeds along the taxi route.

Published Data - Data officially issued for distribution to the public.

Radio Detection and Ranging (RADAR) - A device which, by measuring the time interval between transmission and reception of radio pulses and correlating the angular orientation of the radiated antenna beam or beams in azimuth and/or elevation, provides information on range, azimuth, and/or elevation of objects in the path of the transmitted pulse.

- ***Primary Radar*** - A radar system in which a minute portion of a radio pulse transmitted from a site is reflected by an object and then received back at the site for processing and display at an air traffic control facility.

- ***Secondary Radar/Radar Beacon (ATCRBS)*** -A radar system in which the object to be detected is fitted with cooperative equipment in the form of a radio receiver/transmitter (transponder). Radar pulses transmitted from the searching transmitter/receiver (interrogator) site are received in the cooperative equipment and used to trigger a distinctive transmission from the transponder. This reply transmission, rather than a reflected signal, is then received back at the transmitter/receiver site for processing and display at an air traffic control facility.

Radar Approach - An instrument approach procedure which utilizes Precision Approach Radar (PAR) or Airport Surveillance Radar (ASR).

Radio Beacon – Refer to Nondirectional Beacon.

Ramp – Refer to Apron.

Reference Ellipsoid - A geometric figure comprising one component of a geodetic datum, usually determined by rotating an ellipse about its shorter (polar) axis, and used as a surface of reference for geodetic surveys. The reference ellipsoid closely approximates the dimensions of the geoid, with certain ellipsoids fitting the geoid more closely for various areas of the earth. Elevations derived directly from satellite observations are relative to the ellipsoid and are called ellipsoid heights.

Relocated Threshold – A threshold that is located at a point on the runway other than the beginning of the full strength pavement. The area between the former threshold and the relocated threshold is not available for the landing or takeoff of aircraft. Thus, a relocated threshold marks the end of the runway. The precise end is on the landing approach edge of the relocated threshold paint bar. The abandoned runway area may or may not be available for taxiing.

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.

Runway - A defined rectangular area on a land airport, prepared for the landing and takeoff run of aircraft along its length. Being exactly rectangular, it excludes narrow, rounded, deteriorated, and irregular ends that are not as wide as the general or overall width of the runway. The runway width is the physical width that extends over the entire length of the rectangle. The runway length does not include blast pad, clearway, or stopway surfaces. Displaced thresholds are included in the physical length. Runways are normally numbered in relation to their magnetic direction rounded off to the nearest 10 degrees: e.g., Runway 10, Runway 25.

Runway Centerline – A line connecting the two opposite runway end points, the line may be physically marked on the surface of the runway.

Runway End Point - The point at the runway end, halfway between the edges of the runway.

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.

Remote Transmitter/Receiver (RTR) – Refer to Remote Communications Outlet

Schema - is a logical diagram that shows the structure and interrelationships between different feature types of the data standard or model.

Secondary Airport Control Station (SACS) - A control station established in the vicinity of, and usually on, an airport, and tied directly to the Primary Airport Control Station. SACS must be declared SACS by the National Geodetic Survey and must meet the specific sitting, construction, and accuracy requirements for SACS.

Simplified Directional Facility (SDF) - A navigational aid used for nonprecision instrument approaches. The final approach course is similar to that of an ILS localizer except that the SDF course may be offset from the runway, generally not more than 3 degrees, and the course may be wider than the localizer, resulting in a lower degree of accuracy.

Spatial Data - is data that depicts a real world feature such as a road, building or runway on a map. The most basic types of spatial data are points, lines and polygons but spatial data can also include orthophotos and other more complex forms of locational information.

Specially Prepared Hard Surface (SPHS) - A concrete, asphalt, or other paved surface, or an unpaved surface that has been specially treated to stabilize the surface, protect the subsurface, or provide a smoother rolling surface for aircraft. Unpaved SPHS's include compacted gravel, and gravel treated with a stabilizing bituminous material.

State Plane Coordinate System - A series of plane-rectangular coordinate systems established by the U.S. Coast and Geodetic Survey for the entire United States, with a separate system for each state. A mathematical relationship exists between state plane and geodetic coordinates, one being easily transformed into the other. The advantage of the State Plane Coordinate System is that it permits survey computations for small areas to be performed using plane trigonometry (as opposed to more complex spherical trigonometry), while still yielding very nearly the true angles and distances between points.

Stopway - An area beyond the takeoff runway, not narrower than the runway and centered upon the extended centerline of the runway, able to support the airplane during an aborted takeoff, without causing structural damage to the airplane, and designated by the airport authorities for use in decelerating the airplane during an aborted takeoff.

Supplemental Profile Point - A runway/stopway point 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.

Supporting Feature – A feature, such as a runway number or threshold light set, which does not precisely define a runway/stopway survey point, but provides evidence that the survey point was correctly selected?

Surface Model Library – Surface Model Library (SML) refers to an NGS provided library of functions to create and analyze the mathematical surface models of Obstruction Identification Surfaces (OIS). The SML will be available as a Dynamic Link Library (DLL). NGS will update the SML as needed to reflect changes in the definitions of the OIS.

Survey Point Locator (SPL) – A tangible feature, such as the approach side of a threshold bar, or intangible feature, such as a Trim Line, whose intersection with the runway/stopway centerline defines a survey point.

Take-off Distance Available (TODA) - The length of the take-off run available plus the length of the clearway, if provided.

Take-off Run Available (TORA) - The length of the runway declared available and suitable for the ground run of an airplane take-off.

Tactical Air Navigation (TACAN) - An ultra-high frequency electronic rho-theta air navigational aid which provides suitably equipped aircraft a continuous indication of bearing and distance to the TACAN station.

Taxiway – A defined path established for the taxiing of aircraft from one part of an airport to another.

Tetrahedron - A device normally located on uncontrolled airports and used as a landing direction indicator. The small end of the tetrahedron points in the direction of landing.

Threshold (THLD) - The beginning of that portion of the runway available for landing. A displaced threshold (DTHLD) is a threshold that is located at a point on the runway other than the designated beginning of the runway.

Touchdown Zone (TDZ) - The first 3,000 feet of the runway beginning at the threshold.

Touchdown Zone Elevation (TDZE) - The highest elevation in the Touchdown Zone.

Traffic Pattern – The traffic flow that is prescribed for aircraft landing at, taxiing on or taking off from an airport. The components of a typical traffic pattern are upwind leg, crosswind leg, downwind leg, base leg, and final approach.

Transmissometer (TMOM) - An apparatus used to determine visibility by measuring the transmission of light through the atmosphere. It is the measurement source for determining runway visual range (RVR) and runway visibility value (RVV).

Trim Line – An imaginary line, constructed perpendicular to the runway/stopway centerline, which establishes the location of a runway/stopway end or displaced threshold.

V_1- The takeoff decision speed. If a system failure occurs before V_1, the takeoff is aborted. If the failure occurs at or above V_1, the pilot is committed to continue the takeoff.

Vertical Survey Point - A point that represents the elevation position of a feature. This point may be located on the top or base of the feature or located between feature components. For example, the vertical survey point for a Precision Approach Path Indicator (PAPI) system is the ground at the center of the light array which falls between light units.

Vertical Takeoff and Landing (VTOL) Aircraft - Aircraft capable of vertical climbs and/or descents and of using very short runways or small areas for takeoff and landings. These aircraft include, but are not limited to, helicopters.

Very High Frequency Omnidirectional Range Station (VOR) - A ground-based electronic navigation aid transmitting very high frequency navigation signals, 360 degrees in azimuth, oriented from magnetic north.

Very High Frequency Omnidirectional Range/Tactical Air Navigation (VORTAC) - A navigation aid providing VOR azimuth, TACAN azimuth, and TACAN distance measuring equipment (DME) at one site.

Visual Approach - An approach conducted on an instrument flight rules (IFR) flight plan which authorizes the pilot to proceed visually and clear of clouds to the airport. The pilot must, at all times, have either the airport or preceding aircraft in sight.

Visual Glideslope Indicator - A navigational aid that provides vertical visual guidance to aircraft during approach to landing by either radiating a directional pattern of high intensity light into the approach area, or providing lighted or unlighted panels which can be aligned by the pilot, thereby allowing the pilot to determine if the aircraft is above, below, or on the prescribed glidepath. (See Airport Lighting).

Waypoint - A predetermined geographical position used for route/instrument approach definition, or progress reporting purposes, that is defined relative to a VORTAC station or in terms of latitude/longitude coordinates.

Wide Area Augmentation System (WAAS) - The total FAA system designed and built to meet the mission needs of insuring satellite integrity for using GPS for required navigation performance (RNP) in the National Airspace System and of improving accuracy to support precision approaches using GPS augmented with the WAAS.

Section 1-3: Contractions and Word Phrases

The following list presents the approved contractions for data.

WORD/ PHRASE	CONTRACTION
A	
Abandoned	ABND
Above Ground Level	AGL
Accelerate-Stop Distance Available	ASDA
Advisory Circular	AC
Architecture, Engineering and Construction	A/E/C
Aeronautical Data Collection and Analysis Tool	ADCAT
Aeronautical Information Exchange Model	AIXM
Aeronautical Information Service	AIS
Agricultural	AG
Air Route Surveillance Radar	ARSR
Aircraft	ACFT
Airport	ARPT
Airport Beacon	APBN
Airport District Office	ADO
Airport Facility Directory	AFD
Airport Layout Plan or Airport Location Point	ALP
Airport Obstruction Chart	AOC
Airport Reference Point	ARP
Airport Surface Detection Equipment	ASDE
Airport Surveillance Radar	ASR
Airport Traffic Control Tower	ATCT
Airway Beacon	AWYBN
American Institute of Architects	AIA
American National Standards Institute	ANSI
American Society for Testing and Materials	ASTM
Anemometer	AMOM
Antenna	ANT
Approach	APCH
Approach Light	APP LT
Approach Light System	ALS
Area Navigation Approach	ANA
Arresting Gear	A-GEAR
Automated Flight Service Station	AFSS
Automated Surface Observing System	ASOS
Automatic Weather Observing/Reporting System	AWOS

WORD/ PHRASE	CONTRACTION
B	
Back Course Marker	BCM
Bridge	BRDG
Building	BLDG
C	
Centerline	C/L
Ceilometer	CLOM
Chimney	CHY
Closed	CLSD
Common Traffic Advisory Frequency	CTAF
Computer Aided Drafting and Design	CADD
Construction	CONST
Continuously Operating Reference Station	CORS
D	
Design File (MicroStation)	DGN
Department of Defense (U.S.)	DOD
Department of Transportation (U.S.)	DOT
Direction Finder	DF
Displaced Threshold	DTHLD
Distance Measuring Equipment	DME
Distance to Centerline	DCLN
Distance to Runway End	DEND
Distance to Threshold	DTHR
Drawing File (AutoDesk or AutoCAD)	DWG
E	
Electrical	ELEC
Elevation	EL
Elevation	ELEV
Ellipsoid	ELLIP
Engine Out Departure	EOD
Equipment	EQUIP
Estimated Maximum Elevation	EME
F	
Fan Marker	FM
Federal Aviation Administration	FAA
Federal Geographic Data Committee	FGDC
Flagpole	FLGPL
Flight Service Station	FSS

WORD/ PHRASE	CONTRACTION
G	
Geographic Information System	GIS
Geographic Markup Language	GML
Glide Slope	GS
Global Positioning System	GPS
Ground	GRD
Ground Control Approach	GCA
H	
Hangar	HGR
Height Above Airport	HAA
Height Above Runway	HAR
Height Above Touchdown	HAT
Heliport Reference Point	HRP
Horizontal	HORZ
Horizontal Survey Point	HSP
I	
Inner Marker	IM
Inoperative	INOP
International Civil Aviation Organization	ICAO
International Organization for Standards	ISO
Instrument Flight Rules	IFR
Instrument Landing System	ILS
Instrument Meteorological Conditions	IMC
International Civil Aviation Organization	ICAO
International Earth Rotation Service Terrestrial Reference Frame	ITRF
Intersection	INTXN
L	
Lead In Lighting System	LDIN
Light	LT
Lighted	LTD
Localizer	LOC
Localizer Type Directional Aid	LDA
Locator Middle Marker	LMM
Locator Outer Marker	LOM

WORD/ PHRASE	CONTRACTION
M	
Magnetic Variation	VAR
Mean Sea Level	MSL
Microwave	MCWV
Microwave Landing System	MLS
Microwave Landing System Azimuth Guidance	MLSAZ
Microwave Landing System Elevation Guidance	MLSEL
Middle Marker	MM
Monument	MON
N	
National Airspace System	NAS
National Flight Data Center	NFDC
National Flight Data Digest	NFDD
National Geodetic Survey	NGS
National Geodetic Vertical Datum of 1929	NGVD 29
National Geospatial Intelligence Agency	NGA
National Oceanic and Atmospheric Administration	NOAA
National Ocean Service	NOS
National Spatial Reference System	NSRS
Nautical Mile	NM
Navigational Aid	NAVAID
Nondirectional Radio Beacon	NDB
North American Datum of 1927	NAD 27
North American Datum of 1983	NAD 83
North American Vertical Datum of 1988	NAVD 88
Not Commissioned	NCM
Not to Exceed	NTE
Notice to Airmen	NOTAM
O	
Observation	OBS
Obstruction	OBST
Obstruction Identification Surface	OIS
Obstruction Lighted	OL
Obstruction Light On	OL ON
Omnidirectional Approach Light System	ODALS
Orthometric	ORTHO
Out Of Service	OTS
Outer Marker	OM

WORD/ PHRASE	**CONTRACTION**
P	
Point of Contact	POC
Permanent Survey Mark	PSM
Precision Approach Path Indicator	PAPI
Precision Approach Radar	PAR
Primary Airport Control Station	PACS
Pulsating Visual Approach Slope Indicator	PVASI
R	
Railroad	RR
Radio Technical Commission for Aeronautics	RTCA
Reflector	RFLTR
Relocated	RELCTD
Remote Communications Outlet	RCO
Remote Transmitter/Receiver	RTR
Road	RD
Road (Non-interstate)	RD (N)
Road (Interstate)	RD (I)
Runway	RWY
Runway Alignment Indicator Lights	RAIL
Runway End Identifier Lights	REIL
Runway Visual Range	RVR
S	
Secondary Airport Control Station	SACS
Sensitive Security Information	SSI
Simplified Directional Facility	SDF
Spatial Data Standards for Facilities, Infrastructure and Environment	SDSFIE
Specially Prepared Hard Surface	SPHS
Stack	STK
Standard Instrument Departure	SID
Standard Terminal Arrival	STAR
Standpipe	SPIPE
Stopway	STWY

WORD/ PHRASE	CONTRACTION
T	
Tactical Air Navigation Aid	TACAN
Tank	TK
Taxiway	TWY
Temporary	TMPRY
Threshold	THLD
Take-off Distance Available	TODA
Take-off Run Available	TORA
Touchdown Reflector	TDR
Touchdown Zone	TDZ
Touchdown Zone	Elevation TDZE
Tower	TWR
Transmissometer	TMOM
Transmission Tower	TRMSN TWR
Tri-color Visual Approach Slope Indicator	TRCV
U	
Under Construction	UNC
United States Geological Survey	USGS
Until Further Notice	UFN
V	
Vertical	VERT
Vertical Survey Point	VSP
Very High Frequency Omnidirectional Range	VOR
Visual Approach Slope Indicator	VASI
Visual Flight Rules	VFR
Visual Meteorological Conditions	VMC
VOR/Tactical Air Navigation	VORTAC
W	
Wide Area Augmentation System	WAAS
Wind Direction Indicator	WDI
Wind Tee	WTEE
Wind Tetrahedron	WTET
Windsock	WSK
World Geodetic System of 1984	WGS 84
Z	
Z Marker	ZM

CONTRACTION	WORD/ PHRASE
A	
ABND	Abandoned
AC	Advisory Circular
ACFT	Aircraft
ADCAT	Aeronautical Data Collection and Analysis Tool
ADO	Airport District Office
A/E/C	Architecture/Engineering/Construction
AFD	Airport Facility Directory
AFSS	Automated Flight Service Station
AG	Agricultural
A-GEAR	Arresting Gear
AGL	Above Ground Level
AIA	American Institute of Architects
AIS	Aeronautical Information Service
AIXM	Aeronautical Information Exchange Model
ALP	Airport Location Point
ALS	Approach Light System
AMOM	Anemometer
ANA	Area Navigation Approach
ANSI	American National Standards Institute
ANT	Antenna
AOC	Airport Obstruction Chart
APBN	Airport Beacon
APCH	Approach
APP LT	Approach Light
ARP	Airport Reference Point
ARPT	Airport
ARSR	Air Route Surveillance Radar
ASDA	Accelerate-Stop Distance Available
ASDE	Airport Surface Detection Equipment
ASOS	Automated Surface Observing System
ASR	Airport Surveillance Radar
ASTM	American Society for Testing and Materials
ATCT	Airport Traffic Control Tower
AWOS	Automatic Weather Observing/Reporting System
AWYBN	Airway Beacon

CONTRACTION	WORD/ PHRASE
B	
BCM	Back Course Marker
BLDG	Building
BRDG	Bridge
C	
CADD	Computer Aided Drafting and Design
C/L	Centerline
CHY	Chimney
CLOM	Ceilometer
CLSD	Closed
CONST	Construction
CORS	Continuously Operating Reference Station
CTAF	Common Traffic Advisory Frequency
D	
DCLN	Distance to Centerline
DEND	Distance to Runway End
DF	Direction Finder
DGN	Microstation Design File
DME	Distance Measuring Equipment
DoD	Department of Defense (U.S.)
DOT	Department of Transportation (U.S.)
DTHLD	Displaced Threshold
DTHR	Distance to Threshold
DWG	AutoDesk or AutoCAD Drawing File
E	
EL	Elevation
ELEC	Electrical
ELEV	Elevation
ELLIP	Ellipsoid
EME	Estimated Maximum Elevation
EOD	Engine Out Departure
EQUIP	Equipment
F	
FAA	Federal Aviation Administration
FGDC	Federal Geographic Data Committee
FLGPL	Flagpole
FM	Fan Marker
FSS	Flight Service Station

CONTRACTION	WORD/ PHRASE
G	
GCA	Ground Control Approach
GIS	Geographic Information System
GML	Geographic Markup Language
GPS	Global Positioning System
GRD	Ground
GS	Glide Slope
H	
HAA	Height Above Airport
HAR	Height Above Runway
HAT	Height Above Touchdown
HGR	Hangar
HORZ	Horizontal
HRP	Heliport Reference Point
HSP	Horizontal Survey Point
I	
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
ILS	Instrument Landing System
IM	Inner Marker
IMC	Instrument Meteorological Conditions
INOP	Inoperative
INTXN	Intersection
ISO	International Standards Organization
ITRF	International Earth Rotation Service Terrestrial Reference Frame
L	
LDIN	Lead In Lighting System
LT	Light
LDA	Localizer Type Directional Aid
LMM	Locator Middle Marker
LOC	Localizer
LOM	Locator Outer Marker
LTD	Lighted

CONTRACTION	WORD/ PHRASE
M	
MCWV	Microwave
MLS	Microwave Landing System
MLSAZ	Microwave Landing System Azimuth Guidance
MLSEL	Microwave Landing System Elevation Guidance
MM	Middle Marker
MON	Monument
MSL	Mean Sea Level
N	
NAD 27	North American Datum of 1927
NAD 83	North American Datum of 1983
NAVD 88	North American Vertical Datum of 1988
NAVAID	Navigational Aid
NCM	Not Commissioned
NDB	Nondirectional Radio Beacon
NFDC	National Flight Data Center
NFDD	National Flight Data Digest
NGA	National Geospatial Intelligence Agency
NGS	National Geodetic Survey
NGVD 29	National Geodetic Vertical Datum of 1929
NM	Nautical Mile
NOAA	National Oceanic and Atmospheric Administration
NOS	National Ocean Service
NOTAM	Notice to Airmen
NSRS	National Spatial Reference System
NTE	Not to Exceed
O	
OBS	Observation
OBST	Obstruction
ODALS	Omnidirectional Approach Light System
OIS	Obstruction Identification Surface
OL	Obstruction Lighted
OL ON	Obstruction Light On
OM	Outer Marker
ORTHO	Orthometric
OTS	Out Of Service

CONTRACTION	WORD/ PHRASE
P	
PACS	Primary Airport Control Station
PAPI	Precision Approach Path Indicator
PAR	Precision Approach Radar
POC	Point of Contact
PSM	Permanent Survey Mark
PVASI	Pulsating Visual Approach Slope Indicator
R	
RAIL	Runway Alignment Indicator Lights
RCO	Remote Communications Outlet
RD	Road
REIL	Runway End Identifier Lights
RELCTD	Relocated
RFLTR	Reflector
RD (I)	Road (Interstate)
RD (N)	Road (Non-interstate)
RR	Railroad
RTCA	Radio Technical Commission for Aeronautics
RTR	Remote Transmitter/Receiver
RVR	Runway Visual Range
RWY	Runway
S	
SACS	Secondary Airport Control Station
SDF	Simplified Directional Facility
SDSFIE	Spatial Data Standards for Facilities, Infrastructure and Environment
SID	Standard Instrument Departure
SPHS	Specially Prepared Hard Surface
SPIPE	Standpipe
SSI	Sensitive Security Information
STAR	Standard Terminal Arrival
STK	Stack
STWY	Stopway

CONTRACTION	WORD/ PHRASE
T	
TACAN	Tactical Air Navigation Aid
TDR	Touchdown Reflector
TDZ	Touchdown Zone
TDZE	Touchdown Zone Elevation
THLD	Threshold
TK	Tank
TMOM	Transmissometer
TMPRY	Temporary
TODA	Take-off Distance Available
TORA	Take-off Run Available
TRCV	Tri-color Visual Approach Slope Indicator
TRMSN TWR	Transmission Tower
TWR	Tower
TWY	Taxiway
U	
UFN	Until Further Notice
UNC	Under Construction
USGS	United States Geological Survey
V	
VAR	Magnetic Variation
VASI	Visual Approach Slope Indicator
VERT	Vertical
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions
VOR	Very High Frequency Omnidirectional
Range	
VORTAC	VOR/Tactical Air Navigation
VSP	Vertical Survey Point
W	
WAAS	Wide Area Augmentation System
WDI	Wind Direction Indicator
WGS 84	World Geodetic System of 1984
WSK	Windsock
WTEE	Wind Tee
WTET	Wind Tetrahedron
Z	
ZM	Z Marker

Appendix 2 – Aeronautical Survey Guidance and Specifications

Section 2-1: Airport Reference Point Computation

Compute the Airport Reference Point (ARP) using the centerline end positions of all usable runways based on the ultimate configuration of the airport. However, since runways without specially prepared hard surfaces are most 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)”.

The Airport Reference Point (ARP) is the approximate geometric center of all usable runways based on the ultimate configuration for the airport. The ARP position computation is somewhat similar to a center of mass computation, except that only two dimensions are considered. The following section identifies how to compute the ARP.

ARP Computation Methodology

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.

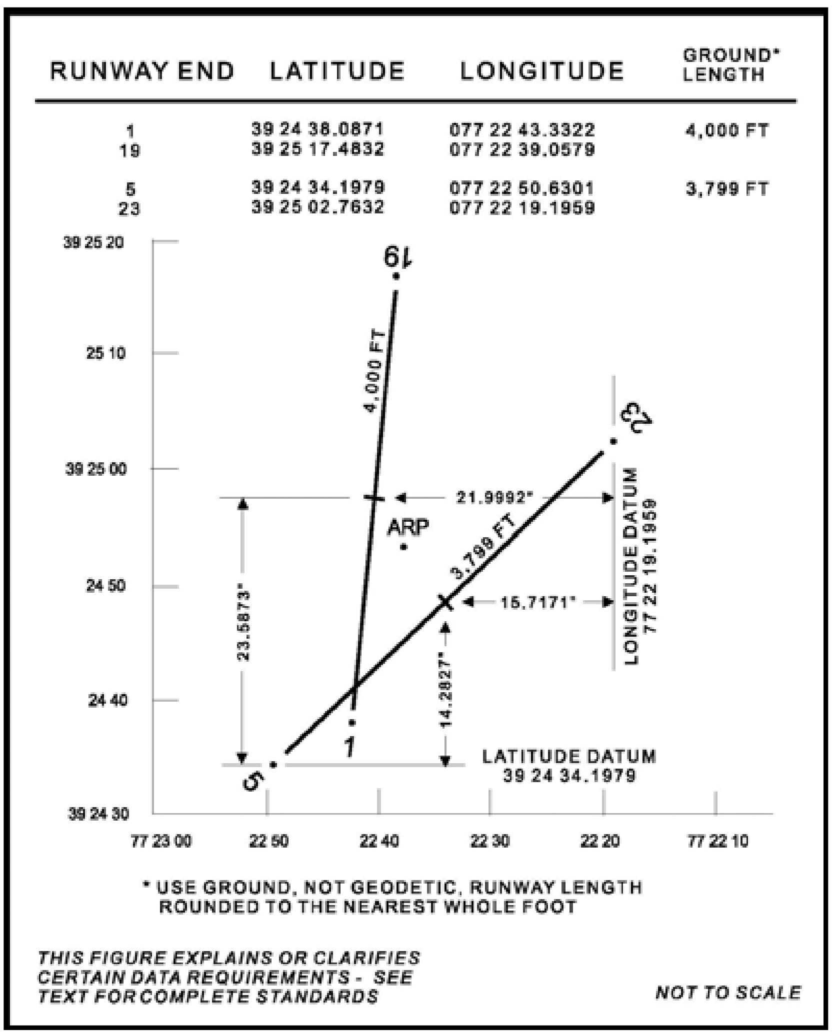
*** The approximate Runway Center Point is the mean of the Latitudes and Longitudes of a Runway’s Ends. This convention eliminates the need for complex geodetic formulas to compute the precise Runway Center Point, thus allowing simple and consistent ARP computations after only brief instructions.**

A Sample ARP Computation follows (See Figure 2.1 of this appendix):
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

APPENDIX 2 FIGURE 2.1
AIRPORT REFERENCE POINT COMPUTATION



Section 2-2: Suggested Data Collection Forms

FORM NAME	Blank	Page	Example	Page
FACILITIES ABSTRACT	Y		Y	
FACILITIES ABSTRACT (Continuation Sheet)	Y		N	
AIRPORT FIELD SURVEY CHECK LIST (General)	Y		Y	
AOC CHECKLIST	Y		Y	
ANA CHECKLIST	Y		Y	
RUNWAY DATA SHEET	Y		Y	
FIELD SURVEY SKETCH	Y		N	
KINEMATIC GPS OBSERVATION LOG	Y		Y	

(For the GPS log for static observations, see http://www.ngs.noaa.gov/PROJECTS/GPSmanual/data.htm#obslog, click on A-4. Observation Log: “Blank Form” or “Sample Entries”.

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION **FACILITIES ABSTRACT** AERONAUTICAL SURVEY PROGRAM		PAGE OF PAGES O.C. NUMBER
AIRPORT NAME	CITY	STATE
CHIEF OF PARTY	PARTY NUMBER	DATE

INSTRUCTIONS
Under Facility, indicate specific runway served or facility identifier, whichever is applicable

FACILITY	FACILITY INDICATED ON	HORIZONTAL FILE	VERTICAL FILE	REMARKS
1. ATCT				
2. APBN				
3. GS				
4. LOC				
5. DME				
6. IM				
7. MM--LMM				
8. OM--LOM				
9. NDB				
10. VOR/DME				
11. VORTAC - TACAN				
12. ASR - ARSR				
13. APP LTS				
14. REIL				
15. VASI - PAPI - (Other)				
16. Other (Specify)				

U. S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

FACILITIES ABSTRACT
CONTINUATION SHEET
AERONAUTICAL SURVEY PROGRAM

PAGE OF

O.C. NUMBER

AIRPORT NAME	CITY	STATE

INSTRUCTIONS
Under Facility, indicate specific runway served or facility identifier, whichever is applicable

FACILITY	FACILITY LOCATED ON	HORIZONTAL FILE	VERTICAL FILE	REMARKS
1. GS				
2. LOC				
3. DME				
4. IM				
5. MM-LMM				
6. OM-LOM				
7 APP LTS				
8. REIL				
9. VASI-PAPI-(Other)				
10. Other (Specify)				
1. GS				
2. LOC				
3. DME				
4. IM				
5. MM-LMM				
6. OM-LOM				
7 APP LTS				
8. REIL				
9. VASI-PAPI-(Other)				
10. Other (Specify)				

NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION **Airport Field Survey Check List** NATIONAL GEODETIC SURVEY		OC NUMBER
AIRPORT NAME	CITY	STATE
PARTY CHIEF	START DATE	END DATE

Check each item. Place an "X" or "NA" (not applicable) after each item to designate all requirements have been met.
Place an "*" after any item requiring more explanation and explain in field report.

Data Collection Printout	1. All field observation printouts checked for correct input and all manual input checked	
	2. All notes properly cross referenced and all rejected values noted	
	3. Positions computed for observed objects	
	4. Azimuth checks within acceptable allowance	
	5. Sketch for observations **(if needed)**	
	6. Field forms edited **(if needed)**	
GPS Control	7. GPS observation times correct for type of observation (position = 15 min & vertical = 30 min)	
	8. GPS log sheets properly filled out	
	9. GPSurvey computations meet all requirements and have been checked for correct input and output	
	10. 3-D Inverses computed for PACS to SACS check and for runway lenths	
Leveling	11. All third-order control level printouts checked for correct input and closure for length of line	
	12. ATCT cab floor elevation determined **(if necessary)**	
	13. Master GPN file edited for correct base elevations	
NAVAIDs	14. Positions computed for facilities located by conventional methods	
	15. Facilities directly observed by GPS methods entered into Master GPN List	
Obstructions	16. Elevations determined for all traverse ways **(if necessary)** and vehicle height allowance added	
	17. All 200 ft AGL obstructions have base elevations field determined or noted to be determined by	
	18. Obstruction lighted objects noted	
	19. Obstructing pole lines and fence lines inked on the photos. Catenary computed if obstructing	
	20. Baseline observations tied to local control, sketches submitted, and computations check for adequate	
	21. Items on field plot sheet properly annotated	
	22. Mobile crane working limits delineated on photo	
Miscellaneous	23. Field report proof read and checked for content concerning non-standard items mentioned in project	
	24. All sketches have north arrows	
	25. New runway ends and displaced thresholds sketched	
	26. Taxiway and ramp delineation inked on photo and new areas & hangars sketched with dimensions	
	27. Photoidentified control points sketched and inked on photo	
	28. Final master GPN printouts annotated and cross-referenced where needed	

AOC OBSTRUCTION CHECKLIST

Revised Version: 09/04/2002

AIRPORT______________________________________ OC/AL#_____ RWY ____/___

CITY____ STATE_____ DATE _______

Complete a checklist for each runway; complete Item #5 for the Low-numbered End only. Write the obstruction number in the blank for each entry; if you have investigated thoroughly and there are no qualifying obstructions or objects, write "NONE" in the blank. For the purposes of this document, "obstruction" shall mean an item that *penetrates* the Obstruction Identification Surface, "object" shall mean an item that does not *necessarily* penetrate the OIS. Use "NA" for "Not Applicable".

"L" (LEFT) OR "R" (RIGHT) is relative to an observer facing forward in a landing aircraft. Refer to FAA405 Section 6.4 for clarification of requirements.

		Low-numbered End _____	High-numbered End_____
1. Highest object in the first 2000 ft. of approach		_____	_____
2. Most penetrating obstruction in the first	2,000 ft. of approach	_____	_____
3. Highest obstruction in the first	10,000 ft. of approach	_____	_____
	20,000 ft. of approach	_____	_____
	30,000 ft. of approach	_____	_____
	40,000 ft. of approach	_____	_____
	entire approach	_____	_____
4. Highest obstruction in primary outward from the runway end		_____	_____

		L	R
5. Highest obstruction in each 3000 ft. section of primary along each side of each runway	0 - 3,000	_____	_____
	3,000 - 6,000	_____	_____
	6,000 - 9,000	_____	_____
	9,000 - 12,000	_____	_____
Highest non-manmade obstruction in each 3000 ft. section of primary along each side of each runway	0 - 3,000	_____	_____
	3,000 - 6,000	_____	_____
	6,000 - 9,000	_____	_____
	9,000 -12,000	_____	_____
Highest obstruction in each 3000 ft. section of transition from primary to Horizontal	0 - 3,000	_____	_____
	3,000 - 6,000	_____	_____
	6,000 - 9,000	_____	_____
	9,000 -12,000	_____	_____

	L	R	L	R
6. Highest obstruction in each transition from approach to Horizontal	_____	_____	_____	_____
7. Highest obstruction in each approach transition in the first 20,000 ft. beyond the Horizontal	_____	_____	_____	_____
8. Highest obstruction in each approach transition beyond the Horizontal	_____	_____	_____	_____

9. Highest obstruction in either the Horizontal or Conical area in each quadrant (centered on ARP position).	_____ (NE)	_____ (SE)	_____ (SW)	_____ (NW)

IMPORTANT NOTES:

Obstruction representation within each obstructing area must include the highest obstruction in the area and the highest obstruction within that portion of the area that penetrates an approach or primary surface.

Remember to check for any ***200 AGL OBSTRUCTIONS***, any ***MOBILE OBSTRUCTIONS*** and any ***VESSELS.***

ANA OBSTRUCTION CHECKLIST

Revised Version: 11/03/2000

(Based on FAA Publication 405, including the April 1998 changes)

AIRPORT____________________ OC/AL #______ RWY APP________

CITY ____________________ STATE______ DATE__________

Write the obstruction number in the blank for each entry; if you have investigated thoroughly and there are no qualifying obstructions or objects, write "NONE" in the blank. For the purposes of this document, "obstruction" shall mean an item that *penetrates* the OIS, "object" shall mean an item that does not *necessarily* penetrate the OIS."L" (LEFT) OR "R" (RIGHT) is relative to an observer facing forward in a landing aircraft.

APPROACH AND TRANSITIONS:

	APP	LEFT TRANS	RIGHT TRANS
1) Two most penetrating ***OBSTRUCTIONS*** in the first 2566 ft.	#1 ________ #2 ________		
2) Most penetrating ***MAN-MADE OBSTRUCTION*** in the first 2566 ft.	________		
3) Two highest ***OBJECTS*** in first 2566 ft. (These must be higher than threshold.)	#1 ________ #2 ________		
4) Two highest ***OBSTRUCTIONS*** in first 2566 ft.		#1 ________ #2 ________	#1 ________ #2 ________
5) The highest **OBSTRUCTION** between 2566 ft. and 10,000 ft.	________		
6) The highest ***OBSTRUCTION*** in the first 10,000 ft.		________	________
7) 20,000 ft.	________	________	________
8) 30,000 ft	________	________	________
9) 40,000 ft	________	________	________
10) The highest ***OBSTRUCTION*** in the approach or transition area	________	________	________

PRIMARY:

11) The highest ***OBSTRUCTION*** on the approach side of the threshold ________________

12) If approach is CAT II or CAT III, the highest ***OBSTRUCTION*** each side of C/L in the primary between thresholds ________________

MISSED APPROACH:

	LEFT	RIGHT
13) The highest ***OBSTRUCTION*** each side of runway C/L or C/L extended	____________	____________
14) The most penetrating ***OBSTRUCTION*** each side of runway C/L or C/L extended	____________	____________

NOTE: Remember to check for any ***200 AGL OBSTRUCTIONS***, any ***MOBILE OBSTRUCTIONS***, and any ***VESSELS.***

U.S. DEPARTMENT OF COMMERCE

Revised Version : 1/23/2001

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

RUNWAY DATA SHEET

AIRPORT OBSTRUCTION CHART PROGRAM

O.C. NUMBER	DATE

AIRPORT NAME			NAME AND TITLE OF PERSON INTERVIEWED
			MAILING ADDRESS
CITY	STATE	OFFICE PHONE	

ALL DIMENSIONS SHALL BE SHOWN TO NEAREST FOOT
(if any dimension has changed, show both the published and re-surveyed dimension)

RUNWAY	WIDTH		LENGTH		DISPLACED LENGTH		STOPWAY LENGTH		BLAST PAD LENGTH	
	PUB	SURV	PUB	SURV	PUB	SURV	PUB	SURV	PUB	SURV

CHIEF OF PARTY	PARTY NUMBER

<table>
<tr><td rowspan="2" colspan="2">U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATOMOSPHERIC ADMINIST
NATIONAL GEODETIC SURVEY</td><td>FILE/NUMBER</td><td>OC</td><td>PAGE OF</td></tr>
<tr><td colspan="2">PHOTO NUMBER</td><td>DATE</td></tr>
<tr><td>FIELD SURVEY SKETCH</td><td colspan="3">AIRPORT NAME</td><td>STATE</td></tr>
<tr><td colspan="5">SUBJECT</td></tr>
</table>

REVISION DATE: NOVEMBER 7, 2000
Last Modified
11/02/2000

KINEMATIC OBSERVATION LOG

Operator Name:	UTC Date:	Day of Year:	Airport ID:
Airport Name / Location: State:			Observation Agency:
Project Name:		Task Number:	Project Number:
GPS Receiver: Manufacturer: Model: P/N#: S/N#	GPS Antenna: Manufacturer: Model: P/N#: S/N#	Tripod Type: Manufacturer. Model. Cable Length. ___________ M	Recording Interval: Sec PAC Station (4-Char ID)

STOP AND GO DATA

	File Name: Start Time:	File Name: Start Time:

4-Char ID: (Point ID)	Station Name:	Recorded Epochs: Stop & Go # 1		Recorded Epochs: Stop & Go # 2		Antenna Heights (meters) Note Changes

PROFILE DATA

File Name:	Antenna Height (M)	Initialization Point	Initialization Location: Runway (R), Other (Explain)

REMARKS: Measurements required at beginning of each profile run. Note changes as needed.
Antenna constants are 22020-00 & 33429.00 = 0.0625 14532-00 = 0.069

Use separate form for each day.

Pole height (- tip) ________ + Wheel height ________ + Antenna const ________ = Antenna height ________

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

PAGE 1 OF 1 PAGES

FACILITIES ABSTRACT

AERONAUTICAL SURVEY PROGRAM

O.C. NUMBER: 5081

AIRPORT NAME	CITY	STATE
SIERRA VISTA MUNICIPAL AIRPORT- LIBBY AAF	SIERRA VISTA	AZ
CHIEF OF PARTY	**PARTY NUMBER**	**DATE**
D. L. ADAMS	80	14 JUNE 2000

INSTRUCTIONS

Under Facility, indicate specific runway served of facility identifier, whichever is applicable

FACILITY		FACILITY INDICATED ON	HORIZONTAL FILE	VERTICAL FILE	REMARKS
1. ATCT		OC-5081			POSITION VERIFIED BY PT NEW TOP ELEVATON
2. APBN		OC-5081			VERIFIED BY PT
3. GS	26	OC-5081			VERIFIED BY PT POS. & BASE ELEV UPDATED
4. LOC	26	OC-5081			VERIFIED BY PT POS. & BASE ELEV UPDATED
5. DME					N/A
6. IM					N/A
7. MM--LMM					N/A
8. OM--LOM					N/A
9. NDB	DAO	OC-5081			NEW THIS SURVEY
10. VOR	FHU	OC-5081			VERIFIED BY PT POSITION UPDATED
11. TACAN	ARH	OC-5081			VERIFIED BY PT POSITION UPDATED
12. ASR	FHU	OC-5081			VERIFIED BY PT POSITION UPDATED
13. APP LTS					N/A
14. REIL	12		HV 5		NEW THIS SURVEY
15. VASI - PAPI - (Other)	12 & 30	RATIO 0962			NEW THIS SURVEY PHOTO IDENTIFIED
16. Other (Specify)					
REIL	26	RATIO 0962			NEW THIS SURVEY PHOTO IDENTIFIED
VASI	8	OC-5081			VERIFIED BY PT
VASI	26	RATIO 0962			NEW THIS SURVEY PHOTO IDENTIFIED

NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION **Airport Field Survey Check List** NATIONAL GEODETIC SURVEY		OC NUMBER 6807
AIRPORT NAME NAMPA MUNICIPAL AIRPORT	CITY NAMPA	STATE ID
PARTY CHIEF JIM HARRINGTON	START DATE JULY 15 1997	END DATE JULY 21 1997

Check each item. Place an "X" or "NA" (not applicable) after each item to designate all requirements have been met.
Place an "*" after any item requiring more explanation and explain in field report.

Data Collection Printout	1. All field observation printouts checked for correct input and all manual input checked	X
	2. All notes properly cross referenced and all rejected values noted	X
	3. Positions computed for observed objects	X
	4. Azimuth checks within acceptable allowance	X
	5. Sketch for observations **(if needed)**	X
	6. Field forms edited **(if needed)**	X
GPS Control	7. GPS observation times correct for type of observation (position = 15 min & vertical = 30 min)	X
	8. GPS log sheets properly filled out	X
	9. GPSurvey computations meet all requirements and have been checked for correct input and output	X
	10. 3-D Inverses computed for PACS to SACS check and for runway lenths	X
Leveling	11. All third-order control level printouts checked for correct input and closure for length of line	X
	12. ATCT cab floor elevation determined **(if necessary)**	X
	13. Master GPN file edited for correct base elevations	X
NAVAIDs	14. Positions computed for facilities located by conventional methods	X
	15. Facilities directly observed by GPS methods entered into Master GPN List	X
Obstructions	16. Elevations determined for all traverse ways **(if necessary)** and vehicle height allowance added	X
	17. All 200 ft AGL obstructions have base elevations field determined or noted to be determined by	NA
	18. Obstruction lighted objects noted	X
	19. Obstructing pole lines and fence lines inked on the photos. Catenary computed if obstructing	X
	20. Baseline observations tied to local control, sketches submitted, and computations check for adequate	X
	21. Items on field plot sheet properly annotated	X
	22. Mobile crane working limits delineated on photo	X
Miscellaneous	23. Field report proof read and checked for content concerning non-standard items mentioned in project	X
	24. All sketches have north arrows	X
	25. New runway ends and displaced thresholds sketched	X
	26. Taxiway and ramp delineation inked on photo and new areas & hangars sketched with dimensions	X
	27. Photoidentified control points sketched and inked on photo	X
	28. Final master GPN printouts annotated and cross-referenced where needed	X

AOC OBSTRUCTION CHECKLIST

Revised Version: 09/04/2002

AIRPORT Fort Wayne International Airport OC/AL# 156 RWY 5 / 23

CITY Fort Wayne STATE IN DATE 07/13/2002

Complete a checklist for each runway; complete Item #5 for the Low-numbered End only. Write the obstruction number in the blank for each entry; if you have investigated thoroughly and there are no qualifying obstructions or objects, write "NONE" in the blank. For the purposes of this document, "obstruction" shall mean an item that *penetrates* the Obstruction Identification Surface, "object" shall mean an item that does not *necessarily* penetrate the OIS. Use "NA" for "Not Applicable".

"L" (LEFT) OR "R" (RIGHT) is relative to an observer facing forward in a landing aircraft. Refer to FAA405 Section 6.4 for clarification of requirements.

		Low-numbered End 5	High-numbered End 23
1. Highest object in the first 2000 ft. of approach		NONE	429
2. Most penetrating obstruction in the first 2,000 ft. of approach		NONE	428
3. Highest obstruction in the first	10,000 ft. of approach	NONE	428
	20,000 ft. of approach	NONE	NA
	30,000 ft. of approach	NONE	NA
	40,000 ft. of approach	NONE	NA
	entire approach	NONE	428
4. Highest obstruction in primary outward from the runway end		NONE	458

		L	R
5. Highest obstruction in each 3000 ft. section of primary along each side of each runway	0 - 3,000	325	NONE
	3,000 - 6,000	NONE	309
	6,000 - 9,000	NONE	399
	9,000 - 12,000	NONE	458
Highest non-manmade obstruction in each 3000 ft. section of primary along each side of each runway	0 - 3,000	NONE	NONE
	3,000 - 6,000	NONE	309
	6,000 - 9,000	NONE	399
	9,000 -12,000	NONE	NONE
Highest obstruction in each 3000 ft. section of transition from primary to Horizontal	0 - 3,000	NONE	374
	3,000 - 6,000	NONE	394
	6,000 - 9,000	NONE	393
	9,000 -12,000	NONE	458

	L	R	L	R
6. Highest obstruction in each transition from approach to Horizontal	NONE	NONE	NONE	NONE
7. Highest obstruction in each approach transition in the first 20,000 ft. beyond the Horizontal	NONE	NONE	NA	NA
8. Highest obstruction in each approach transition beyond the Horizontal	NONE	NONE	NA	NA

	(NE)	(SE)	(SW)	(NW)
9. Highest obstruction in either the Horizontal or Conical area in each quadrant (centered on ARP position).	NONE	NONE	NONE	NONE

IMPORTANT NOTES:

Obstruction representation within each obstructing area must include the highest obstruction in the area and the highest obstruction within that portion of the area that penetrates an approach or primary surface.
Remember to check for any ***200 AGL OBSTRUCTIONS***, any ***MOBILE OBSTRUCTIONS*** and any ***VESSELS.***

ANA OBSTRUCTION CHECKLIST

Revised Version: 11/03/2000

(Based on FAA Publication 405, including the April 1998 changes)

AIRPORT RONALD REAGAN WASHINGTON NATIONAL AIRPORT OC/AL # 443 RWY APP 15

CITY WASHINGTON D.C. STATE D.C. DATE 6/10/1999

Write the obstruction number in the blank for each entry; if you have investigated thoroughly and there are no qualifying obstructions or objects, write "NONE" in the blank. For the purposes of this document, "obstruction" shall mean an item that *penetrates* the OIS, "object" shall mean an item that does not *necessarily* penetrate the OIS."L" (LEFT) OR "R" (RIGHT) is relative to an observer facing forward in a landing aircraft.

APPROACH AND TRANSITIONS:

		APP	LEFT TRANS	RIGHT TRANS
1) Two most penetrating ***OBSTRUCTIONS*** in the first 2566 ft.	#1	#323		
	#2	#460		
2) Most penetrating ***MAN-MADE OBSTRUCTION*** in the first 2566 ft.		#323		
3) Two highest ***OBJECTS*** in first 2566 ft. (These must be higher than threshold.)	#1	#323		
	#2	#463		
4) Two highest ***OBSTRUCTIONS*** in first 2566 ft.			#1 #323	#1 #490
			#2 #486	#2 #384
5) The highest **OBSTRUCTION** between 2566 ft. and 10,000 ft.		#500		
6) The highest ***OBSTRUCTION*** in the first 10,000 ft.			#330	#490
7)	20,000 ft.	#500	#330	#490
8)	30,000 ft	#500	#330	#490
9)	40,000 ft	#500	#330	#490
10) The highest ***OBSTRUCTION*** in the approach or transition area		#500	#330	#490

PRIMARY:

11) The highest ***OBSTRUCTION*** on the approach side of the threshold	#449
12) If approach is CAT II or CAT III, the highest ***OBSTRUCTION*** each side of C/L in the primary between thresholds	NONE

MISSED APPROACH:

	LEFT	RIGHT
13) The highest ***OBSTRUCTION*** each side of runway C/L or C/L extended	#487	#481
14) The most penetrating ***OBSTRUCTION*** each side of runway C/L or C/L extended	#487	#383

NOTE: Remember to check for any ***200 AGL OBSTRUCTIONS***, any ***MOBILE OBSTRUCTIONS***, and any ***VESSELS.***

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Revised Version : 12/1/2000

RUNWAY DATA SHEET

O.C. NUMBER OC-6807	AIRPORT OBSTRUCTION CHART PROGRAM	DATE 21 JULY 1997

AIRPORT NAME NAMPA MUNICIPAL AIPORT			NAME AND TITLE OF PERSON INTERVIEWED Mr. Jo Smith AIRPORT MANAGER
CITY NAMPA	STATE ID	OFFICE PHONE (000) 500-0000	MAILING ADDRESS 001 MUNICIPAL DR NAMPA, IDAHO 83687

ALL DIMENSIONS SHALL BE SHOWN TO NEAREST FOOT
(if any dimension has changed, show both the published and re-surveyed dimension)

RUNWAY	WIDTH		LENGTH		DISPLACED LENGTH		STOPWAY LENGTH		BLAST PAD LENGTH	
	PUB	SURV	PUB	SURV	PUB	SURV	PUB	SURV	PUB	SURV
11	75	75	4050	5000	N/A	N/A	N/A	N/A	N/A	N/A
29					N/A	N/A	N/A	N/A	N/A	N/A

CHIEF OF PARTY	PARTY NUMBER
JIM HARRINGTON	80

Last Modified Nov 6, 2000

KINEMATIC OBSERVATION LOG

Operator Name: JDR	UTC Date: 2001-02-01	Day of Year: 032	Airport ID: TOA
Airport Name / Location: Zamperini Field Airport State: CA			Observation Agency: NGS
Project Name: Zamperini Field Airport		Task Number: RK6C0400	Project Number:
GPS Receiver: Manufacturer: TRIMBLE Model: 4000 SSI P/N: 24840-01 S/N: 3933A26432	GPS Antenna: Manufacturer: TRIMBLE Model: Micro Centered L1/L2 P/N: 33429-00 S/N: 0220172164	Tripod Type: Manufacturer: SECO Model: 5115 Cable Length: 10 M	Recording Interval: 5 Sec PAC Station (4-Char ID): TORA

STOP AND GO DATA

	File Name: SAG3-032-3 Start Time: 1706		File Name: SAG4-032-1 Start Time: 1820		
4-Char ID: (Point ID)	Station Name:	Recorded Epochs Stop & Go #3		Recorded Epochs Stop & Go #4		Antenna Heights (meters) Note Changes

4-Char ID: (Point ID)	Station Name:	Stop & Go #3		Stop & Go #4		Antenna Heights (meters) Note Changes
R29L	TOA CL END RWY 29L	1	60	1	60	2.063
R11R	TOA CL END RWY 11R	2	60	2	60	2.063
TOAB	TOA AP STA B	3	120	3	120	2.063

PROFILE DATA

File Name:	Antenna Height (M)	Initialization Point	Initialization Location: Runway (R), Other (Explain)
P29L-032-1	2.565	INI3	R
P11R-032-1	2.565	INI4	R

REMARKS: Measurements required at beginning of each profile run. Note changes as needed. Antenna constants are 22020-00 & 33429-00 = 0.0625 14532-00 = 0.063 Use separate form for each day.

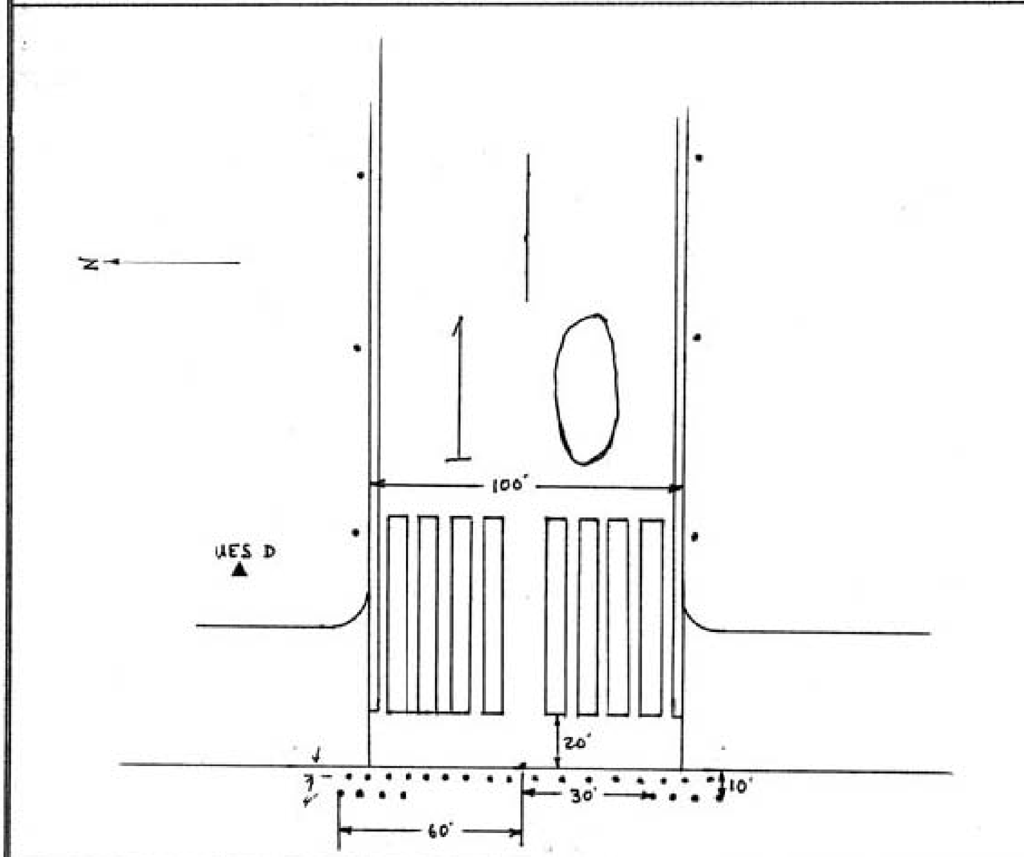
2.000
− .088
1.912

Pole height (- tip) 1.912 + Wheel height 0.590 + Antenna const 0.063 = Antenna height 2.565

Section 2-3: Sample Airport Sketches

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION NATIONAL GEODETIC SURVEY	GPS #: 1423	AIRPORT ID: UES
RUNWAY END SKETCH LOG	OBSERVER: DARREN G. AUG	DATE: 8-9-00

AIRPORT NAME/LOCATION : WAUKESHA COUNTY AIRPORT / CRITES FIELD



RWY END #: 10	REMARKS: PK NAIL & NGS WASHER PLACED AT CENTER OF CONCRETE RUNWAY END

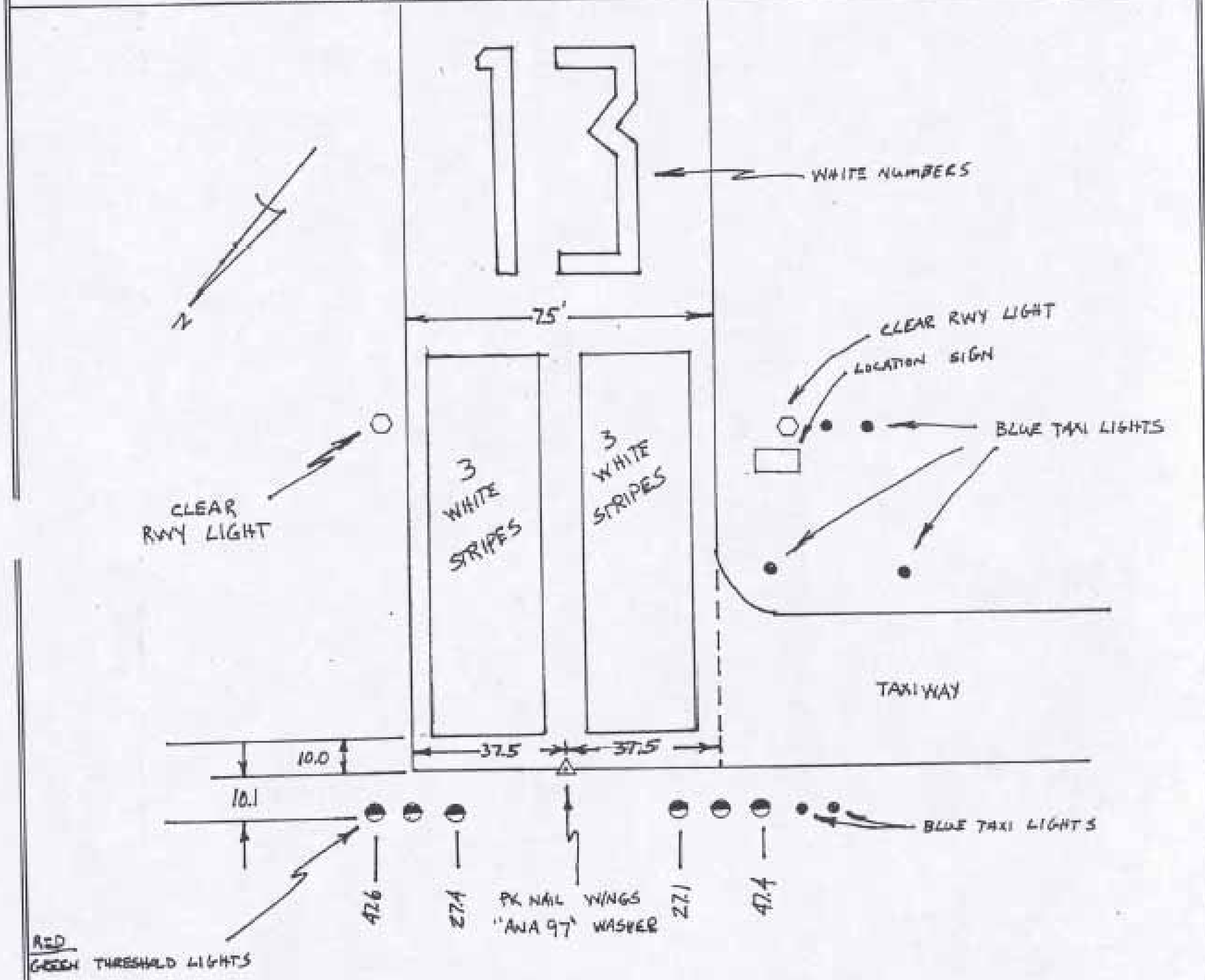
FIRST APP LT OUT 203 FT, NO REILS 8-28-00 comp'd

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL GEODETIC SURVEY

RUNWAY END SKETCH LOG

	GPS #: 1201	AIRPORT ID: EAR
	OBSERVER: SML	DATE: 7-23-97

AIRPORT NAME/LOCATION: KEARNEY MUNICIPAL A/P
KEARNEY, NE.

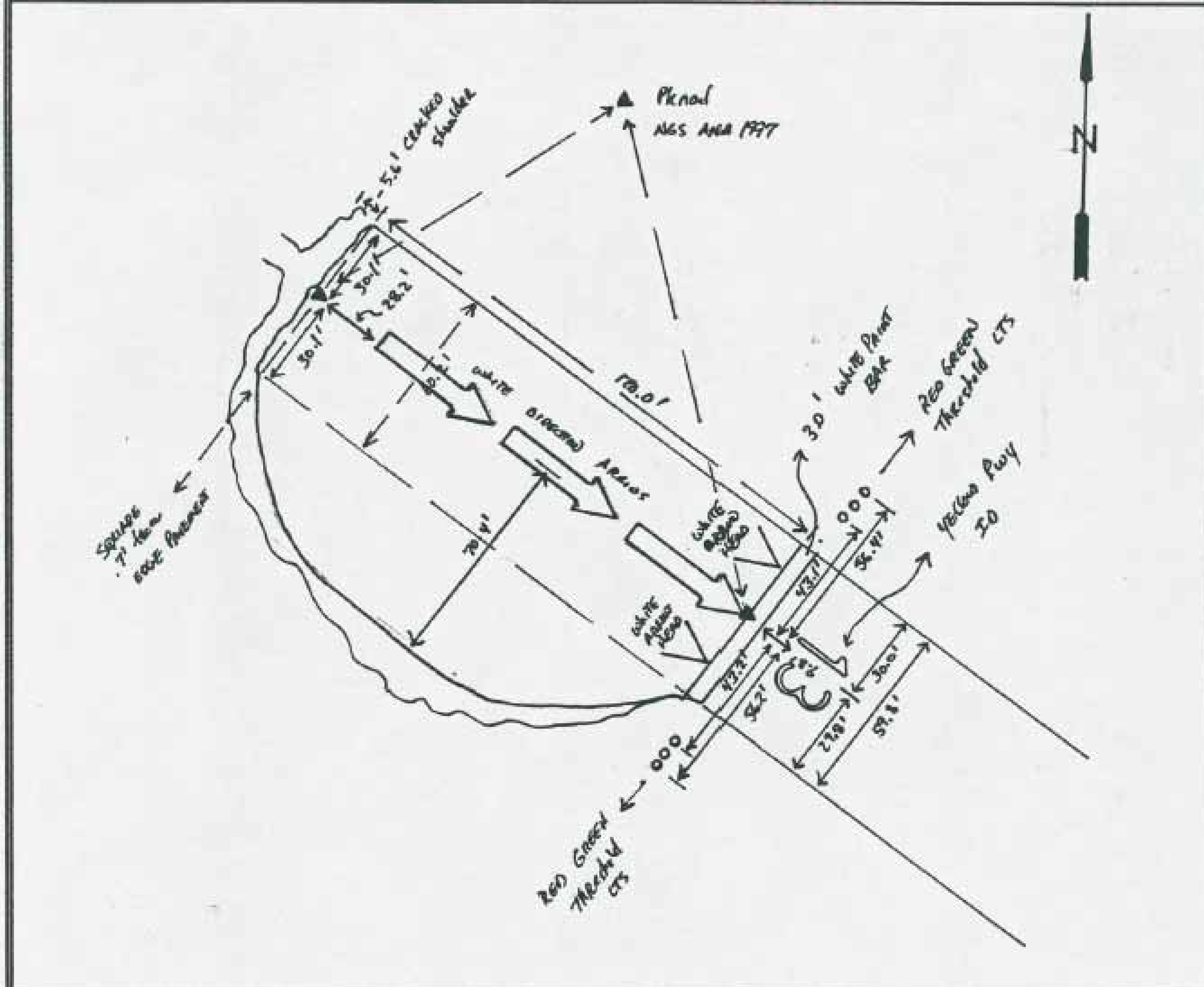


RWY END #: 13

REMARKS: PK NAIL WITH NGS WASHER STAMPED "ANA 97" CEMENTED IN DRILL HOLE IN CONCRETE.

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION NATIONAL GEODETIC SURVEY	GPS #: 1170	AIRPORT ID: T30
RUNWAY END SKETCH LOG	OBSERVER: E. Duvall	DATE: 14 MAR 97

AIRPORT NAME/LOCATION : Frio County Airport / McKinley Field, Pearsall, TX
TASK NUMBER : RK6C0400



RWY END #: 13

REMARKS: Pk nail with NGS washer stamped AAA 1997

Asphalt Condition = Good

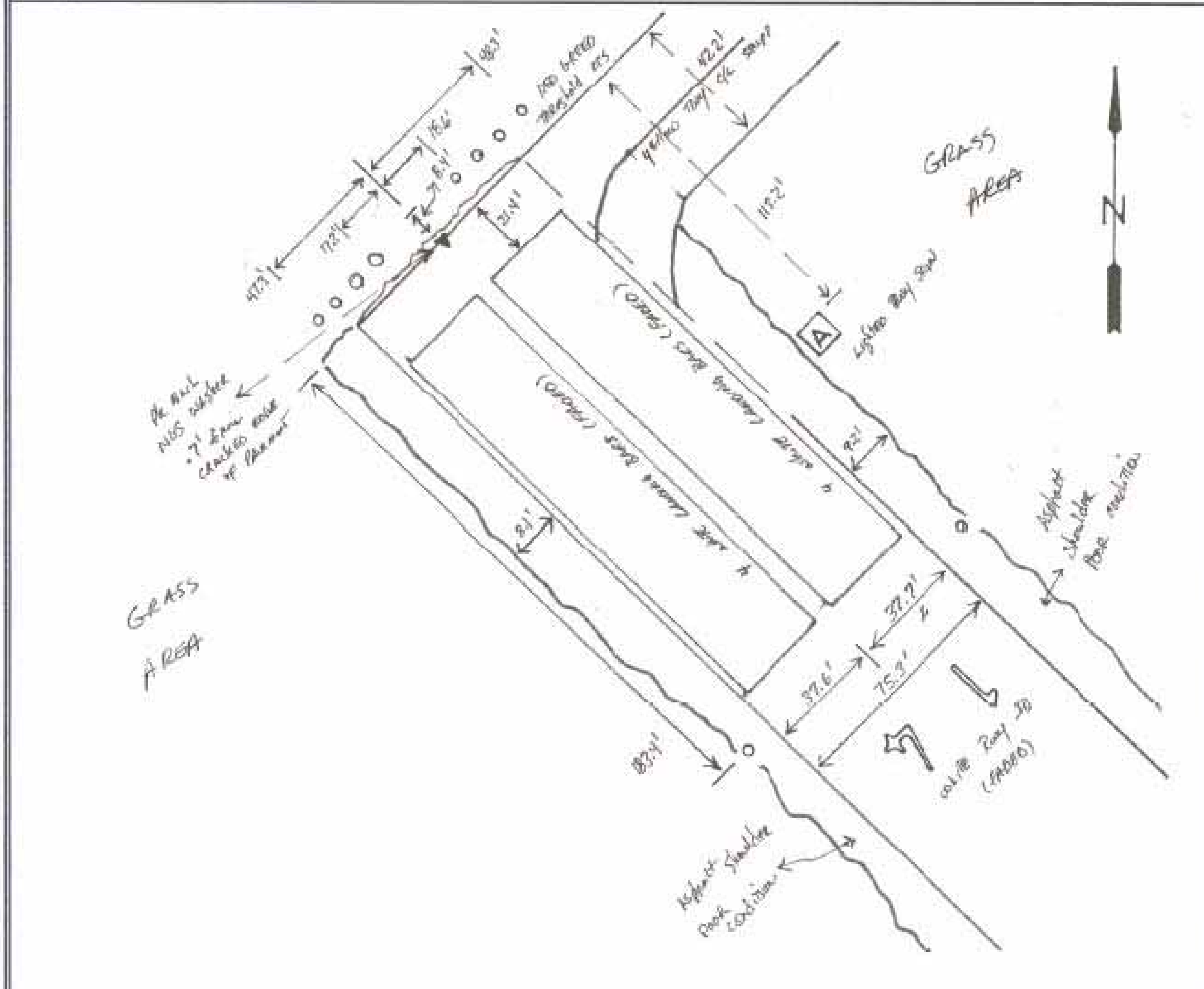
3326' x 60'

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL GEODETIC SURVEY

RUNWAY END SKETCH LOG

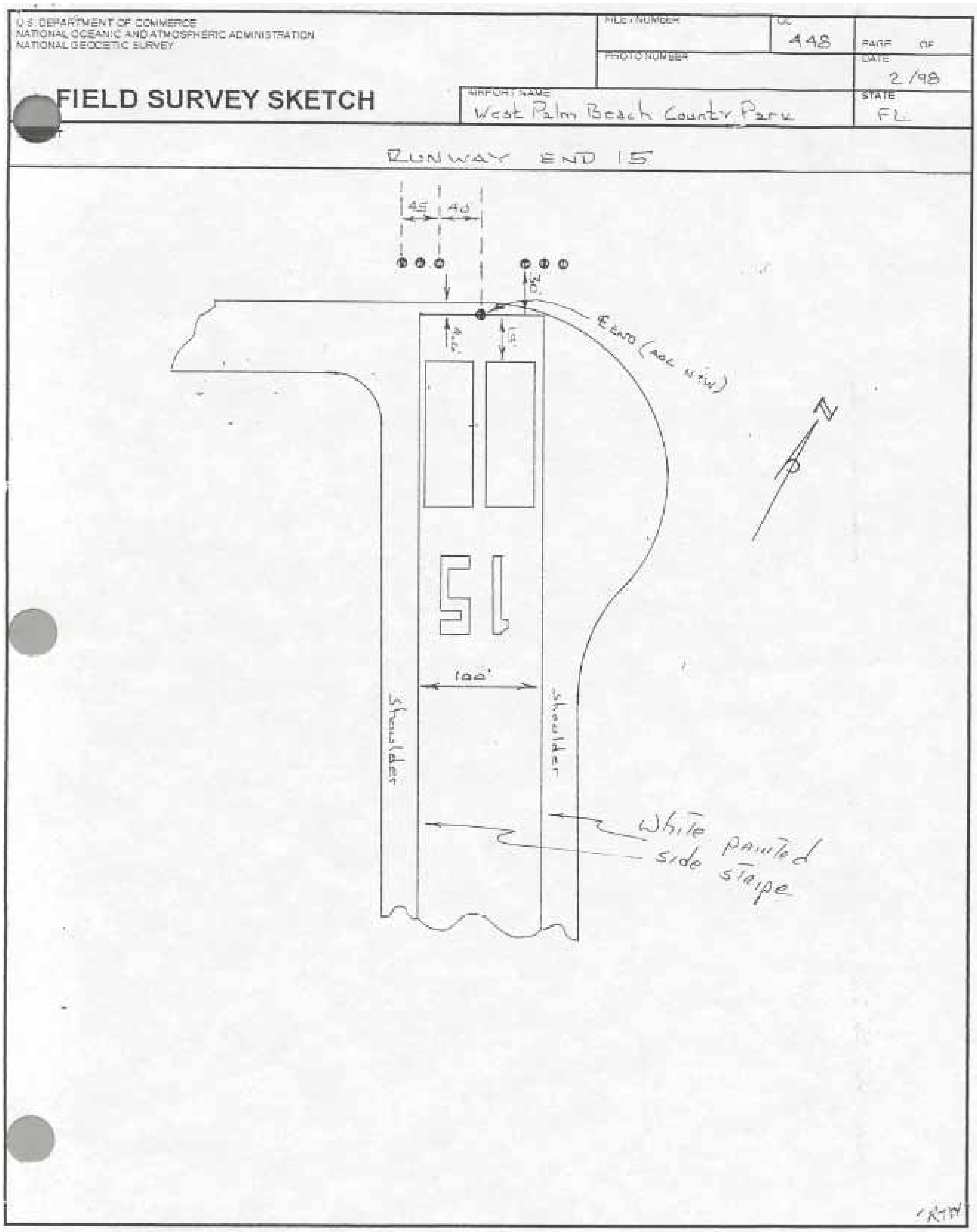
GPS #: 1170	AIRPORT ID: T82	
OBSERVER: E. Duvall	DATE: 14 MAR 97	

AIRPORT NAME/LOCATION: FREDERICKSBURG / GILLESPIE COUNTY AIRPORT, FREDERICKSBURG, TX
TASK NUMBER: RK6C0400



RWY END #: 14

REMARKS:
PK NAIL with NGS WASHER
Asphalt Runway in Fair condition
4600' X 75'



U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL GEODETIC SURVEY

FIELD SURVEY SKETCH

FILE NUMBER	
CC	448
PAGE OF	
PHOTO NUMBER	
DATE	2/98
AIRPORT NAME	West Palm Beach County Park
STATE	FL

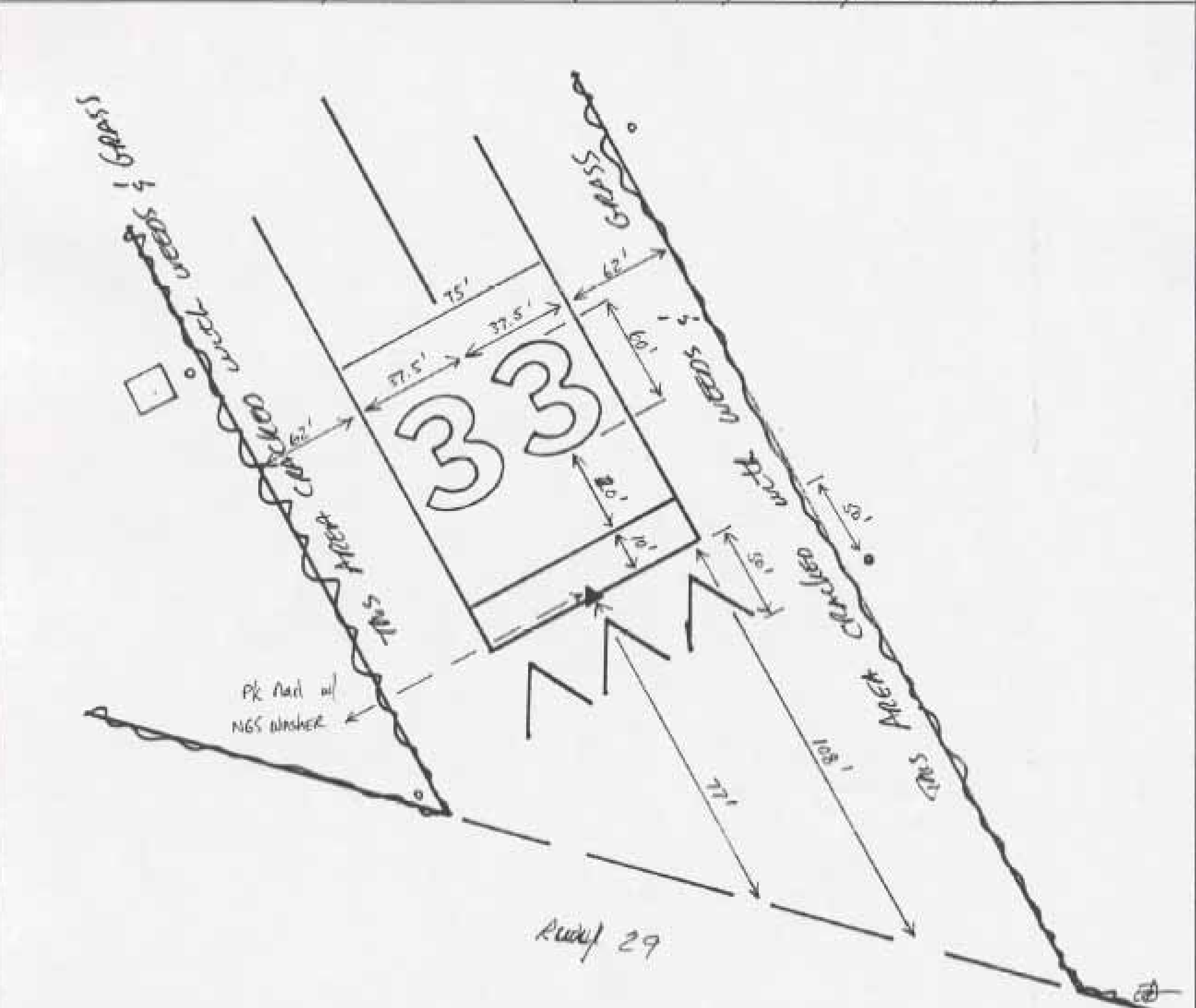
RUNWAY END 15

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL GEODETIC SURVEY

RUNWAY END SKETCH LOG

	GPS #: 999	AIRPORT ID: 34J
RUNWAY END SKETCH LOG	OBSERVER: E. Duvall	DATE: 29 March 96

AIRPORT NAME/LOCATION: New Smyrna Beach Municipal Airport, New Smyrna Beach, Fla.



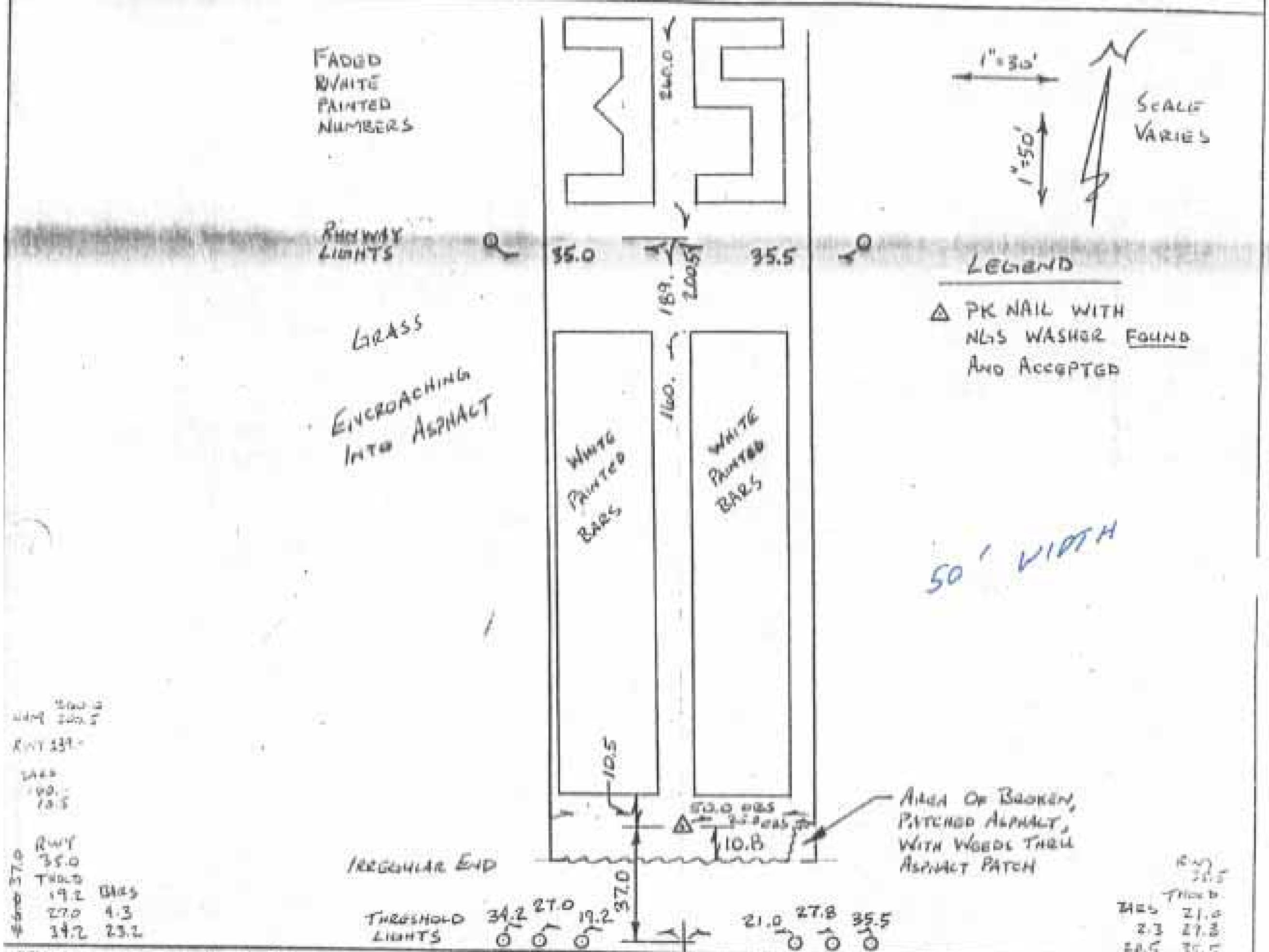
RWY END #: 33

REMARKS: The runway end is set on the centerline at the outboard edge of point bar.

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEAN SERVICE

	VOLUME/PAGE	QC	Page of
	PHOTO		DATE MMDDYY 07-25-95
FIELD SURVEYS SKETCH	AIRPORT DAN E. RICHARDS MUNICIPAL AIRPORT		STATE TX

SUBJECT TEXAS WAAS/AP's SURVEY DATUM TIES



REMARKS

SEE PROPOSED CONSTRUCTION NOTES FOR APPROACH 17

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL GEODETIC SURVEY

RUNWAY END SKETCH LOG

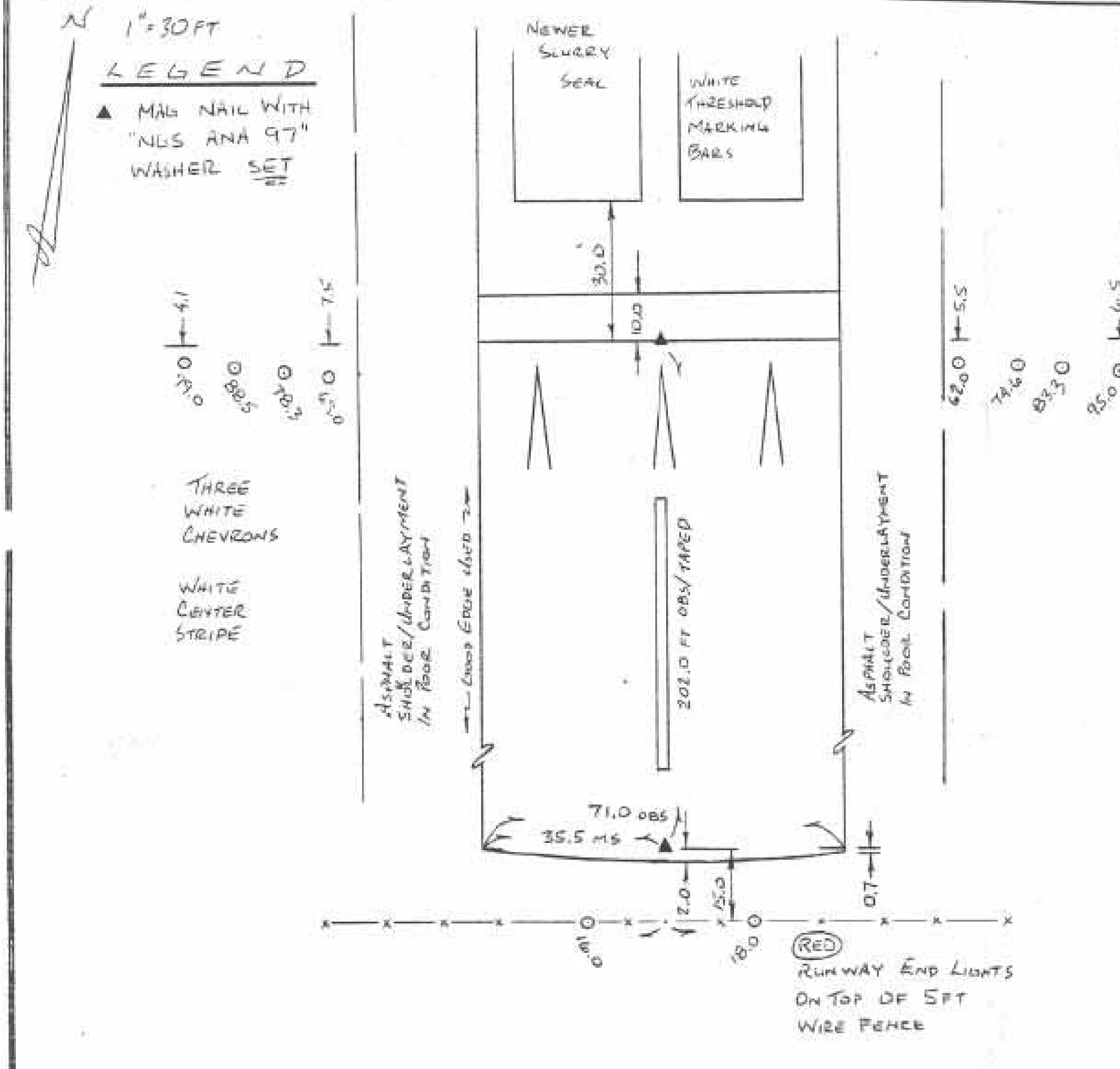
GPS #: 1170

AIRPORT ID: MSA

OBSERVER: WC WAICKMAN

DATE: 04 MAR 97

AIRPORT NAME LOCATION: MT PLEASANT MUNICIPAL AIRPORT, MT PLEASANT TX



RWY END #: 35

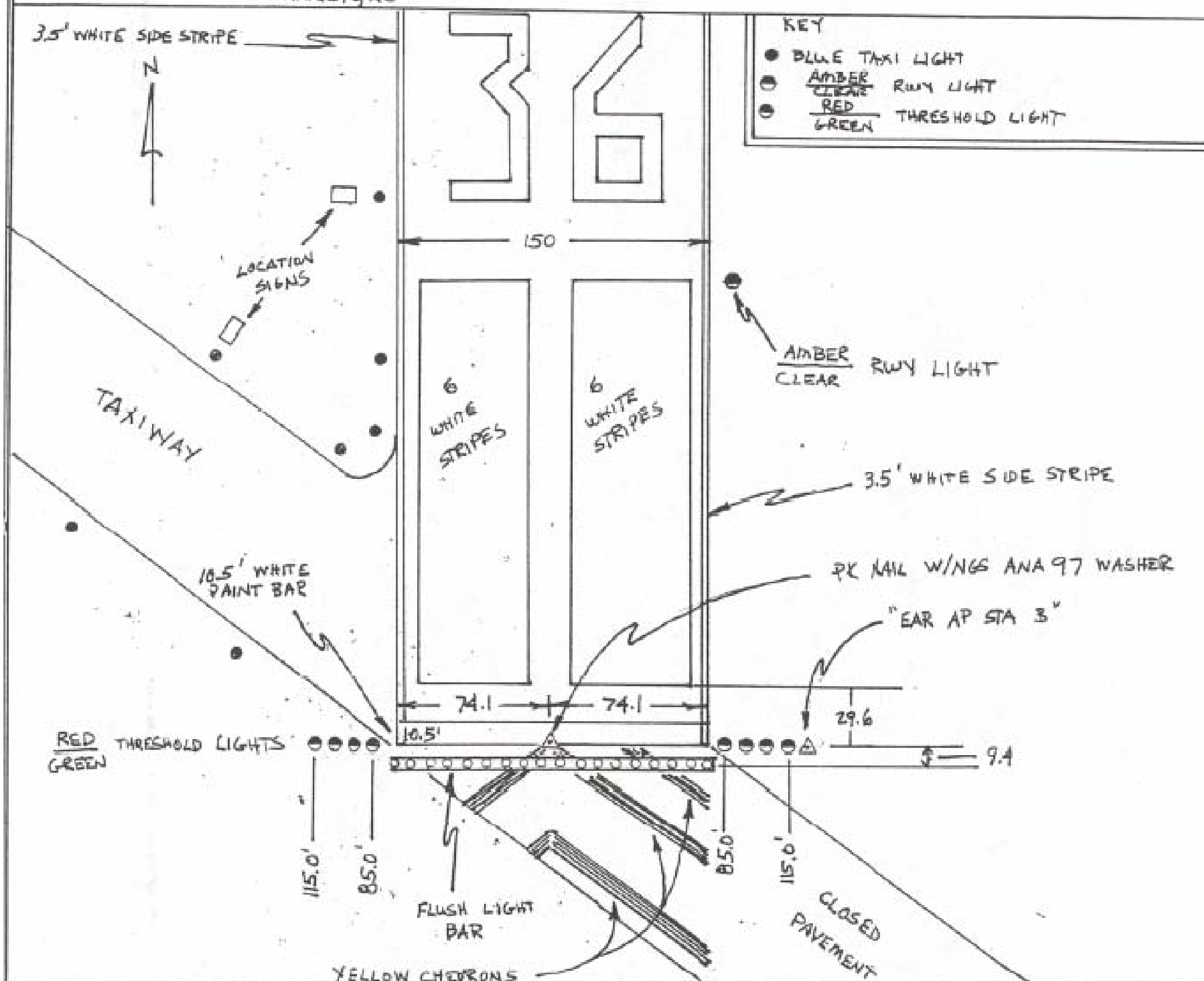
REMARKS: DISPLACED THRESHOLD LIGHTS OFFSET DIMENSIONED FROM CENTERLINE

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL GEODETIC SURVEY

RUNWAY END SKETCH LOG

	GPS #: 1201	AIRPORT ID: EAR
	OBSERVER: SML	DATE: 7-23-97

AIRPORT NAME/LOCATION: KEARNEY MUNICIPAL A/P
KEARNEY, NE



RWY END #: 36

REMARKS:
ALL PAINT BARS, STRIPES + CHEVRONS ARE STRIATED. PAVEMENT EXTENDS 0.5'-1.0' PAST SIDE STRIPES i.e. PAVEMENT IS 150' WIDE BUT ONLY 148' BETWEEN OUTSIDE EDGES OF SIDE STRIPES. PK NAIL IS SET INLINE WITH TRESHOLD LIGHTS AND ON APPROACH SIDE OF 10.5' WIDE WHITE THRESHOLD BAR.

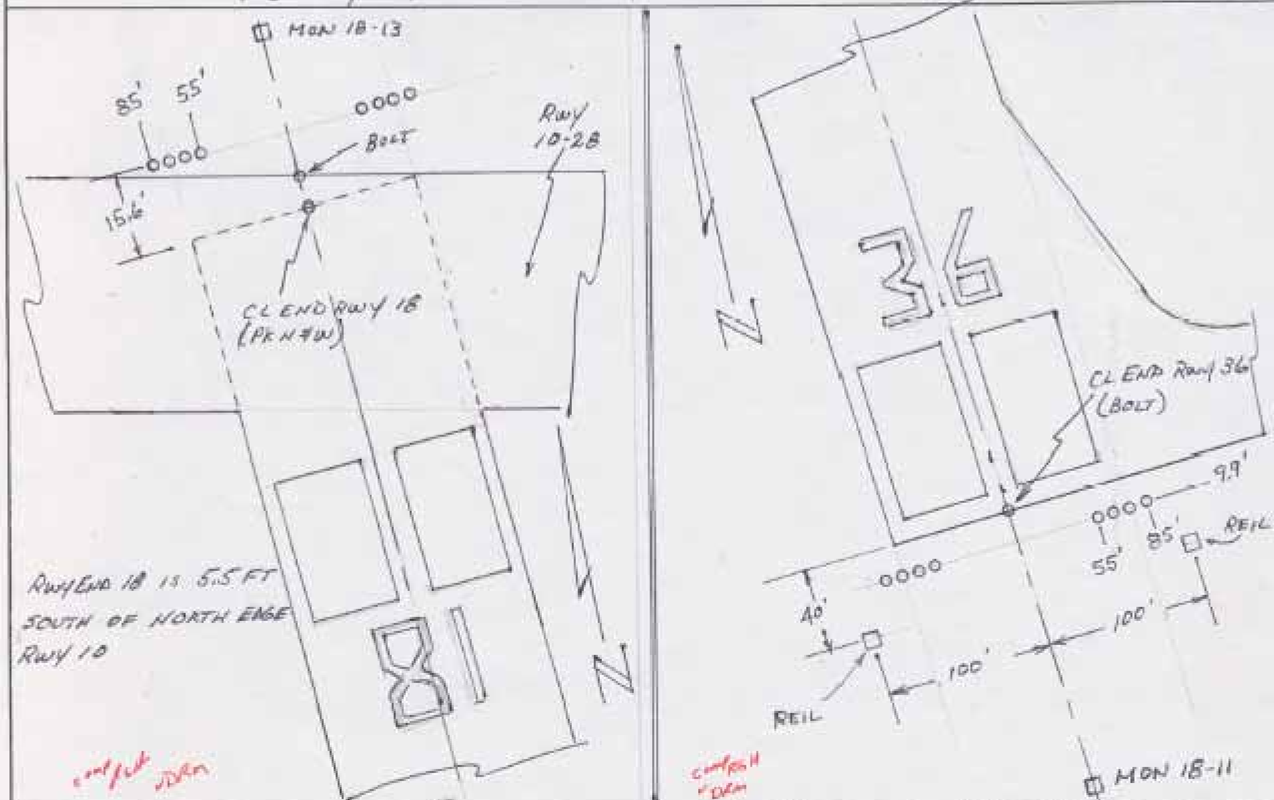
NOAA FORM 76-195 (5-79)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

FIELD SURVEYS SKETCH

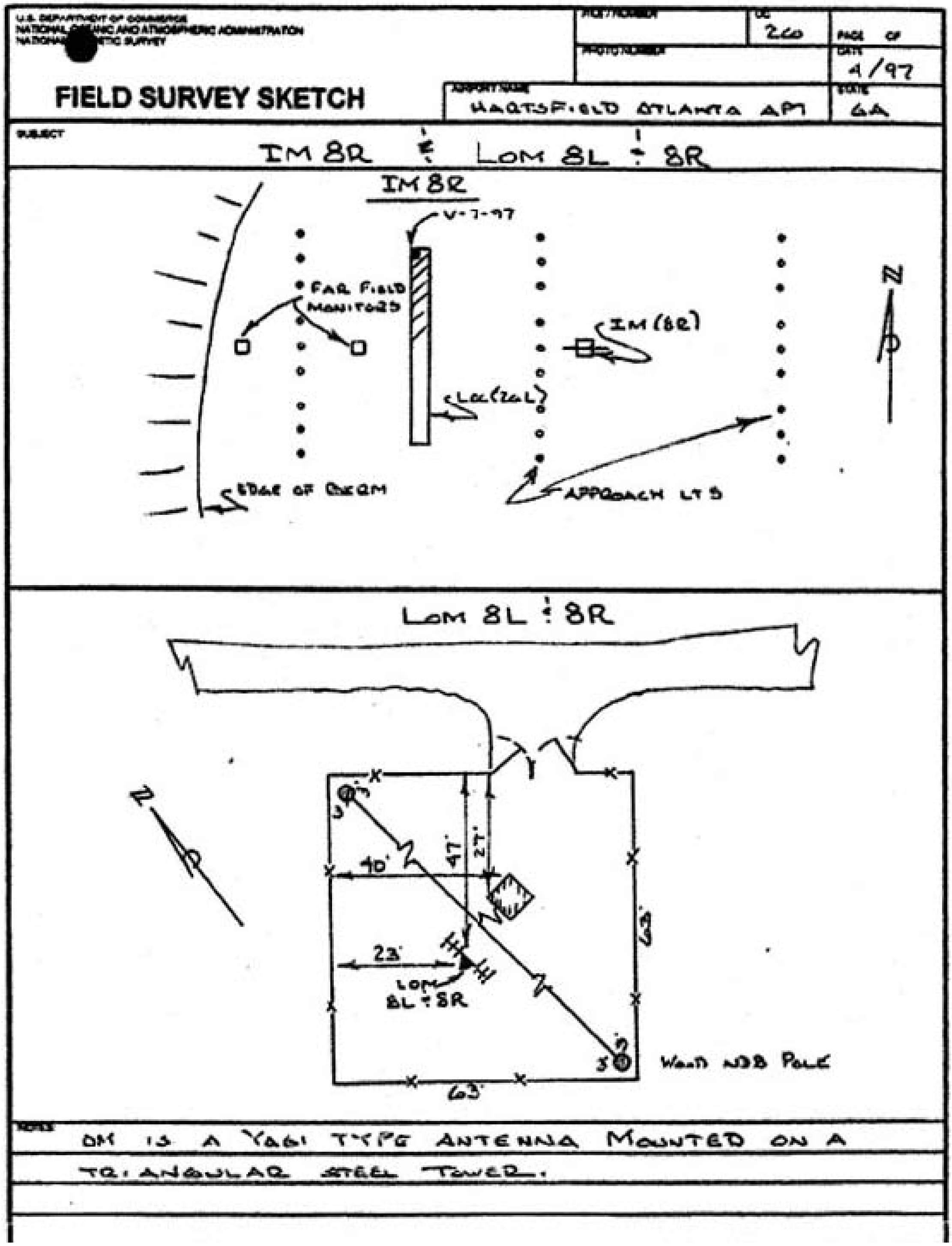
VOL./PAGE | OC 84 | PAGE OF
PHOTO | DATE AUG 1988
LOCALITY CLEVELAND - HOPKINS INT'L APT | STATE OHIO

SUBJECT RUNWAY ENDS 18 AND 36



DISTANCES						
FROM	Mon 18-13			Mon 18-11		
TO	CL END RWY 18			CL END RWY 36		
Press. / Temp.	29.1	27c		29.1	30c	
Tape No. / Atmos. Corr.		18			30	
V∢ or D.E.	00 49 40			01 11 39		
Dist. Feet	204.54			200.10		
Dist. Feet	204.55			200.10		
Dist. Feet	204.55			200.10		
Dist. Meters	62.344			60.990		
Mean Slope Dist. Feet	204.55			200.10		
Tape Corr.	—			—		
Temp. Corr.	—			—		
Prism Corr.	—			—		
Slope Corr.	cos			cos		
Hor. Dist.	204.53			200.06		
Grid Dist.	204.51			200.04		

NOTES: Descriptions, Subpoints, Etc.


U.S. DEPARTMENT OF COMMERCE
FIELD SURVEY SKETCH
2C0
4/97
HARTSFIELD ATLANTA APT
GA
IM 8R & LOM 8L & 8R
IM 8R
V-7-97
FAR FIELD MONITORS
IM (8R)
LOC (26L)
EDGE OF BERM
APPROACH LTS
N
LOM 8L & 8R
3'
40'
47'
27'
63'
23'
LOM 8L & 8R
3'
WOOD NDB POLE
63'
OM IS A YAGI TYPE ANTENNA MOUNTED ON A TRIANGULAR STEEL TOWER.

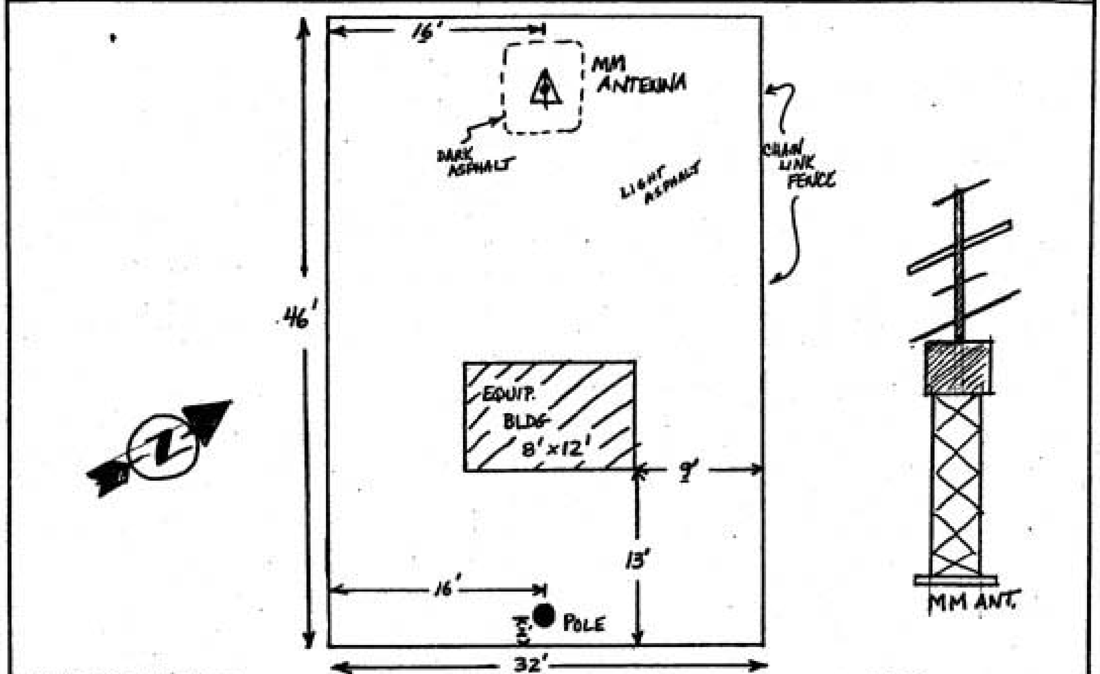
NOAA FORM 76-195 (5-75)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

FIELD SURVEYS SKETCH

VOL./PAGE	OC 669	PAGE 9 OF 10
PHOTO RATIO PHOTO 86BP 1760		DATE MAY 1987
LOCALITY ATLANTIC CITY INT'L APT		STATE NJ

SUBJECT MM (13)



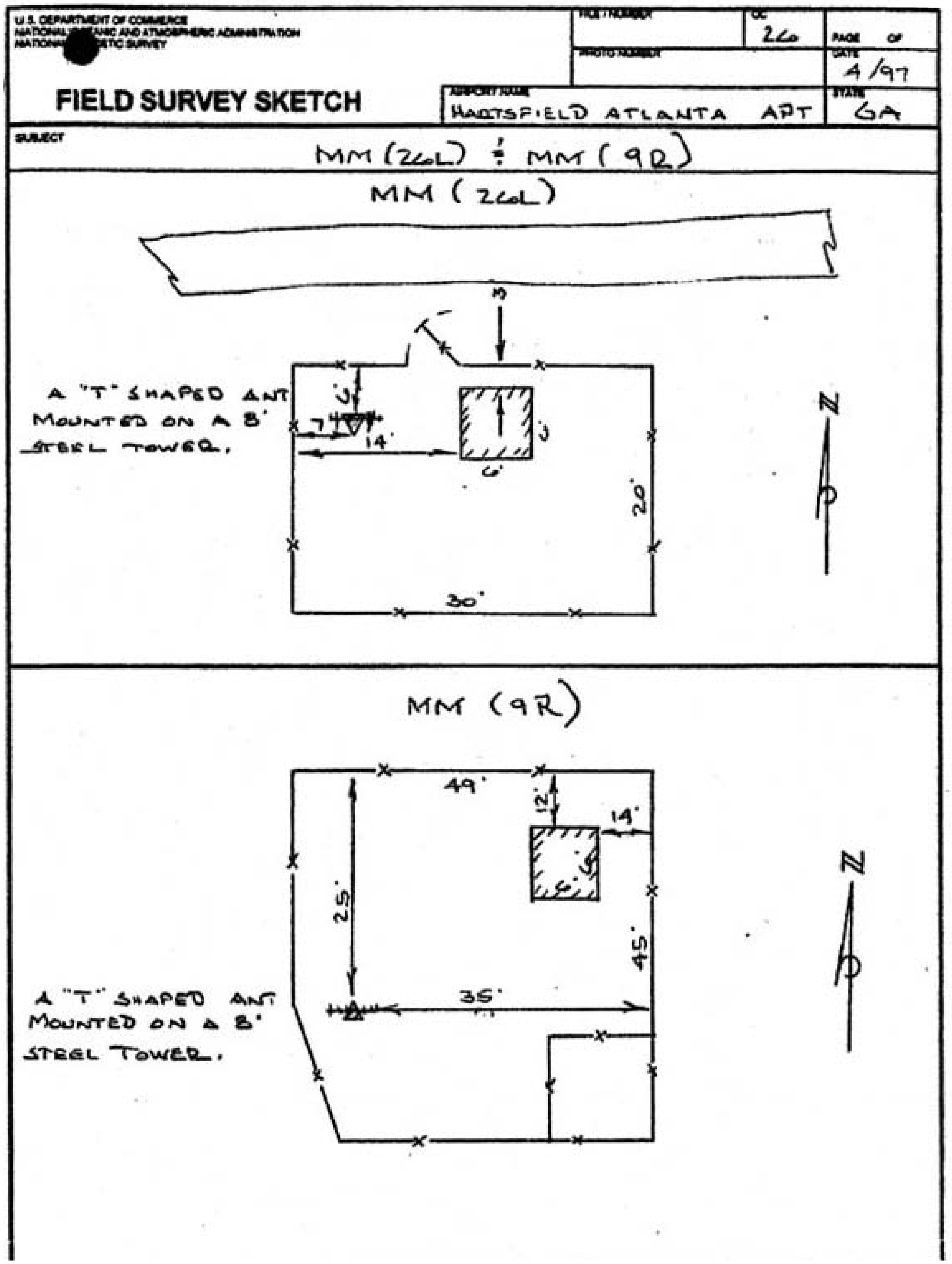
— NOT TO SCALE —

DISTANCES					
FROM					
TO					
Press. / Temp.					
Tape No. / Atmos. Corr.					
V⊄ or D.E.					
Dist. Feet					
Dist. Feet					
Dist. Feet					
Dist. Meters					
Mean Slope Dist. Feet					
Tape Corr.					
Temp. Corr.					
Prism Corr.					
Slope Corr.					
Hor. Dist.					
Grid Dist.					

NOTES: Descriptions, Subpoints, Etc.

MM(13) RELOCATED ON SAME SITE SINCE 1977 GROUND SURVEY LOCATION.

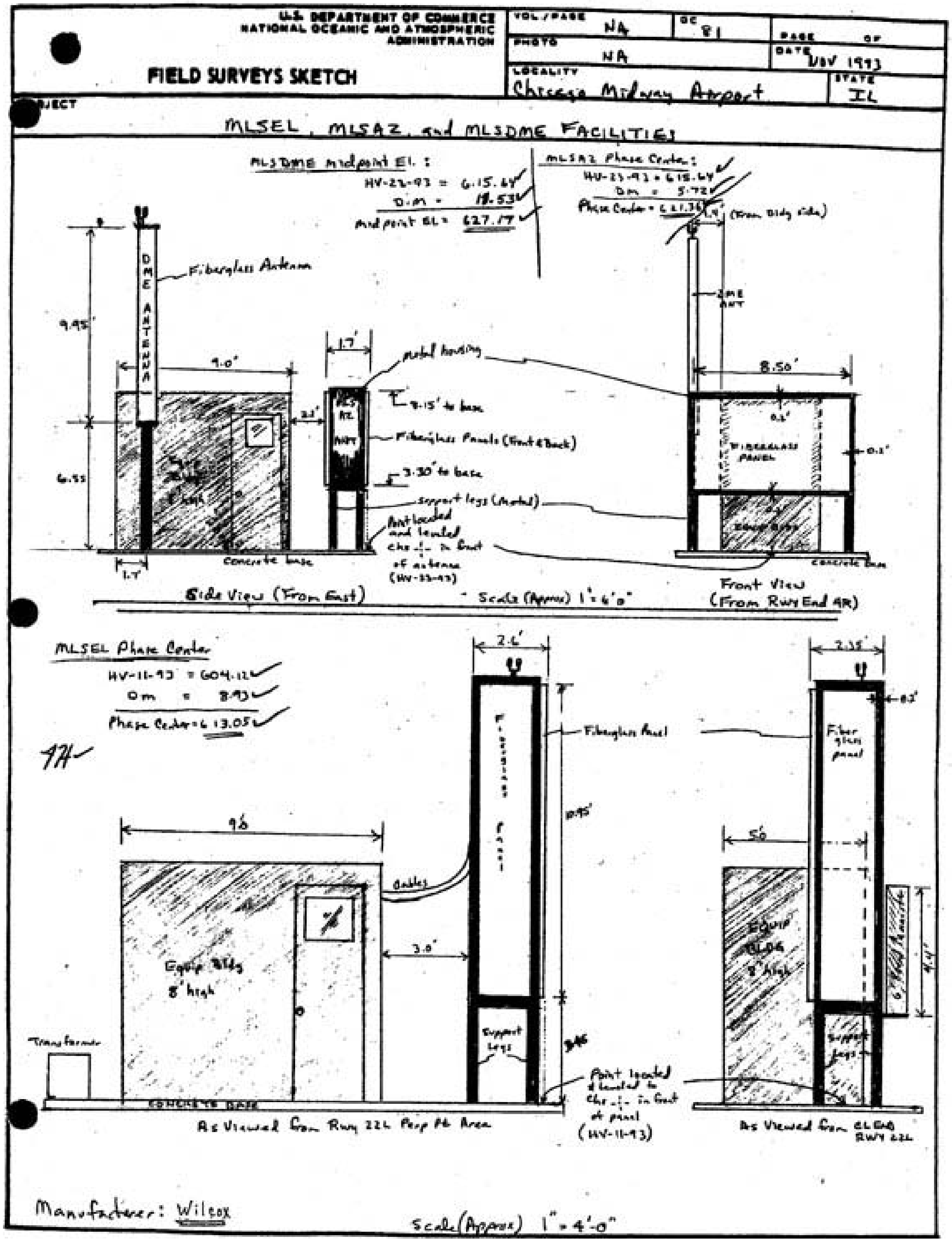
MM ANTENNA LOCATED BY SPUR TRAVERSE FROM FIX POINT A. ANTENNA DIRECTLY PHOTOIDENTIFIED TO AID FUTURE VERIFICATION.


U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL GEODETIC SURVEY

FIELD SURVEY SKETCH

FILE NUMBER	
QC	26
PAGE OF	
PHOTO NUMBER	
DATE	4/97
AIRPORT NAME	HARTSFIELD ATLANTA APT
STATE	GA

SUBJECT: MM (26L) ÷ MM (9R)

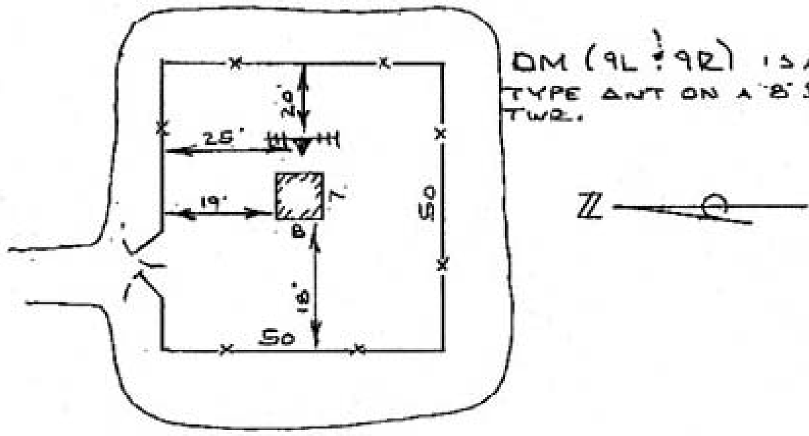

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
FIELD SURVEYS SKETCH
VOL./PAGE NA
PHOTO NA
LOCALITY Chicago Midway Airport
STATE IL
DATE NOV 1993
MLSEL, MLSAZ, and MLSDME FACILITIES
Fiberglass Antenna
DME ANTENNA
metal housing
Fiberglass Panels (Front & Back)
support legs (Metal)
concrete base
Side View (From East)
Front View (From Rwy End 4R)
MLSEL Phase Center
Fiberglass Panel
Equip Bldg 8' high
Transformer
CONCRETE BASE
Support legs
Cables
As Viewed from Rwy 22L Perp Pt Area
As Viewed from CL End RWY 22L
Manufacturer: Wilcox
Scale (Approx) 1" = 4'-0"

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL GEODETIC SURVEY

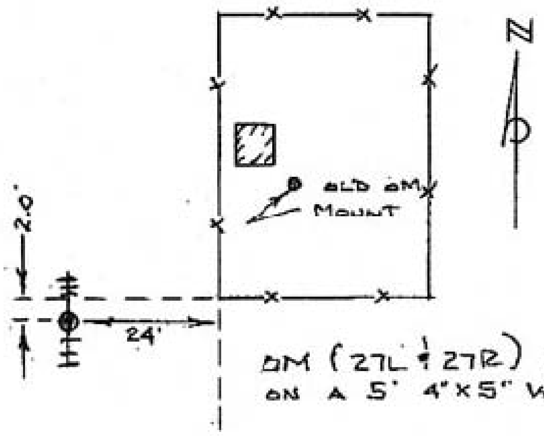
FIELD SURVEY SKETCH

FILE NUMBER		OC 26	PAGE OF
PHOTO NUMBER			DATE 4/97
AIRPORT NAME HARTSFIELD ATLANTA APT			STATE GA

SUBJECT: OM (9L & 9R) & OM (27L & 27R)



OM (9L & 9R) IS A YAGI TYPE ANT ON A 8' STEEL TWR.



OM (27L & 27R) IS A YAGI ANT ON A 5' 4"X5" WOOD POST

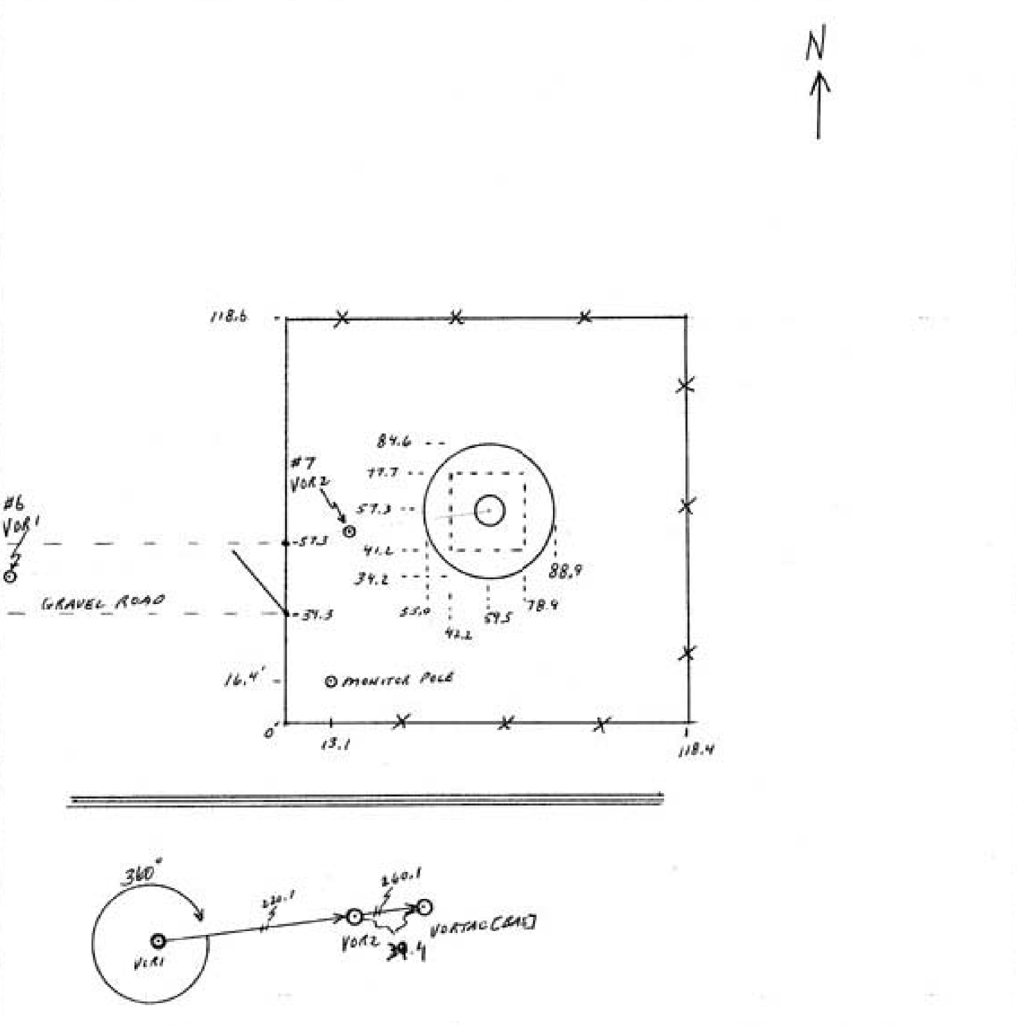
NOTES:

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL GEODETIC SURVEY

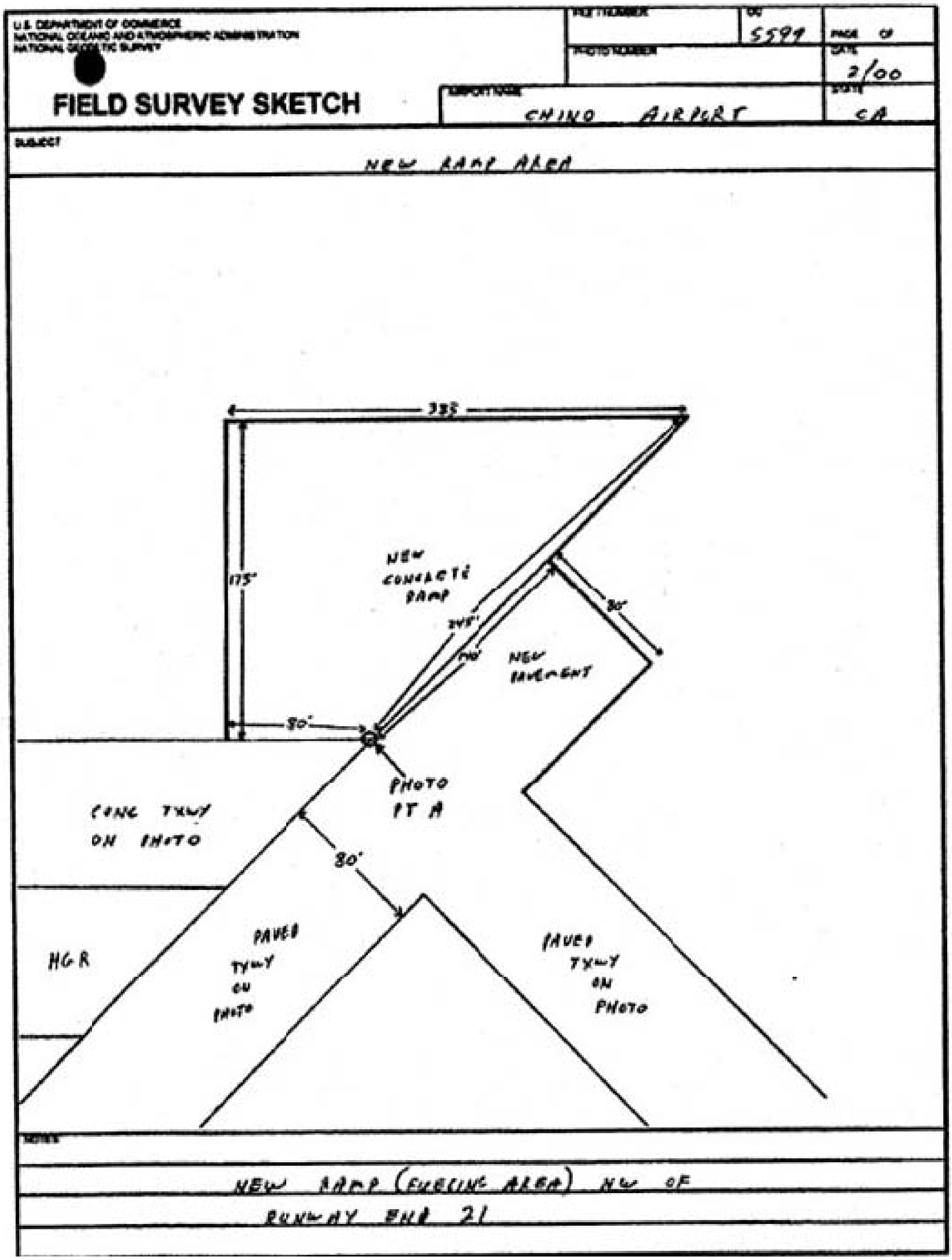
FIELD SURVEY SKETCH

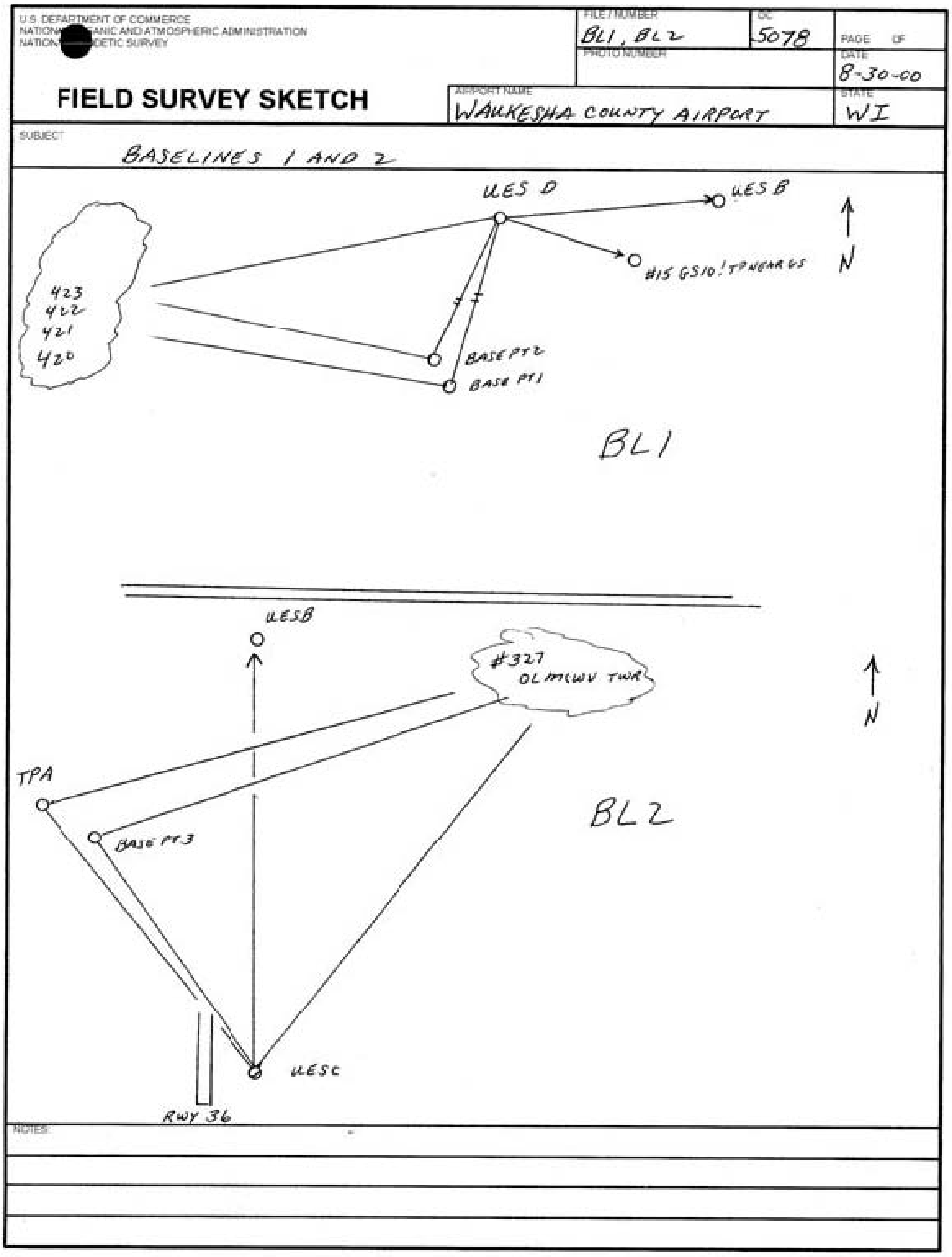
FILE / NUMBER	OC	PAGE OF
GPS 'UES'	5078	
PHOTO NUMBER		DATE
NA		8-30-00
AIRPORT NAME		STATE
WAUKESHA COUNTY AIRPORT		WI

SUBJECT: VORTAC [BAE]



NOTES:
VOR2 WAS SIGHTED ON LINE W/VORTAC FROM VOR1 USING TOPCON TOTAL STATION
VOR1 – VOR2 = 220.70 FT
VOR1 – VORTAC [BAE] = 260.1 FT


U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
FIELD SURVEY SKETCH
5599
2/00
CHINO AIRPORT
CA
NEW RAMP AREA
335'
175'
NEW CONCRETE RAMP
80'
30'
NEW PAVEMENT
PHOTO PT A
CONC TXWY ON PHOTO
80'
HGR
PAVED TXWY ON PHOTO
PAVED TXWY ON PHOTO
NEW RAMP (FUELING AREA) NW OF
RUNWAY END 21


U.S. DEPARTMENT OF COMMERCE
ANIC AND ATMOSPHERIC ADMINISTRATION
DETIC SURVEY
FIELD SURVEY SKETCH
FILE / NUMBER
BL1, BL2
OC
5078
PHOTO NUMBER
PAGE OF
DATE
8-30-00
AIRPORT NAME
WAUKESHA COUNTY AIRPORT
STATE
WI
SUBJECT
BASELINES 1 AND 2
UES D
UES B
N
423
422
421
420
BASE PT 2
BASE PT 1
BL1
UESB
#327
TPA
BASE PT 3
BL2
UESC
RWY 36
NOTES:

Section 2-4: Runway, Stopway, and Displaced Threshold End Identification

1. PURPOSE

The purpose of this document is to provide field surveyors with guidelines for accomplishing runway/stopway surveys for the Federal Aviation Administration (FAA). These surveys, which furnish data critical to the operation of the National Airspace System, are accomplished in accordance with AC 150/5XXX-XX General Guidance and Specifications for Aeronautical Surveys - Airport Survey Data Collection and Geographic Information System Standards.

Included in this document are basic guidelines for:

a) Identifying the precise survey point (SP) for runway ends, displaced thresholds, and stopway ends
b) Resolving runway/stopway conflicts with airport authorities
c) Resolving runway/stopway conflicts with official U.S. Government aeronautical publications

2. BACKGROUND

Accurate runway/stopway surveys are critical to aircraft and airport operations. Fundamental to a good survey is the correct identification of runway ends, stopway ends, and displaced thresholds. In many cases, the location of these points is not intuitively obvious and the precise survey point selection may not be consistent among surveyors. Without basic guidelines, this inconsistency will likely continue.

The positions and elevations of runway/stopway points are used to determine runway length, Accelerate Stop Distance Available (ASDA), Takeoff Distance Available (TODA), Takeoff Run Available (TORA), Landing Distance Available (LDA), and runway gradient. In addition, runway end and threshold information is used to orient the Obstruction Identification Surfaces that define critical obstructions to navigation for arriving and departing aircraft.

Operational uses of runway/stopway data include determining maximum takeoff weights for civil aircraft, developing instrument arrival and departure procedures, certificating airports for certain operations, such as those conducted under Part 139, and updating official U.S. Government aeronautical publications and data bases.

Inaccurate data can result in unnecessary operational limitations or dangerous misassumptions. For example, a misidentified runway end that results in a surveyed length being shorter than the true length could cause unnecessary takeoff weight restrictions or could prevent certain aircraft from operating from a runway or airport entirely because of insurance requirements or other runway length related limitations. A misidentified runway end that results in a surveyed length being longer than the true length could lead to the dangerous assumption that the ASDA, or other declared distance, is sufficient for safely conducting certain operations when it is not.

Incorrectly surveyed runways can also result in a runway not being identified during a computer search. In some cases, this situation could have safety implication. For example, a pilot with a low fuel state or other in-flight emergency may initiate a computer search for the nearest runway at least 5,000 feet long. If a nearby 5,000 foot runway was incorrectly surveyed and published at less than 5,000 feet, it would not be identified during the search and would remain unknown to the pilot.

The Federal Aviation Administration (FAA) has issued a series of Advisory Circulars (AC) establishing standards for construction, markings (painting), lighting, signage, and other items pertaining to runways/stopways. However, compliance with AC standards varies widely. For airports certificated under Federal Aviation Regulations Part 139, AC compliance is generally good. AC compliance is also generally good when it is required under terms of an FAA grant. In many other cases however, AC guidelines may be loosely followed or not followed at all.

Complicating this matter further are situations where runway/stopway changes have occurred, but repainting is delayed for some reason, leaving inappropriate painting in place at the time of the survey.

Other situations occur when AC compliance is intended, but the marking standard is misinterpreted or applied incorrectly. For example, a threshold bar may be incorrectly painted on a blast pad adjacent to a runway end instead of on the runway.

Hopefully, these guidelines will help surveyors correctly identify runway/stopway survey points, not only when standard markings exist, but also in the many cases where nonstandard situations are encountered.

3. TERMINOLOGY

The precise meaning of terms is always important for a clear understanding of spoken or written information. This understanding is especially critical in technical areas where safety is involved.

It is vital that the surveyor be familiar with runway/stopway terminology and that definitions be clearly understood. Certain terms and expressions used in this document have specific meanings that must not be misconstrued or applied incorrectly.

Refer to the Glossary for definitions used in this document. Many of these definitions have come from the “Aeronautical Information Manual,” or the FAA Advisory Circulars, both published by the Federal Aviation Administration. Other definitions are from the “Geodetic Glossary,” published by the National Geodetic Survey. When adequate definitions were not available from an official source, they were carefully developed as needed for this document.

Throughout this document reference is made to the “approach side” or “touchdown side” of a feature. For example, “Threshold lights show green from the approach side.” Correct understanding of these terms is extremely important. The “approach side” of a feature is the side occupied by a landing aircraft before the aircraft has passed the feature. The “touchdown side” of a feature is the side occupied by a landing aircraft after the aircraft has passed the feature. These terms are always referenced to a landing aircraft and the approach end, not the stop end, of the runway.

In addition to the word usage as defined in the glossary, the meanings of two other words must be understood when these words are used in relation to an action:

- the term "should" implies a first choice or preference but does not imply mandatory compliance.

- the term "must" means that compliance is mandatory.

4. FEATURES ASSOCIATED WITH RUNWAY/STOPWAY USAGE AND SURVEY POINT LOCATION

Runway/stopway usage, or intended usage, is usually indicated by one or more features existing on the airport. These features include surface markings, lights, signs, navigational aids, and physical construction.

A runway/stopway survey point (SP) is the intersection of the runway/stopway centerline and a feature that precisely defines the SP, such as the approach side of a threshold bar. The feature that precisely defines the SP is called the Survey Point Locator (SPL).

An SPL may be tangible, such as the approach side of a threshold bar, or intangible, such as an imaginary line constructed relative to a tangible feature or features like outboard (refer to Glossary) runway end lights.

A supporting feature is a feature that is associated with a runway/stopway SP but which does not precisely define the point, such as threshold lights located near a displaced threshold. There may be several supporting features for each SP. Supporting features provide confidence that the SP was correctly selected.

The most useful supporting features are usually one or more of the following:

- threshold bar and other threshold paintings
- runway number
- threshold and runway end lights
- runway edge lights.

Less useful features include:

- signs
- visual glideslope indicators
- electronic navigational aids
- taxiways.

Some features can be either an SPL or a supporting feature, depending on the situation. For example, when a threshold bar is located at a displaced threshold, the approach side of the bar defines the threshold. However, when a threshold bar is located near the end of pavement, the end of pavement usually defines the threshold and the bar is only a supporting feature that provides confidence that the threshold is located at the end and not at some other location on the runway.

Specific features that either define an SP or are useful in supporting SP selection are discussed in this section.

Because of the many nonstandard situations and configurations that may be encountered in the field, selecting the correct SP can be somewhat complex. When considering the features discussed below and their applicability to SP location, it may be useful to refer to Figures 1 through 8 in this section, as well as appropriate FAA Advisory Circulars.

a. LIMIT OF CONSTRUCTION

The limit of construction is usually the SPL for the ends of concrete runways when there is no aligned taxiway (AT). Runways and stopways are built to design criteria. There is an operational benefit to the airport sponsor and aircraft operators to have the maximum runway/stopway length possible. The limit of construction, or the runway end Trim Line (refer to section 4.2 below) usually provides this maximum. The limit of construction is indicated by a surface discontinuity. Be careful not to locate the runway end beyond this discontinuity and on a blast pad, stopway, or other non runway surface.

b. TRIM LINE

A Trim Line is an imaginary line, constructed perpendicular to the runway/stopway centerline, which establishes the location of a runway/stopway end or displaced threshold. A Trim Line is most frequently used to “square off” the ends of an Apparent Runway/Stopway Surface (ARS) (refer to Glossary) thereby establishing the runway/stopway ends. Most ARS’ that are not concrete, have ends that are not perpendicular to the runway/stopway centerline, are breaking up, or are otherwise unsuitable as a runway/stopway. Occasionally, the ARS may also narrow toward its end. This narrowing is most likely to occur on shorter runways at smaller airports. In all of these cases, a Trim Line must be constructed perpendicular to the runway/stopway centerline at “First Good Pavement (FGP)” (refer to attachment 7: Glossary). This Trim Line may be only a few inches or may be many feet from the ARS end. In practice, the surveyor is not qualified to accurately determine the load bearing integrity of a surface. So as a practical matter, the trim line should be established at a point on the ARS that is inside any disintegrating or otherwise questionable surface that appears to be below the full load bearing capacity of the runway/stopway. Other uses of the Trim Line include:

- Establishing a runway end at outboard runway end lights when an AT exists and there is no threshold bar, or the approach side of the bar is located on the approach side of the runway end lights.
- Establishing a runway end at a location determined by operational requirements, such as defining a runway end short of a second runway when abutting surfaces exist.
- Defining a displaced threshold when there is no threshold bar, this may be the case with unpaved runways with outboard threshold lights.

c. SURFACE MARKINGS

1) **THRESHOLD BAR**

A threshold bar is used to delineate the beginning of the runway that is available for landing (threshold) when there is pavement aligned with the runway on the approach side of the threshold. This pavement may be runway, taxiway, or stopway or may be a non-usable surface, such as a blast pad. Threshold bars precisely delineate displaced thresholds, but in many cases do not precisely delineate runway ends even when a bar is located near the runway end. When a threshold bar does define a threshold or runway end, the approach side of the bar is the SPL, the bar being entirely on the landing surface. Threshold bars define runway ends on paved runways with an AT and no displaced threshold, provided the approach side of the bar is aligned with, or is on the touchdown side of the runway end lights. In no other case does the threshold bar precisely define the runway end. (refer to Threshold Lights and Runway End Lights in paragraph 4d) for the use of runway end lights in defining the runway end SP). The threshold bar is only a supporting feature for runway ends with no AT since these bars are often not painted precisely at the runway end (as defined by the limit of construction or a Trim Line). A threshold bar that is painted "close" to the end may be satisfactory for the painting contractor but is not sufficient for precisely defining a runway end. Occasionally, a threshold bar may even be painted on a blast pad or other non-runway surface. Because of the variability and unreliability of threshold bar locations at runway ends with no AT, the bars should not be used to define the runway end SP in these situations. It is important to remember that correct painting on runways is white, while correct painting on taxiways, stopways, or blast pads is yellow. If a displaced threshold exists on a runway with an AT, the runway end may be marked with a yellow demarcation bar. If painted correctly, this demarcation bar is not on the runway surface.

2) **RUNWAY NUMBERS**

The runway number is a supporting feature. Runway numbers are especially useful and reliable as supporting features since most paved runways, even if unlighted, are painted with runway numbers near the threshold. If a runway number is painted on the runway at a location other than near the apparent threshold, a serious conflict exists that must be resolved.

3) **OTHER SURFACE MARKINGS**

Other surface markings are supporting features. Many surface markings, such as threshold markings (specific markings other than the threshold bar), runway side stripes, displaced threshold arrows and arrowheads, the lines and arrowheads on taxiways aligned with runways, and the chevrons on stopways and blast pads are associated with runway/stopway ends and thresholds. While none of these markings precisely define runway/stopway SP’s, many can be useful as supporting features that provide confidence in SP selection.

d. LIGHTS

Caution - when using lights for runway/stopway SP identification, verify that the lights are not out-of-service. Be especially vigilant for redundant lights or lights that seem to be out-of-place. Occasionally, a threshold or runway end may be moved and the original lights placed out-of-service but not physically removed. If this situation is not recognized, it could lead to confusion and incorrect SP location.

1) **THRESHOLD LIGHTS**

Threshold lights are fixed green lights arranged symmetrically left and right of the runway centerline and identify the approximate runway threshold (but not necessarily the runway end). These lights are frequently in multipurpose fixtures that show green from the approach side of the threshold and may show red, white, or amber, or may be obscured from the touchdown side of the threshold, depending on additional function. Threshold lights are usually supporting features for SP's on paved runways. However, they may define the SP for displaced thresholds when a threshold bar is missing, such as may occur on unpaved runways. (Displaced thresholds on unpaved runways are uncommon). Light characteristics can be useful in distinguishing between a displaced threshold and a runway end with an AT. The displaced threshold will include lights that show green from the approach side and white, amber, or obscured from the touchdown side. The runway end with an AT will include lights that show green from the approach side and red from the touchdown side. When threshold lights are located at the runway end, they are usually combined with runway end lights into one fixture. In these cases, threshold lights show green from the approach side, while the runway end lights show red from the touchdown side. Special lens or filters are used to give the desired coverage. In the rare case where the light units define a Trim Line for a displaced threshold SP (no threshold bar), the two units nearest to the runway (one on each side of the runway) will be used. The Trim Line must always be perpendicular to the runway centerline. If the Trim Line connecting the lights (or markers if runway is unlighted) is not perpendicular to the runway centerline, then the line must be best fit to the defining lights or markers. When there is no displaced threshold or runway end with an AT, threshold and runway end lights are normally located across the runway end and about 10 feet on the approach side of the runway. When there is a displaced threshold or a runway end with an AT, these lights are normally located to the side of the runway but are often offset along the runway by 10 feet or more from the true threshold or runway end.

2) **RUNWAY END LIGHTS**

Runway end lights are fixed red lights arranged symmetrically left and right of the runway centerline and identify the approximate runway end, or in some cases, the precise runway end. They show red from the runway side and may show red from the approach side, as well if the runway end is not the threshold. If the runway end is also a threshold, the light unit will show green from the approach side. (refer to Threshold Lights in previous section). FAA guidelines or regulations do not authorize a runway to extend to the approach side of the runway end lights. Therefore, the runway end cannot be on the approach side of the runway end lights regardless of threshold bar or runway end light location. (Do not confuse these situations with that of threshold lights at a displaced threshold where the approach side of the threshold bar defines the threshold and the lights are only supporting features). In most cases where there is no AT, the limit of construction, or a Trim Line, on the touchdown side of the lights defines the runway end and the runway end lights are supporting features only. In some cases, however, runway end lights can define a runway end SP. For runways with an AT, runway end lights (which can be situated either outboard or flush mounted inboard) define the runway end SP if there is no threshold bar or if the approach side of the threshold bar is on the approach side of the lights. (If the bar is entirely on the touchdown side of the lights, the approach side of the bar defines the runway end SP). In the rare cases where there is no AT but the runway end lights are outboard and on the touchdown side of an apparent runway end, the lights define the runway end. The surface on the approach side of the lights is not runway.

3) **RUNWAY/STOPWAY EDGE LIGHTS**

Runway edge lights are white, except on instrument runways, where amber replaces white in the last 2,000 feet, or half the runway length, whichever is less, to form a caution zone for landing. Runway/stopway edge lights are supporting features and do not precisely define SP's. However, in some cases, their color characteristics may identify a section of pavement as either runway or taxiway. The edge lights for taxiways are blue, while the edge lights for runways are white or amber. Stopway lighting is inconsistent and unreliable in stopway SP identification.

4) **RUNWAY END IDENTIFIER LIGHTS**

Runway End Identifier Lights (REIL) consist of a pair of synchronized flashing lights located laterally on each side of the runway threshold but are typically not aligned precisely with the threshold. They may be either omnidirectional or unidirectional facing the approach area. REILs are supporting features and do not precisely identify SPs. REILs may be useful in determining runway usage since they are located near the threshold.

e. SIGNS

Signs are supporting features and do not precisely identify SPs. Occasionally, signs may be useful in indicating that a runway end, especially a runway end with an AT, is nearby. They can also indicate the direction to a runway end.

f. VISUAL GLIDESLOPE INDICATORS

Visual glideslope indicators are light sources which project directional light into the approach area, providing pilots with visual vertical guidance in the final approach phases of flight. The locations and characteristics of visual glideslope indicators vary depending on type. However, all are located beside the runway on the touchdown side of the threshold. Visual glideslope indicators are supporting features and do not precisely define SP's. Occasionally, these indicators may be useful in determining runway usage since they indicate the approximate touchdown area for landing aircraft.

g. ELECTRONIC NAVIGATIONAL AIDS (NAVAIDS)

The Instrument Landing System Glideslope (ILS-GS) antenna is the emission source for electronic signals which provide pilots with electronic vertical guidance in the final approach phases of flight. ILS-GS antennas are typically located approximately 400 feet off the runway centerline and approximately 1,000 feet on the touchdown side of the threshold. However, most runways do not use this facility. Electronic navigational aids, including the ILS-GS, do not precisely identify SPs. Occasionally, the ILS-GS antenna may be useful in determining runway usage since most ILS-GS antennas are sited near the touchdown area for landing aircraft. The locations and use of most other NAVAIDS vary so greatly that they are virtually useless in SP identification.

h. TAXIWAYS

Taxiways are movement areas that provide access to runways from aircraft parking, maintenance, and other areas on the airport. Taxiways do not precisely identify SP's. However, since runway ends are usually accessed by adjacent taxiways, the location of a taxiway may suggest the proximity of a runway end. While many runway ends coincide with the extension of the taxiway edge onto the runway, this is not always the case. Often a runway extends slightly beyond the taxiway edge, making the SPL for the runway end the limit of physical construction, a Trim Line, or a threshold bar and not the taxiway extension onto the runway. It is not unusual to have a runway end without direct taxiway access. One common case occurs when a runway has been extended, but the taxiway has not been extended to the new runway end. This situation is most likely to occur at smaller airports. While taxiway/runway intersections do not define runway points, unusual taxiway/runway configurations can alert the surveyor that an atypical situation may exist.

5. LOCATION OF SPECIFIC SURVEY POINTS

The location of the following runway/stopway Survey Points (SPs) is defined by the intersection of the runway/stopway centerline and one of the indicated Survey Point Locators. When the SP has been determined, it will always be verified by the presence of supporting features. Occasionally, a supporting feature will conflict with the selected SP or another supporting feature. For example, a runway number may be located near the end of pavement, but threshold lights and a threshold bar are located down the runway at an apparent displaced threshold. These conflicts should be resolved before leaving the airport. Discuss the conflict with airport authorities and, if necessary, contact the field supervisor for assistance. In the presentation that follows, reference is made to "inboard" or "outboard" threshold and runway end lights. These terms are defined in the attachment 7: Glossary. If light units are used to construct the Trim Line that defines an SP, as may be the case for the end of a runway with an aligned taxiway, the two units nearest to the runway (one light on each side of the runway) will be used. The Trim Line must always be perpendicular to the runway centerline. If a line connecting the lights (or markers if the runway is unlighted) is not perpendicular to the runway centerline, then the Trim Line must be best fit to the defining lights or markers. When using the following guidelines, select the first "Survey Point Locator" listed that is applicable. While all possible situations cannot be covered, these guidelines should lead to correct SP selection in most of the cases encountered in the field.

a) RUNWAY END: CONCRETE RUNWAY and NO ALIGNED TAXIWAY

1) **Survey Point Locator**

- Limit of construction, provided this line is not located on approach side of runway end lights
- Trim Line at First Good Pavement (FGP), provided this line is not located on approach side of runway end lights

2) **Supporting Features**

- Runway end lights near runway end
- Threshold bar near runway end (usually present only if non-runway pavement is aligned with runway)
- Threshold lights near runway end and usually in same fixture as runway end lights (if threshold not displaced)
- Runway number near runway end (if threshold not displaced)
- Runway edge lights (white or amber) extending to runway end

3) **Comments:** The limit of construction usually defines the SP for the ends of concrete runways. The limit of construction is indicated by a surface discontinuity. Do not confuse the runway end with the end of a blast pad, stopway, or other non-runway surface. Refer to Figures 1 through 4 and Figure 8 for an example of this scenario.

b) RUNWAY END: PAVED/NONCONCRETE RWY and NO ALIGNED TAXIWAY

1) **Survey Point Locator**

- Limit of construction, provided this line is not located on approach side of runway end lights
- Trim Line at FGP, provided this line is not located on approach side of runway end lights

2) **Supporting Features**

- Runway end lights near runway end
- Threshold bar near runway end (usually present only if non-runway pavement is aligned with runway)

- Threshold lights near runway end and usually in same fixture as runway end lights (if threshold not displaced)
- Runway number near runway end (if threshold not displaced)
- Runway edge lights (white or amber) extending to runway end

3) **Comments:** While the limit of construction is the first choice, a trim line at FGP is usually required to define the ends of paved, non-concrete, runways since the ends of these surfaces are almost always crumbling and/or not orthogonal to the runway centerline to some degree. Refer to Figures 1 through 4 and Figure 8 for an example of this scenario.

c) RUNWAY END: UNPAVED RUNWAY and NO ALIGNED TAXIWAY

1) **Survey Point Locator**

- Trim Line 10 feet on touchdown side of inboard runway end lights
- Trim Line connecting outboard runway end lights
- Trim Line 10 feet on touchdown side of inboard runway end day markers
- Trim Line connecting outboard runway end day markers

2) **Supporting features**

- Threshold lights near threshold (if runway lighted and threshold not displaced)

3) **Comments:** If no lights or markers exist, the existence of a runway must be questioned. By FAA definition, a runway is a defined area. Not all areas used for takeoff/landings are runways.

d) RUNWAY END: PAVED RUNWAY and ALIGNED TAXIWAY

1) **Survey Point Locator**

- Approach side of threshold bar provided this line is not located on approach side of runway end lights and threshold is not displaced
- Trim Line connecting outboard runway end lights
- Runway side of yellow demarcation bar provided this line is not located on approach side of runway end lights. (This bar usually occurs only if a displaced threshold and an AT both exist.)

2) **Supporting Features**

- Threshold lights near runway end and usually in same fixture as runway end lights (if threshold not displaced)
- Runway number near runway end (if threshold not displaced)
- Yellow AT painting on approach side of threshold bar
- Taxiway edge lights between runway end and taxiway end
- Absence of runway side stripes between runway end and end of pavement on Precision Instrument Runways

3) **Comments:** Use caution, especially on smaller, poorly marked airports, not to confuse a displaced threshold and a runway end for a runway with an AT. Refer to Figures 5 through 6 for an example of this scenario.

e) **RUNWAY END: UNPAVED RUNWAY and ALIGNED TAXIWAY**

1) **Survey Point Locator**

- Trim Line connecting outboard runway end lights
- Trim Line connecting outboard runway end day markers

2) **Supporting Features**

- Threshold lights near threshold (if threshold not displaced)
- Runway/taxiway edge lights (if runway lighted)

3) **Comments:** Unpaved runways with aligned taxiways are unusual. If this situation is suspected, verify that an area immediately adjacent to, and aligned with, the runway is used for taxi onto the runway and is marked appropriately for this purpose. Refer to Figures 5 through 6 for an example of this scenario.

f) DISPLACED THRESHOLD: PAVED RUNWAY

1) **Survey Point Locator**

- Approach side of threshold bar
- Trim Line connecting outboard threshold lights

2) **Supporting Features**

- Threshold lights near threshold
- Runway end lights sited at another location on approach side of threshold lights

- White or amber runway edge lights, not blue taxiway lights, between threshold and end of runway
- Runway number near threshold
- White displaced threshold markings on approach side of threshold bar
- Runway side stripe on Precision Instrument Runways

3) **Comments:** Use caution, especially on smaller, poorly marked airports, not to confuse a displaced threshold with the end of a runway with an aligned taxiway. Refer to Figure 7 for an example of this scenario.

g) DISPLACED THRESHOLD: UNPAVED RUNWAY

1) **Survey Point Locator**

- Trim Line connecting outboard threshold lights
- Trim Line connecting outboard threshold day markers

2) **Supporting features**

- Runway end lights sited at another location on approach side of threshold lights (if runway lighted)
- Runway end day markers located at another location on approach side of threshold (if runway unlighted)

3) **Comments:** Displaced thresholds on unpaved runways are unusual. If this situation is suspected, verify that the runway end is identifiable at another location on the approach side of the threshold.

h) STOPWAY END: CONCRETE STOPWAY

1) **Survey Point Locator**

- Limit of construction
- Trim Line

2) **Supporting Features**

- Stopway chevrons

3) **Comments:** The stopway end SP must be on the runway centerline extended. Stopways must be at least as wide as the runway but may be

wider. Refer to Section 2: subsection 3, Runway and Stopway Points, for further discussion related to stopway surveys.

i) STOPWAY END: PAVED/NONCONCRETE STOPWAY

1) **Survey Point Locator**

- Limit of construction
- Trim Line at FGP

2) **Supporting Features**

- Stopway chevrons

3) **Comments:** The stopway end SP must be on the runway centerline extended. Stopways must be at least as wide as the runway but may be wider. Refer to Section 2: subsection 3, Runway and Stopway Points, for further discussion related to stopway surveys.

j) STOPWAY END: UNPAVED STOPWAY

1) **Survey Point Locator**

- Trim Line at ARS end

2) **Supporting Features**

- Usually none

3) **Comments:** The stopway end SP must be on the runway centerline extended. Stopways must be at least as wide as the runway but may be wider. Refer to Section 2: subsection 3, Runway and Stopway Points, for further discussion related to stopway surveys.

6. PRELIMINARY COMPUTATIONS AND DATA CONFLICTS

1) COMPUTATION METHODS

Before leaving the area, runway, displaced threshold, and stopway lengths should be computed using the new survey data. These lengths will be determined using a 3D geodetic inverse computation between end points available in the data logger (ADCAT). This computation corrects for the elevation of the points and difference in elevation between points. These lengths should be compared to the runway lengths published in the Airport/Facility Directory (A/FD) and the U.S. Terminal Procedures (TPP), both U.S Government Flight Information Publications, and the lengths provided by the airport authorities. The official runway, stopway, or displaced threshold length is the straight line distance between end points. This line does not account for surface undulations between points.

2) **CONFLICTS WITH PUBLISHED DATA**

Computed lengths seldom match published lengths exactly. Discrepancies are most likely caused by interpretation of runway/stopway SP location, remarking of thresholds, or less accurate published data. As the magnitude of discrepancies increases, the probability also increases that physical changes have occurred to the runways/stopways or that the thresholds have been moved. Differences with published data should be considered as an alert that there may be a problem in the survey. However, published lengths are often not as accurate as the new surveyed lengths and are occasionally obsolete or otherwise grossly erroneous. Therefore, the validity of the published data must always be questioned when comparing it with the new survey data, especially if the SP's have been selected correctly.

Even though published data is often incorrect or obsolete, new survey data should be carefully reexamined when discrepancies between published and surveyed data occur. The reasons for small discrepancies are often difficult or impossible to identify. As discrepancies become larger, the reasons typically become more apparent. Even though the source of the discrepancy may not be identified, the reexamination should be conducted to provide the highest level of confidence that accurate runway data has been provided. Stopway conflicts pose a special problem, largely because of issues related to the stopway definition and the protocols required by FAA in declaring a stopway.

If either of the following situations occurs, contact the FAA Airport Surveying–GIS Program Manager for assistance:

- The apparent stopway dimensions on the ground differ from the stopway dimensions as published in either the A/FD or TPP by more than 10 percent of the published dimensions.

- A published stopway does not appear to meet the definition of a stopway, including the requirement to support an aircraft during an aborted takeoff, without causing structural damage to the aircraft.

If the FAA Airport Surveying–GIS Program Manager or NGS staff personnel cannot resolve a situation, final resolution may ultimately require FAA intervention.

3) **CONFLICTS WITH AIRPORT AUTHORITIES**

Because of the importance of runway/stopway data, runway/stopway surveys should always be discussed with appropriate airport authorities.

Conflicts that occur between the judgment of the surveyor and the opinions, understandings, or intentions of the airport authorities should be resolved. It may be necessary to revisit the field with airport personnel and explain the survey and SP selection. If a conflict with the airport authorities still cannot be resolved, assistance should be sought from the field survey supervisor. In some cases, final resolution may ultimately require FAA intervention. Stopway conflicts pose a special problem. Before an area can be officially declared a stopway and published in official U.S. Government documents, such as the A/FD and TPP, the request for a stopway must be filed by airport authorities with appropriate FAA offices. FAA will conduct an Airspace Review and approve or disapprove the request.

If either of the following situations occur, contact the field supervisor for assistance:

- Airport authorities request that an area be surveyed as a stopway but the stopway is not published in either the A/FD or TPP current at the time of the field survey.

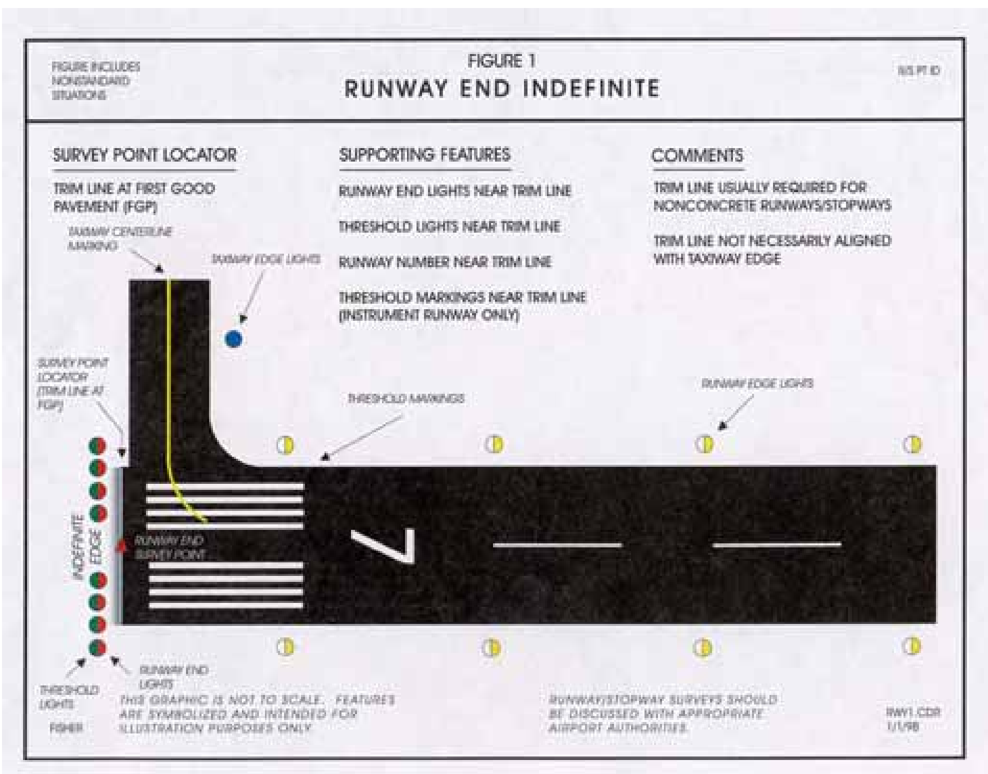
- Airport authorities request a change to, or do not concur with, the published stopway data or data resulting from the new survey.

As with conflicts with published data, if the FAA Airport Surveying–GIS Program Manager or NGS staff personnel cannot resolve a situation, final resolution may ultimately require FAA intervention.

4) COMPARISON WITH CRITICAL RUNWAY LENGTH

Runway lengths that are whole thousands of feet (5,000, 8,000, etc.) or whole thousands of feet plus 500 feet (5,500, 8,500, etc.) often have special operational significance. For purposes of this document, these lengths are called critical lengths. Many aircraft operations require a minimum runway length, which is often a critical length, and many runways are built to these lengths. If a runway is incorrectly published shorter than a critical length, certain operations could be unnecessarily restricted. In addition to imposing unnecessary operational limitations, incorrectly surveyed runways may not be retrieved during a computer search. This situation is especially likely to occur with critical length runways. In some cases, this failure could have safety implications. While all runway/stopway lengths should be accurate, even small errors in critical lengths could have significant and far reaching ramifications. Runway lengths that are determined to be less than, but within 20 feet of, a critical length should be carefully reexamined to provide the highest level of confidence that the survey is correct. This reexamination should include an inspection of the runway end SP’s to ensure that the longest runway length possible was provided.

7. Example Figures



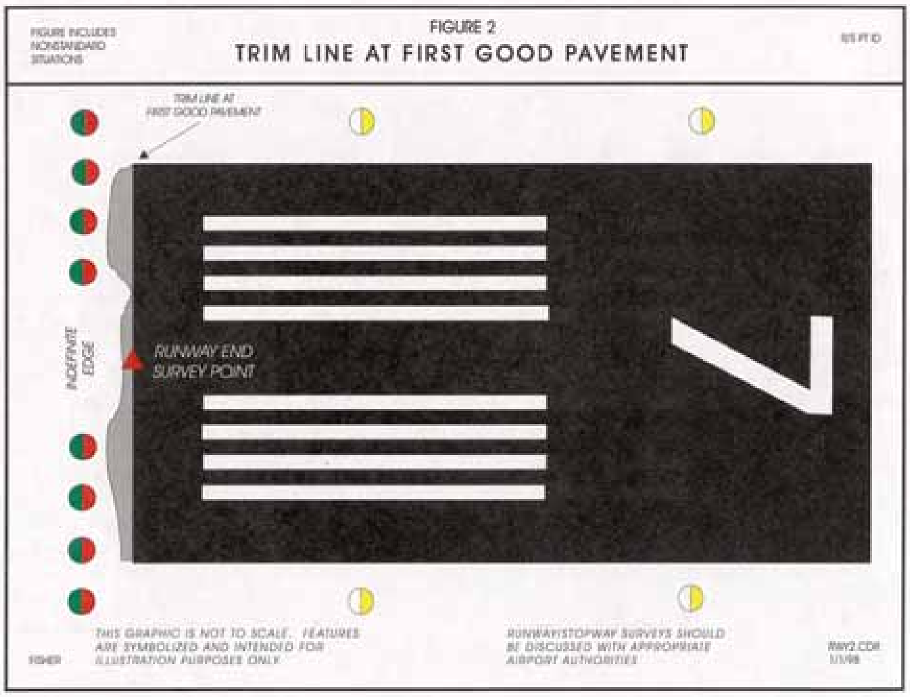


FIGURE INCLUDES
NONSTANDARD
SITUATIONS
FIGURE 2
TRIM LINE AT FIRST GOOD PAVEMENT
R/S PT ID
TRIM LINE AT
FIRST GOOD PAVEMENT
INDEFINITE
EDGE
RUNWAY END
SURVEY POINT
7
THIS GRAPHIC IS NOT TO SCALE. FEATURES
ARE SYMBOLIZED AND INTENDED FOR
ILLUSTRATION PURPOSES ONLY.
RUNWAY/STOPWAY SURVEYS SHOULD
BE DISCUSSED WITH APPROPRIATE
AIRPORT AUTHORITIES
FISHER
RWY2.CDR
1/1/98

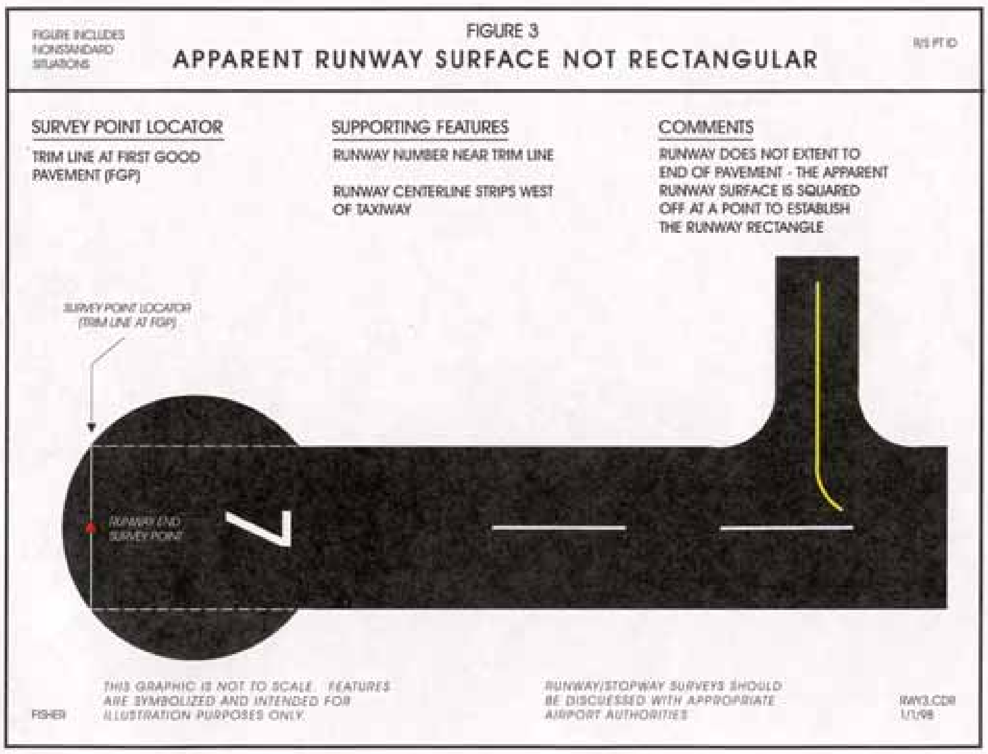


FIGURE INCLUDES
NONSTANDARD
SITUATIONS
FIGURE 3
APPARENT RUNWAY SURFACE NOT RECTANGULAR
R/S PT ID
SURVEY POINT LOCATOR
TRIM LINE AT FIRST GOOD
PAVEMENT (FGP)
SUPPORTING FEATURES
RUNWAY NUMBER NEAR TRIM LINE
RUNWAY CENTERLINE STRIPS WEST
OF TAXIWAY
COMMENTS
RUNWAY DOES NOT EXTENT TO
END OF PAVEMENT - THE APPARENT
RUNWAY SURFACE IS SQUARED
OFF AT A POINT TO ESTABLISH
THE RUNWAY RECTANGLE
SURVEY POINT LOCATOR
(TRIM LINE AT FGP)
RUNWAY END
SURVEY POINT
7
THIS GRAPHIC IS NOT TO SCALE. FEATURES
ARE SYMBOLIZED AND INTENDED FOR
ILLUSTRATION PURPOSES ONLY.
RUNWAY/STOPWAY SURVEYS SHOULD
BE DISCUSSED WITH APPROPRIATE
AIRPORT AUTHORITIES
FISHER
RWY3.CDR
1/1/98

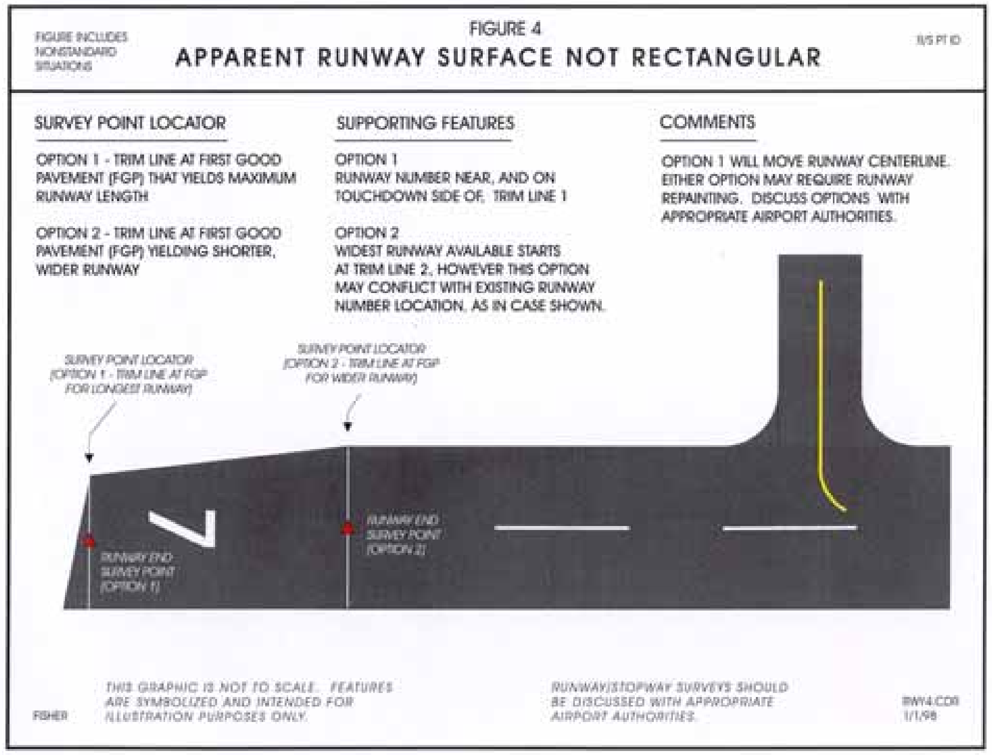


FIGURE INCLUDES NONSTANDARD SITUATIONS
FIGURE 4
APPARENT RUNWAY SURFACE NOT RECTANGULAR
11/S PT ID
SURVEY POINT LOCATOR
OPTION 1 - TRIM LINE AT FIRST GOOD PAVEMENT (FGP) THAT YIELDS MAXIMUM RUNWAY LENGTH
OPTION 2 - TRIM LINE AT FIRST GOOD PAVEMENT (FGP) YIELDING SHORTER, WIDER RUNWAY
SUPPORTING FEATURES
OPTION 1
RUNWAY NUMBER NEAR, AND ON TOUCHDOWN SIDE OF, TRIM LINE 1
OPTION 2
WIDEST RUNWAY AVAILABLE STARTS AT TRIM LINE 2, HOWEVER THIS OPTION MAY CONFLICT WITH EXISTING RUNWAY NUMBER LOCATION, AS IN CASE SHOWN.
COMMENTS
OPTION 1 WILL MOVE RUNWAY CENTERLINE. EITHER OPTION MAY REQUIRE RUNWAY REPAINTING. DISCUSS OPTIONS WITH APPROPRIATE AIRPORT AUTHORITIES.
SURVEY POINT LOCATOR (OPTION 1 - TRIM LINE AT FGP FOR LONGEST RUNWAY)
SURVEY POINT LOCATOR (OPTION 2 - TRIM LINE AT FGP FOR WIDER RUNWAY)
RUNWAY END SURVEY POINT (OPTION 1)
RUNWAY END SURVEY POINT (OPTION 2)
FISHER
THIS GRAPHIC IS NOT TO SCALE. FEATURES ARE SYMBOLIZED AND INTENDED FOR ILLUSTRATION PURPOSES ONLY.
RUNWAY/STOPWAY SURVEYS SHOULD BE DISCUSSED WITH APPROPRIATE AIRPORT AUTHORITIES.
RWY4.CDR
1/1/98

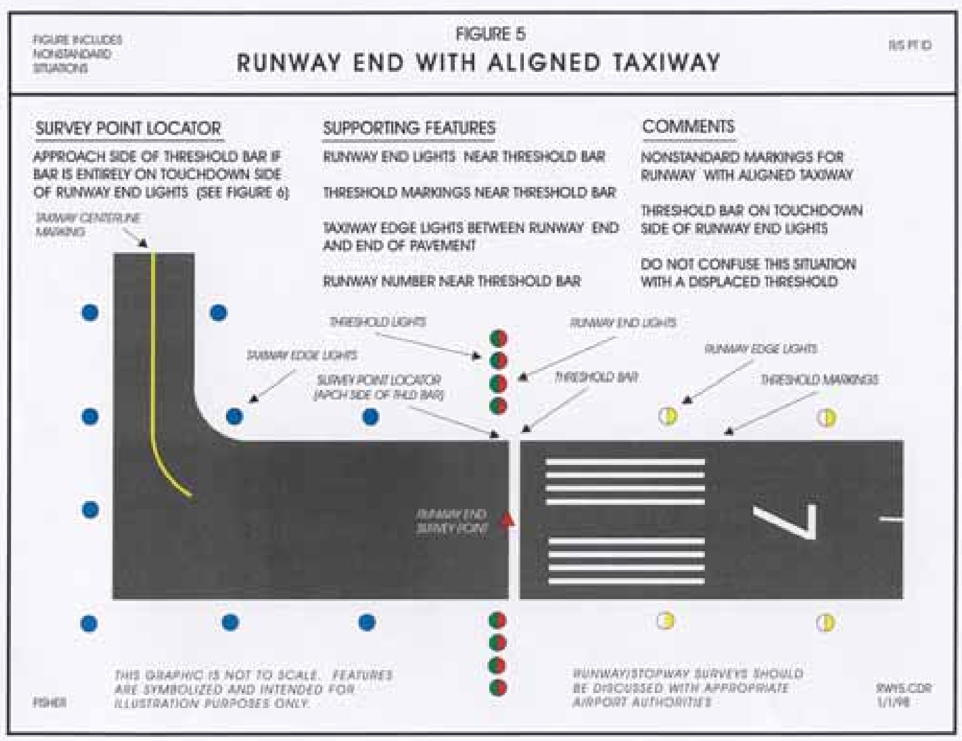


FIGURE INCLUDES NONSTANDARD SITUATIONS
FIGURE 5
RUNWAY END WITH ALIGNED TAXIWAY
11/S PT ID
SURVEY POINT LOCATOR
APPROACH SIDE OF THRESHOLD BAR IF BAR IS ENTIRELY ON TOUCHDOWN SIDE OF RUNWAY END LIGHTS (SEE FIGURE 6)
SUPPORTING FEATURES
RUNWAY END LIGHTS NEAR THRESHOLD BAR
THRESHOLD MARKINGS NEAR THRESHOLD BAR
TAXIWAY EDGE LIGHTS BETWEEN RUNWAY END AND END OF PAVEMENT
RUNWAY NUMBER NEAR THRESHOLD BAR
COMMENTS
NONSTANDARD MARKINGS FOR RUNWAY WITH ALIGNED TAXIWAY
THRESHOLD BAR ON TOUCHDOWN SIDE OF RUNWAY END LIGHTS
DO NOT CONFUSE THIS SITUATION WITH A DISPLACED THRESHOLD
TAXIWAY CENTERLINE MARKING
THRESHOLD LIGHTS
RUNWAY END LIGHTS
RUNWAY EDGE LIGHTS
TAXIWAY EDGE LIGHTS
SURVEY POINT LOCATOR (APCH SIDE OF THLD BAR)
THRESHOLD BAR
THRESHOLD MARKINGS
RUNWAY END SURVEY POINT
FISHER
THIS GRAPHIC IS NOT TO SCALE. FEATURES ARE SYMBOLIZED AND INTENDED FOR ILLUSTRATION PURPOSES ONLY.
RUNWAY/STOPWAY SURVEYS SHOULD BE DISCUSSED WITH APPROPRIATE AIRPORT AUTHORITIES.
RWY5.CDR
1/1/98

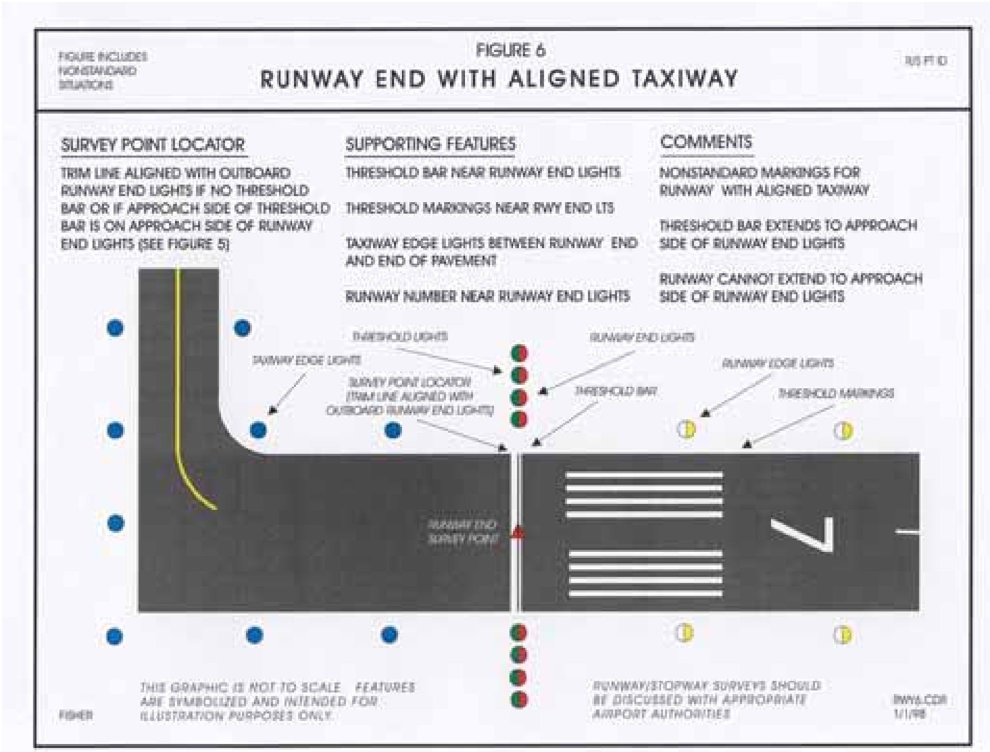


FIGURE INCLUDES NONSTANDARD SITUATIONS
FIGURE 6
RUNWAY END WITH ALIGNED TAXIWAY
R/S PT ID
SURVEY POINT LOCATOR
TRIM LINE ALIGNED WITH OUTBOARD RUNWAY END LIGHTS IF NO THRESHOLD BAR OR IF APPROACH SIDE OF THRESHOLD BAR IS ON APPROACH SIDE OF RUNWAY END LIGHTS (SEE FIGURE 5)
SUPPORTING FEATURES
THRESHOLD BAR NEAR RUNWAY END LIGHTS
THRESHOLD MARKINGS NEAR RWY END LTS
TAXIWAY EDGE LIGHTS BETWEEN RUNWAY END AND END OF PAVEMENT
RUNWAY NUMBER NEAR RUNWAY END LIGHTS
COMMENTS
NONSTANDARD MARKINGS FOR RUNWAY WITH ALIGNED TAXIWAY
THRESHOLD BAR EXTENDS TO APPROACH SIDE OF RUNWAY END LIGHTS
RUNWAY CANNOT EXTEND TO APPROACH SIDE OF RUNWAY END LIGHTS
THRESHOLD LIGHTS
RUNWAY END LIGHTS
TAXIWAY EDGE LIGHTS
RUNWAY EDGE LIGHTS
SURVEY POINT LOCATOR (TRIM LINE ALIGNED WITH OUTBOARD RUNWAY END LIGHTS)
THRESHOLD BAR
THRESHOLD MARKINGS
RUNWAY END SURVEY POINT
7
THIS GRAPHIC IS NOT TO SCALE. FEATURES ARE SYMBOLIZED AND INTENDED FOR ILLUSTRATION PURPOSES ONLY.
RUNWAY/STOPWAY SURVEYS SHOULD BE DISCUSSED WITH APPROPRIATE AIRPORT AUTHORITIES
FISHER
RWY6.CDR
1/1/98

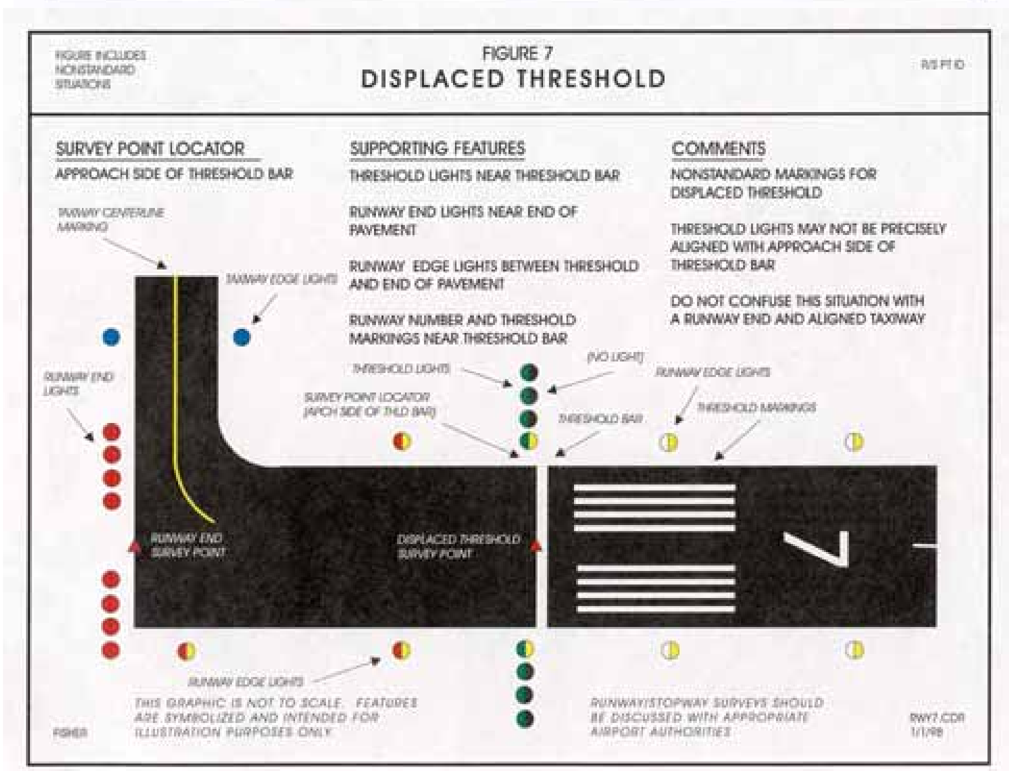


FIGURE INCLUDES NONSTANDARD SITUATIONS
FIGURE 7
DISPLACED THRESHOLD
R/S PT ID
SURVEY POINT LOCATOR
APPROACH SIDE OF THRESHOLD BAR
SUPPORTING FEATURES
THRESHOLD LIGHTS NEAR THRESHOLD BAR
RUNWAY END LIGHTS NEAR END OF PAVEMENT
RUNWAY EDGE LIGHTS BETWEEN THRESHOLD AND END OF PAVEMENT
RUNWAY NUMBER AND THRESHOLD MARKINGS NEAR THRESHOLD BAR
COMMENTS
NONSTANDARD MARKINGS FOR DISPLACED THRESHOLD
THRESHOLD LIGHTS MAY NOT BE PRECISELY ALIGNED WITH APPROACH SIDE OF THRESHOLD BAR
DO NOT CONFUSE THIS SITUATION WITH A RUNWAY END AND ALIGNED TAXIWAY
TAXIWAY CENTERLINE MARKING
TAXIWAY EDGE LIGHTS
RUNWAY END LIGHTS
THRESHOLD LIGHTS
(NO LIGHT)
RUNWAY EDGE LIGHTS
THRESHOLD MARKINGS
SURVEY POINT LOCATOR (APCH SIDE OF THLD BAR)
THRESHOLD BAR
RUNWAY END SURVEY POINT
DISPLACED THRESHOLD SURVEY POINT
7
RUNWAY EDGE LIGHTS
THIS GRAPHIC IS NOT TO SCALE. FEATURES ARE SYMBOLIZED AND INTENDED FOR ILLUSTRATION PURPOSES ONLY.
RUNWAY/STOPWAY SURVEYS SHOULD BE DISCUSSED WITH APPROPRIATE AIRPORT AUTHORITIES
FISHER
RWY7.CDR
1/1/98

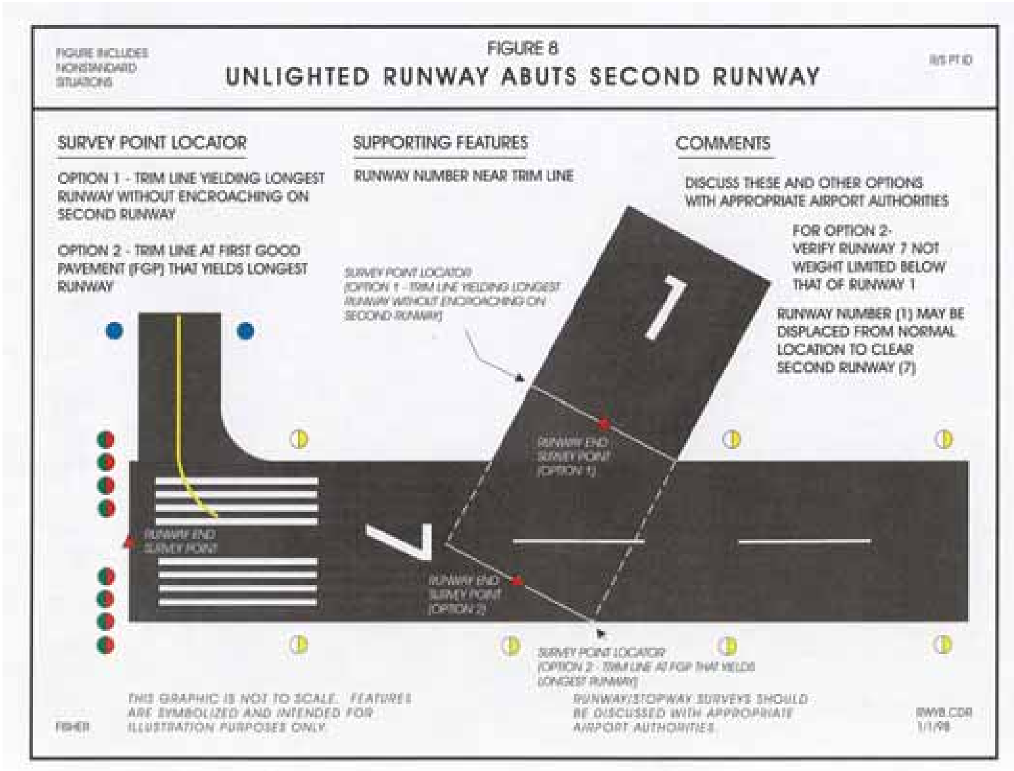


FIGURE INCLUDES NONSTANDARD SITUATIONS
FIGURE 8
UNLIGHTED RUNWAY ABUTS SECOND RUNWAY
R/S PT ID
SURVEY POINT LOCATOR
OPTION 1 - TRIM LINE YIELDING LONGEST RUNWAY WITHOUT ENCROACHING ON SECOND RUNWAY
OPTION 2 - TRIM LINE AT FIRST GOOD PAVEMENT (FGP) THAT YIELDS LONGEST RUNWAY
SUPPORTING FEATURES
RUNWAY NUMBER NEAR TRIM LINE
COMMENTS
DISCUSS THESE AND OTHER OPTIONS WITH APPROPRIATE AIRPORT AUTHORITIES
FOR OPTION 2- VERIFY RUNWAY 7 NOT WEIGHT LIMITED BELOW THAT OF RUNWAY 1
RUNWAY NUMBER (1) MAY BE DISPLACED FROM NORMAL LOCATION TO CLEAR SECOND RUNWAY (7)
SURVEY POINT LOCATOR (OPTION 1 - TRIM LINE YIELDING LONGEST RUNWAY WITHOUT ENCROACHING ON SECOND RUNWAY)
1
RUNWAY END SURVEY POINT (OPTION 1)
7
RUNWAY END SURVEY POINT
RUNWAY END SURVEY POINT (OPTION 2)
SURVEY POINT LOCATOR (OPTION 2 - TRIM LINE AT FGP THAT YIELDS LONGEST RUNWAY)
THIS GRAPHIC IS NOT TO SCALE. FEATURES ARE SYMBOLIZED AND INTENDED FOR ILLUSTRATION PURPOSES ONLY.
RUNWAY/STOPWAY SURVEYS SHOULD BE DISCUSSED WITH APPROPRIATE AIRPORT AUTHORITIES.
FISHER
RWY8.CDR
1/1/98

Appendix 3 – Additional Airport Data Content Features Standards and Computer Aided Drafting and Design Compliance Specifications

Section 3-1: Additional Airport Data Content Features

Group: Airfield

AircraftGateStand *

Operational area of gate (parking) stand. If no gate stand area painting is vailable, a virtual parking stand area should be provided [Source: RTCA DO-272]

Geometry Type: Polygon

Accuracy: +/-5Ft.

Sensitivity: Restricted

SDSFIE Entity: airfield_surface_site

Attributes:

acpark_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type
feat_name (String30)	The name of the feature. [Source: SDSFIE Feature Table]
feat_desc (String255)	Description of the feature.
gate_stand_type_d (Enumeration)	The type of aircraft gate/stand.
pavementClassificationNumber	A number which expresses the relative load carrying capacity of a pavement in terms of a standard single wheel load. [Source: AC 150/5335-5]
wingspan (Real)	The quantity representing the maximum wingspan which can be accommodated by the airfield surface. [Source: SDSFIE Feature Table]
status_d (Enumeration)	A temporal description of the operational status of the feature. This attribute is used to describe real-time status
feat_width (Real)	The overall width of the airfield surface. [Source: SDSFIE Feature Table]
feat_len (Real)	The overall length of the airfield surface. [Source: SDSFIE Attribute Table]
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.

meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s)

AircraftNonMovementArea

An area where aircraft cannot be seen by a control tower and therefore are restricted to move.

Geometry Type: Polygon

Accuracy: +/-5Ft.

Sensitivity:Restricted

SDSFIE Entity *none*

Attributes:

aircraftnonmovementarea_id	Primary Key. A globally unique identifier assigned to the instance of a feature type.
name (String40)	Name of the feature.
feat_desc (String255)	Description of the feature.
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

AirfieldLight *

Any lighting located within or near an airport boundary the provides guidance for airborne and ground maneuvering of aircraft [Source: AIM, AC 150/5340-24]Point

Accuracy: +/-5Ft.

Sensitivity: Restricted

SDSFIE Entity: airfield_light_point

Attributes:

light_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type.
name (String40)	Name of the feature.
feat_desc (String255)	Description of the feature.
lightingType_d (Enumeration)	A description of the lighting system. Lighting system classifications are Approach; Airport; Runway; Taxiway; and Obstruction
color_d (Enumeration16)	The color of the airfield light. [Source: SDSFIE Feature Table]
luminesc (String12)	The luminescence of the airfield light. [Source: SDSFIE Feature Table]
pilotControlFrequency * (Real)	The radio frequency used by pilots to control various airport lighting systems
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

AirfieldLinearFeatureSafetyLine *

Location of the arresting gear cable across the runway [Source: RTCA DO-272]

Geometry Type: Line

Accuracy: +/-5Ft.

Sensitivity: Restricted

SDSFIE Entity *airfield_linear_safety_feature_line*

Attributes:

safety_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type
fac_typ_d (String16)	The type of facility or feature related to airfield operations. [Source: SDSFIE Attribute Table]
status_d (Enumeration)	A temporal description of the operational status of the feature. This attribute is used to describe real-time status

user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item’s data
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s)

AirOperationsArea *

A portion of an airport, specified in the airport security program, in which security measures are carried out. This area includes aircraft movement areas, aircraft parking areas, loading ramps, and safety areas and any adjacent areas (such as general aviation areas) that are not separated by adequate security systems, measures, or procedures. [Source: 49 CFR Part 1542, Airport Security]

Geometry Type: Polygon

Accuracy: +/-5Ft.

Sensitivity: Unclassified

SDSFIE Entity *none*

<u>Attributes:</u>

airoperationsarea_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type.
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item’s data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s)

FrequencyArea *

Area specifying the designated part of the surface movement area where a specific frequency is required by ATC or ground control [Source: RTCA DO-272]

Geometry Type: Polygon

Accuracy:Unspecified

Sensitivity: Unclassified

SDSFIE Entity: communications_groundwave_polygon_area

Attributes:

gwv_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type
feat_name (String30)	Any commonly used name for the feature. [Source: SDSFIE Feature Table]
feat_desc (String60)	A description of the feature. [Source: SDSFIE Feature Table]
frequency (Real)	Primary frequency used on frequency area (in MHZ). [Source: RTCA DO-272]
station (String30)	Service or Station assigned to primary frequency (e.g., ATC Tower, Ground Control) [Source: RTCA DO-272]
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

HelipadFATO *

A defined area over which the final phase of the approach to a hover, or a landing, is completed and from which the takeoff is initiated. This area was called the "takeoff and landing area" in previous publications [Source: AC 150/5390-2B]

Geometry Type: Polygon

Accuracy: +/-5Ft.

Sensitivity: Unclassified

SDSFIE Entity: none

Attributes:

helipadfato_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type.
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the

	applicable feature level metadata record(s)

HelipadThreshold *

Based on the predominant wind direction, the helipad threshold position is congruent with the approach/takeoff paths [Source: RTCA DO-272]

Geometry Type:Point

Accuracy: +/-5Ft.

Sensitivity: Unclassified

SDSFIE Entity *none*

Attributes:

helipadthreshold_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type.
thresholdDesc (String254)	A descriptive of the helipad and direction. See SF21 3.3.3.4.54
latitude (Real)	Latitude in decimal degrees with negative numbers used for Western hemisphere
longitude (Real)	Longitude in decimal degrees with negative numbers used for Western Hemisphere
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect thesubject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record (s)

PassengerLoadingBridge *

A bridge for loading/unloading access to airplanes for passengers and crew.

Geometry Type: Polygon

Accuracy: Unspecified

Sensitivity: Restricted

SDSFIE Entity *none*

Attributes:

passengerloadingbridge_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type
name (String40)	Name, code or identifier used to identify the loading bridge.
feat_desc (String255)	Description of the feature.
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

PavementSection *

A section of paved surface used for pavement condition assessment.

Geometry Type: Polygon

Accuracy: +/-5Ft.

Sensitivity: Restricted

SDSFIE Entity: none

Attributes:

taxiwayintersection_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type
name (String40)	Name of the feature.
feat_desc (String255)	Description of the feature.

user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

RunwayArrestingArea *

Any FAA-approved high energy absorbing material of a specific strength that will reliably and predictably bring and aircraft to a stop without imposing loads that exceed the aircraft's design limits, cause major structural damage, or impose excessive forces on its occupants. Currently, the only FAA approved material is EMAS - Engineered Material Arresting System. [Source: AC 150/5220-22]

Geometry Type: Polygon

Accuracy: +/-5Ft.

Sensitivity: Restricted

SDSFIE Entity: airfield_linear_saftey_feature_line

<u>Attributes:</u>

safety_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type.
surfaceMaterial_d (Enumeration)	A code indicating the composition of the related surface [Source: NFDC]
feat_len (Real)	The overall length of the feature. [Source: SDSFIE Feature Table]
feat_width (Real)	The overall width of the feature.
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

RunwayCenterline *

Continuous line along the painted centerline of a runway connecting the middle-points of the two outermost thresholds. Centerline is composed of many centerline points (see RunwayControlPoint). It is used to calculate grade and line-of-sight criteria. [Source: AC 150/5300-13]

Geometry Type: Line

Accuracy: +/-2Ft.

Sensitivity: Restricted

SDSFIE Entity *airfield_surface_centerline*

Attributes:

runwaycenterline_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type
rwy_desg (String7)	Designator of the runway based on the magnetic bearing and position in relation to parallel runways (e.g. 33R/15L) [Source: AC 150/5340-1]
isDerived (Boolean)	Indicates whether the centerline is derived or photodetermined.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

RunwayHelipadDesignSurface *

A three-dimensional surface that is used in runway design [Source: AC 150/5300-13]

Geometry Type: Polygon

Accuracy: +/-5Ft.

Sensitivity: Restricted

SDSFIE Entity *airfield_imaginary_surface_area*

Attributes:

spc_zon_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type.
zone_name (String30)	Table]
feat_desc (String255)	Description of the feature.
designSurfaceType_d (Enumeration)	A description of the design surface
safety_reg (String20)	An identifier for the safety regulations in effect within the zone. [Source: SDSFIE Feature Table]
zone_use (String50)	A description of the use of the zone. [Source: SDSFIE Feature Table]
determination (String255)	A formal declaration of the runway safety area condition with respect to standards and any requirement improvements [Source: FAA Order 5200.8]

determinationDate (Date)	The date the RSA determination was approved [Source: FAA Order 5200.8]
zone_inner_width * (Real)	The width of the narrow end of a trapezoidal shaped DesignSurface feature. This is normally the end that is closest to the landing surface [Source: AC 150/5300-13]
zone_outer_width (Real)	The width of the wide end of a trapezoidal shaped DesignSurface feature. This is normally the end that is furthest from the landing surface.
zone_length (Real)	The length of a trapezoidal shaped DesignSurface feature.
grad_lo_hi (Real)	The low to high gradient within the airspace. [Source: SDSFIE Feature Table]
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

RunwayIntersection *

The area of intersection between two or more runways [Source: RTCA DO-272]

Geometry Type: Polygon

Accuracy: +/-2Ft.

Sensitivity: Restricted

SDSFIE Entity: none

Attributes:

runwayintersection_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type.
rnw1_desgn (String7)	Designator of the 1st intersecting runway based on the magnetic bearing and position in relation to parallel runways (e.g. 33R/15L) [Source: SDSFIE Attribute Table]
rnw2_desgn (String7)	Designator of the 2nd intersecting runway based on the magnetic bearing and position in relation to parallel runways (e.g. 33R/15L) [Source: SDSFIE Attribute Table]
rnw3_desgn (String7)	Designator of the 3rd intersecting runway based on the magnetic bearing and position in relation to parallel runways (e.g. 33R/15L) [Source: SDSFIE Attribute Table]
pavementClassificationNumber	A number which expresses the relative load carrying capacity of a pavement in terms of a standard single wheel load. [Source: AC 150/5335-5]
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

RunwayLAHSO *

Markings installed on a runway where an aircraft is to stop when the runway is normally used as a taxiway or used for Land and Hold Short Operations (LAHSO) as identified in a letter of agreement with the Air Traffic Control
Tower (ATCT). A runway should be considered as normally used for taxiing if there is no parallel taxiway and no ATCT. Otherwise, seek input from ATCT [Source: Order 7110.118]

Geometry Type: Line

Accuracy: +/-5Ft.

Sensitivity: Restricted

SDSFIE Entity: none

<u>Attributes:</u>

runwaylahso_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type.
protected_rnw_desgn (String7)	Unique runway identifier for the airport of the runway, if any, being protected by the LAHSO (when the LAHSO precedes a runway intersection).
markingFeatureType_d	The type of the marking
color_d (Enumeration)	The color of the marking
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

RunwaySegment *

A section of the runway surface. The runway surface can be defined by a set of non-overlapping RunwaySegment polygons. RunwaySegments may overlap Runway and RunwayIntersection features. Use RunwaySegment to model the physical runway pavement in terms of surface, material, strength and condition. [Source: AC 150/5335-5, AC 150/5320-12, AC 150/5320-17, AC 150/5320-6]

Geometry Type: Polygon

Accuracy: +/-5Ft.

Sensitivity: Restricted

SDSFIE Entity: none

Attributes:

runwaysegment_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type.
name (String40)	Name of the feature.
feat_desc (String255)	Description of the feature.
status_d (Enumeration)	A temporal description of the operational status of the feature. This attribute is used to describe real-time status
surfaceType_d (Enumeration)	A classification of airfield pavement surfaces for Airport Obstruction Charts [Source: NGS]
pavementClassificationNumber	A number which expresses the relative load carrying capacity of a pavement in terms of a standard single wheel load. [Source: AC 150/5335-5]
surfaceCondition_d (Enumeration)	A description of the serviceability of the pavement [Source: NFDC]
surfaceMaterial_d (Enumeration)	A code indicating the composition of the related surface [Source: NFDC]
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

Shoulder *

An area adjacent to the edge of paved runways, taxiways, or aprons providing a transition between the pavement and the adjacent surface; support for aircraft running off the pavement; enhance drainage; and blast protection [Source: AC 150/5300-13]

Geometry Type: Polygon

Accuracy: +/-5Ft.

Sensitivity: Restricted

SDSFIE Entity *airfield_surface_site*

Attributes:

air_sur_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type
shl_type_d (String20)	Code for whether this is a runway shoulder or taxiway shoulder [Source: SDSFIE Attribute Table]
surfaceMaterial_d (Enumeration)	A code indicating the composition of the related surface [Source: NFDC]
feat_width (Real)	The overall width of the airfield surface. [Source: SDSFIE Feature Table]
feat_len (Real)	The overall length of the airfield surface. [Source: SDSFIE Attribute Table]
status_d (Enumeration)	A temporal description of the operational status of the feature. This attribute is used to describe real-time status
restricted (Boolean)	An indicator as to whether access to the feature is restricted.
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

TaxiwayHoldingPosition

A designated position at which taxiing aircraft and vehicles will stop and hold position, unless otherwise authorized by the aerodrome control tower [Source: RTCA DO-272]

Geometry Type: Line

Accuracy: +/-2Ft.

Sensitivity: Restricted

SDSFIE Entity *none*

Attributes:

taxiwayholdingposition_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type.
rnw_desgn (String7)	The designator for the approaching runway [Source: SDSFIE Attribute Table]
taxi_desgn (String4)	The designator for the taxiway [Source: SDSFIE Attribute Table]
low_visibility_cat_d (Enumeration)	The low visibility category
status_d (Enumeration)	A temporal description of the operational status of the feature. This attribute is used to describe real-time status
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

TaxiwayIntersection *

A junction of two or more taxiways [Source: ICAO Annex 14 (Aerodromes), Chapter 1, page 5]

Geometry Type: Point

Accuracy: +/-5Ft.

Sensitivity: Restricted

SDSFIE Entity: none

Attributes:

pavementsection_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type.
name (String40)	Name of the feature.
pavement_condition_index (Integer)	Pavement Classification Number Code [Source: SDSFIE Feature Table]

feat_desc (String255)	Description of the feature.
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

Group: Cadastral

County

Boundary line of the land and water under the right, power, or authority of the county government. [Source: SDSFIE]

Geometry Type: Polygon

Accuracy:

Sensitivity: Restricted

SDSFIE Entity: political_jurisdiction_county_line

Attributes:

juris_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type.
polit_name (String30)	The common name associated with the property area. [Source: SDSFIE Feature Table]
feat_desc (String254)	The description of the area. [Source: SDSFIE Attribute Table]
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

EasementsAndRightofWays

A parcel of land for which formal or informal deed easement rights exist [Source: SDSFIE (modified)]

Geometry Type: Polygon

Accuracy:

Sensitivity: Confidential

SDSFIE Entity: easement_right_of_way_area

Attributes:

easementsandrightofways_id	Primary Key. A globally unique identifier assigned to the instance of a feature type
name (String40)	Name of the feature.
feat_desc (String60)	A brief description of the feature. [Source: SDSFIE Feature Table]
status_d (String16)	The status of the parcel. (Active, inactive, terminated) [Source: SDSFIE Feature Table]
purpose (String30)	Project purpose for which the easement was acquired. [Source: SDSFIE Feature Table]
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

FAARegionArea

This feature depicts the FAA regions. [Source: SDSFIE]

Geometry Type: Polygon

Accuracy:

Sensitivity: Unclassified

SDSFIE Entity: faa_region_area

Attributes:

region_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type
reg_name (String60)	Name of the FAA region. [Source: SDSFIE Feature Table]
reg_desc (String60)	Description of the FAA region [Source: SDSFIE Feature Table]
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

LandUse *

A description of the human use of land and water [Source: SDSFIE]

Geometry Type: Polygon

Accuracy:

Sensitivity: Confidential

SDSFIE Entity *land_use_area*

Attributes:

landuse_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type
use_name (String30)	Name of the land use area. [Source: SDSFIE Feature Table]
use_desc (String60)	Description of the land use area. [Source: SDSFIE Feature Table]
use_typ_d (Enumeration)	The way in which the land is being used. High level (i.e. n000) or detailed (i.e. nnnn) can be used. [Source: SDSFIE]

user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

LeaseZone

A parcel of land leased by an individual, agency, or organization for their use. [Source: SDSFIE]

Geometry Type: Polygon

Accuracy:

Sensitivity: Unclassified

SDSFIE Entity *lease_zone_area*

Attributes:

leasezone_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type
name (String40)	Name of the feature.
feat_desc (String60)	A brief description of the feature. [Source: SDSFIE Feature Table]
ten_name (String75)	The current name of the tenant occupying the leased parcel [Source: SDSFIE Attribute Table]
status_d (String16)	The status of the parcel. (Active, inactive, terminated) [Source: SDSFIE Feature Table]
permit_use (String20)	Permitted use of the leased parcel [Source: SDSFIE Attribute Table]
lsd_area (Real)	Area accounted for in the lease for a parcel [Source: SDSFIE Attribute Table]
act_area (Real)	Actual measured area of the leased parcel [Source: SDSFIE Attribute Table]
date_lsexp (Date)	The date the lease is expected to expire. Format for date is YYYYMMDD (i.e. September 15, 1994 = 19940915). [Source: SDSFIE Feature Table]
legl_desc (String240)	The complete legal description of the property as it appears in the deed. [Source: SDSFIE Feature Table]

user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

Municipality *

Boundary line of the land and water under the right, power, or authority of the municipal government. [Source: SDSFIE]

Geometry Type: Polygon

Accuracy:

Sensitivity: Restricted

SDSFIE Entity *political_jurisdiction_municipal_line*

Attributes:

juris_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feture type
polit_name (String30)	The common name associated with the property area. [Source: SDSFIE Feature Table]
feat_desc (String254)	The description of the area. [Source: SDSFIE Attribute Table]
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s)

Parcel

A single cadastral unit, which is the spatial extent of the past, present, and future rights and interests in real property and the geographic framework to support the description of the spatial extent. [Source: SDSFIE]

Geometry Type: Polygon

Accuracy: +/-1Ft.

Sensitivity: Restricted

SDSFIE Entity: parcel_area

Attributes:

parcel_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type
parc_num (String12)	Any locally used number to identify the parcel. [Source: SDSFIE Feature Table]
parc_use_d (String16)	The current primary use of the parcel. [Source: SDSFIE Feature Table]
status_d (String16)	The status of the parcel. (Active, inactive, terminated) [Source: SDSFIE Feature Table]
legl_desc (String240)	The complete legal description of the property as it appears in the deed. [Source: SDSFIE Feature Table]
date_acqrd (Date)	The date the parcel was acquired by the current owner. Format for date is YYYYMMDD (i.e. September 15, 1994 = 19940915). [Source: SDSFIE Feature Table]
area_size (Real)	The size of the area, zone, or polygon in square units. [Source: SDSFIE Feature Table]
assd_value (Real)	The most recent assessed value of the parcel. [Source: SDSFIE Feature Table]
deed_ref (String30)	Reference to where the deed to the parcel is recorded in such information as Plat Book and Page. [Source: SDSFIE Feature Table]
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

State

Boundary line of the land and water under the right, power, or authority of the state government. [Source: SDSFIE]

Geometry Type: Polygon

Accuracy:

Sensitivity: Restricted

SDSFIE Entity *political_jurisdiction_state_line*

Attributes:

juris_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type
polit_name (String30)	The common name associated with the property area. [Source: SDSFIE Feature Table]
feat_desc (String254)	The description of the area. [Source: SDSFIE Attribute Table]
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

Zoning *

A parcel of land zoned specifically for real estate and land management purposes; more specifically for commercial, residential, or industrial use. [Source: SDSFIE]

Geometry Type: Polygon

Accuracy:

Sensitivity: Restricted

SDSFIE Entity: zoning_area

Attributes:

zoning_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feture type
name (String40)	Name of the feature.
feat_desc (String60)	A brief description of the feature. [Source: SDSFIE Feature Tale]
zng_cls_d (Enumeration16)	The zoning classification of the parcel. [Source: SDSFIE Feature Table]

restrict_d (String16)	Codes determining the land owner restriction for the parcel. [Source: SDSFIE Feature Table]
status_d (String16)	The status of the parcel. (Active, inactive, terminated) [Source: SDSFIE Feature Table]
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

Group: Environmental

EnvironmentalContaminationArea

A facility or other locational entity, (as designated by the Environmental Protection Agency) that is regulated or monitored because of environmental concerns. [Source: SDSFIE]

Geometry Type: Polygon

Accuracy:

Sensitivity: Restricted

SDSFIE Entity: environmental_regulated_facility_site

Attributes:

sitaoc_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type
site_name (String50)	The name of a specific facility. [Source: SDSFIE Feature Table]
ehazcat_d (String16)	Indicates the broad category or type of the most prevalent or serious environmental hazard present at the site. [Source: SDSFIE Feature Table]
rel_typ_d (String16)	A descriptor for the type of pollutant release experienced. [Source: SDSFIE Feature Table]
severity_d (String16)	A descriptor for the severity of the pollution. [Source: SDSFIE Feature Table]
rem_urg_d (String16)	A code indicating the urgency for accomplishing a site remediation project. [Source: SDSFIE Feature Table]
tox_stt_d (String16)	A descriptor for the toxic status of the pollution. [Source: SDSFIE Feature Table]
pstatus_d (String16)	The code indicating whether the facility status is Active or Inactive. [Source: SDSFIE Feature Table]
date_found (Date)	The date the pollution was discovered. Format for date is YYYYMMDD (i.e. September 15, 1994 = 19940915) [Source: SDSFIE Feature Table]
cause_d (String16)	A code indicating the cause of the pollution. [Source: SDSFIE Feature Table]
pol_src_d (String16)	The actual or suspected source of the pollutant. [Source: SDSFIE Table]
src_desc (String60)	A description of the source of the pollution. [Source: SDSFIE Feature Table]

user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

FaunaHazardArea

An area where there are hazards due to wildlife activities. This includes bird aircraft strike hazard (BASH) areas, and deer strike areas. [Source: SDSFIE]

Geometry Type: Polygon

Accuracy:

Sensitivity: Restricted

SDSFIE Entity *fauna_hazard_area*

Attributes:

hazard_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feture type
haz_typ_d (Enumeration16)	A descriptor of the type of the hazard. [Source: SDSFIE Feature Table]
narrative (String240)	A description or other unique information concerning the subject item, limited to 240 characters. [Source: SDSFIE Feature Table]
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

FloodZone *

Areas subject to 100-year, 500-year and minimal flooding [Source: SDSFIE]

Geometry Type: Polygon

Accuracy:

Sensitivity: Unclassified

SDSFIE Entity: flood_zone_area

Attributes:

fld_zon_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature Type
zone_type_d (Enumeration)	The zoning classification of the area
feat_desc (String254)	Description of the feature.
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

FloraSpeciesSite *

The specific location where an individual flora species or an aggregate of flora species has been identified

Geometry Type: Point

Accuracy:

Sensitivity: Unclassified

SDSFIE Entity: flora_species_site

Attributes:

species_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feture type
plnt_typ_d (String16)	A descriptor of the type of flora. [Source: SDSFIE Feature Table]
plant_ht (Real)	The average height of the flora species. [Source: SDSFIE Feature Table]

hab_stt (String1)	Defines if the habitat has been designated as a critical habitat under (C) the Endangered species Act or has not been so designated (N). [Source: SDSFIE Feature Table]
feat_desc (String60)	Any brief description of the feature. [Source: SDSFIE Feature Table]
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

ForestStandArea *

A forest flora community with similar characteristics. [Source: SDSFIE]

Geometry Type: Polygon

Accuracy:

Sensitivity: Confidential

SDSFIE Entity: flora_species_management_area

Attributes:

flmspc_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feture type
habcat_d (String16)	Discriminator - The designation or type of the special wildlife habitat. [Source: SDSFIE Feature Table]
feat_desc (String60)	A description of the flora species. [Source: SDSFIE Feature Table]
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

HazMatStorageSite

A defined or bounded geographical area designated and used for the storage of contained hazardous materials. [Source: SDSFIE]

Geometry Type: Point

Accuracy:

Sensitivity: Unclassified

SDSFIE Entity: contained_hazwaste_storage_site

Attributes:

hwarea_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feture type
hsb_cat_d (String16)	The general type or category of contained hazardous material stored. [Source: SDSFIE Feature Table]
narrative (String240)	A description or other unique information concerning the subject item, limited to 240 characters. [Source: SDSFIE Feature Table]
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

NoiseIncident *

A formal complaint by an individual or group regarding excessive noise resulting from airport operations.

Geometry Type: Point

Accuracy:

Sensitivity: Restricted

SDSFIE Entity: noise_incident_point

Attributes:

inc_sit_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type
reporter (String50)	The name of the individual or organization reporting the incident. [Source: SDSFIE Feature Table]
incid_desc (String60)	A general description of the complete incident, including any reference material. [Source: SDSFIE Feature Table]
latitude (Real)	Latitude in decimal degrees with negative numbers used for Western Hemisphere
longitude (Real)	Longitude in decimal degrees with negative numbers used for Western Hemisphere
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

NoiseMonitoringPoint *

The location of noise sensing equipment or where a noise sample is taken. [Source: SDSFIE]

Geometry Type: Point

Accuracy:

Sensitivity: Restricted

SDSFIE Entity: noise_monitoring_point

Attributes:

noisemonitoringpoint_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feture type
name (String40)	Name of the feature.
feat_desc (String255)	Description of the feature.
status_d (Enumeration)	A temporal description of the operational status of the feature. This attribute is used to describe real-time status
latitude (Real)	Latitude in decimal degrees with negative numbers used for Western Hemisphere

longitude (Real)	Longitude in decimal degrees with negative numbers used for Western Hemisphere
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

SampleCollectionPoint

The physical location at which one or more environmental hazards field samples are collected. [Source: SDSFIE]

Geometry Type: Point

Accuracy:

Sensitivity: Confidential

SDSFIE Entity *field_sample_collection_location_point*

Attributes:

sam_pt_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type
ltccode_d (String16)	Code describing the type of location which is undergoing sampling (e.g., bh= borehole, wl=well). IRPIMS. [Source: SDSFIE Feature Table]
locdesc (String240)	Descriptor providing any additional information to describe the sampling location in text format (e.g., monitoring well located 10 feet northeast of building 624 within spill area). IRPIMS. [Source: SDSFIE Feature Table]
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

Shoreline *

The boundary where land meets the edge of a large body of fresh or salt water. The shoreline is the mean high water line between high and low tide [Source: SDSFIE]

Geometry Type: Line

Accuracy:

Sensitivity: Restricted

SDSFIE Entity *shoreline*

Attributes:

indfshl_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type
shore_name (String30)	A commonly used name for the shoreline. [Source: SDSFIE Feature Table]
shr_typ_d (String16)	Discriminator - A value indicating the type or kind of shoreline [Source: SDSFIE Feature Table]
shore_desc (String60)	A local description for the shoreline. [Source: SDSFIE Feature Table]
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

Wetland *

Transitional lands between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. The soils are predominantly saturated with water and the plants and animals that live there are specialized for this ecosystem [Source: SDSFIE]

Geometry Type: Polygon

Accuracy:

Sensitivity: Restricted

SDSFIE Entity: wetland_area

Attributes:

wetland_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feture type
wetln_name (String30)	Any commonly used name for the wetland. [Source: SDSFIE Feature Table]
wetln_desc (String60)	A description of the wetland. [Source: SDSFIE Feature Table]
feat_typ_d (String16)	A descriptor of how the wetland is depicted graphically. [Source: SDSFIE Feature Table]
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

Group: Geotechnical

CoordinateGridArea

A regular pattern of horizontal and vertical lines used to represent regular coordinate intervals along the x and y axis. This grid line can be used to generate an arbitrary grid system which is common on locator maps. [Source: SDSFIE]

Geometry Type: Line

Accuracy: +/-1Ft.

Sensitivity: Restricted

SDSFIE Entity *coordinate_grid_area*

Attributes:

cmgrd_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feture type
name (String40)	The name, code or identifier used to refer to an individual grid cell.
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

ElevationContour

Connecting points on the surface of the earth of equal vertical elevation representing some fixed elevation interval. [Source: SDSFIE]

Geometry Type: Line

Accuracy: +/-1Ft.

Sensitivity: Restricted

SDSFIE Entity: elevation_contour_line

Attributes:

contour_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type
elevation (Real)	The elevation of the contour line. [Source: SDSFIE Feature Table]
feat_len (Real)	The overall length of the feature. [Source: SDSFIE Feature Table]
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

ImageArea

The image foot print or coverage area. [Source: SDSFIE]

Geometry Type: Polygon

Accuracy:

Sensitivity: Confidential

SDSFIE Entity: image_area

Attributes:

gdimage_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feture type
frame_no (String20)	Frame number of the image. [Source: SDSFIE Feature Table]
narrative (String240)	A description or other unique information concerning the subject item, limited to 240 characters. [Source: SDSFIE Feature Table]
photo_date (Date)	Date the aerial photography was flown. Format for date is YYYYMMDD (i.e. September 15, 1994 = 19940915) [Source: SDSFIE Feature Table]

user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

Group: Manmade Structures

Fence *

Any fencing (chain-link, razor wire, PVC, etc. [Source: FAA]

Geometry Type: Line

Accuracy:

Sensitivity: Restricted

SDSFIE Entity *fence_line*

Attributes:

fence_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type
fenc_typ_d (String16)	A code indicating the fencing material used. [Source: SDSFIE Feature Table]
narrative (String240)	A description or other unique information concerning the subject item, limited to 240 characters. [Source: SDSFIE Feature Table]
fence_ht (Real)	The overall distance from the surface of the ground to the top of the fence. [Source: SDSFIE Feature Table]
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

Gate *

The aircraft stand location defines the outermost location to where a parking stand area can accommodate a specific aircraft type [Source: RTCA DO-272]

Geometry Type:Line

Accuracy:

Sensitivity: Restricted

SDSFIE Entity: gate_line

Attributes:

gate_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type
name (String40)	Name, code or identifier used to identify the gate.
gate_typ_d (String16)	The gate material and method of construction. [Source: SDSFIE Feature Table]
gate_len (Real)	The overall distance from one end of the gate to the other. [Source: SDSFIE Feature Table]
gate_ht (Real)	The overall distance from the surface of the ground to the top of the gate. [Source: SDSFIE Feature Table]
attended_d (Boolean)	A Boolean indicating whether the gate is tended by a guard or other individual. [Source: SDSFIE Feature Table]
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

Tower *

An existing structure that was created, by man, to facilitate an activity at an elevated level above the ground.

Geometry Type: Point

Accuracy: +/-5Ft.

Sensitivity: Restricted

SDSFIE Entity *tower_site*

Attributes:

tower_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type
name (String40)	Name of the feature.
feat_desc (String255)	Description of the feature.

lightCode (Boolean)	A code indicating that the obstacle is lighted [Source: AIXM]
lightingType_d (Enumeration)	A description of the lighting system. Lighting system classifications are Approach; Airport; Runway; Taxiway; and Obstruction
color_d (Enumeration)	The color of the marking(s)
markingFeatureType_d	The type of the marking(s)
verticalStructureMaterial_d	Classifies the predominant material of the vertical object
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

Group: Navigational Aids

NAVAIDCriticalArea *

A zone encompassing a specific ground area in the vicinity of a radiating antenna array which must be protected from parking and unlimited movement of surface and air traffic [Source: FAA Order 6750.16C]

Geometry Type: Polygon

Accuracy: +/-5Ft.

Sensitivity: Restricted

SDSFIE Entity *airfield_buffer_zone_area*

Attributes:

afl_buf_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type
name (String40)	Name of the feature.
feat_desc (String255)	Description of the feature.
buffr_dist (Real)	The linear distance of the limit of the buffer for the airfield. [Source: SDSFIE Feature Table]
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

NAVAIDSite *

The parcel, lease, or right-of-way boundary for a navaid facility that is located off airport property.

Geometry Type: Polygon

Accuracy:

Sensitivity: Unclassified

SDSFIE Entity *airfield_facility_surface_site*

Attributes:

navaidsite_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type.
faaLocID (Char4)	The location identifier assigned to the feature by FAA.
fac_typ_d (String16)	The type of facility or feature related to airfield operations. [Source: SDSFIE Feature Table]
facil_desc (String60)	A brief description of the facility and any special characteristics. [Source: SDSFIE Feature Table]
PropertyCustodian (String50)	The regional property management office responsible for ownership of the site
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s)

NAVAIDSystem *

A reference point to a grouping of NAVAIDS that together perform a common function.

Geometry Type: Point

Accuracy: +/-5Ft.

Sensitivity: Unclassified

SDSFIE Entity *none*

Attributes:

navaidsystem_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type
faaLocID (Char4)	The location identifier assigned to the feature by FAA.
navaidSysTypeCode_d	The type of NAVAID system
latitude (Real)	Latitude in decimal degrees with negative numbers used for Western Hemisphere

longitude (Real)	Longitude in decimal degrees with negative numbers used for Western Hemisphere
feat_len (Real)	The overall length of the airfield surface. [Source: SDSFIE Attribute Table]
feat_desc (String255)	Description of the feature.
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

Group: Other

OtherLine

Other polygon features not elsewhere classified

Geometry Type: Line

Accuracy:

Sensitivity: Restricted

SDSFIE Entity: none

Attributes:

otherline_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type
featureType (String40)	The type of feature
narrative (String240)	A description or other unique information concerning the subject item, limited to 240 characters. [Source: SDSFIE Attribute Table]
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

OtherPoint

Other line features not elsewhere classified

Geometry Type: Point

Accuracy: Varies

Sensitivity: Restricted

SDSFIE Entity *none*

Attributes:

otherpoint_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type
featureType (String40)	The type of feature
narrative (String240)	A description or other unique information concerning the subject item, limited to 240 characters. [Source: SDSFIE Attribute Table]
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

OtherPolygon

Other polygon features not elsewhere classified

Geometry Type: Polygon

Accuracy: Varies

Sensitivity: Restricted

SDSFIE Entity *none*

Attributes:

otherpolygon_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type
featureType (String40)	The type of feature
narrative (String240)	A description or other unique information concerning the subject item, limited to 240 characters. [Source: SDSFIE Attribute Table]
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

Group: SeaPlane

FloatingDockSite *

A floating facility which can serve as a mooring place for vessels or as a floating dry dock. [Source: SDSFIE]

Geometry Type: Polygon

Accuracy:

Sensitivity: Unclassified

SDSFIE Entity: floating_dock_site

Attributes:

floatingdocksite_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type
name (String40)	Name of the feature.
feat_desc (String255)	Description of the feature.
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

NavigationBuoy *

A floating marker which is moored to the bottom at a specific known location, which is used as an aid to navigation or for other special purpose. [Source: SDSFIE]

Geomtry Type: Point

Accuracy: +/-5Ft.

Sensitivity: Unclassified

SDSFIE Entity: marine_navigation_buoy_point

Attributes:

buoy_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feture type
buoy_num (String20)	The official number of the buoy. [Source: SDSFIE Feature Table]
feat_name (String120)	Any commonly used name associated with the buoy. [Source: SDSFIE Feature Table]
narrative (String240)	A description or other unique information concerning the buoy limited to 240 characters. [Source: SDSFIE Feature Table]
buoy_typ_d (String16)	Discriminator - The type of the buoy. [Source: SDSFIE Feature Table]
color_d (Enumeration16)	The color of the buoy. [Source: SDSFIE Feature Table]
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

SeaplaneLandingArea *

An area specifically designated for take-offs and landings of sea planes. [Source: SDSFIE]

Geometry Type: Polygon

Accuracy: +/-5Ft.

Sensitivity: Restricted

SDSFIE Entity: sea_plane_landing_area

Attributes:

sealand_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feture type
feat_name (String30)	Any commonly used name associated with the sea plane landing area. [Source: SDSFIE Feature Table]
feat_desc (String255)	Description of the feature.

restrictn (String240)	Any restrictions or cautions associated with the sea plane landing area. [Source: SDSFIE Feature Table]
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

SeaplaneRampCenterline *

The centerline of ramps specifically designed to transit seaplanes from land to water and vice versa. [Source: SDSFIE]

Geometry Type: Line

Accuracy: +/-5Ft.

Sensitivity: Restricted

SDSFIE Entity *sea_plane_ramp_centerline*

Attributes:

seaplnr_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feture type
name (String40)	Name of the feature.
feat_desc (String255)	Description of the feature.
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

SeaplaneRampSite *

Ramps specifically designed to transit seaplanes from land to water and vice versa.
[Source: SDSFIE]

Geometry Type: Polygon

Accuracy: +/-5Ft.

Sensitivity: Restricted

SDSFIE Entity: sea_plane_ramp_site

Attributes:

seaplnr_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type
name (String40)	Name of the feature.
feat_desc (String255)	Description of the feature.
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

Group: Security

SecurityArea *

An area of the airport in which security measures required by 49CFR1542.201 must be carried out [Source: 49CFR1542]

Geometry Type: Polygon

Accuracy: +/-5Ft.

Sensitivity: Secret

SDSFIE Entity: none

Attributes:

securityarea_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type
name (String40)	Name of the feature.
feat_desc (String255)	Description of the feature.
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

SecurityIdentificationDisplayArea *

Portions of an airport, specified in the airport security program, in which security measures required by regulation must be, carried out. This area includes the security area and may include other areas of the airport. [Source: DHS]

Geometry Type: Polygon

Accuracy: +/-5Ft.

Sensitivity: Secret

SDSFIE Entity: none

Attributes:

sida_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type
name (String40)	Name of the feature.
feat_desc (String255)	Description of the feature.
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

SecurityPerimeterLine *

Any type of perimeter, such as barbed wire, high fences, motion detectors and armed guards at gates, that ensure no unauthorized visitors can gain entry. [Source: SDSFIE]

Geometry Type: Polygon

Accuracy:

Sensitivity: Confidential

SDSFIE Entity: security_perimiter_line

Attributes:

secper_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feture type
name (String40)	Name of the feature.
narrative (String240)	A description or other unique information concerning the subject item, limited to 240 characters. [Source: SDSFIE Attribute Table]
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

SterileArea *

Portions of an airport defined in the airport security program that provide passengers access to boarding aircraft and to which the access is generally controlled by TSA, an aircraft operator, or a foreign air carrier. [Source: DHS]

Geometry Type: Polygon

Accuracy: +/-5Ft.

Sensitivity: Secret

SDSFIE Entity *none*

Attributes:

sterilearea_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type
name (String40)	Name of the feature.
feat_desc (String255)	Description of the feature.
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

Group: Surface Transportation

Bridge *

A structure used by vehicles that allows passage over or under an obstacle such as a river, chasm, mountain, road or railroad. [Source: SDSFIE]

Geometry Type: Polygon

Accuracy: +/-5Ft.

Sensitivity: Restricted
SDSFIE Entity: road_bridge_area

Attributes:

bridge_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feture type
feat_name (String30)	Any commonly used name for the bridge. [Source: SDSFIE Feature Table]
narrative (String240)	This attribute field is used to identify the datum from which the vertical clearance information is referenced and to calculate actual vertical clearance. [Source: SDSFIE Feature Table]
brdg_typ_d (String16)	The fundamental structure type of the bridge. [Source: SDSFIE Feature Table]
vert_clr (Real)	The clearance in feet between the lowest point under the bridge opening and the water's surface at Mean High Water (MHW). [Source: SDSFIE Feature Table]
brdg_ht (Real)	The clearance of the bridge structure; i.e. the height beneath the structure of the bridge. [Source: SDSFIE Feature Table]
brdg_len (Real)	The total length of the span of the bridge. [Source: SDSFIE Feature Table]
lightingType_d (Enumeration)	A description of the lighting system. Lighting system classifications are Approach; Airport; Runway; Taxiway; and Obstruction
markingFeatureType_d	The type of the marking(s)
color_d (Enumeration)	The color of the marking(s)
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s)

DrivewayArea

An access to a residence or other vehicle parking lot or storage area. [Source: SDSFIE]

Geometry Type: Polygon

Accuracy:

Sensitivity: Restricted

SDSFIE Entity: driveway_area

Attributes:

drvway_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type
surf_mat_d (String16)	The material used as a surface for the driveway. [Source: SDSFIE Feature Table]
feat_desc (String255)	Description of the feature.
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

DrivewayCenterline

The center of the driveway as measured from the edge of the paved surface. The segments of a driveway centerline will coincide with the road segments in order to provide network connectivity. [Source: SDSFIE]

Geometry Type: Line

Accuracy:

Sensitivity: Restricted

SDSFIE Entity: none

<u>Attributes:</u>

drivewaycenterline_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type
feat_desc (String255)	Description of the feature.
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

ParkingLot

An area of an airport used for parking of automobiles, buses, etc. [Source: SDSFIE]

Geometry Type: Polygon

Accuracy: +/-5Ft.

Sensitivity: Restricted

SDSFIE Entity: vehicle_parking_area

<u>Attributes:</u>

parking_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type
feat_name (String30)	Any commonly used name for the parking area. [Source: SDSFIE Feature Table]
feat_desc (String60)	A description of the parking lot. [Source: SDSFIE Feature Table]
park_use_d (String16)	The primary use of the parking area. [Source: SDSFIE Feature Table]
srf_typ_d (String16)	Type of different materials used to construct the surface. [Source: SDSFIE Feature Table]
tot_spaces (Integer0)	The total parking spaces available in the area including handicapped or reserved spaces. [Source: SDSFIE Feature Table]
num_hndcp (Real)	The total number of spaces marked as being handicapped parking. [Source: SDSFIE Feature Table]
owner (String75)	The owner of the parking lot
user_flag (String254)	An operator-defined work area. This attribute can be used

	by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

RailroadCenterline *

Represents the centerline of each pair of rails [Source: ANSI: Data Content Standards For Transportation Networks: Roads]

Geometry Type: Line

Accuracy: +/-5Ft.

Sensitivity: Confidential

SDSFIE Entity: railroad_centerline

Attributes:

railrd_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type
feat_name (String30)	Any commonly used name for the railroad [Source: SDSFIE Feature Table]
remarks (String240)	Any narrative remarks concerning the railroad. [Source: SDSFIE Feature Table]
use_d (String16)	The current status as to whether the railroad segment is being used. [Source: SDSFIE Feature Table]
numTracks (Integer)	The number of tracks present
owner (String75)	The owner of the rail track
bridge_d (Boolean)	Indicates given road segment is bridge (Y- a is bridge, N- is not a bridge). [Source: SDSFIE Feature Table]
tunnel_d (Boolean)	Indicates given road segment is tunnel (Y- is a tunnel, N- is not a tunnel). [Source: SDSFIE Feature Table]
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.

meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

RailroadYard *

Represents a railroad yard [Source: ANSI: Data Content Standards For Transportation Networks: Roads]

Geometry Type: Polygon

Accuracy: +/-5Ft.

Sensitivity: Restricted

SDSFIE Entity: railroad_yard_area

Attributes:

rryard_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type
yard_name (String60)	A name that represent the railroad yard. [Source: SDSFIE Feature Table]
feat_desc (String60)	Any brief description of the feature. [Source: SDSFIE Feature Table]
owner (String75)	The owner of the rail yard
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

RoadCenterline *

The center of the roadway as measured from the edge of the paved surface. The segments of a road centerline will coincide with the road segments in order to have similar characteristics. [Source: SDSFIE]

Geometry Type: Line

Accuracy: +/-5Ft.

Sensitivity: Confidential

SDSFIE Entity: road_centerline

Attributes:

cline_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type
feat_name (String40)	Any commonly used name for the road centerline. [Source: SDSFIE Feature Table]
alt_name (String35)	The alternate name or second name for the road. [Source: SDSFIE Feature Table]
rou1_name (String30)	The route number or other identifier that is affiliated with the first route type [Source: SDSFIE Feature Table]
rou1_typ_d (String16)	The first route type for the road (Interstate, US, State, etc.) [Source: SDSFIE Feature Table]
rou2_name (String30)	The route number or other identifier that is affiliated with the second route type [Source: SDSFIE Feature Table]
rou2_typ_d (String16)	The second route type for the road (Interstate, US, State, etc.) [Source: SDSFIE Feature Table]
rou3_name (String30)	The number or other identifier that is affiliated with the third route type [Source: SDSFIE Feature Table]
rou3_typ_d (String16)	The third route type for the road (Interstate, US, State, etc.) [Source: SDSFIE Feature Table]
use_typ_d (String16)	The current usage status of the road [Source: SDSFIE Feature Table]
feat_len (Real)	The overall length of the road centerline. [Source: SDSFIE Feature Table]
num_lanes (Real)	The number of normal traffic lanes throughout the length of the centerline. [Source: SDSFIE Feature Table]
bridge_d (Boolean)	Indicates given road segment is bridge ("Y"- a is bridge, "N"-is not a bridge). [Source: SDSFIE Feature Table]
tunnel_d (Boolean)	Indicates given road segment is tunnel ("Y"- is a tunnel, "N"-is not a tunnel). [Source: SDSFIE Feature Table]
feat_desc (String254)	Description of the feature.
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

RoadPoint *

A point along the roadway system which has some special significance either for starting or ending a road segment or for representing a significant position along the roadway system such as the start or center of a bridge or the center of an intersection [Source: ANSI: Data Content Standards For Transportation Networks: Roads]

Geometry Type: Point

Accuracy:

Sensitivity: Confidential

SDSFIE Entity: none

Attributes:

roadpoint_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

RoadSegment *

Represents a linear section of the physical road system designed for, or the result of, human or vehicular movement; must be continuous (no gaps) and cannot branch; no mandates are provided on how to segment the road system except that data providers adopt a consistent method [Source: ANSI: Data Content Standards For Transportation Networks: Roads]

Geometry Type: Polygon

Accuracy: +/-5Ft.

Sensitivity: Confidential

SDSFIE Entity: road_site

Atributes:

rd_seg_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type
road_name (String30)	A common name or street name used to refer to the stretch of road. [Source: SDSFIE Feature Table]
alt_name (String30)	The alternate name or second name for the road. [Source: SDSFIE Feature Table]
srf_typ_d (String16)	Type of material used to construct the surface. [Source: SDSFIE Feature Table]
rou1_name (String30)	The route number or other identifier that is affiliated with the first route type [Source: SDSFIE Feature Table]
rou1_typ_d (String16)	The first route type for the road (Interstate, US, State, etc.) [Source: SDSFIE Feature Table]
rou2_name (String30)	The route number or other identifier that is affiliated with the second route type [Source: SDSFIE Feature Table]
rou2_typ_d (String16)	The second route type for the road (Interstate, US, State, etc.) [Source: SDSFIE Feature Table]
rou3_name (String30)	The number or other identifier that is affiliated with the third route type [Source: SDSFIE Feature Table]
rou3_typ_d (String16)	The third route type for the road (Interstate, US, State, etc.) [Source: SDSFIE Feature Table]
seg_len (Real)	The length of the road segment measured at the centerline. [Source: SDSFIE Feature Table]
seg_width (Real)	The average width of the road segment. [Source: SDSFIE Feature Table]

num_lanes (Real)	The total number of lanes of traffic, counting both directions, not including turning lanes. [Source: SDSFIE Feature Table]
bridge_d (Boolean)	Indicates given road segment is bridge (Y- a is bridge, N- is not a bridge). [Source: SDSFIE Feature Table]
tunnel_d (Boolean)	Indicates given road segment is tunnel (Y- is a tunnel, N- is not a tunnel). [Source: SDSFIE Feature Table]
feat_desc (String60)	A general description of the road. [Source: SDSFIE Feature Table]
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

Sidewalk *

A paved or concrete pad used as a pedestrian walkway. Usually is composed of one or more SideWalkSegments. [Source: SDSFIE]

Geometry Type: Line

Accuracy:

Sensitivity: Restricted

SDSFIE Entity *pedestrian_sidewalk_area*

Attributes:

walk_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type
walk_use (String26)	A short description of the primary use of the sidewalk. [Source: SDSFIE Feature Table]
walk_desc (String60)	A brief description of any special characteristics of the sidewalk. [Source: SDSFIE Feature Table]
pri_matl_d (String16)	Primary material used in the sidewalk and/or trail. [Source: SDSFIE Feature Table]
sec_len (Real)	The overall length of the sidewalk section. [Source: SDSFIE Feature Table]
sec_width (Real)	The mean width of the sidewalk section. [Source: SDSFIE Feature Table]

ada_acc_d (Boolean)	Boolean indicating whether or not the walkway is in compliance with the American Disabilities Act. [Source: SDSFIE Feature Table]
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

Tunnel *

The area of a transportation passage, open at both ends, used to provide access through or under a natural obstacle [Source: SDSFIE]

Geometry Type: Polygon

Accuracy: +/-5Ft.

Sensitivity: Restricted

SDSFIE Entity: tunnel_area

Attributes:

tunnel_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type
tun_typ_d (String16)	The code that represents the type of tunnel [Source: SDSFIE Feature Table]
vert_clr (Real)	Indicates the actual vertical clearance to the top of the tunnel imposed by any restrictions (measured in meters). [Source: SDSFIE Feature
avg_ht (Real)	The average height of the tunnel. [Source: SDSFIE Feature Table]
avg_wd (Real)	The average width of the tunnel. [Source: SDSFIE Feature Table]
tunnel_len (Real)	The length of the tunnel. [Source: SDSFIE Feature Table]
feat_desc (String255)	Description of the feature.
lightingType_d (Enumeration)	A description of the lighting system. Lighting system classifications are Approach; Airport; Runway; Taxiway; and Obstruction

user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

Group: Utilities

TankSite *

An above or below grade receptacle or chamber for holding anything (e.g., fuels, water, waste, etc.) on a temporary basis prior to transfer, use, or disposal. Tanks are located on TankSites [Source: SDSFIE]

“Geometry Type: Polygon

Accuracy: +/-3Ft.

Sensitivity: Confidential

SDSFIE Entity: undefined_tank_site

Attributes:

unktnk_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type
tank_type (String40)	Name of the feature.
narrative (String240)	A description or other unique information concerning the subject item, limited to 240 characters. [Source: SDSFIE Feature Table]
top_elv (Real)	The dimension indicating the elevation of exterior top surface of the tank's lid, hatch, rim, or roof in feet (English units) or meters (SI units) above some datum, if it is known. [Source: SDSFIE Feature Table]
lightCode (Boolean)	A code indicating that the obstacle is lighted [Source: AIXM]
lightingType_d (Enumeration)	A description of the lighting system. Lighting system classifications are Approach; Airport; Runway; Taxiway; and Obstruction
color_d (Enumeration)	The color of the marking(s)
markingFeatureType_d	The type of the marking(s)
verticalStructureMaterial_d	Classifies the predominant material of the vertical object
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

UtilityLine

Any utility feature that can be represented as a line

Geometry Type: Line

Accuracy: +/-3Ft.

Sensitivity: Top Secret

SDSFIE Entity *none*

Attributes:

utilityline_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type
utilityType_d (Enumeration)	The class of utility based on SDSFIE Entity Class definitions.
feat_desc (String255)	Description of the feature.
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

UtilityPoint

Any utility feature that can be represented as a point

Geometry Type: Point

Accuracy: +/-3Ft.

Sensitivity: Top Secret

SDSFIE Entity *none*

Attributes:

utilitypoint_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type
utilityClass_d (Enumeration)	The class of utility based on SDSFIE Entity Class definitions.
feat_desc (String255)	Description of the feature.
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

UtilityPolygon

Any utility feature that can be represented as a polygon

Geometry Type: Polygon

Accuracy: +/-3Ft.

Sensitivity: Top Secret

SDSFIE Entity *none*

Attributes:

utilitypolygon_id (Number*)	Primary Key. A globally unique identifier assigned to the instance of a feature type
utilityType_d (Enumeration)	The class of utility based on SDSFIE Entity Class definitions.
feat_desc (String255)	Description of the feature.
user_flag (String254)	An operator-defined work area. This attribute can be used by the operator for user-defined system processes. It does not affect the subject item's data integrity and should not be used to store the subject item's data.
meta_id (Integer20)	Foreign Key. Used to link the record to the applicable feature level metadata record(s).

Section 3-2: Domain Values

This appendix lists the acceptable domain values for each of the attributes bound by list domains in Appendix A. Each list of acceptable values is an enumeration, which means that one of the values must be selected in order to be compliant with the standard. For each value, a definition along with any applicable source information is provided.

airportFacilityType_d

Value	Definition (Notes) [Source]
HP	Heliport only
AH	Airport with helicopter landing area
AD	Airport only

approachCat_d

Value	Definition (Notes) [Source]
A	Speed less than 91 knots
B	Speed 91 knots or more but less than 121 knots
C	Speed 121 knots or more but less than 141 knots
D	Speed 141 knots or more but less than 166 knots
E	Speed 166 knots or more

approachType_d

Value	Definition (Notes) [Source]
AP2	ANA PC CAT 2/3 REVISION DATE: 1/28/2004
NUL	NUL
PC1	ANA PC CAT 1
PC2	ANA PC CAT 2/3
AP1	ANA PC CAT 1 REVISION DATE: 1/28/2004

apronType_d

Value	Definition (Notes) [Source]
Hardstand	Area for parking a single aircraft; more temporary than a PARKING_AREA. [Source: SDSFIE]
Access Ramp	Access pavement between maintenance hangars opening to the apron and the apron edge.
Apron	Apron
CargoLoading	Cargo loading area used for the loading/unloading of cargo
Fueling Area	Area used for aircraft fueling
Maintenance	Area used for aircraft maintenance

PassengerLoading	Passenger loading area used for the loading/unloading of passengers
Turnaround	Area for aircraft to turn around [Source SDSFIE]
Parking Area	Area used to park aircraft
De-icing	Area used for the de-icing of aircraft

color_d

Value	**Definition (Notes) [Source]**
Green	Green [Source: SDSFIE]
Violet	Violet [Source: SDSFIE]
TBD	to be determined [Source: SDSFIE]
Red	Red [Source: SDSFIE]
Yellow	Yellow [Source: SDSFIE]
Pink	Pink [Source: SDSFIE]
Orange	Orange [Source: SDSFIE]
Magenta	Magenta [Source: SDSFIE]
Grey	Grey [Source: SDSFIE]
Brown	Brown [Source: SDSFIE]
Blue	Blue [Source: SDSFIE]
Black	Black [Source: SDSFIE]
White	White [Source: SDSFIE]
Amber	Amber [Source: SDSFIE]
LightGrey	LightGrey [Source: SDSFIE]
Other	Other [Source: SDSFIE]

designGroup_d

Value	**Definition (Notes) [Source]**
I	Up to but not including 49 ft (15 m)
II	49 ft (15 m) up to but not including 79 ft (24 m)
III	79 ft (24 m) up to but not including 118 ft (36 m)
IV	118 ft (36 m) up to but not including 171 ft (52 m)
V	171 ft (52 m) up to but not including 214 ft (65 m)
VI	214 ft (65 m) up to but not including 262 ft (80 m)

designSurfaceType_d

Value	**Definition (Notes) [Source]**
POFA	Precision object free area (See AC 150/5300-13, paragraph 307)
TSS	Threshold Siting Surface (See AC 150/5300-13, Appendix 2)
TSA	Threshold sighting area

TOFA	Taxiway and taxilane object free area (See AC 150/5300-13, paragraph
RWYPTX	Runway to Parallel Taxiway and Taxiline Separation
RSZ	Runway safety zone
RSA	Runway safety area
RPZ	Runway protection zone (See AC 150/5300-13, paragraph 212)
TXSA	Taxiway safety area (See AC 150/5300-13, paragraph 403)
PRSVFR	Parallel Runway Separation Simultaneous VFR Operations
PRSIFR	Parallel Runway Separation Simultaneous IFR Operations
BRL	Building restriction line (not a standard)
ROFA	Runway object free area (See AC 150/5300-13, paragraph 307)
OFZ	Obstacle free zone (See AC 150/5300-13, paragraph 306)

directionality_d

Value	**Definition (Notes) [Source]**
BI	Bidirectional
ES	One way from end-to-startpoint
SE	One way from start-to-endpoint

faaRegion_d

Value	**Definition (Notes) [Source]**
ASO	Southern
AAL	Alaska
ACE	Central
AEA	Eastern
AGL	Great Lakes
ASW	Southwest
ANM	Northwest Mountain
AWP	Western Pacific
ANE	New England

gate_stand_type_d

Value	**Definition (Notes) [Source]**
TM	Temporary
HS	Hard stand
SR	Stairs
JB	Jet bridge

haz_typ_d

Value	Definition (Notes) [Source]
Bash	(Source SDSFIE)
Unknown	(Source SDSFIE)
Tortoise_Pitfall	(Source SDSFIE)
Deer Strike	(Source SDSFIE)
TBD	(Source SDSFIE)

landmarkType_d

Value	Definition (Notes) [Source]
QUARRY	
UTILITY LINE	
OTHER	
AIRPORT	
LEVEE	
ROAD	
FENCE	
SHORELINE	
SHORELINE FEATURE	
RAILROAD	

landUse_d

Value	Definition (Notes) [Source]
7140	Skiing, snowboarding, etc. (Source: APA LBCS)
6800	Historical or cultural celebrations, parades, reenactments, etc. (Source: APA LBCS)
7000	Leisure activities (Source: APA LBCS)
5400	Trains or other rail movement (Source: APA LBCS)
7100	Active leisure sports and related activities (Source: APA LBCS)
7110	Running, jogging, bicycling, aerobics, exercising, etc. (Source: APA
5410	Rail maintenance, storage, or related activities (Source: APA LBCS)
7130	Hockey, ice skating, etc. (Source: APA LBCS)
5510	Boat mooring, docking, or servicing (Source: APA LBCS)
7150	Automobile and motorbike racing (Source: APA LBCS)
7160	Golf (Source: APA LBCS)

7180	Tennis (Source: APA LBCS)
7190	Track and field, team sports (baseball, basketball, etc.), or other sports (Source: APA LBCS)
7120	Equestrian sporting activities (Source: APA LBCS)
6700	Gatherings at galleries, museums, aquariums, zoological parks, etc. (Source: APA LBCS)
6600	Social, cultural, or religious assembly (Source: APA LBCS)
5520	Port, ship-building, and related activities (Source: APA LBCS)
5600	Aircraft takeoff, landing, taxiing, and parking (Source: APA LBCS)
5700	Spacecraft launching and related activities (Source: APA LBCS)
6000	Mass assembly of people (Source: APA LBCS)
6100	Passenger assembly (Source: APA LBCS)
6200	Spectator sports assembly (Source: APA LBCS)
6300	Movies, concerts, or entertainment shows (Source: APA LBCS)
6400	Gatherings at fairs and exhibitions (Source: APA LBCS)
6500	Mass training, drills, etc. (Source: APA LBCS)
7200	Passive leisure activity (Source: APA LBCS)
8200	Livestock related activities (Source: APA LBCS)
5500	Sailing, boating, and other port, marine and water-based Activities (Source: APA LBCS)
8100	Farming, tilling, plowing, harvesting, or related activities (Source: APA)
9999	To be determined (Source: APA LBCS)
9990	To be determined (Source: APA LBCS)
9900	To be determined (Source: APA LBCS)
9300	Subsurface activity (Source: APA LBCS)
9200	Unclassifiable activity (Source: APA LBCS)
9100	Not applicable to this dimension (Source: APA LBCS)
9000	No human activity or unclassifiable activity (Source: APA LBCS)
8700	Drilling, dredging, etc. (Source: APA LBCS)
8600	Mining including surface and subsurface strip mining (Source: APA LBCS)
8500	Quarrying or stone cutting (Source: APA LBCS)
8400	Logging (Source: APA LBCS)
4320	Sewer-related control, monitor, or distribution activities (Source: APA

8000	Natural resources-related activities (Source: APA LBCS)
8300	Pasturing, grazing, etc. (Source: APA LBCS)
7210	Camping (Source: APA LBCS)
7460	Water-skiing (Source: APA LBCS)
7450	Scuba diving, snorkeling, etc. (Source: APA LBCS)
7440	Fishing, angling, etc. (Source: APA LBCS)
7430	Swimming, diving, etc. (Source: APA LBCS)
7420	Canoeing, kayaking, etc. (Source: APA LBCS)
7410	Boating, sailing, etc. (Source: APA LBCS)
7400	Water sports and related leisure activities (Source: APA LBCS)
7300	Flying or air-related sports (Source: APA LBCS)
7260	Trapping (Source: APA LBCS)
7250	Shooting (Source: APA LBCS)
7240	Promenading and other activities in parks (Source: APA LBCS)
7230	Hunting (Source: APA LBCS)
7220	Gambling (Source: APA LBCS)
5220	Drive-in, drive through, stop-n-go, etc. (Source: APA LBCS)
2320	Office activities with high turnover of automobiles (Source: APA LBCS)
4130	Other instructional activities including those that occur in libraries (Source: APA LBCS)
4120	Training or instructional activities outside classrooms (Source: APA LBCS)
4110	Classroom-type activities (Source: APA LBCS)
4100	School or library activities (Source: APA LBCS)
4000	Social, institutional, or infrastructure-related activities (Source: APA LBCS)
3300	Construction activities (grading, digging, etc.) (Source: APA LBCS)
3230	Waste processing or recycling (Source: APA LBCS)
3220	Landfilling or dumping (Source: APA LBCS)
3210	Solid waste collection and storage (Source: APA LBCS)
3200	Solid waste management activities (Source: APA LBCS)
3120	Primarily goods storage or handling activities (Source: APA LBCS)
3110	Primarily plant or factory-type activities (Source: APA LBCS)

4200	Emergency response or public-safety-related activities (Source: APA
3000	Industrial, manufacturing, and waste-related activities (Source: APA LBCS)
1300	Institutional living (Source: APA LBCS)
2310	Office activities with high turnover of people (Source: APA LBCS)
2300	Office activities (Source: APA LBCS)
2210	Restaurant-type activity with drive-through (Source: APA LBCS)
2200	Restaurant-type activity (Source: APA LBCS)
2120	Service-oriented shopping (Source: APA LBCS)
2110	Goods-oriented shopping (Source: APA LBCS)
2100	Shopping (Source: APA LBCS)
2000	Shopping, business, or trade activities (Source: APA LBCS)
5210	Vehicular parking, storage, etc. (Source: APA LBCS)
1200	Transient living (Source: APA LBCS)
4322	Sewer treatment and processing (Source: APA LBCS)
1000	Residential activities (Source: APA LBCS)
3100	Plant, factory, or heavy goods storage or handling activities (Source: APA LBCS)
4700	Military base activities (Source: APA LBCS)
1100	Household activities (Source: APA LBCS)
4210	Fire and rescue-related activities (Source: APA LBCS)
5200	Vehicular movement (Source: APA LBCS)
5100	Pedestrian movement (Source: APA LBCS)
5000	Travel or movement activities (Source: APA LBCS)
4710	Ordnance storage (Source: APA LBCS)
4600	Interment, cremation, or grave digging activities (Source: APA LBCS)
4500	Health care, medical, or treatment activities (Source: APA LBCS)
4430	Storage of chemical, nuclear, or other materials (Source: APA LBCS)
4420	Storage of natural gas, fuels, etc. (Source: APA LBCS)
4410	Water storage (Source: APA LBCS)
4400	Mass storage, inactive (Source: APA LBCS)
4350	Natural gas or fuels-related control, monitor, or distribution Activities (Source: APA LBCS)
4311	Water storing, pumping, or piping (Source: APA LBCS)

4230	Emergency or disaster-response-related activities (Source: APA LBCS)
4220	Police, security, and protection-related activities (Source: APA LBCS)
4720	Range and test activities (Source: APA LBCS)
4340	Telecommunications-related control, monitor, or distribution activities (Source: APA LBCS)
4300	Activities associated with utilities (water, sewer, power, etc.) (Source: APA LBCS)
4310	Water-supply-related activities (Source: APA LBCS)
4312	Water purification and filtration activities (Source: APA LBCS)
4313	Irrigation water storage and distribution activities (Source: APA LBCS)
4314	Flood control, dams, and other large irrigation activities (Source: APA LBCS)
4321	Sewage storing, pumping, or piping (Source: APA LBCS)
4330	Power generation, control, monitor, or distribution activities (Source: APA LBCS)
4331	Power transmission lines or control activities (Source: APA LBCS)
4332	Power generation, storage, or processing activities (Source: APA LBCS)

lightingType_d

Value	**Definition (Notes) [Source]**
PAPI-4	Precision Approach Path Indicator with 4 lights
VASI-2	Visual Approach Slope Indicator with 2 bars
SSALR	Simplified Short Approach Lighting System
PAPI-2	Precision Approach Path Indicator with 2 lights
RCLS	Runway Centerline Lighting System
REIL	Runway End Identifier Lights
RWYGRD	Runway Gurad Lights
PVASI	Pulsating Visual Approach Slop Indicators
STPBAR	Stop Bar Lights
TCTL	Taxiway Centerline Lights
TDZL	Touchdown Zone Lighting
TLOF	Taxiway Lead-Off Lights
TRCV	Tri-Color Visual Approach Slope Indicator
VASI-16	Visual Approach Slope Indicator with 3 bars and 16 boxes
VASI-2-2	Visual Approach Slope Indicator with 2 bars and 2 boxes

ODALS	Omni Directional Approach Lighting System
LITL	Low Intensity Taxiway Edge Lights
VASI-3	Visual Approach Slope Indicator with 3 bars
VASI-12	Visual Approach Slope Indicator with 2 bars and 12 boxes
ALSF-2	High Intensity Approach Lighting System - Configuration 2
MALSR	Medium Intensity Approach Lighting Systems with Runway Alignment Indicator Lights (RAIL)
ALSF-1	High Intensity Approach Lighting System - Configuration 1
OBSWHT	Flashing White Onstruction Lights
APAP	Alighnment of Elements Systems
APTBCN	Airport or Heliport Beacon
CLRBAR	Taxiway Clearance Bar Lights
CODEBCN	Code Beacon
COURSE	Course Lights
LAHSO	Land and Hold Short Lights
LIRL	Low Intensity Runway Edge Light System
MALSF	Medium Intensity Approach Lighting Systems with with Sequenced Flashing Lights
MIRL	Medium Intensity Runway Edge Light System
MITL	Medium Intensity Taxiway Edge Lights
OBSCAT	Catenary Lighting
OBSDUAL	A combination of OBSRED and OBSDUAL
OBSRED	Aviation Red Obstruction Lights
HIRL	High Intensity Runway Edge Light System

low_visibility_cat_d

Value	**Definition (Notes) [Source]**
1	Supports ILS CAT I low visibility operations
2	Supports ILS CAT II III low visibiloity operations
0	No low visibility operation supported

markingFeatureType_d

Value	**Definition (Notes) [Source]**
LAHSO	Marking associated with a Land And Hold Short Operations (LAHSO)
APRNSIGN	Surface painted apron position/entrance sign (Geomtery Type: Polygon) [Source: AC 150/5340-1]
ARROW	Arrows identify the dsiplaced threshold area to provide centerline guidance for takeoffs and rollouts (Geomtery Type: Line) [Source: AC

ARROWHD	Arrow heads are used in conjunction with a threshold bar to further highlight the beginning of a runway (Geomtery Type: Line) [Source: AC
CHEVRON	A marking used to designate blast pads and other areas that are not suitable for aircraft (Geomtery Type: Line) [Source: AC 150/5340-1]
DEMARK	Demarcation Bar (Geomtery Type: Line) [Source: AC 150/5340-1]
DIRSIGN	Surface painted taxiway direction signs (Geomtery Type: Polygon) [Source: AC 150/5340-1]
GATELINE	All painted taxilines covering a parking stand area are regarded as stand guidance lines and will be individual objects in the database. There may be several stand guidance taxilines leading to an aircraft stand to accommodate different aircraft types.
GATESIGN	Surface painted gate position signs (Geomtery Type: Polygon) [Source: AC 150/5340-1]
HOLDSIGN	Surface painted holding position signs (Geomtery Type: Polygon) [Source: AC 150/5340-1]
AIMINGPT	Runway Aiming Point (Geomtery Type: Polygon) [Source: AC 150/5340-1]
TWYCTL	Taxiway Centerline (Geomtery Type: Line) [Source: AC 150/5340-1]
INTRHOLD	Holding position marking for taxiway/taxiway intersections (Geomtery Type: Line) [Source: AC 150/5340-1]
VEHICLE	Vehicle roadway markings (Geomtery Type: Line) [Source: AC
TWYSHD	Taxway shoulder marking (Geomtery Type: Line) [Source: AC 150/5340-1]
TWYEDGE	Taxiway edge marking (Geomtery Type: Line) [Source: AC 150/5340-1]
THRSHBAR	Runway Threshold Bar (Geomtery Type: Polygon) [Source: AC
TEMPCLSE	Markings for temporarily closed runways and taxiways (Geomtery Type: Line) [Source: AC 150/5340-1]
TDZMARK	Runway Touchdown Zone Marking (Geomtery Type: Polygon) [Source: AC 150/5340-1]
SIDESTRP	Runway Side Stripe Marking (Geomtery Type: Line) [Source: AC

RWYTHRSH	Runway Threshold Marking (Geomtery Type: Polygon) [Source: AC 150/5340-1]
RWYSHD	Runway shoulder markings (Geomtery Type: Line) [Source: AC
NONMOVE	Non-movement area marking (Geomtery Type: Line) [Source: AC
TWYHOLD	Runway hold position markings on taxiways (Geomtery Type: Polygon) [Source: AC 150/5340-1]
RWYID	Runway Designation Marking (Geomtery Type: Polygon) [Source: AC 150/5340-1]
ILSHOLD	Holding position markings for Instrument Landing Systems (Geomtery Type: Polygon) [Source: AC 150/5340-1]
LOCSIGN	Surface painted taxway location signs (Geomtery Type: Polygon) [Source: AC 150/5340-1]
OTHLINE	Other markings suitable for representation as a line
OTHPOLY	Other markings suitable for representation as a polygon
PERMCLSE	Markings for permanently closed runways and taxiways (Geomtery Type: Polygon) [Source: AC 150/5340-1]
POSSIGN	Geographic position markings (Geomtery Type: Polygon) [Source: AC 150/5340-1]
RWYCTL	Runway Centerline (Geomtery Type: Line) [Source: AC 150/5340-1]
RWYHOLD	Runway holding position markings on Runways (Geomtery Type: Polygon) [Source: AC 150/5340-1]

NavaidEquipTypeCode_d

Value	**Definition (Notes) [Source]**
NDB/U - NDB	Required
VOT - VOT	Required
TLS - APGS	Required
SDF - SDF	Required
SECRA - SECRA	Required
TACAN - TACAN	Required
PAR - PAR	Required
TLS - APLOC	Required
VDME - DME	Required
VDME - VOR	Required
VOR - VOR	Required
VORTAC - VOR	Required
NDB/M - NDB	Required

MLS - AZ	Required
VORTAC - TACAN	Required
DME - DME	Required
ARSR - ARSR	Required
MLS - ELEV	Required
DF - DF	Required
NDB/H - NDB	Required
FAN - FAN	Required
ILS - GS	Required
ILS - LOC	Required
MLS - DME	Required
MSBLS - AZ	Required
MSBLS - DME	Required
MSBLS - ELEV	Required
NDB/C - NDB	Required
LOC - LOC	Required
ASR - ASR	Required

NavaidSysTypeCode_d

Value	**Definition (Notes) [Source]**
VOT	VOR Test
PAR	Precision Approach Radar
SECRA	Secondary Radar
TACAN	Tactical Air Navigation
TLS	Transponder Landing System
VDME	VHF Omnirange w/Distance Measuring Equipment
Visual	
VORTAC	VHF Omnirange w/Tactical Air Navigation
NDB/M	Nondirectional Radio Beacons/Medium HF
NDB/U	Nondirectional Radio Beacons/Ultra HF
VOR	VHF Omnirange
ILS	Instrument Landing System
SDF	Simplified Direction Facility
ASR	Airport Surveillance Radar
DF	Direction Finder
FAN	FAN Marker Beacon
LOC	Localizer System
MLS	Microwave Landing System
MSBLS	Microwave Scan Beam Landing System
NDB/H	Nondirectional Radio Beacon -- High Frequency
NDB/C	Nondirectional Radio Beacon -- Compas Locator

ARSR	Air Route Surveillance Radar
DME	Distance Measuring Equipment

obstacle_type_d

Value	Definition (Notes) [Source]
OR	Other
OP	OEP
WW	Worldwide DOD
SE	Spot Elevations
ST	State-Coded
FI	FIFO
AR	Army
AN	ANA
OC	Obstacle Chart

ObstAreaType_d

Value	Definition (Notes) [Source]
TREE	
URBAN	
MOBILE CRANE	
GROUND	
BUILDING	
AG EQUIP	Agricultural equipment

oisSurfaceCondition_d

Value	Definition (Notes) [Source]
SUPPLEMENTARY	
PRIMARY	

oisSurfaceType_d

Value	Definition (Notes) [Source]
RBI	Ron Brown Airport Initiative
ANA	Area Navigational Approach
CGR	Congressional
F77	FAR Part 77
OEP	Operational Evolution Plan

oisZoneType_d

Value	Definition (Notes) [Source]
TRANSITION	
PRIMARY	
APPROACH	
CONICAL	
HORIZONTAL	

operationsType_d

Value	Definition (Notes) [Source]
CIV	Civil operations only
JOINT	Joing military and civil operations
MIL	Military operations only
MILEXT	Military operations + civil operations allowed

owner_d

Value	Definition (Notes) [Source]
K	International Military
X	Special
S	State
R	Army
P	Private
O	Other (Specify In Metadata)
L	International (U.S. Aid Funds)
I	International
H	International Public
F	FAA (Other Than F&E)
E	FAA F&E Projects
C	Coast Guard
B	Public
A	Air Force
J	International Private
N	Navy

PointType_d

Value	Definition (Notes) [Source]
9	Spot Elevation Point
UNDEFINED/OTHER	
AIRPORT_ELEV	
5	ElevationPoint
CENTERLINE_ELEV	This may be the same as CenterlinePoint
DISPLACED_THRESHOLD	
RUNWAY_END	This item should be deleted, see RunwayEnd feature
TACS	
STOPWAY_END	
7	HelipadReferencePoint
6	NavaidControlPoint
4	CenterlinePoint
3	RunwayControlPoint
2	Secondary Airport Control Station (SAC)
1	Primary Airport Control Station (PAC)
0	Airport Reference Point (ARP)
8	VerticalPointObject

precisionApproachGuidance_d

Value	Definition (Notes) [Source]
6	ILS precision approach runway category III D
5	ILS precision approach runway category III C
4	ILS precision approach runway category III B
3	ILS precision approach runway category III A
2	ILS precision approach runway, category II
0	non precision approach runway
7	MLS precision approach
1	ILS precision approach runway, category I

projectStatus_d

Value	Definition (Notes) [Source]
PROPOSED	Not yet approved
IN_PROGRESS	In progress
PLANNED	Approved and planned

signTypeCode_d

Value	Definition (Notes) [Source]
OUT_DEST	Outbound Destination Sign
INFO	Signs installed on the airside of an airport, other than taxiway guidance signs or runway distance remaining signs.
TWY_LOC	Taxiway Location Sign
TWY_END	Taxiway Ending Marker
TWY_DIR	Taxiway Direction Sign
TERM	Inbound Destination Sign - gate positionsat which aircraft are loaded and unloaded
RWY_LOC	Runway Location Sign
RWY_EXIT	Runway Exit Sign
RWY_DIST_REM	Sign that designates the remaining runway distance to pilots During takeoff and landing operations
RSA_RWY_APPR	Runway Safety Area/OFZ and Runway Approach Boundary Sign
RD_YIELD	Yield sign in areas where vehicle roadways intersect runways or taxiways
RD_STOP	Stop sign in areas where vehicle roadways intersect runways or taxiways
PAX	Inbound Destination Sign - areas set aside for passenger handling
FUEL	Inbound Destination Sign - areas wehre aircraft are fueled or serviced
MIL	Inbound Destination Sign - areas set aside for military aircraft
NO_ENTRY	No Entry Sign
CARGO	Inbound Destination Sign - areas set aside for cargo handling
FBO	Inbound Destination Sign - fixed base operator
HOLD_ILS	Holding Position Sign for ILS Critical Areas
HOLD_RWY_APPR	Holding Position Sign for Runway Approach Areas
HOLD_RWY_RWY	Holding Position Sign for Runway/Runway Intersections
HOLD_TWY_RWY	Holding Position Sign for Taxiway/Runway
ILS_CRITICAL	ILS Critical Area Boundary Sign
INTL	Inbound Destination Sign - areas set aside for handling international

APRON	Inbound Destination Sign - general parking, servicing, and loading areas
CIVIL	Inbound Destination Sign - areas set aside for civil aircraft

status_d

Value	Definition (Notes) [Source]
ABANDONED	Abandoned [Source: SDSFIE]
OPERATIONAL	Operational (fully) [Source: SDSFIE]
WIP	Construction or work in progress
UNDERCONSTRUCTION	Planned or under construction [Source: SDSFIE]
TBD	To be determined [Source: SDSFIE]
SPOWER	Secondary power supply in operation
PARKED	Parked or disabled aircraft
NONOPERATIONAL	Non operational [Source: SDSFIE]
LIMITED	Limited operations [Source: SDSFIE]
FAILAID	Failure or irregular operation of visual aides
CLOSED	Closed surface [Source: SDSFIE]
ACTIVE	Active surface [Source: SDSFIE]
BKN	Broken or rough surface

surfaceCondition_d

Value	Definition (Notes) [Source]
GOOD	Good condition
POOR	Poor condition
FAIR	Fair condition

surfaceMaterial_d

Value	Definition (Notes) [Source]
CNG	Concrete ungrooved
W	Water
SI	Snow/Ice
GS	Turf
DS	Desert/Sand
CGs	Concrete and turf
CG	Concrete grooved
BE	Bare earth
ANG	Asphalt ungrooved
GR	Gravel
Ags	Asphalt and turf
AG	Asphalt grooved
CA	Concrete and asphalt

surfaceType_d

Value	Definition (Notes) [Source]
P	PAVED (SPECIALLY PREPARED HARD SURFACE)
S	SPECIAL (NOT A SPECIALLY PREPARED HARD SURFACE)
U	UNPAVED (SPECIALLY PREPARED HARD SURFACE)

taxiwayType_d

Value	Definition (Notes) [Source]
LI-LANE	Lead-in taxilane
APRON	Apron taxiway
T-AROUND	Turn around taxiway
STUB	Stub taxiway
S-TLANE	Gate/stand taxilane
PAR	Parallel taxiway
LO-TLANE	Lead-out taxilane
AIR-TLANE	Air taxilane
FASTEXIT	Rapid exit/turnoff taxiway
EXIT	Exit/turnoff taxiway
BYPASS	Bypass holding bay
AIRTWY	Air taxiway
GNDTWY	Ground taxiway

thresholdType_d

Value	Definition (Notes) [Source]
Normal	An indication that the landing threshold cooresponds to the end of the runway
Displaced	An indication that the landing threshold is located at a point other than the runway end.

utilityType_d

Value	Definition (Notes) [Source]
CNTRL_MNTR_SYSTEM	The components of an electronic monitoring and control system (EMCS) including cables, devices, etc.
NATURAL_GAS_SYSTEM	The components of a natural gas distribution system consisting of pipes, fittings, fixtures, etc.
WATER_SYSTEM	The components of a water system including pipes, fittings, fixtures, treatment plants, etc.
TRANSMISSION_SYSTEM	Objects related to the long distance transmission of gas, oil, or hazardous liquid.

STORM_SYSTEM	The components of a storm drainage collection system including pipes, fittings, fixtures, etc.
SALTWATER_SYSTEM	The components of a salt water collection system.
NUCLEAR	The components of a nuclear system such as nuclear fuel, Nuclear research, nuclear waste, and nuclear weapons.
WASTEWATER_SYSTEM	The components of a wastewater collection system including pipes, fittings, fixtures, treatment plants, collection locations, etc.
HEAT_COOL_SYSTEM	The components of a heating and cooling distribution system consisting of pipes, fittings, fixtures, etc.
GENERAL	The components of utility system which are universal in use and purpose and do not belong to a specific utility.
FUEL_SYSTEM	The components of a fuel distribution system consisting of pipes, fittings, fixtures, pumps, tanks, etc.
ELECTRICAL_SYSTEM	The components of an electrical distribution system including cables, switches, devices, motors, transformers, etc.
COMPRESSED_AIR_SYSTEM	The components of a compressed air system.
INDUSTRIAL_SYSTEM	The components of an industrial waste collection system including pipes, fittings, fixtures, tanks, lagoons, etc.
ELECTRICAL_EXT_LIGHT	The components of an electrical exterior lighting system including cables, switches, devices, transformers, etc. Does not include airfield, navaid or approach lighting.

verticalStructureMaterial_d

Value	**Definition (Notes) [Source]**
6	Wood
1	Concrete
2	Metal
3	Stone/brick
4	Composition
5	Rock

zng_cls_d

Value	**Definition (Notes) [Source]**
RESIDENTIAL	Areas which are zoned for housing or residential development. (Source SDSFIE)
QUASI_PUBLIC	Areas which are zoned public although under private ownership or control. (Source SDSFIE)

COMMERCIAL	Areas which are zoned for merchandising, shopping, or other commercial development. (Source SDSFIE)
INDUSTRIAL	Areas which are zoned for factory, manufacturing, or other industrial development. (Source SDSFIE)

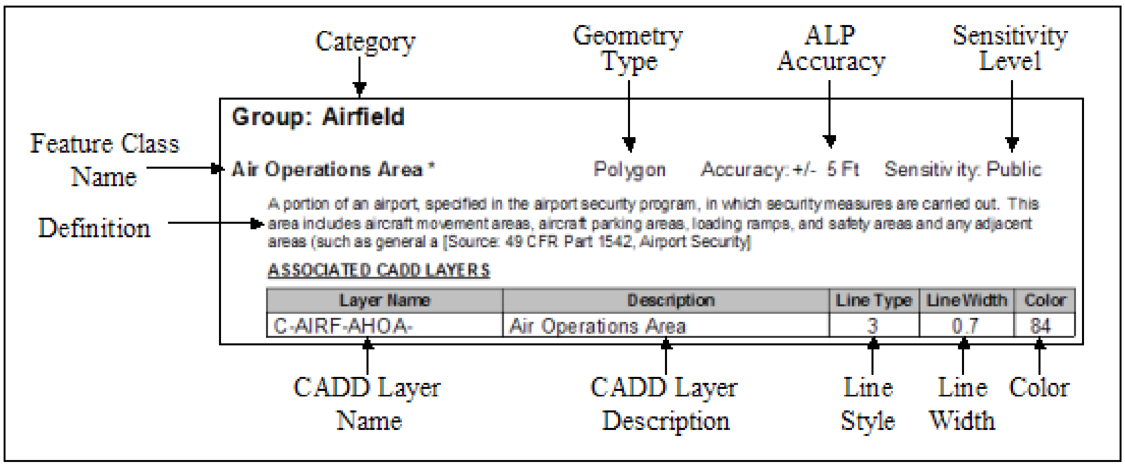
zone_type

Value	**Definition (Notes) [Source]**
PROJECTED	Areas expected to be subject to flooding in the future.
10_YEAR	Areas subject to 10 year flooding.
100_YEAR	Areas subject to 100 year flooding.
15_YEAR	Areas subject to 15 year flooding.
25_YEAR	Areas subject to 25 year flooding.
5_YEAR	Areas subject to 5 year flooding.
50_YEAR	Areas subject to 50 year flooding.
500_YEAR	Areas subject to 500 year flooding.
GENERAL	Areas prone to flooding in general

Section 3-3: Feature Types and Associated CADD Layers

This section lists each of the 763 CADD layers defined by this standard. The CADD layers are grouped by category (i.e. Airfield, Airspace, Environmental, etc.) and by Feature Type (i.e. Air Operations Area, Aircraft Deicing Area, etc.) as the GIS layers were in Chapter 2 or Appendix 3, Section 1 for ease of use. This primary difference is that each Feature Type has one or more CADD layers associated with it. For each CADD layer, the layer name, description, line style, line width and color are provided. It is important to note that not all features, and therefore CADD layers, are required. Those that are required are marked with an asterisk. The following figure provides a key to the information provided in Appendix 3 Section 3-3.

Legend to Appendix 3 Section 3-3



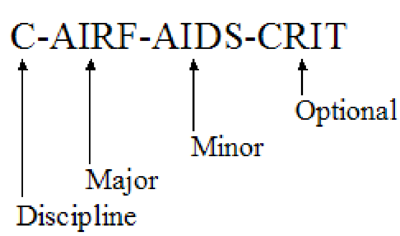
Each CADD layer is assigned a name made up of 5 parts. This format is consistent with layer name format used in the A/E/C CADD Standards and the National CADD Standard, which are all based on recommendations made in the American Institute of Architects CAD Layer Guidelines (AIA 2001) and is the same. The first part is a single character indicating the discipline of the data contained on that layer. A list of the disciplines used in this standard and their one-character codes is provided in the following list.

A	Architectural
C	Civil
E	Electrical
G	General
H	Hazardous Materials
L	Landscape
M	Mechanical
P	Plumbing
S	Structural
T	Telecommunications
V	Surveying/Mapping

The second part is a 4-character code for the major group. Major groups include AIRF for airfield related features, AIRS related features and BLDG for buildings. The third part is a 4-character code for the minor group. Minor groupings further distinguish layers. For instance within the AIRF major grouping there are AIDS for navigational aids, DSRF for design surfaces, and OBST for obstructions. The fourth part is similar to the third but it is optional and is only used to further distinguish features. An example is the breakdown of COMM for communications, WTHR for weather and ILS_ for instrument landing system navigational aides within the Major group AIRF and the minor group AIDS. The fifth and last part of the layer name is an optional character indicating the status of the data contained on the layer. Figure 17 provides an example of a CADD layer name for a NAVAID critical area.

Figure 17

Format of CADD Layer Names



Group: Airfield

AircraftDeicingArea *
Polygon Accuracy: +/- 5 Ft Sensitivity: Unclassified

An aircraft deicing facility is a facility where: (1) frost, ice, or snow is removed (deicing) from the aircraft in order to provide clean surfaces, and/or, (2) clean surfaces of the aircraft receive protection (anti-icing) against the formation of frost or ice and accumulation of snow or slush for a limited period of time [Source: AC 150/5300-13]

Associated CADD Layers:

Layer Name	Description
C-APRN-DEIC-	Aircraft Deicing Area

AircraftGateStand *
Polygon Accuracy: +/- 5 Ft Sensitivity: Restricted

Operational area of gate (parking) stand. If no gate stand area painting is available, a virtual parking stand area should be provided [Source: RTCA DO-272]

Associated CADD Layers:

Layer Name	Description
C-APRN-ACPK-	Aircraft gate/stand parking area

AircraftNonMovementArea
Polygon Accuracy: +/- 5 Ft Sensitivity: Restricted

An area where aircraft cannot be seen by a control tower and therefore are restricted to move.

Associated CADD Layers:

Layer Name	Description
C-APRN-ANOM-	Aircraft non-movement area
C-AIRF-DSRF-NMOV	Aircraft Non-Movement Area

AirfieldLight *
Point Accuracy: +/- 5 Ft Sensitivity: Restricted

Any lighting located within or near an airport boundary the provides guidance for airborne and ground maneuvering of aircraft [Source: AIM, AC 150/5340-24]

Associated CADD Layers:

Layer Name	Description
E-LITE-APPR-	Approach lights
E-LITE-DIST-	Distance and arresting gear markers and lights
E-LITE-LANE-	Hoverlane, taxilane, and helipad lights
E-LITE-OBST-	Obstruction lights
E-LITE-ROOF-	Roof lighting
E-LITE-RUNW-EDGE	Runway edge lights
E-LITE-SIGN-	Taxiway guidance signs
E-LITE-TAXI-CNTL	Taxiway centerline lights
E-LITE-THRS-	Threshold lights
V-LITE-APPR-	Approach lights
V-LITE-LANE-	Hoverlane, taxilane, and helipad lights
V-LITE-OBST-	Obstruction lights
V-LITE-RUNW-	Runway lights
V-LITE-TAXI-	Taxiway lights
V-LITE-THRS-	Threshold lights
V-LITE-RUNW-TDZN	Runway Touchdown Zone lights

V-LITE-RUNW-CNTL	Runway Centerline lights
E-LITE-RUNW-TDZN	Runway Touchdown Zone lights
E-LITE-RUNW-CNTR	Runway Centerline lights
E-LITE-RUNW-DTGS1	Runway Distance to go lights
E-LITE-APRN-	Apron Lighting
E-LITE-TAXI-EDGE	Taxiway edge lights
E-LITE-RNWY-GARD	Runway guard lights

AirfieldLinearFeatureSafetyLine * Line Accuracy: +/- 5 Ft Sensitivity: Restricted

Location of the arresting gear cable across the runway [Source: RTCA DO-272]

Associated CADD Layers:

Layer Name	Description
C-RUNW-ARST-	Runway Arresting Gear Location

AirOperationsArea * Polygon Accuracy: +/- 5 Ft Sensitivity: Unclassified

A portion of an airport, specified in the airport security program, in which security measures are carried out. This area includes aircraft movement areas, aircraft parking areas, loading ramps, and safety areas and any adjacent areas (such as general aviation areas) that are not separated by adequate security systems, measures, or procedures. [Source: 49 CFR Part 1542, Airport Security]

Associated CADD Layers:

Layer Name	Description
C-AIRF-AHOA-	Air Operations Area

AirportBoundary Polygon Accuracy: +/- 1 Ft Sensitivity: Restricted

A polygon, or a set of polygons, that encompasses all property owned or controlled by the airport for aviation purposes [Source: AC 150/5300-13, Appendix 7, Order 5190.6A, Section 5]

Associated CADD Layers:

Layer Name	Description
C-AIRF-PROP-	Airport property

AirportSign * Point Accuracy: +/-10 Ft Sensitivity: Restricted

Signs at an airport other than surface painted signs [Source: AC 150/5340-18]

Associated CADD Layers:

Layer Name	Description
A-ELEV-SIGN-	Signage
A-FLOR-SIGN-	Signage
C-NGAS-SIGN-	Surface markers/signs
C-PVMT-SIGN-	Other signs
C-SSWR-SIGN-	Surface markers/signs
C-STRM-SIGN-	Surface markers/signs
E-SPCL-TRAF-	Traffic signal system
V-LITE-DIST-	Distance and arresting gear markers
V-LITE-SIGN-	Taxiway guidance signs
V-NGAS-SIGN-	Surface markers/signs
V-SPCL-TRAF-	Traffic signal system
V-SSWR-SIGN-	Surface markers/signs

V-STRM-SIGN-	Surface markers/signs
C-RUNW-SIGN-	Airfield signs on the runway such as distance remaining signs
C-TAXI-SIGN-	Airfield signs on the taxiway such as taxiway designator, hold short and directional signs
C-APRN-SIGN-	Airfield signs on the apron

Apron *

Polygon Accuracy: +/- 5 Ft Sensitivity: Restricted

A defined area on an airport or heliport, paved or unpaved, intended to accommodate aircraft for purposes of loading or unloading passengers or cargo, refueling, parking, or maintenance [Source:

Associated CADD Layers:

Layer Name	**Description**
C-APRN-OTLN-	Airfield apron

DisplacedThreshold *

Point Accuracy: +/- 5 Ft Sensitivity: Restricted

The beginning of that portion of the runway available for landing when it is located at a point other than the physical end of the runway [Source: AC 150/5300-13]

Associated CADD Layers:

Layer Name	**Description**
C-RUNW-DISP-	Displaced threshold
C-RUNW-THRS-	Threshold markers

FrequencyArea *

Polygon Accuracy: +/-20 Ft Sensitivity: Unclassified

Area specifying the designated part of the surface movement area where a specific frequency is required by ATC or ground control [Source: RTCA DO-272]

Associated CADD Layers:

Layer Name	**Description**
C-AIRF-FREQ-	Frequency Area

HelipadFATO *

Polygon Accuracy: +/- 5 Ft Sensitivity: Unclassified

A defined area over which the final phase of the approach to a hover, or a landing, is completed and from which the takeoff is initiated. This area was called the "takeoff and landing area" in previous publications [Source: AC 150/5390-2B]

Associated CADD Layers:

Layer Name	**Description**
C-HELI-FATO-	Helipad FATO

HelipadThreshold *

Point Accuracy: +/- 5 Ft Sensitivity: Unclassified

Based on the predominant wind direction, the helipad threshold position is congruent with the approach/takeoff paths [Source: RTCA DO-272]

Associated CADD Layers:

Layer Name	**Description**
C-HELI-DISP-	Displaced threshold markings
C-HELI-THRS-	Threshold markers

HelipadTLOF *

Polygon Accuracy: +/- 5 Ft Sensitivity: Unclassified

A load bearing, generally paved area, normally centered in the FATO, on which the helicopter lands or takes off. The TLOF is frequently called a helipad or helideck. TLOFs will be photogrammetrically determined [Source: AC 150/5390-2B]

Associated CADD Layers:

Layer Name	Description
C-HELI-TLOF-	Helipad take off and landing area

MarkingArea *

Polygon Accuracy: +/- 2 Ft Sensitivity: Unclassified

An element of Marking whose geometry is a polygon [Source: AC 150/5340-1]

Associated CADD Layers:

Layer Name	Description
C-HELI-IDEN-	Heliport numbers and letters
C-HELI-TDZM-	Touchdown zone markers
C-RUNW-DIST-	Fixed distance markings
C-RUNW-IDEN-	Runway numbers and letters
C-RUNW-TDZM-	Touchdown zone markers

MarkingLine *

Line Accuracy: +/- 2 Ft Sensitivity: Restricted

An element of Marking whose geometry is a line [Source: AC 150/5340-1, RTCA/DO-272]

Associated CADD Layers:

Layer Name	Description
C-APRN-CNTR-	Centerlines
C-APRN-HOLD-	Holding position markings
C-APRN-MRKG-	Apron markings
C-APRN-SECU-	Security zone markings
C-APRN-SHLD-	Shoulder stripes
C-HELI-BLST-	Helipad blast pad and stopway markings
C-HELI-CNTR-MARK	Centerline markings
C-HELI-DIST-	Fixed distance markings
C-HELI-SIDE-	Side stripes
C-OVRN-CNTR-	Centerlines
C-OVRN-SHLD-	Shoulder markings
C-PADS-CNTR-	Centerlines
C-PADS-OTLN-	Pad - outlines
C-RUNW-CNTR-MARK	Centerline markings
C-RUNW-SHLD-	Shoulder markings
C-RUNW-SHLD-	Runway Shoulder
C-RUNW-SIDE-	Side stripes
C-TAXI-CNTR-MARK	Centerline markings
C-TAXI-EDGE-	Edge markings
C-TAXI-SHLD-	Shoulder transverse stripes
V-PVMT-MRKG-	Pavement markings
C-PVMT-MRKG-WHIT	Roadway markings (white)
C-PVMT-MRKG-YELO	Roadway markings (yellow)

ObstructionArea * Polygon Accuracy: +/-20 Ft Sensitivity: Restricted

Areas penetrating the plane of a specified or supplemental obstruction identification surface (OIS). The type of obstructing area is determined by the predominantly obstructing element in the grouped area. Penetrating groups of trees, ground, buildings, urban areas, mobile cranes, and agricultural area are the most common types of area limits found within the surfaces of a FAR-77 survey. [Source: NGS]

Associated CADD Layers:

Layer Name	Description
C-AIRS-OBST-LINE	Airspace obstructions - Line

PassengerLoadingBridge * Polygon Accuracy: +/-10 Ft Sensitivity: Restricted

A bridge for loading/unloading access to airplanes for passengers and crew

Associated CADD Layers:

Layer Name	Description
A-EQPM-JETB-	Aircraft Jetbridge

RestrictedAccessBoundary * Line Accuracy: +/- 5 Ft Sensitivity: Confidential

A restricted area boundary defines aircraft movement area that is strictly reserved for use by authorized personnel only. These boundaries, typically found on joint civil/military use airports, are often painted red lines on taxiway or apron surfaces. [Source: NGS]

Associated CADD Layers:

Layer Name	Description
C-AIRF-SECR-RSTR	Military restricted access boundary

Runway Polygon Accuracy: +/- 5 Ft Sensitivity: Restricted

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., Runway 10/28, Runway 07/25. [Source: AC 150/5300-13]

Associated CADD Layers:

Layer Name	Description
C-RUNW-EDGE-	Airfield runway edges

RunwayArrestingArea * Polygon Accuracy: +/- 5 Ft Sensitivity: Restricted

Any FAA-approved high energy absorbing material of a specific strength that will reliably and predictably bring and aircraft to a stop without imposing loads that exceed the aircraft's design limits, cause major structural damage, or impose excessive forces on its occupants. Currently, the only FAA approved material is EMAS - Engineered Material Arresting System. [Source: AC 150/5220-22]

Associated CADD Layers:

Layer Name	Description
C-RUNW-ARST-	Runway arresting area

RunwayBlastPad * Polygon Accuracy: +/- 5 Ft Sensitivity: Restricted

A specially prepared surface placed adjacent to the ends of runways to eliminate the erosive effect of the high wind forces produced by airplanes at the beginning of their takeoff rolls [Source: AC 150/5300-13]

Associated CADD Layers:

Layer Name	Description
C-RUNW-BLST-	Runway blast pad

RunwayCenterline * Line Accuracy: +/- 2 Ft Sensitivity: Restricted

Continuous line along the painted centerline of a runway connecting the middle-points of the two outermost thresholds. Centerline is composed of many centerline points (see RunwayControlPoint). It is used to calculate grade and line-of-sight criteria. [Source: AC 150/5300-13]

Associated CADD Layers:

Layer Name	Description
C-RUNW-CNTR-	Runway Centerline

RunwayEnd Point Accuracy: +/- 1 Ft Sensitivity: Restricted

The end of the runway surface suitable for landing or takeoff runs of aircraft. RunwayEnds are related to and describe the approach and departure procedure characteristics of a runway threshold. RunwayEnd is the same as the runway threshold when the threshold is not displaced. [Source: NGS]

Associated CADD Layers:

Layer Name	Description
C-RUNW-ENDP-	Runway endpoint

RunwayHelipadDesignSurface * Polygon Accuracy: +/- 5 Ft Sensitivity: Restricted

A three-dimensional surface that is used in runway design [Source: AC 150/5300-13]

Associated CADD Layers:

Layer Name	Description
C-AIRF-DSRF-BLDR	Building Restriction Line
C-AIRF-DSRF-RSA_	Runway Safety Area
C-AIRF-DSRF-RPZ_	Runway Protection Zone
C-AIRF-DSRF-OFA_	Object Free Area
C-AIRF-DSRF-OFZ_	Object Free Zone
C-AIRF-DSRF-POFA	Precision Object Free Area
C-AIRF-DSRF-KEYH	Key holes
C-RUNW-CLRW-	Runway clearway
C-HELI-DSRF-	Helipad design surface

RunwayIntersection * Polygon Accuracy: +/- 2 Ft Sensitivity: Restricted

The area of intersection between two or more runways [Source: RTCA DO-272]

Associated CADD Layers:

Layer Name	Description
C-RUNW-INTS-	Runway intersection

RunwayLabel Point Accuracy: +/- Ft Sensitivity: Secret

The bottom center position of the runway designation marking [Source: NGS]

Associated CADD Layers:

Layer Name	Description
C-RUNW-ENDP-MARK	Runway label marking point

RunwayLAHSO * Line Accuracy: +/- 5 Ft Sensitivity: Restricted

Markings installed on a runway where an aircraft is to stop when the runway is normally used as a taxiway or used for Land and Hold Short Operations (LAHSO) as identified in a letter of agreement with the Air Traffic Control Tower (ATCT). A runway should be considered as normally used for taxiing if there is no parallel taxiway and no ATCT. Otherwise, seek input from ATCT [Source: Order 7110.118]

Associated CADD Layers:

Layer Name	Description
C-RUNW-LAHS-	Runway land and hold short area

RunwaySegment * Polygon Accuracy: +/- 5 Ft Sensitivity: Restricted

A section of the runway surface. The runway surface can be defined by a set of non-overlapping RunwaySegment polygons. RunwaySegments may overlap Runway and RunwayIntersection features. Use RunwaySegment to model the physical runway pavement in terms of surface, material, strength and condition. [Source: AC 150/5335-5, AC 150/5320-12, AC 150/5320-17, AC 150/5320-6]

Associated CADD Layers:

Layer Name	Description
C-RUNW-SEGM-	Runway segment

Shoulder * Polygon Accuracy: +/- 5 Ft Sensitivity: Restricted

An area adjacent to the edge of paved runways, taxiways, or aprons providing a transition between the pavement and the adjacent surface; support for aircraft running off the pavement; enhance drainage; and blast protection [Source: AC 150/5300-13]

Associated CADD Layers:

Layer Name	Description
C-HELI-SHLD-	Shoulder
C-PADS-SHLD-	Shoulders with annotation

Stopway * Polygon Accuracy: +/- 5 Ft Sensitivity: Restricted

A defined rectangular surface beyond the end of a runway prepared or suitable for use in lieu of runway to support an airplane, without causing structural damage to the airplane, during an aborted takeoff [Source: AC 150/5300-13]

Associated CADD Layers:

Layer Name	Description
C-RUNW-STWY-	Runway stopway markings

TaxiwayHoldingPosition Line Accuracy: +/- 2 Ft Sensitivity: Restricted

A designated position at which taxiing aircraft and vehicles will stop and hold position, unless otherwise authorized by the aerodrome control tower [Source: RTCA DO-272]

Associated CADD Layers:

Layer Name	Description
C-TAXI-HOLD-	Holding lines

TaxiwaySegment * Polygon Accuracy: +/- 5 Ft Sensitivity: Restricted

The taxiway segment features are used to represents taxiway, apron taxiway, rapid exit taxiway, taxiway intersection, and aircraft stand taxilane surface [Source: AC 150-5300-13]

Associated CADD Layers:

Layer Name	Description
C-TAXI-OTLN-	Taxiway - outlines

Group: Airspace

LandmarkSegment Polygon Accuracy: +/-10 Ft Sensitivity: Unclassified

Geographic features located in the vicinity of an airport that aid geographic orientation. The features may or may not have obstruction value. These may include objects such as roads, railroads, fences, utility lines, shorelines, levees, quarries and nearby airport, etc. [Source: NGS]

Associated CADD Layers:

Layer Name	Description
C-AIRS-LNDM-	Landmark segment

Obstacle Point Accuracy: +/- Ft Sensitivity: Restricted

All fixed (whether temporary or permanent) and mobile objects, or parts thereof, that are located on an area intended for the surface movement of aircraft or that represent a defined Obstruction Identification Surface [Source: NGS]

Associated CADD Layers:

Layer Name	Description
C-AIRS-OBSC-	Airfield obstruction

ObstructionIdentificationSurface Polygon Accuracy: +/-20 Ft Sensitivity: Restricted

A derived imaginary Obstruction Identification Surface defined by FAA. [Source: NGS]

Associated CADD Layers:

Layer Name	Description
C-AIRS-OTHR-	Other airspace surfaces
C-AIRS-TERP-	TERPS surfaces
C-AIRS-PART-PRIM	FAR Part 77 Primary Surface
C-AIRS-PART-HORZ	FAR Part 77 Horizontal Surface
C-AIRS-PART-CONL	FAR Part 77 Conical Surface
C-AIRS-PART-TRNS	FAR Part 77 Transitional Surface
C-AIRS-PART-APRC	FAR Part 77 Approach Surface

Group: Cadastral

County Polygon Accuracy: +/-50 Ft Sensitivity: Restricted

Boundary line of the land and water under the right, power, or authority of the county government. [Source: SDSFIE]

Associated CADD Layers:

Layer Name	Description
V-PROP-CNTY-	County Boundary

EasementsAndRightofWays Polygon Accuracy: +/-0.5 Ft Sensitivity: Confidential

A parcel of land for which formal or informal deed easement rights exist [Source: SDSFIE (modified)]

Associated CADD Layers:

Layer Name	Description
C-PROP-ESMT-	Easements
C-PROP-RWAY-	Right of ways

V-PROP-ESMT-	Government easements/property lines
V-PROP-RWAY-	Right of ways

FAARegionArea
Polygon Accuracy: +/-40 Ft Sensitivity: Unclassified

This feature depicts the FAA regions. [Source: SDSFIE]

Associated CADD Layers:

Layer Name	Description
C-AIRF-FAAR-	FAA Region

LandUse *
Polygon Accuracy: +/-50 Ft Sensitivity: Confidential

A description of the human use of land and water [Source: SDSFIE]

Associated CADD Layers:

Layer Name	Description
V-PROP-LUSE-	Land Use Area

LeaseZone
Polygon Accuracy: +/-0.5 Ft Sensitivity: Unclassified

A parcel of land leased by an individual, agency, or organization for their use. [Source: SDSFIE]

Associated CADD Layers:

Layer Name	Description
V-PROP-LEAS-	Lease line (surveyed)
A-PROP-LEAS-	Lease line (interior)
C-PROP-LEAS-	Lease line (exterior / ground lease)

Municipality *
Polygon Accuracy: +/-50 Ft Sensitivity: Restricted

Boundary line of the land and water under the right, power, or authority of the municipal government. [Source: SDSFIE]

Associated CADD Layers:

Layer Name	Description
V-PROP-MUNI-	Municipal Boundary

Parcel
Polygon Accuracy: +/- 1 Ft Sensitivity: Restricted

A single cadastral unit, which is the spatial extent of the past, present, and future rights and interests in real property and the geographic framework to support the description of the spatial extent. [Source: SDSFIE]

Associated CADD Layers:

Layer Name	Description
V-PROP-LINE-	Property lines (Existing recorded plats)
V-PROP-QTRS-	Quarter lines
V-PROP-SECT-	Section lines
V-PROP-SXTS-	Sixteenth lines (40 lines)

State
Polygon Accuracy: +/-50 Ft Sensitivity: Restricted

Boundary line of the land and water under the right, power, or authority of the state government. [Source: SDSFIE]

Associated CADD Layers:

Layer Name	Description
V-PROP-STAT-	State Boundary

Zoning *
Polygon Accuracy: +/-50 Ft Sensitivity: Restricted

A parcel of land zoned specifically for real estate and land management purposes; more specifically for commercial, residential, or industrial use. [Source: SDSFIE]

Associated CADD Layers:

Layer Name	Description
V-PROP-ZONG-	Zoning Areas

Group: Environmental

EnvironmentalContaminationArea
Polygon Accuracy:+/- 10 Ft

Sensitivity: Restricted

A facility or other locational entity, (as designated by the Environmental Protection Agency) that is regulated or monitored because of environmental concerns. [Source: SDSFIE]

Associated CADD Layers:

Layer Name	Description
H-POLL-CONC-	Polluted area of concern
H-POLL-POTN-	Potential spill, emission, or release source

FaunaHazardArea
Polygon Accuracy: +/-10 Ft Sensitivity: Restricted

An area where there are hazards due to wildlife activities. This includes bird aircraft strike hazard (BASH) areas, and deer strike areas. [Source: SDSFIE]

Associated CADD Layers:

Layer Name	Description
V-TOPO-SPEC-	Species Site

FloodZone *
Polygon Accuracy: +/-10 Ft Sensitivity: Unclassified

Areas subject to 100-year, 500-year and minimal flooding [Source: SDSFIE]

Associated CADD Layers:

Layer Name	Description
C-TOPO-FLZN-	Flood Zone

FloraSpeciesSite *
Point Accuracy: +/-20 Ft Sensitivity: Unclassified

The specific location where an individual flora species or an aggregate of flora species has been identified [Source: SDSFIE]

Associated CADD Layers:

Layer Name	Description
L-PLNT-CTNR-	Containers or planters
L-PLNT-PLTS-	Planting plants (e.g., ornamental annuals and perennials)
L-PLNT-TREE-	Trees (e.g., evergreen, deciduous, etc.)

ForestStandArea * Polygon Accuracy: +/-10 Ft Sensitivity: Confidential

A forest flora community with similar characteristics. [Source: SDSFIE]

Associated CADD Layers:

Layer Name	Description
L-DETL-GRAS-	Grass, sod
L-PLNT-BEDS-	Planting beds
L-PLNT-BUSH-	Bushes and shrubs (e.g., evergreen, deciduous)
L-PLNT-BUSH-LINE	Bush and shrub line
L-PLNT-GRND-	Groundcover and vines
L-PLNT-MLCH-	Mulches - organic and inorganic
L-PLNT-SPRG-	Sprigs
L-PLNT-TREE-LINE	Tree line
L-PLNT-TURF-	Lawn areas (turfing limits)
V-SITE-VEGE-	Existing treelines and vegetation

HazMatStorageSite Point Accuracy: +/-10 Ft Sensitivity: Unclassified

A defined or bounded geographical area designated and used for the storage of contained hazardous materials. [Source: SDSFIE]

Associated CADD Layers:

Layer Name	Description
H-STOR-HAZM-	Hazardous materials
H-STOR-HAZW-	Hazardous waste

NoiseContour * Polygon Accuracy: +/- 1 Ft Sensitivity: Confidential

An area that describes the noise attributed to operations. For aircraft operations, the Day/Night average sound level (Ldn) descriptor is typically used to categorize noise levels [Source: 14 CFR Part 150]

Associated CADD Layers:

Layer Name	Description
C-TOPO-AUZN-	Noise Contour/Zone

NoiseIncident * Point Accuracy: +/-10 Ft Sensitivity: Restricted

A formal complaint by an individual or group regarding excessive noise resulting from airport operations

Associated CADD Layers:

Layer Name	Description
C-TOPO-AUCO-	Noise Complaint

NoiseMonitoringPoint * Point Accuracy: +/-10 Ft Sensitivity: Restricted

The location of noise sensing equipment or where a noise sample is taken. [Source: SDSFIE]

Associated CADD Layers:

Layer Name	Description
C-TOPO-AUST-	Noise Monitoring Station

SampleCollectionPoint Point Accuracy: +/-10 Ft Sensitivity: Confidential

The physical location at which one or more environmental hazards field samples are collected. [Source: SDSFIE]

Associated CADD Layers:

Layer Name	Description
C-TOPO-BORE-	Boring locations
H-SAMP-AIRS-	Air samples
H-SAMP-BIOL-	Biological samples
H-SAMP-GWTR-	Ground water samples
H-SAMP-SEDI-	Sediment samples
H-SAMP-SOIL-	Soil samples
H-SAMP-SOLI-	Solid material samples
H-SAMP-SWTR-	Surface water samples
H-SAMP-WAST-	Waste samples
V-TOPO-BORE-	Boring locations

Shoreline * Line Accuracy: +/-10 Ft Sensitivity: Restricted

The boundary where land meets the edge of a large body of fresh or salt water. The shoreline is the mean high water line between high and low tide [Source: SDSFIE]

Associated CADD Layers:

Layer Name	Description
C-DRED-OHWM-	Ordinary high water marks
C-TOPO-SHOR-	Shorelines, land features, and references
H-MNST-GWTR-	Ground water
H-MNST-SWTR-	Surface water
S-GRDL-WATR-	Water surface
V-SITE-EWAT-	Water features
V-SITE-WATR-	Water features
V-TOPO-SHOR-	Shorelines, land features, and references

Wetland * Polygon Accuracy: +/-10 Ft Sensitivity: Restricted

Transitional lands between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. The soils are predominantly saturated with water and the plants and animals that live there are specialized for this ecosystem [Source: SDSFIE]

Associated CADD Layers:

Layer Name	Description
V-TOPO-WETL-	Wetland

Group: Geotechnical

AirportControlPoint * Point Accuracy: +/-0.07Ft Sensitivity:Restricted

A control station established in the vicinity of, and usually on, an airport and tied to the National Spatial Reference System (NSRS) [Source: NGS]

Associated CADD Layers:

Layer Name	Description
C-TOPO-SPOT-	Spot elevations

V-SURV-DATA-	Survey data (benchmarks and horizontal control points or monuments)
V-TOPO-SPOT-	Spot elevations
C-TOPO-RNYE-	Runway centerline elevation point

CoordinateGridArea

Line Accuracy: +/- 1 Ft Sensitivity: Restricted

A regular pattern of horizontal and vertical lines used to represent regular coordinate intervals along the x and y axis. This grid line can be used to generate an arbitrary grid system which is common on locator maps. [Source: SDSFIE]

Associated CADD Layers:

Layer Name	Description
C-DETL-GRPH-	Graphics, gridlines, non-text items
C-GRID-FRAM-	Frame (bounding frame of an area referenced by a grid)
C-GRID-MAJR-	Major grid lines
C-GRID-MINR-	Minor grid lines
S-GRID-HORZ-	Primary grid lines (horizontal)
S-GRID-MSC-	Miscellaneous grid lines (Type 1)
S-GRID-MSC2-	Miscellaneous grid lines (Type 2)
S-GRID-MSC3-	Miscellaneous grid lines (Type 3)
S-GRID-MSC4-	Miscellaneous grid lines (Type 4)
S-GRID-VERT-	Primary grid lines (vertical)
V-GRID-FRAM-	Frame
V-GRID-MAJR-	Major grid lines
V-GRID-MINR-	Minor grid lines

ElevationContour

Line Accuracy: +/- 1 Ft Sensitivity: Restricted

Connecting points on the surface of the earth of equal vertical elevation representing some fixed elevation interval. [Source: SDSFIE]

Associated CADD Layers:

Layer Name	Description
C-TOPO-MAJR-	Major contours
C-TOPO-MINR-	Minor contours
V-TOPO-MAJR-	Major contours
V-TOPO-MAJR-IDEN	Major contours - annotation
V-TOPO-MINR-	Minor contours
V-TOPO-MINR-IDEN	Minor contours - annotation
C-TOPO-MINR-ONEF	Minor contours - One Foot Intervals
C-TOPO-MINR-TWOF	Minor contours - Two Foot Intervals

ImageArea

Polygon Accuracy: +/-20 Ft Sensitivity: Confidential

The image foot print or coverage area. [Source: SDSFIE]

Associated CADD Layers:

Layer Name	Description
V-AERI-BNDY-	Aerial photography boundaries

Group: Manmade Structures

Building *

Polygon Accuracy: +/- 5 Ft Sensitivity: Restricted

A three dimensional permanent structure modeled with a bounding polygon. This feature includes all on-airport buildings within an Airport Parcel and any building in the vicinity of the airport that affects air navigation or airport design requirements [Source: FAA]

Associated CADD Layers:

Layer Name	Description
A-ELEV-OTLN-	Building outlines
C-BLDG-OTLN-	Buildings and other structures
G-PLAN-OTLN-	Floor outline/perimeter/building footprint
H-BLDG-OTLN-	Command posts, information centers
M-ELEV-OTLN-	Building outlines
V-BLDG-OTLN-	Buildings and other structures

ConstructionArea *

Polygon Accuracy: +/-10 Ft Sensitivity: Restricted

A defined area that is under construction, not intended for active use until authorized by the concerned authority. The area defines a boundary for personnel, material, and equipment engaged in the construction activity [Source: FAA]

Associated CADD Layers:

Layer Name	Description
A-STAT-DEMO-	Demolition
A-STAT-DEMO-PHS1	Demolition - phase 1
A-STAT-DEMO-PHS2	Demolition - phase 2
A-STAT-DEMO-PHS3	Demolition - phase 3
A-STAT-FUTR-	Future work
A-STAT-NEWW-	New work
A-STAT-TEMP-	Temporary work
C-PROP-CONS-	Construction limits/controls, staging area
C-STAT-DEMO-	Demolition
C-STAT-DEMO-PHS1	Demolition - phase 1
C-STAT-DEMO-PHS2	Demolition - phase 2
C-STAT-DEMO-PHS3	Demolition - phase 3
C-STAT-FUTR-	Future work
C-STAT-NEWW-	New work
C-STAT-TEMP-	Temporary work
E-STAT-DEMO-PHS1	Demolition - phase 1
E-STAT-DEMO-PHS2	Demolition - phase 2
E-STAT-DEMO-PHS3	Demolition - phase 3
F-STAT-DEMO-	Demolition (Note: comprehensive demolition is handled in Model File Type: Demolition Plan)
F-STAT-DEMO-PHS1	Demolition - phase 1
F-STAT-DEMO-PHS2	Demolition - phase 2
F-STAT-DEMO-PHS3	Demolition - phase 3
F-STAT-FUTR-	Future work
F-STAT-NEWW-	New work
F-STAT-TEMP-	Temporary work
G-SITE-OTLN-	Site plan - key map

H-STAT-DEMO-PHS1	Demolition - phase 1
H-STAT-DEMO-PHS2	Demolition - phase 2
H-STAT-DEMO-PHS3	Demolition - phase 3
L-STAT-DEMO-	Demolition (Note: comprehensive demolition is handled in Model File Type: Demolition Plan)
L-STAT-DEMO-PHS1	Demolition - phase 1
L-STAT-DEMO-PHS2	Demolition - phase 2
L-STAT-DEMO-PHS3	Demolition - phase 3
L-STAT-FUTR-	Future work
L-STAT-NEWW-	New work
L-STAT-TEMP-	Temporary work
M-STAT-DEMO-	Demolition
M-STAT-DEMO-PHS1	Demolition - phase 1
M-STAT-DEMO-PHS2	Demolition - phase 2
M-STAT-DEMO-PHS3	Demolition - phase 3
M-STAT-FUTR-	Future work
M-STAT-NEWW-	New work
M-STAT-TEMP-	Temporary work
P-FUEL-NGAS-	Natural gas piping
P-STAT-DEMO-	Demolition
P-STAT-DEMO-PHS1	Demolition - phase 1
P-STAT-DEMO-PHS2	Demolition - phase 2
P-STAT-DEMO-PHS3	Demolition - phase 3
P-STAT-FUTR-	Future work
P-STAT-NEWW-	New work
P-STAT-TEMP-	Temporary work
S-STAT-DEMO-	Demolition
S-STAT-DEMO-PHS1	Demolition - phase 1
S-STAT-DEMO-PHS2	Demolition - phase 2
S-STAT-DEMO-PHS3	Demolition - phase 3
S-STAT-FUTR-	Future work
S-STAT-NEWW-	New work
S-STAT-TEMP-	Temporary work
T-STAT-DEMO-PHS1	Demolition - phase 1
T-STAT-DEMO-PHS2	Demolition - phase 2
T-STAT-DEMO-PHS3	Demolition - phase 3
V-STAT-DEMO-	Demolition (Note: comprehensive demolition is handled in Model File Type: Demolition Plan)
V-STAT-FUTR-	Future work
V-STAT-NEWW-	New work
V-STAT-TEMP-	Temporary work

Fence * Line Accuracy: +/-10 Ft Sensitivity: Restricted

Any fencing (chain-link, razor wire, PVC, etc. [Source: FAA]

Associated CADD Layers:

Layer Name	Description
C-DETL-FENC-	Fencing

C-SITE-FENC-	Fences and handrails
L-DETL-FENC-	Fencing
L-SITE-FENC-	Fencing
S-SAFE-FENC-	Fencing
V-SITE-FENC-	Fences and handrails
C-DETL-FENC-SECU	Security Fencing

Gate *

Line Accuracy: +/-10 Ft Sensitivity: Restricted

The aircraft stand location defines the outermost location to where a parking stand area can accommodate a specific aircraft type [Source: RTCA DO-272]

Associated CADD Layers:

Layer Name	Description
L-DETL-GATE-	Gate
L-SITE-GATE-	Gate
C-SITE-GATE-	Gates along fences or other barriers intended to restrict access

Tower *

Point Accuracy: +/- 5 Ft Sensitivity: Restricted

An existing structure that was created, by man, to facilitate an activity at an elevated level above the ground. [Source: SDSFIE]

Associated CADD Layers:

Layer Name	Description
C-STRC-TOWR-	Tower
E-POLE-GUYS-	Guying equipment
V-POLE-GUYS-	Guying equipment
V-STRC-TOWR-	Tower

Group: Navigational Aids

NAVAIDCriticalArea *

Polygon Accuracy: +/- 5 Ft Sensitivity: Restricted

A zone encompassing a specific ground area in the vicinity of a radiating antenna array which must be protected from parking and unlimited movement of surface and air traffic [Source: FAA Order 6750.16C]

Associated CADD Layers:

Layer Name	Description
C-AIRF-AIDS-CRIT	Airfield Navigational Aid - Critical Area

NAVAIDEquipment *

Point Accuracy: +/- 5 Ft Sensitivity: Unclassified

Any ground-based visual or electronic device that provides point to point guidance information or position to aircraft in flight. The location is specified by FAA Specification 405 [Source: FAA Specification 405]

Associated CADD Layers:

Layer Name	Description
C-AIRF-AIDS-OTHR	Other airfield navigational aides
C-AIRF-AIDS-SITE	Airfield Navigational Aid - Site
E-BCNS-MISC-	Miscellaneous navaids - windcones and beacons
E-BCNS-STRB-	Strobe beacons
V-BCNS-MISC-	Miscellaneous navaids - windcones and beacons
V-BCNS-STRB-	Strobe beacons

C-AIRF-AIDS-RADI	Radio airfield navigational aides
C-AIRF-AIDS-ILS_	Airfield Instrument Landing System
C-AIRF-AIDS-RADR	Radar airfield navigational aides
C-AIRF-AIDS-COMM	Communications airfield navigational aides
C-AIRF-AIDS-GPS_	GPS airfield navigational aides
C-AIRF-AIDS-MCWV	Microwave airfield navigational aides
C-AIRF-AIDS-WTHR	Weather airfield navigational aides
C-AIRF-AIDS-RMTE	Remote airfield navigational aides

NAVAIDSystem * Point Accuracy: +/- 5 Ft Sensitivity: Unclassified

A reference point to a grouping of NAVAIDS that together perform a common function.

Associated CADD Layers:

Layer Name	Description
C-AIRF-AIDS-SYST	NAVAID system

Group: SeaPlane

FloatingDockSite * Polygon Accuracy: +/-10 Ft Sensitivity: Unclassified

A floating facility which can serve as a mooring place for vessels or as a floating dry dock. [Source: SDSFIE]

Associated CADD Layers:

Layer Name	Description
C-SEAP-DOCK-	Seaplane dock

NavigationBuoy * Point Accuracy: +/- 5 Ft Sensitivity: Unclassified

A floating marker which is moored to the bottom at a specific known location, which is used as an aid to navigation or for other special purpose. [Source: SDSFIE]

Associated CADD Layers:

Layer Name	Description
C-SEAP-BUOY-	Seaplane navigation buoy

SeaplaneLandingArea * Polygon Accuracy: +/- 5 Ft Sensitivity: Restricted

An area specifically designated for take-offs and landings of sea planes. [Source: SDSFIE]

Associated CADD Layers:

Layer Name	Description
C-SEAP-LNDA-	Seaplane landing area

SeaplaneRampCenterline * Line Accuracy: +/- 5 Ft Sensitivity: Restricted

The centerline of ramps specifically designed to transit seaplanes from land to water and vice versa. [Source: SDSFIE]

Associated CADD Layers:

Layer Name	Description
C-SEAP-RAMP-CNTR	Seaplane ramp centerline

SeaplaneRampSite * Polygon Accuracy: +/- 5 Ft Sensitivity: Restricted

Ramps specifically designed to transit seaplanes from land to water and vice versa. [Source: SDSFIE]

Associated CADD Layers:

Layer Name	Description
C-SEAP-RAMP-	Seaplane ramp site

Group: Security

SecurityIdentificationDisplayArea * PolygonAccuracy: +/- 5 Ft Sensitivity: Secret

Portions of an airport, specified in the airport security program, in which security measures required by regulation must be carried out. This area includes the security area and may include other areas of the airport. [Source: DHS]

Associated CADD Layers:

Layer Name	Description
C-AIRF-SECR-SIDA	Security Identification Display Area

Group: Surface Transportation

Bridge * Polygon Accuracy: +/- 5 Ft Sensitivity: Restricted

A structure used by vehicles that allows passage over or under an obstacle such as a river, chasm, mountain, road or railroad. [Source: SDSFIE]

Associated CADD Layers:

Layer Name	Description
C-STRC-OTLN-	Bridges, piers, breakwaters, docks, floats, etc. - outlines
L-SITE-BRDG-	Bridges
M-MATL-CRAN-	Bridge cranes, jib cranes, and monorails
V-SITE-STRC-	Structures (bridges, sheds, foundation pads, footings, etc.)
V-STRC-OTLN-	Bridges, piers, breakwaters, docks, floats, etc. - outlines

DrivewayArea Polygon Accuracy: +/-10 Ft Sensitivity: Restricted

An access to a residence or other vehicle parking lot or storage area. [Source: SDSFIE]

Associated CADD Layers:

Layer Name	Description
C-ROAD-DRIV-	Driveway edge of pavement

DrivewayCenterline Line Accuracy: +/-10 Ft Sensitivity: Restricted

The center of the driveway as measured from the edge of the paved surface. The segments of a driveway centerline will coincide with the road segments in order to provide network connectivity. [Source: SDSFIE]

Associated CADD Layers:

Layer Name	Description
C-ROAD-DRIV-CNTR	Driveway centerline

ParkingLot Polygon Accuracy: +/- 5 Ft Sensitivity: Restricted

An area of an airport used for parking of automobiles, buses, etc. [Source: SDSFIE]

Associated CADD Layers:

Layer Name	Description
C-PKNG-ISLD-	Parking islands
C-PKNG-OTLN-	Parking lots

RailroadCenterline * Line Accuracy: +/- 5 Ft Sensitivity: Confidential

Represents the centerline of each pair of rails [Source: ANSI: Data Content Standards For Transportation Networks: Roads]

Associated CADD Layers:

Layer Name	Description
C-RAIL-CNTR-	Centerlines
C-RAIL-TRAK-	Railroads

RailroadYard * Polygon Accuracy: +/- 5 Ft Sensitivity: Restricted

Represents a railroad yard [Source: ANSI: Data Content Standards For Transportation Networks: Roads]

Associated CADD Layers:

Layer Name	Description
C-RAIL-YARD-	Railroad Yard

RoadCenterline * Line Accuracy: +/- 5 Ft Sensitivity: Confidential

The center of the roadway as measured from the edge of the paved surface. The segments of a road centerline will coincide with the road segments in order to have similar characteristics. [Source: SDSFIE]

Associated CADD Layers:

Layer Name	Description
C-ROAD-CNTR-	Centerlines

RoadPoint * Point Accuracy: +/-10 Ft Sensitivity: Confidential

A point along the roadway system which has some special significance either for starting or ending a road segment or for representing a significant position along the roadway system such as the start or center of a bridge or the center of an intersection [Source: ANSI: Data Content Standards For Transportation Networks: Roads]

Associated CADD Layers:

Layer Name	Description
C-ROAD-POIN-	Road Point

RoadSegment *

Polygon Accuracy: +/- 5 Ft Sensitivity: Confidential

Represents a linear section of the physical road system designed for, or the result of, human or vehicular movement; must be continuous (no gaps) and cannot branch; no mandates are provided on how to segment the road system except that data providers adopt a consistent method [Source: ANSI: Data Content Standards For Transportation Networks: Roads]

Associated CADD Layers:

Layer Name	Description
C-PROF-ROAD-	Roads
C-ROAD-CURB-	Curbs
C-ROAD-OTLN-	Roads
V-PROF-ROAD-	Roads

Sidewalk *

Line Accuracy: +/-10 Ft Sensitivity: Restricted

A paved or concrete pad used as a pedestrian walkway. Usually is composed of one or more SideWalkSegments. [Source: SDSFIE]

Associated CADD Layers:

Layer Name	Description
C-SITE-WALK-	Walks, trails and bicycle paths
L-SITE-WALK-	Walks and steps
V-SITE-WALK-	Walks, trails, and bicycle paths

Tunnel *

Polygon Accuracy: +/- 5 Ft Sensitivity: Restricted

The area of a transportation passage, open at both ends, used to provide access through or under a natural obstacle [Source: SDSFIE]

Associated CADD Layers:

Layer Name	Description
L-SITE-TUNL-	Tunnels

Group: Utilities

TankSite *

Polygon Accuracy: +/- 3 Ft Sensitivity: Confidential

An above or below grade receptacle or chamber for holding anything (e.g., fuels, water, waste, etc.) on a temporary basis prior to transfer, use, or disposal. Tanks are located on TankSites [Source: SDSFIE]

Associated CADD Layers:

Layer Name	Description
L-DETL-TKST-	Tank Site

UtilityLine

Line Accuracy: +/- 3 Ft Sensitivity: Top Secret

Any utility feature that can be represented as a line

Associated CADD Layers:

Layer Name	Description
C-FUEL-ABND-	Abandoned piping
C-FUEL-DEFL-	Defueling piping
C-FUEL-MAIN-	Main fuel piping
C-FUEL-SERV-	Service piping

C-FUEL-TRCH-	Fuel line trench
C-NGAS-ABND-	Abandoned piping
C-NGAS-MAIN-	Main natural gas piping
C-NGAS-SERV-	Service piping
C-PROF-PIPE-	Piping
C-SSWR-ABND-	Abandoned piping
C-SSWR-MAIN-	Sanitary sewer piping
C-SSWR-SERV-	Sanitary sewer service piping
C-STRM-ABND-	Abandoned piping
C-STRM-HDWL-	Headwalls and endwalls
C-STRM-MAIN-	Storm sewer piping
C-STRM-ROOF-	Roof drain line
C-STRM-SERV-	Storm sewer service piping
C-STRM-SUBS-	Subsurface drain piping
E-AIRF-DUCT-	Ductbanks
E-CABL-COAX-	Coax cable
E-CABL-FIBR-	Fiber optics cable
E-CABL-MULT-	Multi-conductor cable
E-CABL-TRAY-	Cable trays and wireways
E-CIRC-CTRL-	Control and monitoring circuits
E-CIRC-MULT-	Multiple circuits
E-CIRC-SERS-	Series circuits
E-COMM-OVHD-	Overhead communications/telephone lines
E-COMM-UNDR-	Underground communications/telephone lines
E-DUCT-MULT-	Ductbank
E-GRND-CIRC-	Circuits
E-LITE-CIRC-	Lighting circuits (including crosslines and homeruns)
E-POWR-CIRC-	Power circuits (including crosslines and homeruns)
E-PRIM-OVHD-	Overhead electrical utility lines
E-PRIM-UNDR-	Underground electrical utility lines
E-SECD-OVHD-	Overhead electrical utility lines
E-SECD-UNDR-	Underground electrical utility lines
F-AFFF-PIPE-	Piping
F-CO2S-PIPE-	CO2 piping or CO2 discharge nozzle piping
F-HALN-PIPE-	Halon piping
F-IGAS-PIPE-	Inert gas piping
F-PROT-HOSE-	Fire hoses
F-SPRN-PIPE-	Sprinkler piping
F-WATR-PIPE-	Piping
L-DETL-WIRE-	Wiring
L-IRRG-PIPE-	Piping
M-ACID-PIPE-	Acid, alkaline, and oil waste piping
M-ACID-VENT-	Acid, alkaline, and oil waste vent piping
M-AFRZ-PIPE-	Anti-freeze piping
M-AFRZ-WAST-	Waste anti-freeze piping
M-BRIN-PIPE-	Brine system piping
M-CHEM-PIPE-	Piping (includes fittings, valves)
M-CNDW-PIPE-	Condenser water piping

M-COND-PIPE-	Condensate piping (includes fittings, valves)
M-CONT-WIRE-	Low voltage wiring
M-CWTR-PIPE-	Piping (includes fittings, valves)
M-DETL-PIPE-	Piping
M-DETL-WIRE-	Electrical wiring
M-DUAL-PIPE-	Piping (includes fittings, valves)
M-GTHP-PIPE-	Piping (includes fittings, valves)
M-HTCW-ABND-	Abandoned piping
M-HTCW-CHLL-	Main chilled water piping
M-HTCW-CHLS-	Chilled water service piping
M-HTCW-HTPL-	Main high temperature piping
M-HTCW-HTPS-	High temperature service piping
M-HTCW-LTPL-	Main low temperature piping
M-HTCW-LTPS-	Low temperature service piping
M-HTCW-STML-	Main steam piping
M-HTCW-STMS-	Steam service piping
M-HVAC-RETN-	Return ductwork
M-HVAC-SUPP-	Supply ductwork
M-HYDR-PIPE-	Hydraulic system piping
M-INSL-PIPE-	Insulating oil piping
M-LUBE-PIPE-	Lubrication oil piping
M-PROC-PIPE-	Process piping
M-RCOV-PIPE-	Piping (includes fittings, valves)
M-REFG-PIPE-	Piping (includes fittings, valves)
M-RWTR-PIPE-	Raw water piping
M-STEM-PIPE-	Steam piping
P-CMPA-PIPE-	Piping
P-FUEL-FGAS-	Fuel gas piping
P-FUEL-FOIL-	Fuel oil piping
P-LGAS-PIPE-	Piping
P-MDGS-PIPE-	Piping
P-SANR-COND-	Condensate piping
P-SANR-PIPE-	Piping
P-SANR-VENT-	Vent piping
P-STRM-PIPE-	Storm drain piping
T-CABL-TRAY-	Cable trays and wireways
V-AIRF-DUCT-	Ductbanks
V-CIRC-CTRL-	Control and monitoring circuits
V-CIRC-MULT-	Multiple circuits
V-CIRC-SERS-	Series circuits
V-COMM-OVHD-	Overhead communications/telephone lines
V-COMM-UNDR-	Underground communications/telephone lines
V-DUCT-MULT-	Ductbank
V-ELEC-VALT-	Vaults
V-FUEL-ABND-	Abandoned piping
V-FUEL-DEFL-	Defueling piping
V-FUEL-MAIN-	Main fuel piping
V-FUEL-SERV-	Service piping

V-FUEL-TRCH-	Fuel line trench
V-GTHP-PIPE-	Piping (includes fittings, valves)
V-HTCW-ABND-	Abandoned piping
V-HTCW-CHLL-	Main chilled water piping
V-HTCW-CHLS-	Chilled water service piping
V-HTCW-HTPL-	Main high temperature piping
V-HTCW-HTPS-	High temperature service piping
V-HTCW-LTPL-	Main low temperature piping
V-HTCW-LTPS-	Low temperature service piping
V-HTCW-STML-	Main steam piping
V-HTCW-STMS-	Steam service piping
V-NGAS-ABND-	Abandoned piping
V-PRIM-OVHD-	Overhead electrical utility lines
V-PRIM-UNDR-	Underground electrical utility lines
V-PROF-PIPE-	Piping
V-SECD-OVHD-	Overhead electrical utility lines
V-SECD-UNDR-	Underground electrical utility lines
V-SSWR-ABND-	Abandoned piping
V-SSWR-MAIN-	Sanitary sewer piping
V-SSWR-SERV-	Sanitary sewer service piping
V-STRM-ABND-	Abandoned piping
V-STRM-MAIN-	Storm sewer piping
V-STRM-SUBS-	Subsurface drain piping
V-UTIL-ELEC-	Power lines, lights, telephone poles, communication lines
V-UTIL-STEM-	Steam lines
V-UTIL-STRM-	Storm sewer lines, culverts, manholes, and headwalls
V-UTIL-WATR-	Water lines, hydrants, tanks

UtilityPoint

Point Accuracy: +/- 3 Ft Sensitivity: Top Secret

Any utility feature that can be represented as a point

Associated CADD Layers:

Layer Name	**Description**
C-DETL-TANK-	Tanks
C-FUEL-DEVC-	Air eliminators, filter strainers, hydrant fill points, line vents, markers, oil/water separators, reducers, regulators, and valves
C-FUEL-FTTG-	Caps, crosses, and tees
C-FUEL-HYDR-	Hydrant control pits
C-FUEL-JBOX-	Junction boxes, manholes, handholes, test boxes
C-FUEL-METR-	Meters
C-FUEL-PUMP-	Booster pump stations
C-FUEL-TANK-	Fuel tanks
C-FUEL-VENT-	Vent pits
C-FUEL-VLVE-	Valve pits
C-NGAS-DEVC-	Hydrant fill points, lights, vents, markers, rectifiers, reducers, regulators, sources, tanks, drip pots, taps, and valves
C-NGAS-FTTG-	Caps, crosses, and tees
C-NGAS-METR-	Meters

C-NGAS-PUMP-	Compressor stations
C-NGAS-REDC-	Reducing stations
C-NGAS-VENT-	Vent pits
C-NGAS-VLVE-	Valve pits/boxes
C-SSWR-DEVC-	Grease traps, grit chambers, flumes, neutralizers, oil/water separators, ejectors, and valves
C-SSWR-FILT-	Filtration beds
C-SSWR-FTTG-	Caps and cleanouts
C-SSWR-JBOX-	Junction boxes and manholes
C-SSWR-PUMP-	Booster pump stations
C-SSWR-TANK-	Septic tanks
C-STRM-CULV-	Culverts
C-STRM-DEVC-	Downspouts, flumes, oil/water separators, and flap gates
C-STRM-EROS-	Erosion control (riprap)
C-STRM-FMON-	Flow monitoring station
C-STRM-FTTG-	Caps and cleanouts
C-STRM-INLT-	Inlets (curb, surface, and catch basins)
C-STRM-MHOL-	Manholes
C-STRM-PUMP-	Pump stations
C-STRM-STRC-	Storm drainage, headwalls, inlets, manholes, culverts, and drainage structures
E-AIRF-DEVC-	Capacitors, voltage regulators, motors, buses, generators, meters, grounds, and markers
E-AIRF-JBOX-	Junction boxes, pull boxes, manholes, handholes, pedestals, splices
E-CATH-ANOD-	Sacrificial anode system
E-CATH-CURR-	Impress current system
E-CATH-TEST-	Test stations
E-COMM-EQPM-	Other communications distribution equipment
E-COMM-JBOX-	Communication junction boxes, pull boxes, manholes, handholes, pedestals, splices
E-ELEC-DEVC-	Capacitors, voltage regulators, motors, buses, generators, meters, grounds, and markers
E-ELEC-JBOX-	Junction boxes, pull boxes, manholes, handholes, pedestals, splices
E-ELEC-SUBS-	Other substation equipment
E-ELEC-SWCH-	Fuse cutouts, pole mounted switches, circuit breakers, gang operated disconnects, reclosers, cubicle switches
E-ELEC-VALT-	Vaults
E-GRND-EQUI-	Equipotential ground system
E-GRND-REFR-	Reference ground system
E-LITE-EMER-	Emergency fixtures (outline of light (if ceiling mounted) should go on E-LITE-CLNG)
E-LITE-EXIT-	Exit fixtures (outline of light (if ceiling mounted) should go on E-LITE-CLNG)
E-LITE-EXTR-	Exterior lights
E-LITE-JBOX-	Junction boxes
E-LITE-PANL-	Main distribution panels, switchboards, lighting panels
E-LITE-SPCL-	Special fixtures

E-LITE-SWCH-	Lighting contactors, photoelectric controls, low-voltage lighting controls, etc.
E-LITE-WALL-	Wall mounted fixtures
E-LTNG-COND-	Lightning protection conductors
E-LTNG-TERM-	Lightning protection terminals
E-POLE-UTIL-	Utility poles
E-POWR-BUSW-	Busways and wireways
E-POWR-CABL-	Cable trays
E-POWR-FEED-	Feeders
E-POWR-GENR-	Generators and auxiliary equipment
E-POWR-JBOX-	Junction boxes
E-POWR-PANL-	Panelboards, switchboards, MCC, unit substations
E-POWR-SWCH-	Disconnect switches, motor starters, contactors, etc.
E-SERT-BURD-	Buried sensors
E-SERT-UNDR-	Buried sensors
E-SPCL-JBOX-	Junction boxes
E-SPCL-PANL-	Panelboards, backing boards, patch panel racks
E-SPCL-SYST-	Special systems (UMCS, EMCS, CATV, etc.)
E-TRAN-PADM-	Pad mounted transformers
E-TRAN-POLE-	Pole mounted transformers
F-AFFF-EQPM-	Equipment
F-ALRM-INDC-	Indicating appliances
F-ALRM-MANL-	Manual fire alarm pull stations
F-ALRM-PHON-	Fire service or emergency telephone stations
F-CO2S-EQPM-	Equipment
F-CTRL-PANL-	Control panels
F-HALN-EQPM-	Halon equipment
F-IGAS-EQPM-	Inert gas equipment
F-LITE-EMER-	Emergency fixtures
F-LITE-EXIT-	Exit fixtures
F-LSFT-EGRE-	Egress requirements designator
F-LSFT-OCCP-	Occupant load for egress capacity
F-WATR-CONN-	Fire department connections
F-WATR-HYDR-	Hydrants
F-WATR-PUMP-	Fire pumps
H-DECN-EQPM-	Decontamination equipment
H-DISP-TANK-	Spill containment tanks
L-DETL-VLVE-	Valves, fittings
L-IRRG-SPKL-	Sprinklers
M-ACID-EQPM-	Acid, alkaline, and oil waste equipment
M-BRIN-EQPM-	Brine system equipment
M-CHEM-EQPM-	Equipment
M-CNDW-EQPM-	Condenser water equipment
M-CONT-THER-	Thermostats, controls, instrumentation, and sensors
M-CWTR-EQPM-	Equipment
M-DETL-BOIL-	Boilers
M-DETL-COIL-	Coils and fin tubes
M-DETL-DUCT-	Ducts

M-DETL-EQPT-	Equipment and fixtures
M-DETL-FANS-	Fans
M-DETL-PUMP-	Pumps and compressors
M-DETL-TANK-	Tanks
M-DETL-TRAP-	Traps and drains
M-DETL-VENT-	Vents
M-DETL-VLVE-	Valves and fittings
M-DUAL-EQPM-	Equipment
M-DUST-DUCT-	Dust and fume ductwork
M-DUST-EQPM-	Dust and fume collection equipment
M-GTHP-EQPM-	Equipment
M-HTCW-CHLP-	Chilled water plant
M-HTCW-DEVC-	Rigid anchors, anchor guides, rectifiers, reducers, markers, meters, pumps, regulators, tanks, and valves
M-HTCW-FTTG-	Caps and flanges
M-HTCW-HTPP-	High temperature water plant
M-HTCW-JBOX-	Junction boxes, manholes, handholes, test boxes
M-HTCW-PITS-	Valve pits/vaults, steam pits
M-HTCW-PUMP-	Pump stations
M-HTCW-RTRN-	Return for all HTCW lines
M-HVAC-DAMP-	Fire and smoke dampers
M-HVAC-EQPM-	Air system equipment
M-HVAC-ROOF-	Roof mounted HVAC equipment
M-HWTR-EQPM-	Equipment
M-HWTR-PIPE-	Piping (includes fittings, valves)
M-HYDR-EQPM-	Hydraulic system equipment
M-INSL-EQPM-	Insulating oil equipment
M-LUBE-EQPM-	Lubrication oil equipment
M-MACH-BASE-	Machinery bases
M-MATL-LIFT-	Miscellaneous lifting equipment
M-PROC-EQPM-	Equipment
M-RCOV-EQPM-	Equipment
M-REFG-EQPM-	Equipment
M-RWTR-EQPM-	Raw water equipment
M-STEM-EQPM-	Equipment
P-CMPA-EQPM-	Equipment
P-FUEL-EQPM-	Equipment
P-LGAS-EQPM-	Equipment
P-MDGS-EQPM-	Equipment
P-SANR-EQPM-	Equipment (e.g., sand/oil/water separators)
P-SANR-FLDR-	Floor drains, sinks, and cleanouts
S-BRAC-VERT-	Vertical bracing
S-GRAT-SUBS-	Subsurface grating
S-PIPE-GATE-	Gates (flap gates, sluice gates, other)
T-CABL-COAX-	Coax cable
T-CABL-FIBR-	Fiber optics cable
T-CABL-MULT-	Multi-conductor cable
T-COMM-JBOX-	Junction boxes

T-EQPM-COPP-	Distribution equipment for copper
T-EQPM-FIBR-	Distribution equipment for fiber optic
T-EQPM-OTHR-	Other telecommunications equipment
T-JACK-DATA-	Data/LAN jacks
T-JACK-PHON-	Telephone jacks
V-AIRF-DEVC-	Capacitors, voltage regulators, motors, buses, generators, meters, grounds, and markers
V-AIRF-JBOX-	Junction boxes, pull boxes, manholes, handholes, pedestals, splices
V-CATH-ANOD-	Sacrificial anode system
V-CATH-CURR-	Impress current system
V-CATH-TEST-	Test stations
V-COMM-EQPM-	Other communications distribution equipment
V-COMM-JBOX-	Communication junction boxes, pull boxes, manholes, handholes, pedestals, splices
V-ELEC-DEVC-	Capacitors, voltage regulators, motors, buses, generators, meters, grounds, and markers
V-ELEC-JBOX-	Junction boxes, pull boxes, manholes, handholes, pedestals, splices
V-ELEC-SUBS-	Other substation equipment
V-ELEC-SWCH-	Fuse cutouts, pole mounted switches, circuit breakers, gang operated disconnects, reclosers, cubicle switches
V-FUEL-DEVC-	Air eliminators, filter strainers, hydrant fill points, line vents, markers, oil/water separators, reducers, regulators, and valves
V-FUEL-FTTG-	Caps, crosses, and tees
V-FUEL-HYDR-	Hydrant control pits
V-FUEL-JBOX-	Junction boxes, manholes, handholes, test boxes
V-FUEL-METR-	Meters
V-FUEL-PUMP-	Booster pump stations
V-FUEL-TANK-	Fuel tanks
V-FUEL-VENT-	Vent pits
V-FUEL-VLVE-	Valve pits
V-GTHP-EQPM-	Equipment
V-HTCW-CHLP-	Chilled water plant
V-HTCW-DEVC-	Rigid anchors, anchor guides, rectifiers, reducers, markers, meters, pumps, regulators, tanks, and valves
V-HTCW-FTTG-	Caps and flanges
V-HTCW-HTPP-	High temperature water plant
V-HTCW-JBOX-	Junction boxes, manholes, handholes, test boxes
V-HTCW-PITS-	Valve pits/vaults, steam pits
V-HTCW-PUMP-	Pump stations
V-HTCW-RTRN-	Return for all HTCW lines
V-LITE-FIXT-	Exterior Lights
V-NGAS-DEVC-	Hydrant fill points, lights, vents, markers, rectifiers, reducers, regulators, sources, tanks, drip pots, taps, and valves
V-NGAS-FTTG-	Caps, crosses, and tees
V-NGAS-METR-	Meters
V-NGAS-PUMP-	Compressor stations
V-NGAS-REDC-	Reducing stations

V-NGAS-VENT-	Vent pits
V-NGAS-VLVE-	Valve pits/boxes
V-POLE-UTIL-	Utility poles
V-PROF-MHOL-	Manholes
V-SPCL-SYST-	Special systems (UMCS, EMCS, CATV, etc.)
V-SSWR-DEVC-	Grease traps, grit chambers, flumes, neutralizers, oil/water separators, ejectors, and valves
V-SSWR-FILT-	Filtration beds
V-SSWR-FTTG-	Caps and cleanouts
V-SSWR-JBOX-	Junction boxes and manholes
V-SSWR-PUMP-	Booster pump stations
V-SSWR-TANK-	Septic tanks
V-STRM-CHUT-	Chutes and concrete erosion control structures
V-STRM-CULV-	Culverts
V-STRM-DEVC-	Downspouts, flumes, oil/water separators, and flap gates
V-STRM-EROS-	Erosion control (riprap)
V-STRM-FMON-	Flow monitoring station
V-STRM-FTTG-	Caps and cleanouts
V-STRM-HDWL-	Headwalls and endwalls
V-STRM-INLT-	Inlets (curb, surface, and catch basins)
V-STRM-MHOL-	Manholes
V-STRM-PUMP-	Pump stations
V-TRAN-PADM-	Pad mounted transformers
V-TRAN-POLE-	Pole mounted transformers
V-UTIL-LINE-	Utilities
V-UTIL-NGAS-	Gas lines, features, and valves
V-UTIL-SSWR-	Sanitary lines and manholes
E-SPCL-SRFS-	Surface Sensor System
T-COMM-ANTN-	Telecommunications antennae
C-SITE-SECU-CMRA	Security camera locations outside of buildings

UtilityPolygon

Polygon Accuracy: +/- 3 Ft Sensitivity: Top Secret

Any utility feature that can be represented as a polygon

Associated CADD Layers:

Layer Name	**Description**
C-SSWR-LAGN-	Lagoons
C-SSWR-LEAC-	Leach field
C-SSWR-NITF-	Nitrification drain fields
C-SSWR-PLNT-	Treatment plants
C-STRM-AFFF-	AFFF lagoon/detention pond
C-STRM-CHUT-	Chutes and concrete erosion control structures
C-STRM-LAGN-	Lagoons, ponds, watersheds, and basins
E-AIRF-VALT-	Airfield lighting vaults
E-COMM-VALT-	Communications vault
V-COMM-VALT-	Communications vault
V-SSWR-LAGN-	Lagoons
V-SSWR-LEAC-	Leach field

V-SSWR-NITF-	Nitrification drain fields
V-SSWR-PLNT-	Treatment plants
V-STRM-AFFF-	AFFF lagoon/detention pond
V-STRM-LAGN-	Lagoons, ponds, watersheds, and basins

Section 3-4: Metadata Elements

This appendix list the metadata elements defined in this standard. These elements have been extracted from ISO's Geographic Information – Metadata standard (ISO 19115). For each element, the name, type, description and ISO information are provided. Also provided, are indicators as to which level(s) of metadata the element can be applied.

CATEGORY: Overview (1)

status CodeList *Applies to: Collections Classes Attrib.*

Description: Status of the the data being submitted. Acceptable values are (completed, histroicalArchive, obsolete, onGoing, planned, required, under development)

ISO *idStatus (28)*

ISO Definition: *status of the resource(s)*

geometricObjectCount Integer *Applies to: Collections Classes* .

Description: Number of feature instances being transmitted

ISO *geoObjCnt (185)*

ISO Definition: *Total number of the point or vector object type occurring in the dataset*

abstract String (254) *Applies to: Collections Classes Attrib.*

Description: Description of the contents of the data collection being submitted

ISO *idAbs (25)*

ISO Definition: *brief narrative summary of the content of the resource(s)*

CATEGORY: Useage (62)

specificUsage String (254) *Applies to: Collections Classes Attrib.*

Description: Description of how the data should be used

ISO *specUsage (63)*

ISO Definition: *brief description of the resource and/or resource series usage*

BegusageDateTime See ISO 8601 *Applies to: Collections Classes Attrib.*

Description: The first date/time for which the data described by the scope is valid

ISO *usageDate (64)*

ISO Definition: *date and time of the first use or range of uses of the resource and/or resource series*

endUsageDateTime See ISO 8601 *Applies to: Collections Classes Attrib.*

Description: The last date/time for which the data described by the scope is valid

ISO *usageDate (64)*

ISO Definition:

CATEGORY: Source (92)

city string (50) *Applies to: Collections*

Description: City

ISO *city (382)*

ISO Definition: *city of the location*

statement String (254) *Applies to: Collections*

Description: Description of the source of the data
ISO *statement (83)*
ISO Definition: *general explanation of the data producer's knowledge about the lineage of the dataset*

individualName String (50) *Applies to: Collections*

Description: Name of the person submitting the data
ISO *rpIndName (375)*
ISO Definition: *name of the responsible person- surname, given name, title separated by a delimiter*

organizationName String (75) *Applies to: Collections*

Description: Organization of the person submitting the data
ISO *rpOrgName (376)*
ISO Definition: *name of the responsible organization*

deliveryPoint String (254) *Applies to: Collections*

Description: Street address of the person submitting the data
ISO *delPoint (381)*
ISO Definition: *address line for the location (as described in ISO 11180, Annex A)*

administrativeArea string (20) *Applies to: Collections*

Description: State
ISO *adminArea (383)*
ISO Definition: *state, province of the location*

postalCode string (10) *Applies to: Collections*

Description: Zip Code
ISO *postCode (384)*
ISO Definition: *ZIP or other postal code*

electronicMailAddress String (50) *Applies to: Collections*

Description: e-Mail address
ISO *eMailAdd (386)*
ISO Definition: *address of the electronic mailbox of the responsible organization or individual*

voice String (20) *Applies to: Collections*

Description: Phone
ISO *voiceNum (388)*
ISO Definition: *telephone number by which individuals can speak to the responsible organization or*

positionName String (30) *Applies to: Collections*

Description: Title of the person submitting the data
ISO *rpPosName (377)*
ISO Definition: *role or position of the responsible person*

CATEGORY: Data Quality (99)

evalutionMethodDescription String (254) *Applies to: Collections Classes Attrib.*

Description: Description of the evaluation method used
ISO *evalMethDesc (104)*
ISO Definition: *description of the evaluation method*

pass Boolean *Applies to: Collections Classes Attrib.*

Description: Indicatation of whether data described by the scope passed or failed in evaluation
ISO *conPass (132)*
ISO Definition: *indication of the conformance result where 0=fail or 1=pass*

title String (20) *Applies to: Collections Classes Attrib.*

Description: Name of the evaluation method used
ISO *resTitle (360)*
ISO Definition: *name by which the cited resource is known*

CATEGORY: Scope (149)

dataset String *Applies to: Collections*

Description: List of feature classes to which the metadata pertains (seperated by commas)
ISO *datasetSet (154)*
ISO Definition: *dataset to which the information applies*

features String *Applies to: Collections Classes*

Description: List of feature names to which the metadata pertains (seperated by commas)
ISO *featSet (151)*
ISO Definition: *features to which the information applies*

attributes See ISO *Applies to: Attrib.*

Description: List of attribute names to which the metadata pertains (seperated by commas)
ISO *attribSet (150)*
ISO Definition: *Attributes to which the information applies*

CATEGORY: Coordinate System (189)

projection RS_Identifier *Applies to: Collections Classes*

Description: Name of the projection used (SPCS, LL)
ISO *projection (190)*
ISO Definition: *identity of the projection used*

datum RS_Identifier *Applies to: Collections Classes*

Description: Horizontal datum of submitted data (NAD27, NAD83 or WGS84)

ISO *datum (192)*

ISO Definition: *identify of the datum used*

code String (4) *Applies to: Collections Classes*

Description: Four digit code for the state place coordinate system used. A list of codes can be found in NOAA manual NOS NGS 5.

ISO *identCode (207)*

ISO Definition: *alphanumeric value indicating an instance in the namespace*