Ensuring Airport Approach Safety

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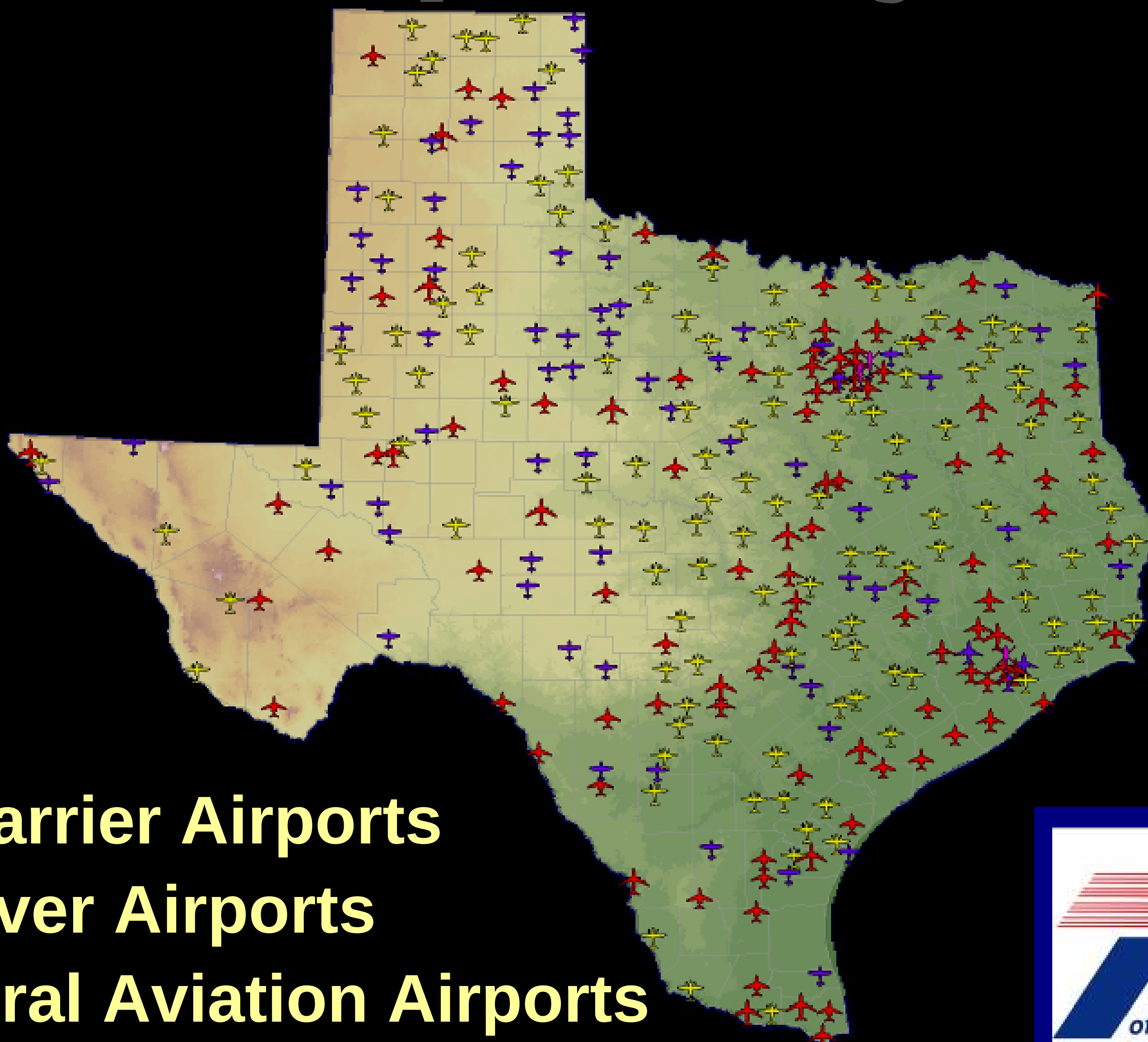
IHEEP September 29, 2009

Ensuring Airport Approach Safety

- TxDOT's Role in Texas Aviation
- Instrument Flight Operations
- FAA's NEXTGEN Implementation
- Airports GIS (Surveying and eALP's)
- Airport Obstruction Analysis Process

Texas Airport System



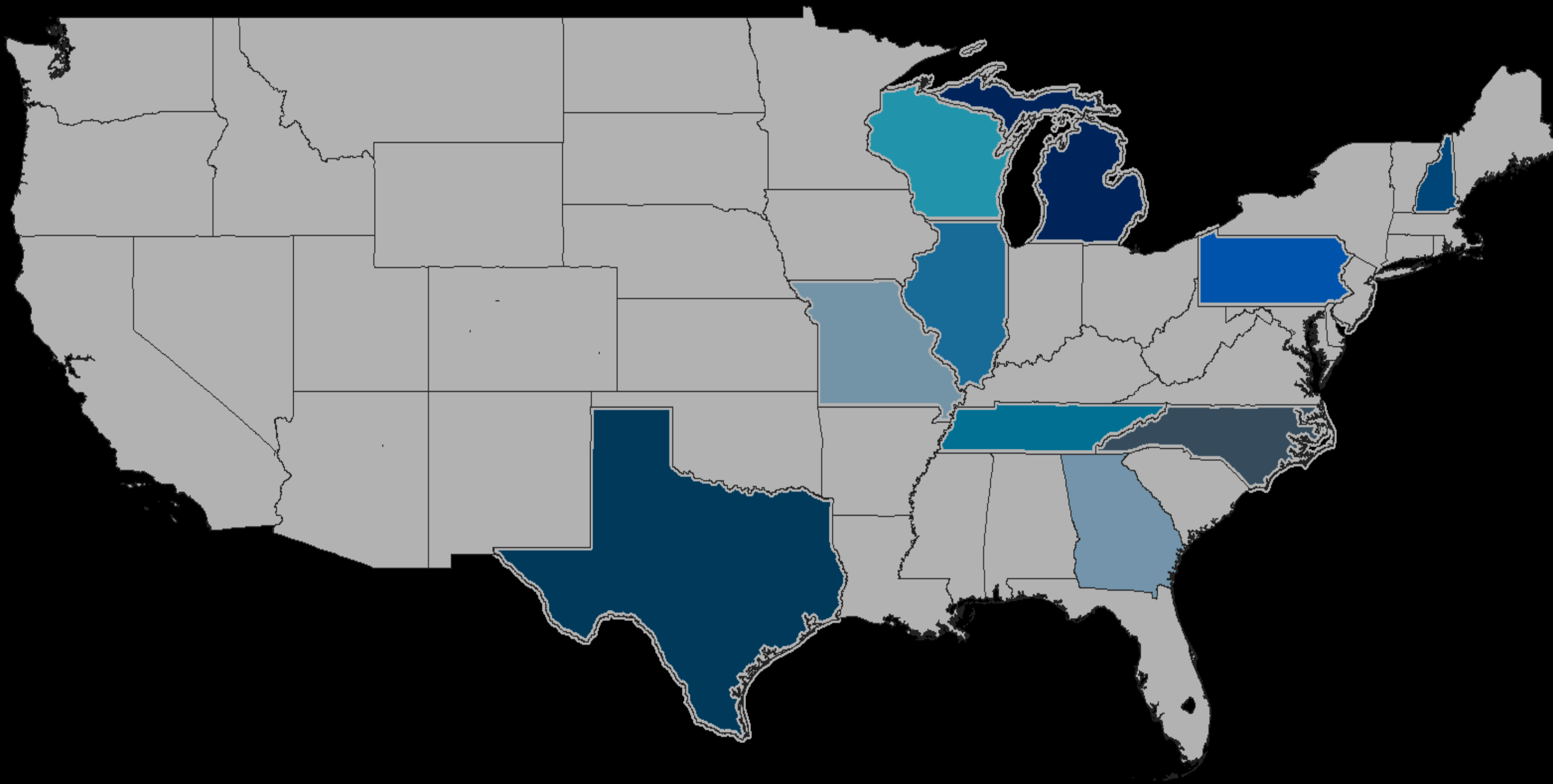
26 Air Carrier Airports

21 Reliever Airports

257 General Aviation Airports

Texas Department of Transportation
Aviation Division

State Block Grant Program

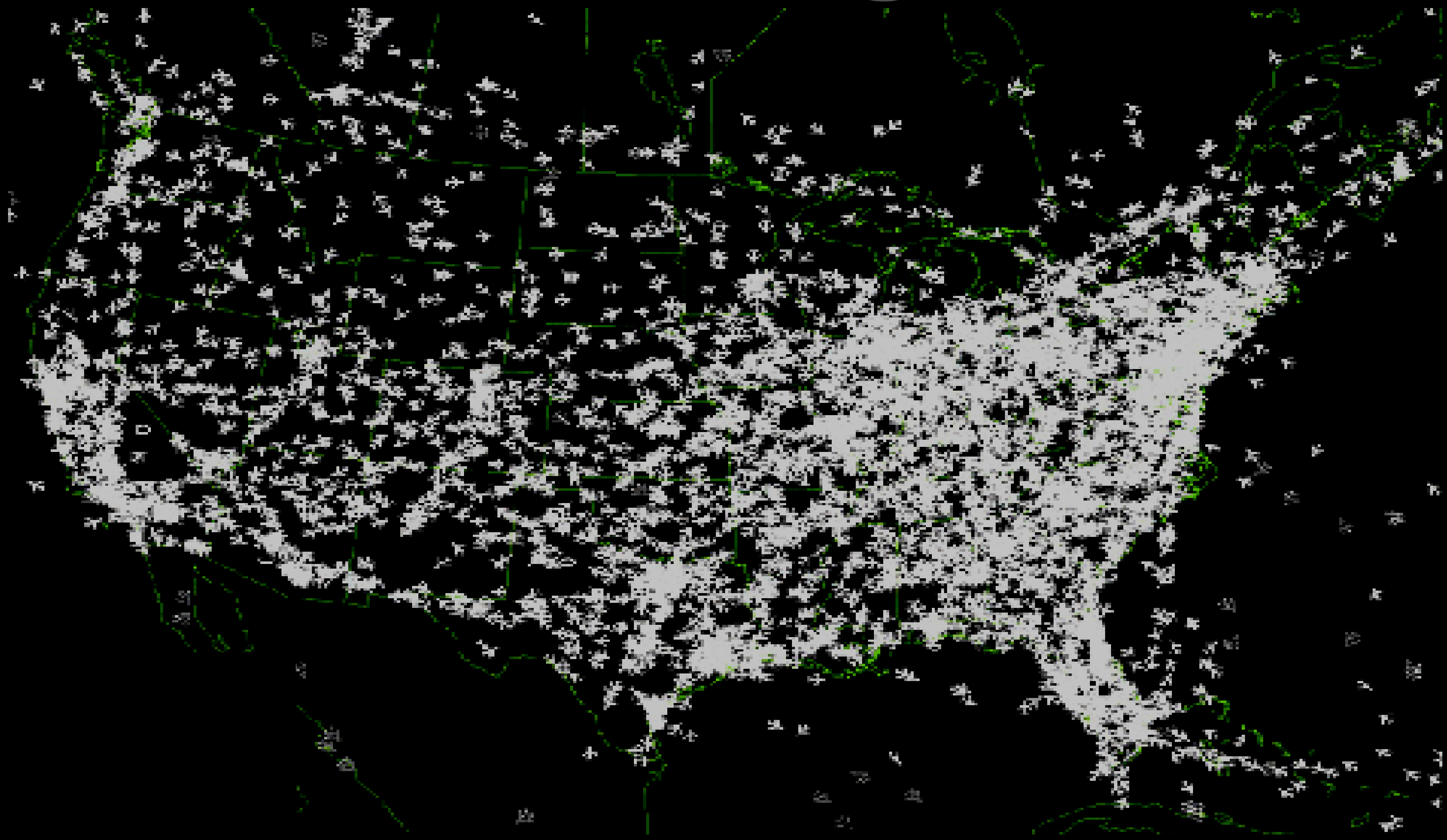


Georgia
Illinois
Michigan

Missouri
New Hampshire
North Caroline
Pennsylvania

Tennessee
Texas
Wisconsin

7,000 Flights!

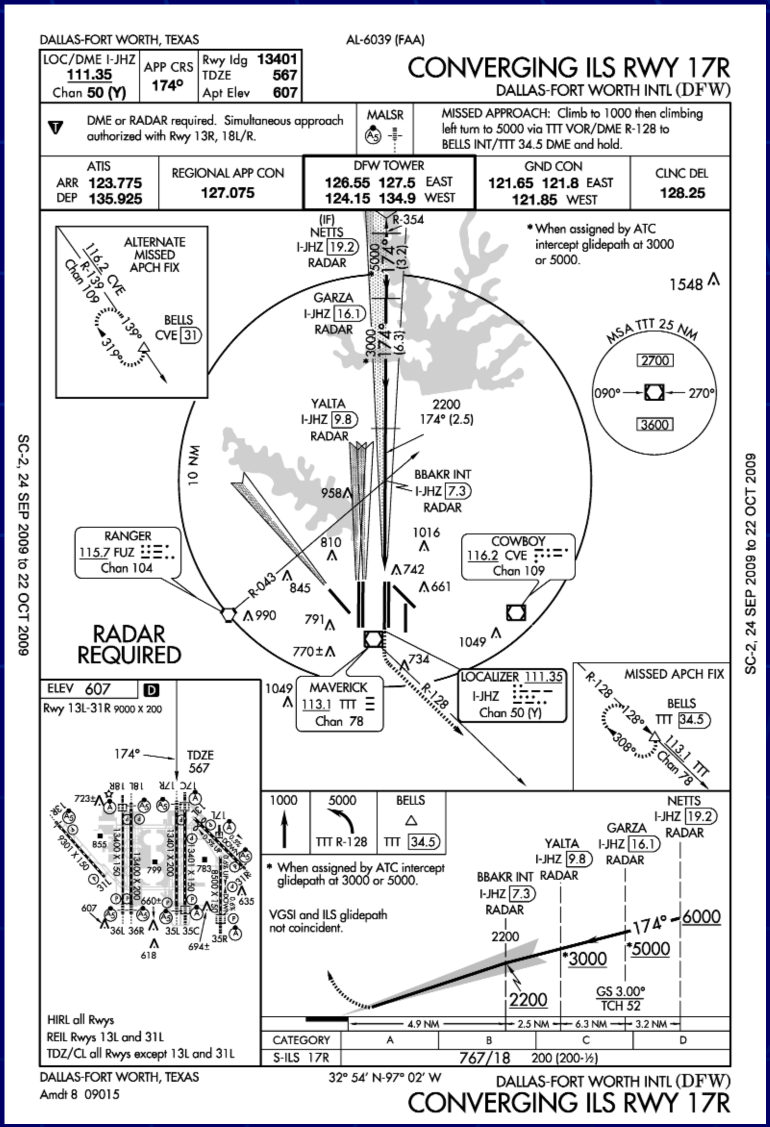


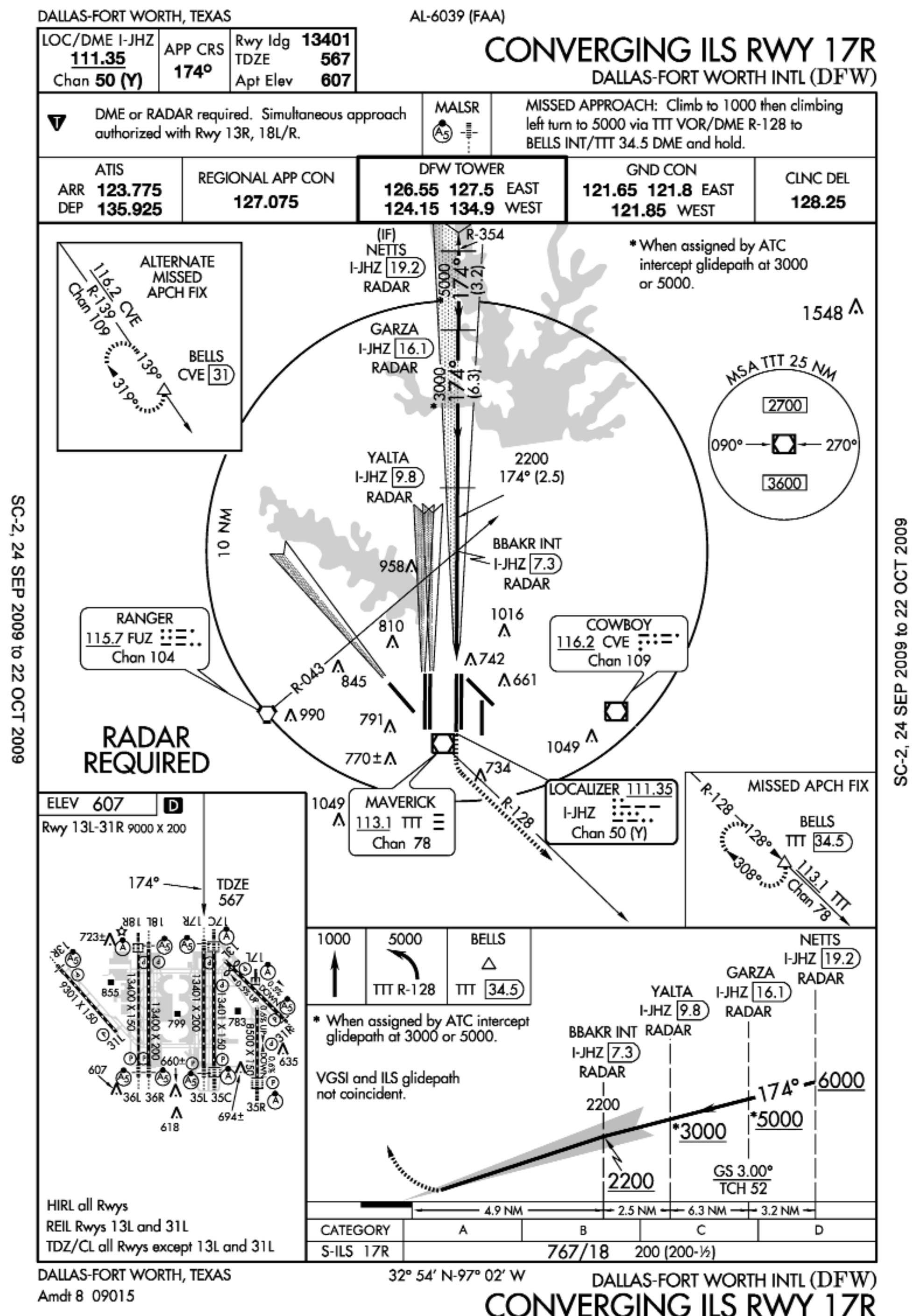
"There are around 7,000 aircraft in the air over the United States at any given time" (FAA.gov)

Visual or Instrument?

Instrument Flight

Standard Instrument Approach Procedure (SIAP)



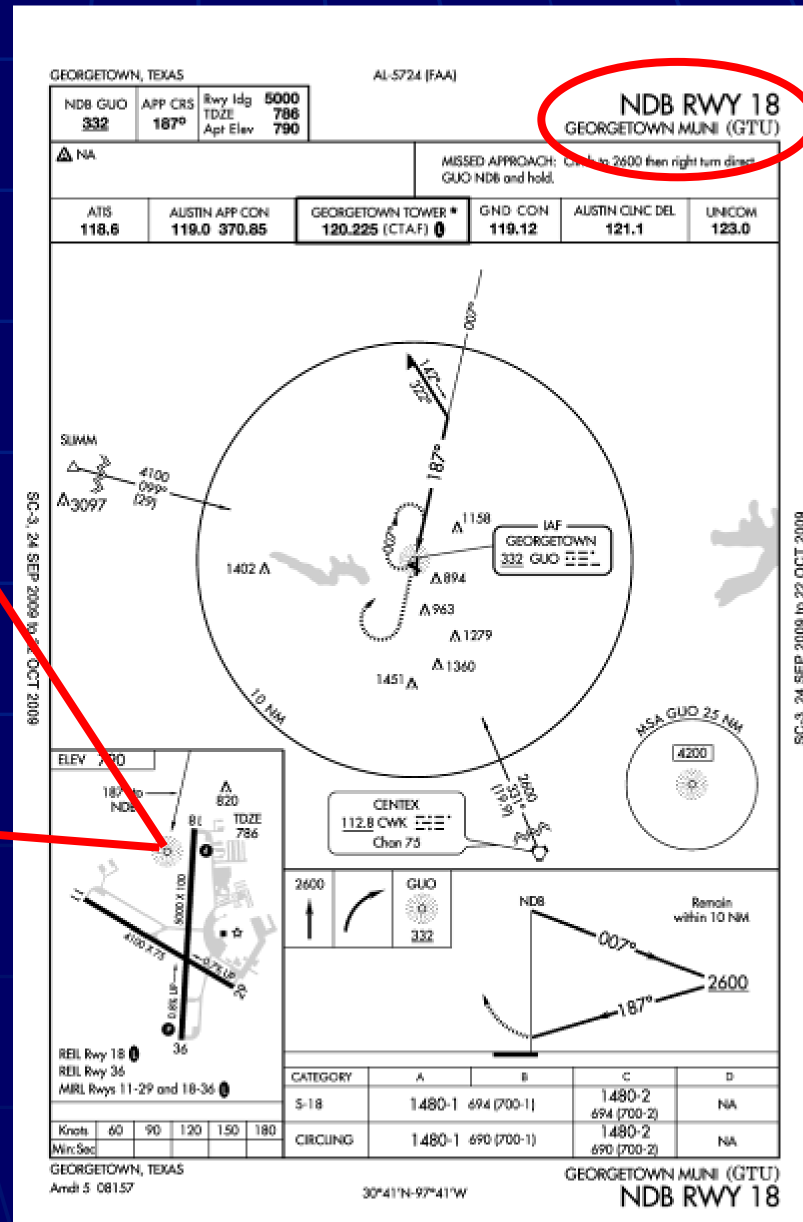


DALLAS-FORT WORTH, TEXAS
AL-6039 (FAA)
CONVERGING ILS RWY 17R
DALLAS-FORT WORTH INTL (DFW)
LOC/DME I-JHZ 111.35 Chan 50 (Y)
APP CRS 174°
Rwy ldg 13401
TDZE 567
Apt Elev 607
DME or RADAR required. Simultaneous approach authorized with Rwy 13R, 18L/R.
MALSR
MISSED APPROACH: Climb to 1000 then climbing left turn to 5000 via TTT VOR/DME R-128 to BELLS INT/TTT 34.5 DME and hold.
ATIS ARR 123.775 DEP 135.925
REGIONAL APP CON 127.075
DFW TOWER 126.55 127.5 EAST 124.15 134.9 WEST
GND CON 121.65 121.8 EAST 121.85 WEST
CLNC DEL 128.25
ALTERNATE MISSED APCH FIX
116.2 CVE R-139 Chan 109
BELLS CVE 31
139°
319°
(IF) NETTS I-JHZ 19.2 RADAR
R-354
5000
174°
(3.2)
* When assigned by ATC intercept glidepath at 3000 or 5000.
1548
GARZA I-JHZ 16.1 RADAR
*3000
(6.3)
MSA TTT 25 NM
2700
090°
270°
3600
YALTA I-JHZ 9.8 RADAR
2200
174° (2.5)
10 NM
BBAKR INT I-JHZ 7.3 RADAR
958
1016
810
742
661
RANGER 115.7 FUZ Chan 104
COWBOY 116.2 CVE Chan 109
R-043
845
990
791
1049
RADAR REQUIRED
770±
734
LOCALIZER 111.35 I-JHZ Chan 50 (Y)
MISSED APCH FIX
R-128
128°
308°
BELLS TTT 34.5
113.1 TTT Chan 78
1049
MAVERICK 113.1 TTT Chan 78
ELEV 607
D
Rwy 13L-31R 9000 X 200
174°
TDZE 567
HIRL all Rwys
REIL Rwys 13L and 31L
TDZ/CL all Rwys except 13L and 31L
1000
5000 TTT R-128
BELLS TTT 34.5
* When assigned by ATC intercept glidepath at 3000 or 5000.
VGSI and ILS glidepath not coincident.
NETTS I-JHZ 19.2 RADAR
GARZA I-JHZ 16.1 RADAR
YALTA I-JHZ 9.8 RADAR
BBAKR INT I-JHZ 7.3 RADAR
2200
174°
6000
*3000
*5000
2200
GS 3.00° TCH 52
4.9 NM
2.5 NM
6.3 NM
3.2 NM
CATEGORY A B C D
S-ILS 17R 767/18 200 (200-½)
SC-2, 24 SEP 2009 to 22 OCT 2009
DALLAS-FORT WORTH, TEXAS
Amdt 8 09015
32° 54' N-97° 02' W
DALLAS-FORT WORTH INTL (DFW)
CONVERGING ILS RWY 17R

Instrument Flight

Ground Based Navigation

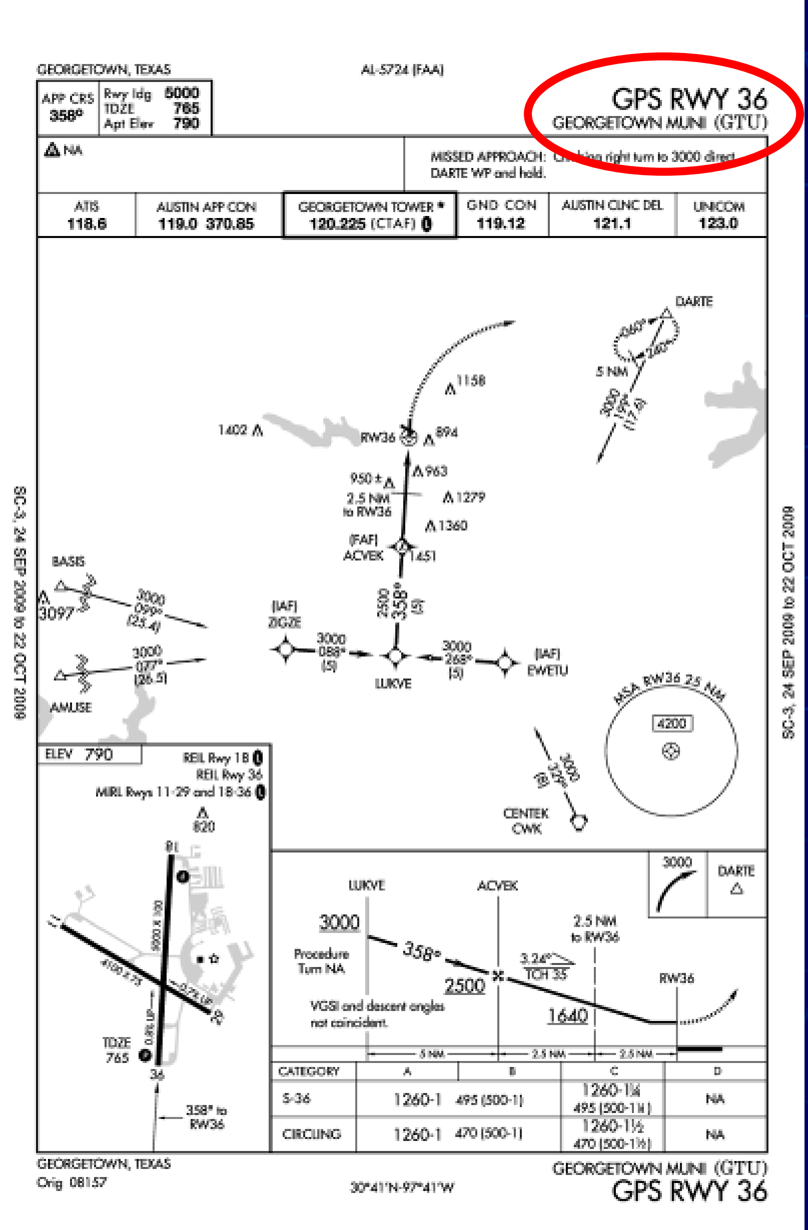
Non-Directional Beacon (NDB)



Instrument Flight

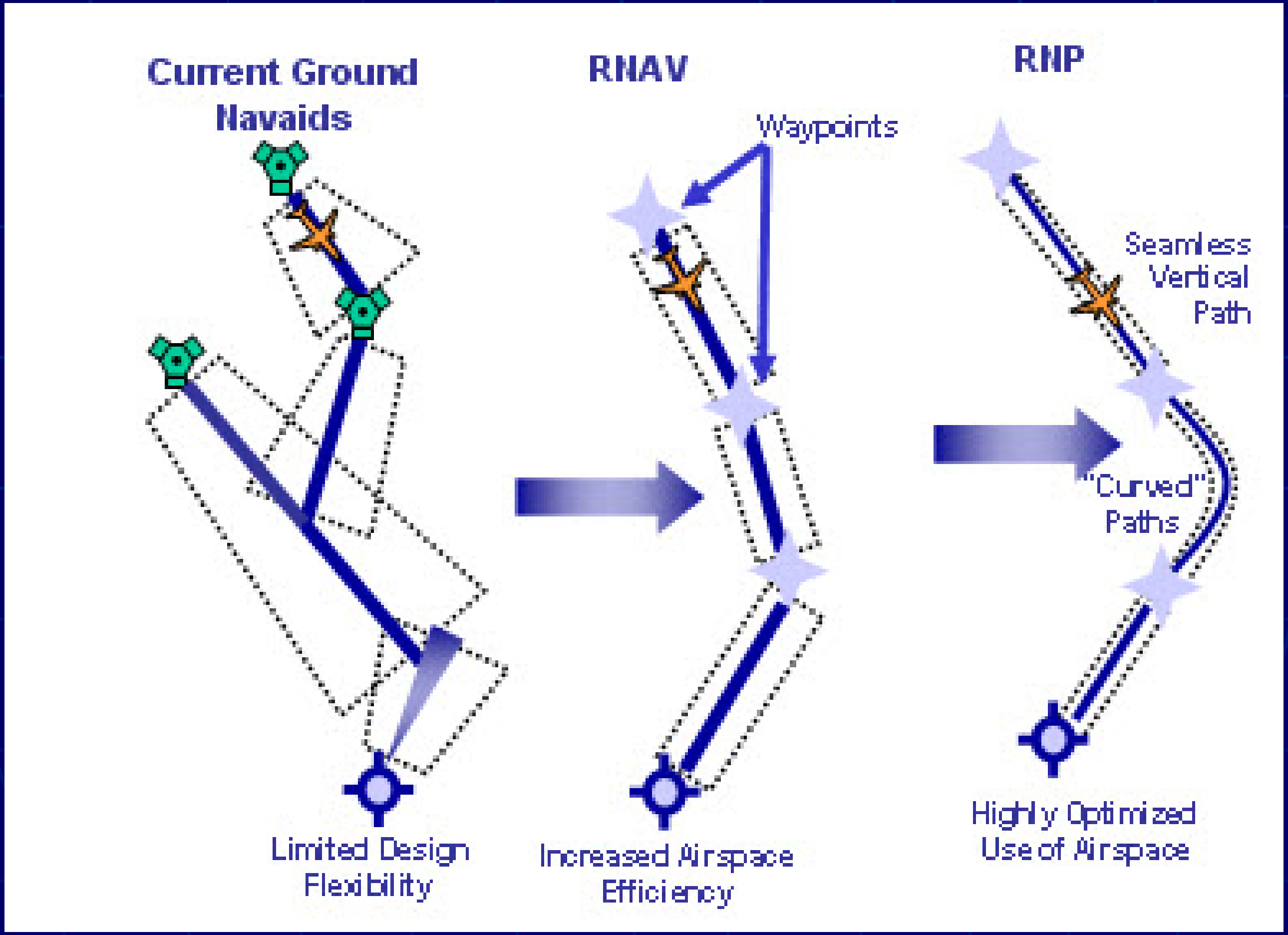
Space Based Navigation

Global Positioning System (GPS)

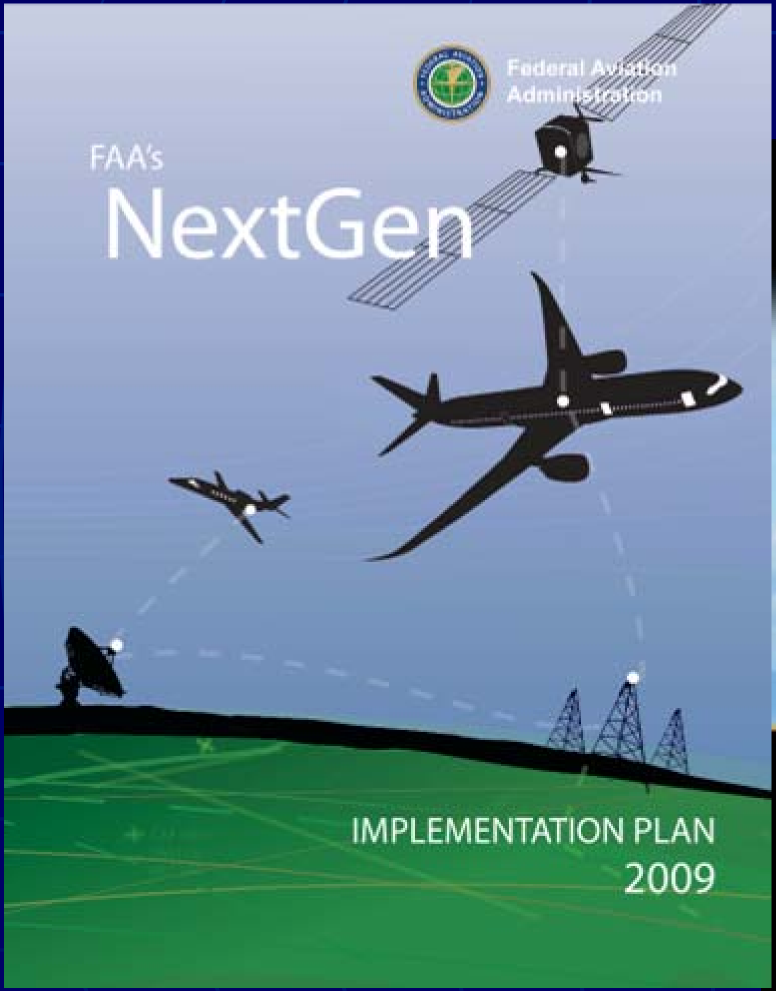


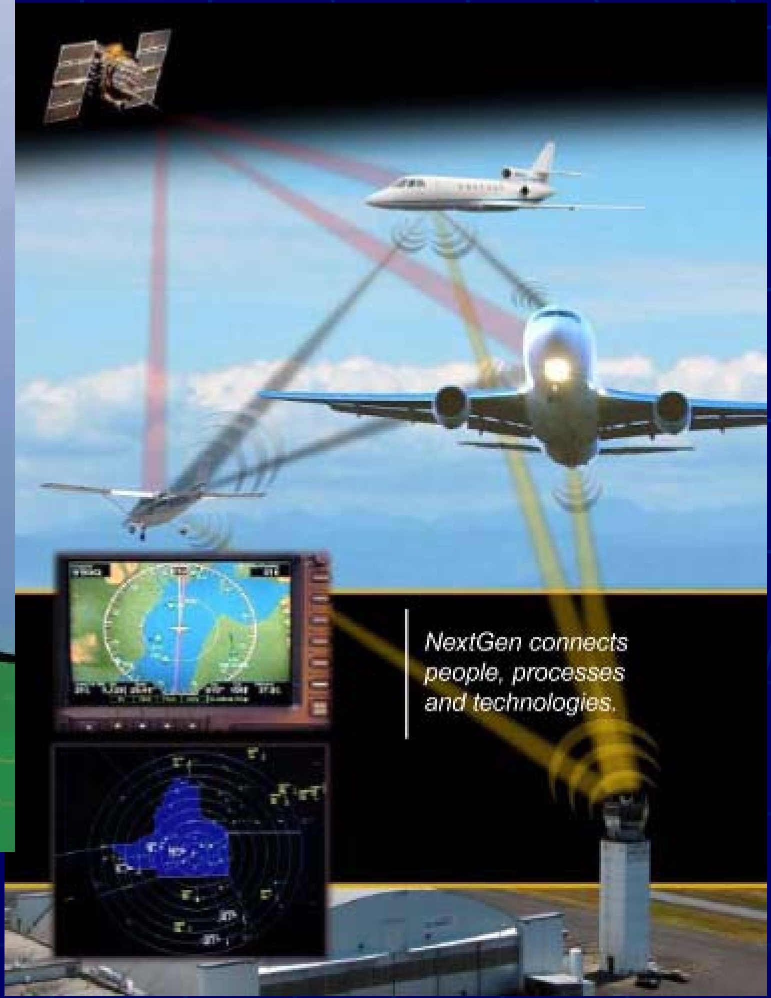
Instrument Flight

Shifting from Ground to Space Based Navigation



NEXTGEN (Next Generation)

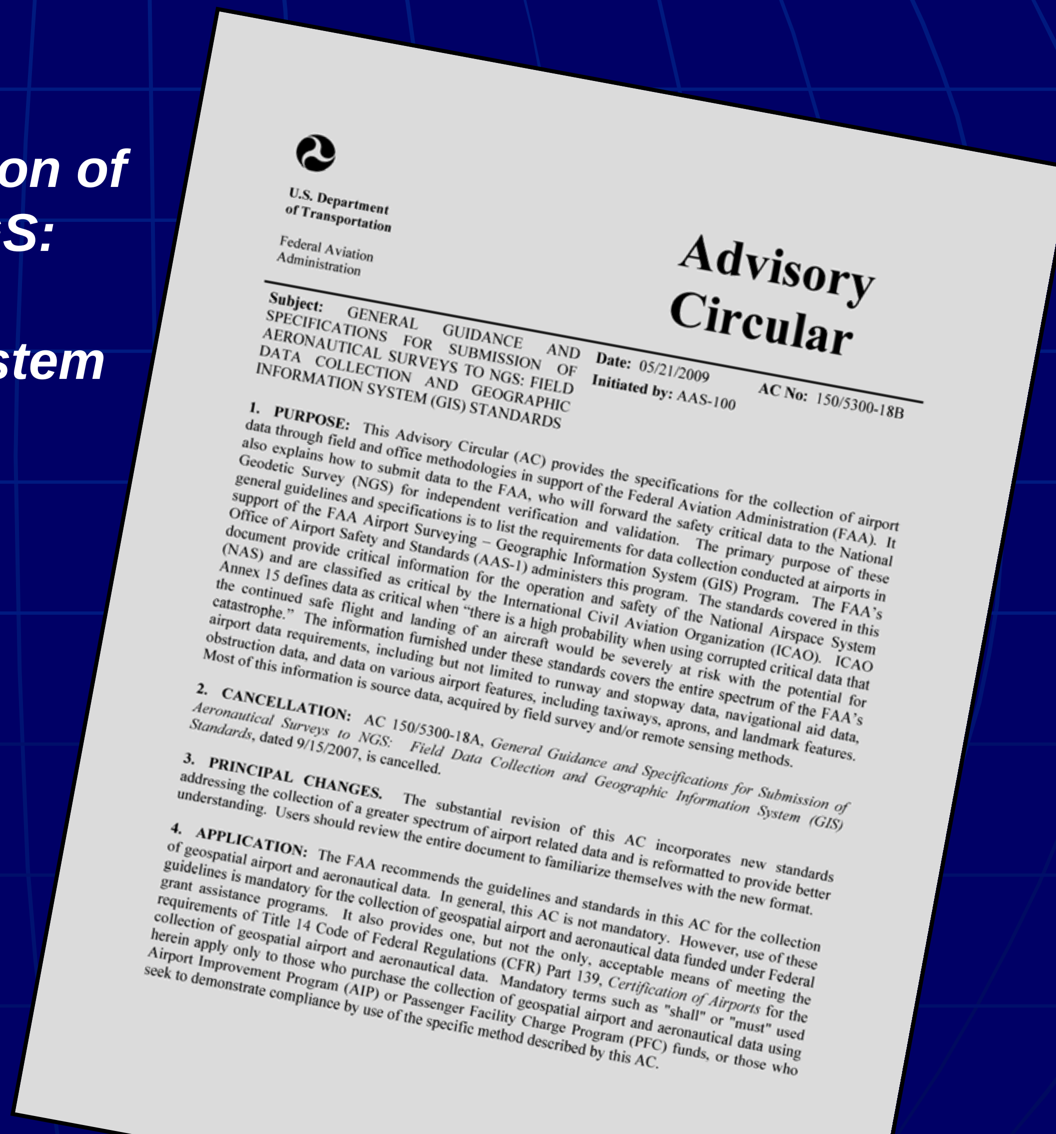




FAA's "Airports GIS"

FAA Advisory Circular 150/5300-18B

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



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: 05/21/2009

Initiated by: AAS-100

AC No: 150/5300-18B

1. PURPOSE: This Advisory Circular (AC) provides the specifications for the collection of airport data through field and office methodologies in support of the Federal Aviation Administration (FAA). It also explains how to submit data to the FAA, who will forward the safety critical data to the National Geodetic Survey (NGS) for independent verification and validation. The primary purpose of these general guidelines and specifications is to list the requirements for data collection conducted at airports in support of the FAA Airport Surveying – Geographic Information System (GIS) Program. The FAA's Office of Airport Safety and Standards (AAS-1) administers this program. The standards covered in this document provide critical information for the operation and safety of the National Airspace System (NAS) and are classified as critical by the International Civil Aviation Organization (ICAO). ICAO Annex 15 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 covers the entire spectrum of the FAA's airport data requirements, including but not limited to runway and stopway data, navigational aid data, obstruction data, and data on various airport features, including taxiways, aprons, and landmark features. Most of this information is source data, acquired by field survey and/or remote sensing methods.

2. CANCELLATION: AC 150/5300-18A, *General Guidance and Specifications for Submission of Aeronautical Surveys to NGS: Field Data Collection and Geographic Information System (GIS) Standards*, dated 9/15/2007, is cancelled.

3. PRINCIPAL CHANGES. The substantial revision of this AC incorporates new standards addressing the collection of a greater spectrum of airport related data and is reformatted to provide better understanding. Users should review the entire document to familiarize themselves with the new format.

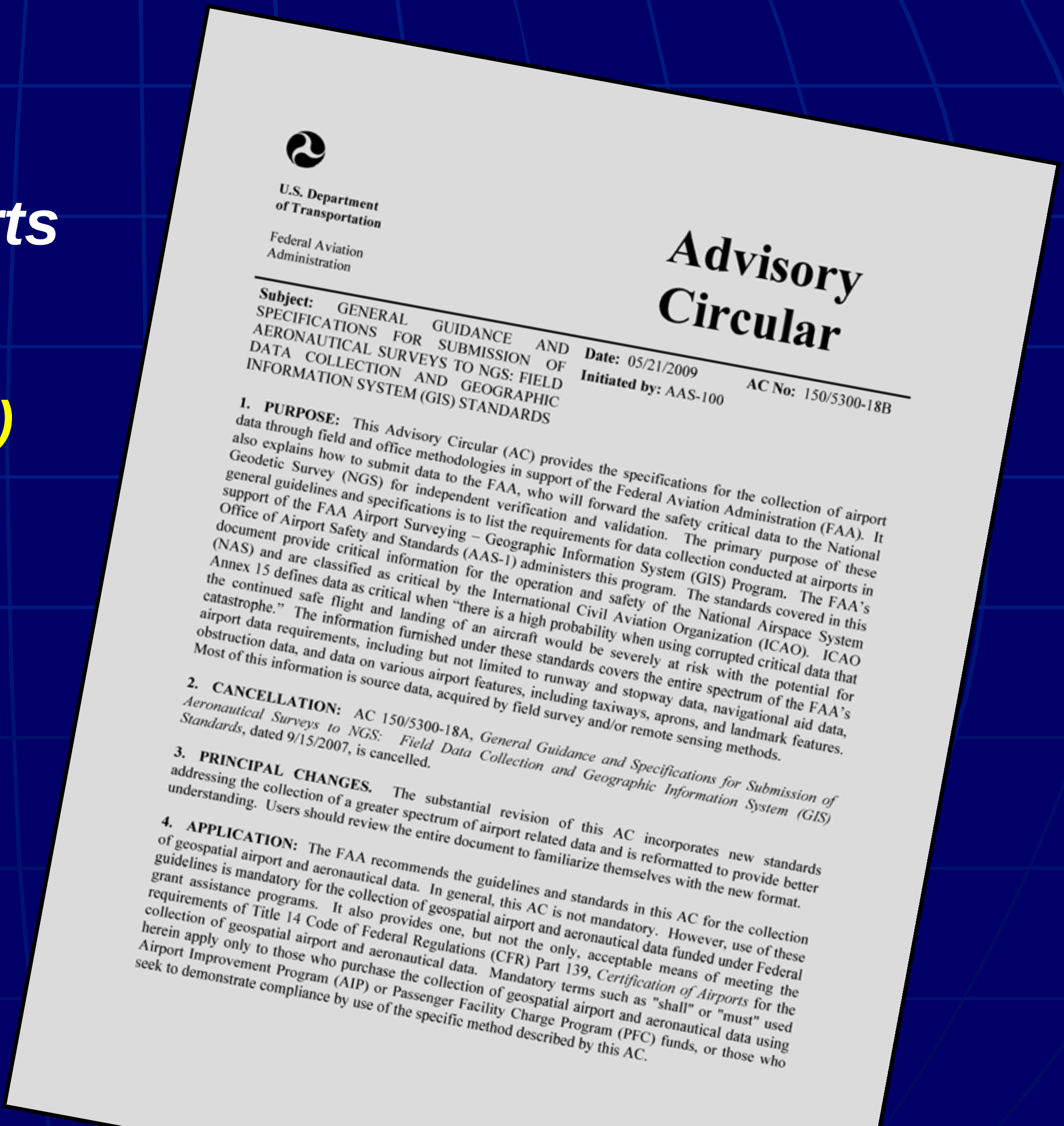
4. APPLICATION: The FAA recommends the guidelines and standards in this AC for the collection of geospatial airport and aeronautical data. In general, this AC is not mandatory. However, use of these guidelines is mandatory for the collection of geospatial airport and aeronautical data funded under Federal grant assistance programs. It also provides one, but not the only, acceptable means of meeting the requirements of Title 14 Code of Federal Regulations (CFR) Part 139, *Certification of Airports* for the collection of geospatial airport and aeronautical data. Mandatory terms such as "shall" or "must" used herein apply only to those who purchase the collection of geospatial airport and aeronautical data using Airport Improvement Program (AIP) or Passenger Facility Charge Program (PFC) funds, or those who seek to demonstrate compliance by use of the specific method described by this AC.

FAA's "Airports GIS"

FAA Advisory Circular 150/5300-18B

2 Types of Survey Efforts

- ***Obstruction Survey***
- ***Airport Layout Plan (ALP)***



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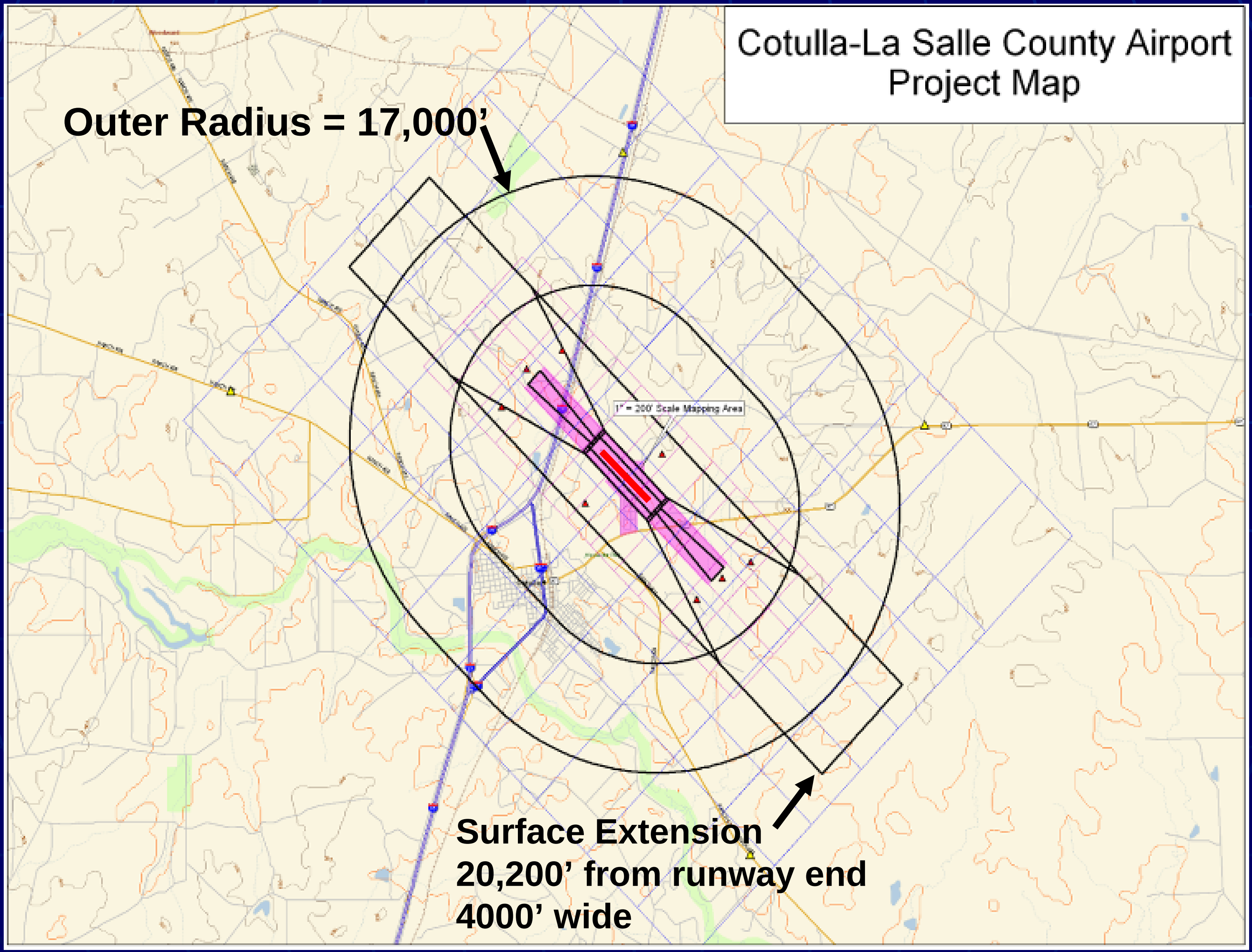
FAA's "Airports GIS"

Obstruction Survey Area for "Vertically Guided" Approach



FAA's "Airports GIS"

FAA Advisory Circular 150/5300-18B

5.4.4. Airfield Light

Definition: Any lighting located within or near an airport boundary that provides guidance for airborne and ground maneuvering of aircraft [Source: AIM, AC 150/5345 Series of ACs]					
Feature Group	Airfield				
Feature Class Name	AirfieldLight				
Feature Type	Point				
CADD Standard Requirements					

Layer/Level	**Description**	**Layer/Level**	**Description**
E-LITE-APPR-	Approach lights	V-LITE-RUNW-	Runway lights
E-LITE-DIST-	Distance and arresting gear markers and lights	V-LITE-TAXI-	Taxiway lights
E-LITE-LANE-	Hoverlane, taxilane, and helipad lights	V-LITE-THRS-	Threshold lights
E-LITE-OBST-	Obstruction lights	V-LITE-RUNW-TDZN	Runway Touchdown Zone lights
E-LITE-TAXI-CNTL	Taxiway centerline lights	E-LITE-RUNW-CNTR	Runway Centerline lights
E-LITE-THRS-	Threshold lights	E-LITE-RUNW-DTGS1	Runway Distance to go lights
V-LITE-APPR-	Approach lights	E-LITE-TAXI-EDGE	Taxiway edge lights
V-LITE-LANE-	Hoverlane, taxilane, and helipad lights	E-LITE-RNWY-GARD	Runway guard lights
V-LITE-OBST-	Obstruction lights		

	Color	**Linetype**	**Line Weight**	**Symbol**
AutoDesk Standards	3	Point	1 MM	User Defined
MicroStation Standards	2		7	

Information Assurance Level	Restricted		
Equivalent Standards	**AIXM**	*LightElementExtension*	Extension
	FGDC	*AirfieldLight*	Extension
	SDSFIE	*airfield_light_point*	
Documentation and Submission Requirements	None		
Related Features			

Data Capture Rules: *Collect a point in the center of the object at the highest point. Other lights on the airfield such as apron lights, roof mounted lights etc. used for general illumination should be captured using the feature type UtilityPoint and delineated using the attribute codeUtilityType.*

Monumentation	No monumentation required.		
Survey Point Location	**Horizontal**	**Vertical**	
	N/A	N/A	
Accuracy Requirements (in feet)	**Horizontal**	**Vertical**	
		Orthometric	**Ellipsoidal**
	± 3 ft	± 5 ft	N/A
Resolution	**Geographic Coordinates**	**Distances and Elevations**	
	Hundredth of arc second	Nearest foot	

Airport Data Feature Definitions:

Group
Class
Description
Capture Rules
Feature Attributes

Feature Attributes

Attribute (Datatype)	**Description**
name (VARCHAR2(50))	Use this attribute to identify the use of the light such as Runway Edge Light, Taxiway Edge Light, Taxiway Centerline Light, etc.
description (String 255)	Description of the feature
status (Enumeration: codeStatus)	A temporal description of the operational status of the feature. This attribute is used to describe real-time status.
lightingType (Enumeration: codeLightingConfigurationType)	A description of the lighting system. Lighting system classifications are Approach; Airport; Runway; Taxiway; and Obstruction
color (Enumeration: codeColor)	The color of the airfield light.
luminescence (Integer)	The luminescence of the airfield light specified in candellas (cd).

FAA's "Airports GIS"

FAA Advisory Circular 150/5300-18B

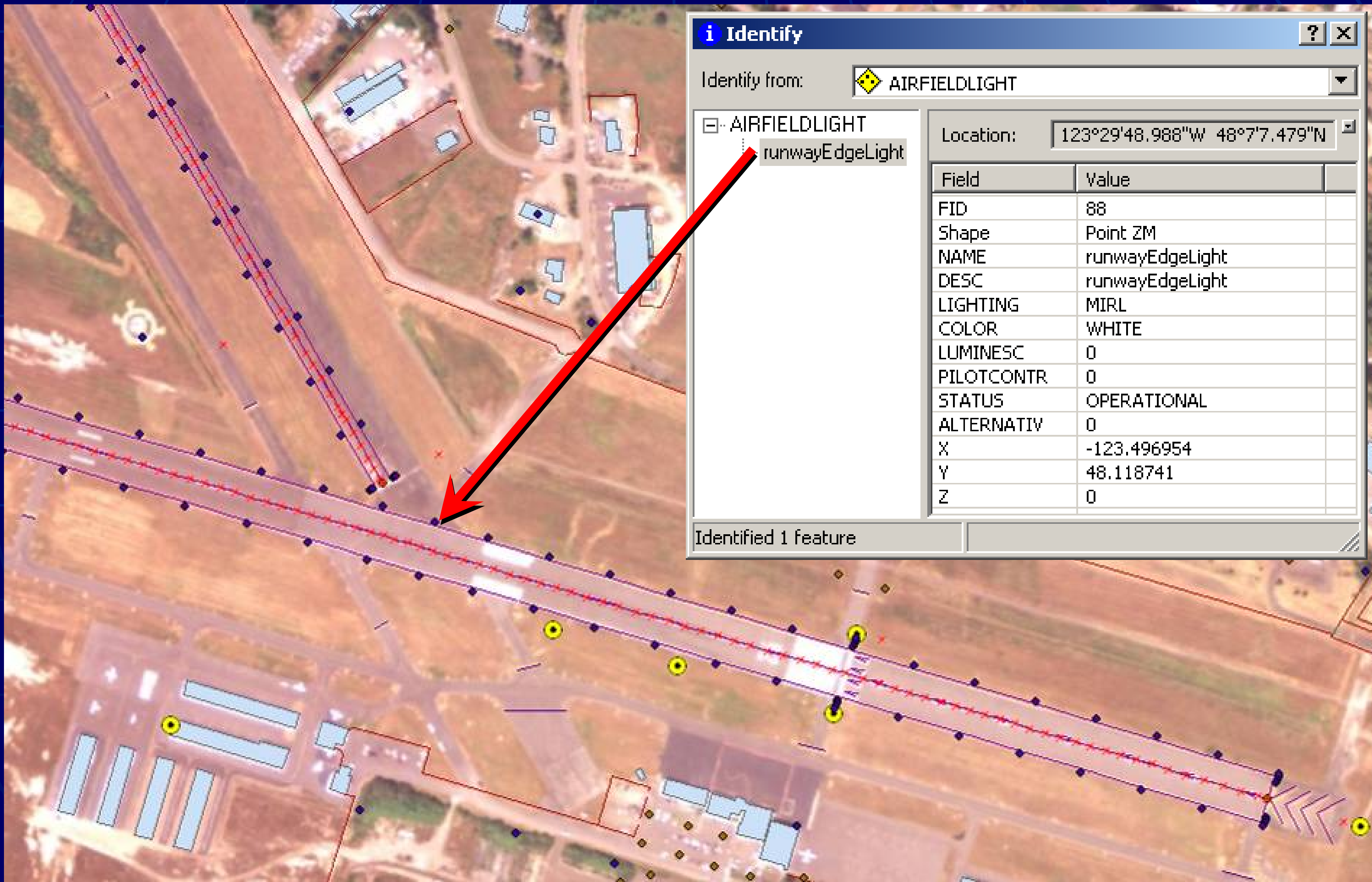
Attribute Enumeration Tables: *Valid Values for Populating Attribute Tags for Features*

Feature Attributes	
Attribute (Datatype)	**Description**
name (VARCHAR2(50))	Use this attribute to identify the use of the light su Edge Light, Taxiway Edge Light, Taxiway Cente etc.
description (String 255)	Description of the feature
status (Enumeration: codeStatus)	A temporal description of the operational status o This attribute is used to describe real-time status.
lightingType (Enumeration: codeLightingConfigurationType)	A description of the lighting system. Lighting sys classifications are Approach; Airport; Runway; T Obstruction
color (Enumeration: codeColor)	The color of the airfield light.
luminescence (Integer)	The luminescence of the airfield light specified in (cd).

5.15.9. CodeColor

Value	Description
AMBER	Amber [U.S. CADD]
BLACK	Black [U.S. CADD]
BLUE	Blue [U.S. CADD]
BROWN	Brown [U.S. CADD]
GREEN	Green [U.S. CADD]
GREEN-GREEN	Bidirectional (Source AC 150/5345-46C)
GREEN-RED	Bidirectional (Source AC 150/5345-46C)
GREEN-YELLOW	Bidirectional (Source AC 150/5345-46C)
GREY	Grey [U.S. CADD]
LIGHTGREY	LightGrey [U.S. CADD]
MAGENTA	Magenta [U.S. CADD]
ORANGE	Orange [U.S. CADD]
OTHER	Other [U.S. CADD]
PINK	Pink [U.S. CADD]
PURPLE	Purple [AIXM]
RED	Red [U.S. CADD]
RED-GREEN	Bidirectional (Source AC 150/5345-46C)
RED-RED	Bidirectional (Source AC 150/5345-46C)
TBD	To be determined
VIOLET	Violet [U.S. CADD]
WHITE	White [U.S. CADD]
WHITE-RED	Bidirectional (Source AC 150/5345-46C)
WHITE-WHITE	Bidirectional (Source AC 150/5345-46C)
WHITE-YELLOW	Bidirectional (Source AC 150/5345-46C)
YELLOW	Yellow [U.S. CADD]
YELLOW-GREEN	Bidirectional (Source AC 150/5345-46C)
YELLOW-RED	Bidirectional (Source AC 150/5345-46C)
YELLOW-YELLOW	Bidirectional (Source AC 150/5345-46C)

FAA's "Airports GIS"



FAA's "Airports GIS"

Lago Vista – Rusty Allen Airport
Lago Vista, Texas
Obstruction Analysis Process

Agenda:

Airport Obstruction Evaluation

- Obtaining the existing conditions
- Creating Imaginary surfaces per FAA regulations
- Using conventional methods to review extruding features in the flight path zones
- Using Lidar methods to supplement & confirm extruding features

Obtaining the Existing Conditions

- Collect top of feature points for ground trees, buildings, towers, and any other feature that extrudes into the air

- Collect data with the following methods:
  - Ground Survey
    - Total Station
    - Static and Kinematic GPS
  - Photogrammetric Data
  - Aerial Imagery
  - Existing Plans
    - Create CAD drawings in real world coordinates
  - Lidar data (optional)
    - Ground Based
    - Mobile
    - Aerial

Creating Surfaces from Existing conditions

- **Existing ground surface – original.wmv**
- **Building and Vegetation surface – build-veg.wmv**

Creating Imaginary surfaces

- Threshold Siting Surface (TSS) - TSS.wmv
  - Begins 200-ft past end of runway pavement
  - Elevation starts at the runway endpoint elevation
  - Slopes 20:1 for 10,000-ft
  - Initial width, centered on runway, is 400-ft
  - End width, centered on runway, is 3800-ft

- Object Free Area (OFA) - OFA.wmv
  - Begins 240-ft past end of runway pavement
  - Elevation starts at the runway endpoint elevation
  - Surface is rectangular
  - Extends horizontally from runway centerline
  - Width, centered on runway, is 400-ft
  - Elevation coincides with runway centerline elevation

Using conventional methods to review extruding features in the flight path zones

- **Create bare earth ground surface**
- **Create TSS and OFA surfaces based on runway geometry and grading requirements**
- **Create a differences surface between build-veg surface and the TSS surface - conventional.wmv**
- **Report and Annotate Extrusion surface - reports2.wmv**

Using Lidar solutions to supplement & confirm extruding features relative to the imaginary surfaces

- **Do all of the conventional methods**
- **Merge the Lidar data, including non-bare earth data, to create a surface model**
- **Drape the imagery on the Lidar surface for visual extrusion detection**
- **Generate a 3D Geotiff that combines the Lidar data with imagery, creating a Geotiff that has x/y and z values. Use this to also evaluate and confirm visual extrusions - Lidar.wmv**

Questions:

Thank You:

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