

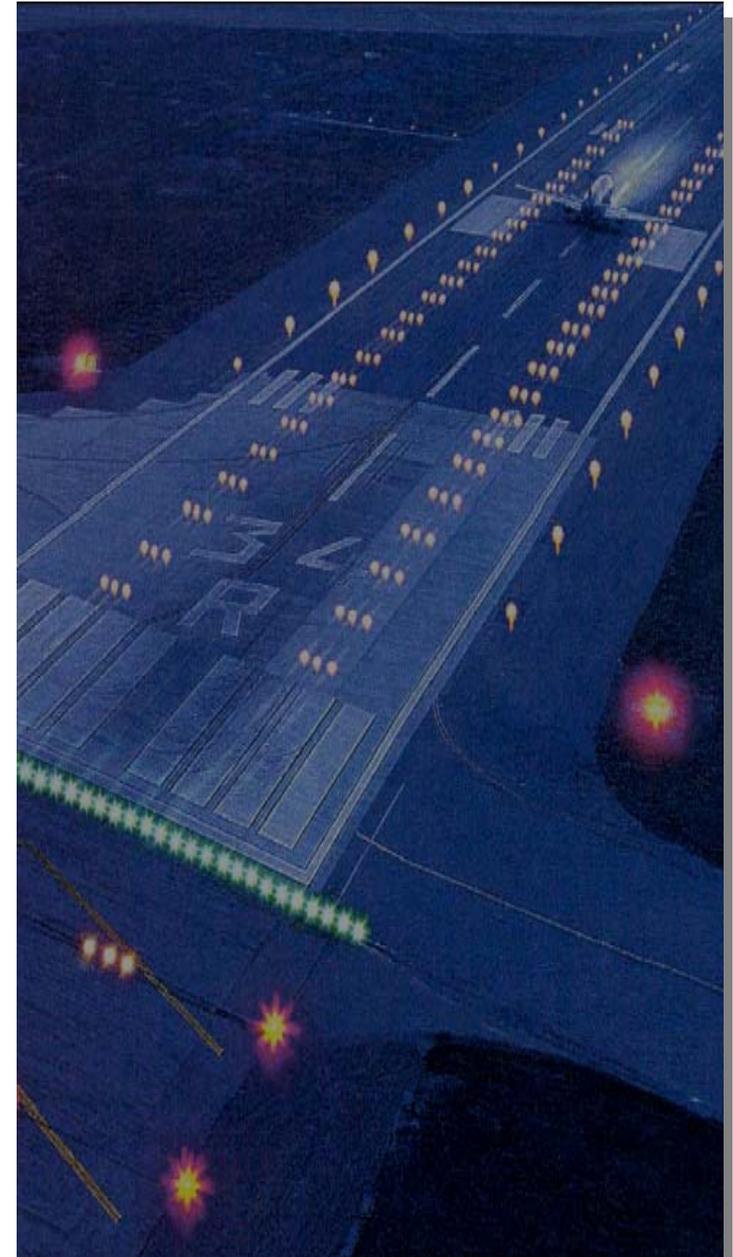
# WAAS - LPV

## Airport and Aeronautical Surveys

Presentation to:  
ANM Airports Conference

Name:  
Robert Bonanni

Date: 04/12/2006



Federal Aviation  
Administration

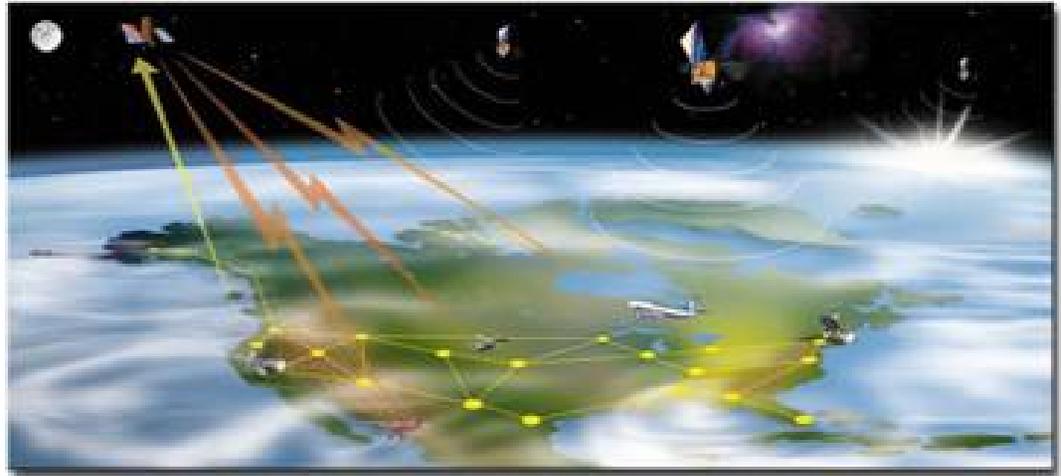
# Overview

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- LPV (WAAS)
- FAA Airports-GIS Initiative
  - Airport Surveying
  - GIS
- Questions



# What is WAAS?

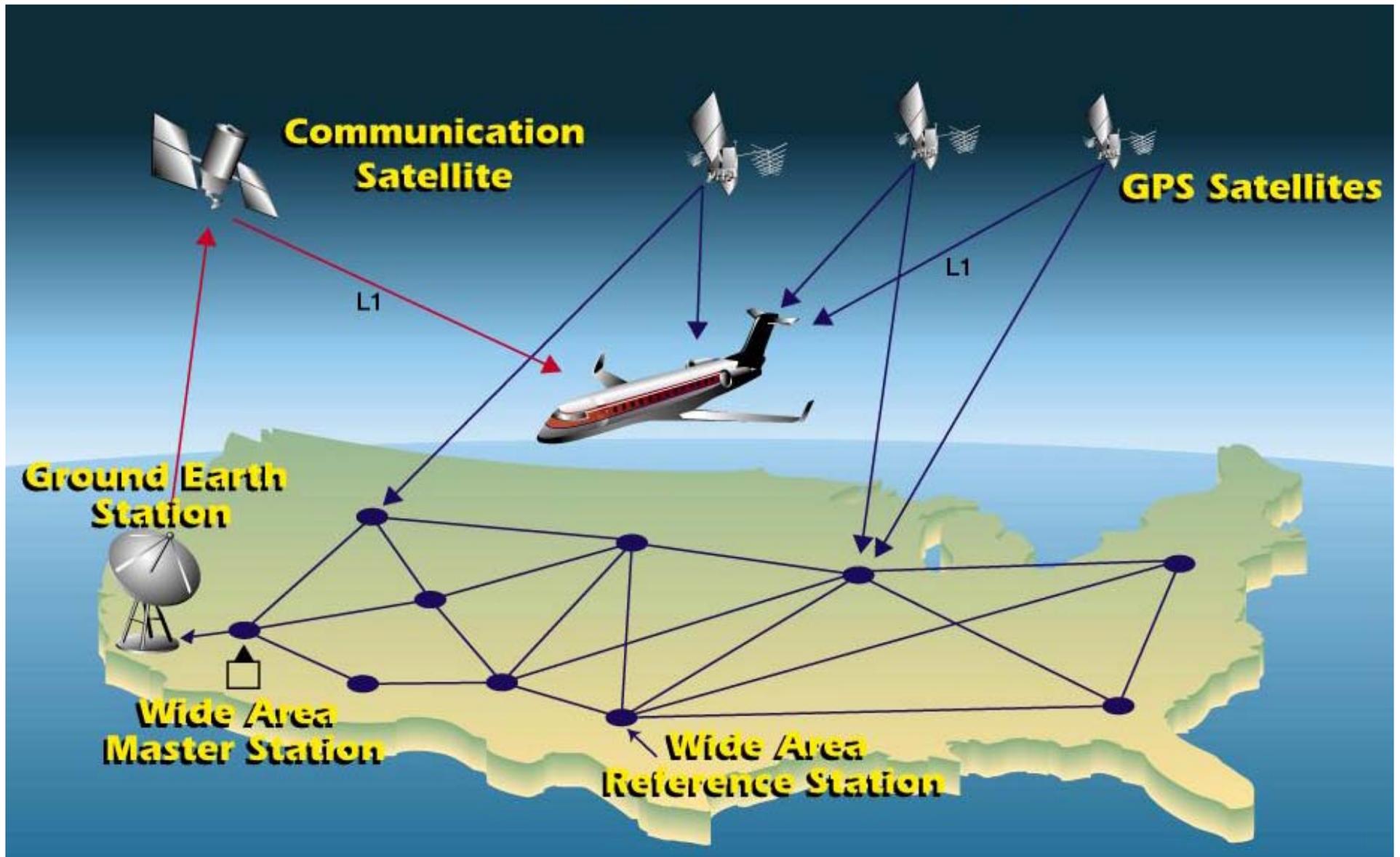


- WAAS consists of:
  - 25 reference stations
  - 2 master stations
  - 2 geosynchronous satellites
  - 3 uplink stations
- WAAS augments the GPS constellation to meet the necessary integrity, availability, accuracy, and continuity for use in all phases of flight

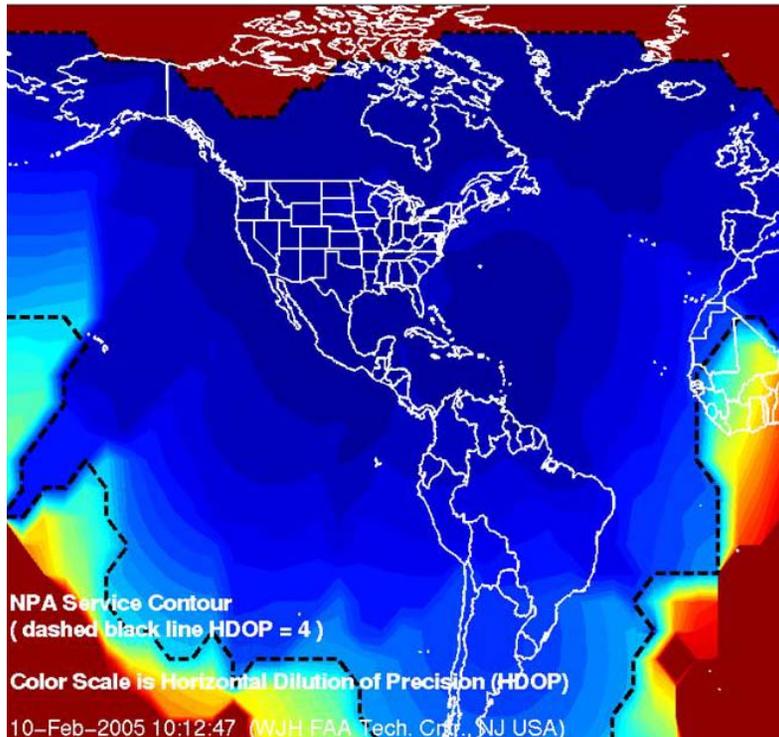




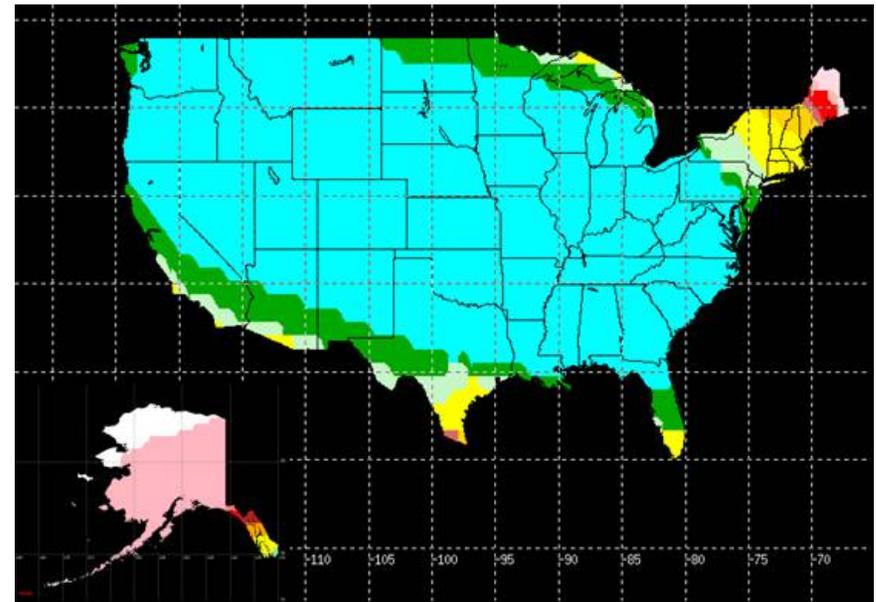
# Wide Area Augmentation System (WAAS)



# Current Performance



WAAS Provides Non-Precision Approach Capability to All Areas in Blue



99.5%

99.0%

- Poor Coverage in Alaska, Northeast, Southern California and Texas



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# WAAS Development 2006 - 2008

- Improvements to obtain full LPV performance
  - Increase communications capacity – September 2005
  - New WRS
    - Alaska
      - Four new sites installed February 2005
      - Operational 2006
    - Canada
      - Two sites installed Summer 2005, two to be installed Summer 2006
      - Operational 2007
    - Mexico
      - Three sites installed Summer 2005, two to be installed Summer 2006
      - Operational 2007
  - Replace GEO communication links
    - Launched in September and October
    - Operational 1<sup>st</sup>/2<sup>nd</sup> Quarter FY07
  - Software integrity monitor improvements to be introduced in 2007 and 2008



# North American WAAS



# WAAS Schedule

Release/Modification	2003	2004	2005	2006	2007	2008
WAAS Commissioning	◆ 7/03					
First Published LPV Approach	◆ 7/03					
Software Release 1			◆ 5/05			
Software Release 2			◆ 9/05			
AOR-W Transfer				◇ 2/06		
Software Release 3				◇ 5/06		
Software Release 4				◇ 8/06		
Software Release 5 a				◇ 8/06		
b					◇ 1/07	
c					◇ 2/07	
Software Release 6/7					◇ 3/07	
POR & AOR-W Shut-off					◇ 7/07	
Software Release 8/9						◇ 6/08

■ Affects availability  
 ■ No impact to availability



# WAAS IOC to Release 2 (09/2005)

\*Initial Operational Capability (IOC)

\*\*Release 2

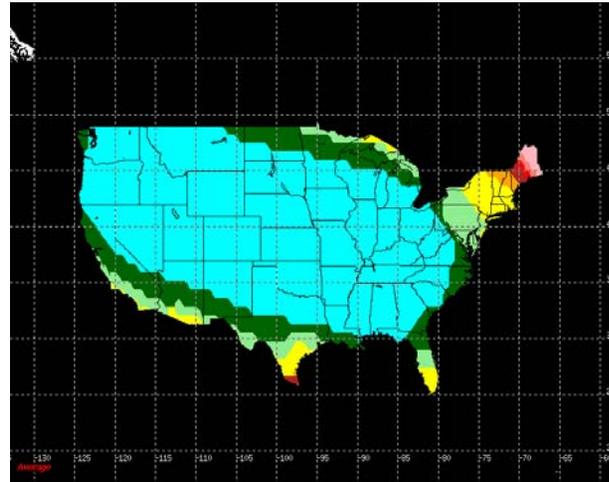
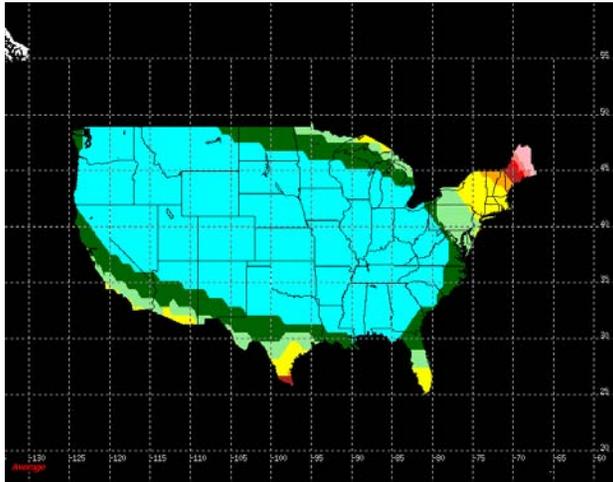
New changes in Release 2:

- Omit “1-WRS-in-CONUS” Rule

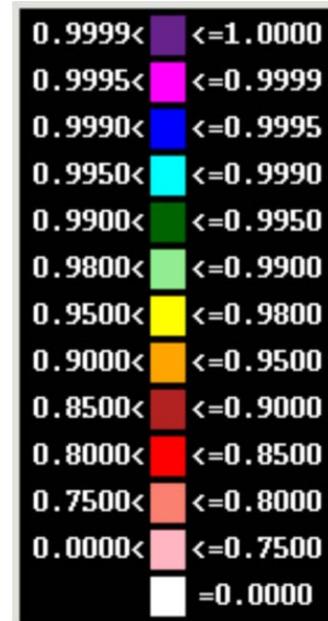
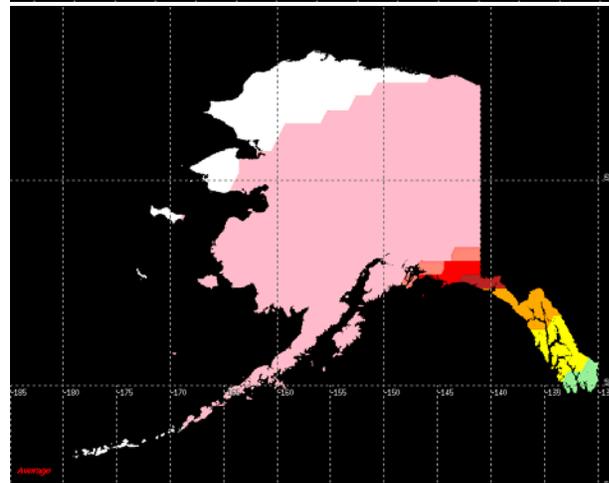
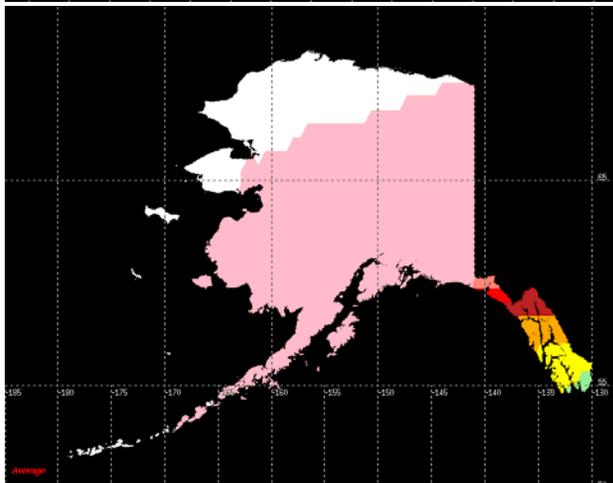
GEO LOCATIONS

- POR: 178 E (UDRE = 50 m)
- AOR-W: 54W (UDRE = 15 m)

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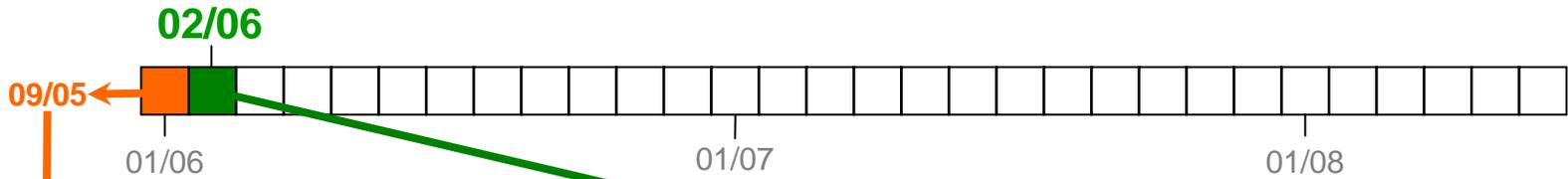
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AVAILABILITY



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Administration



Release 2

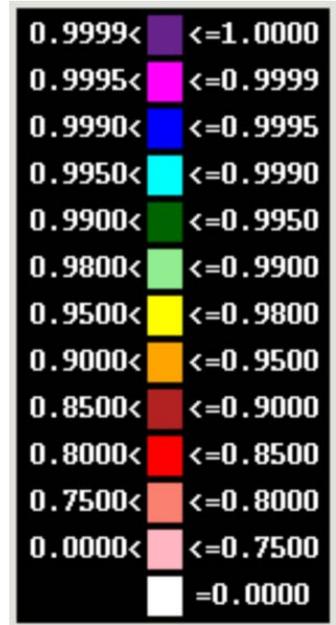
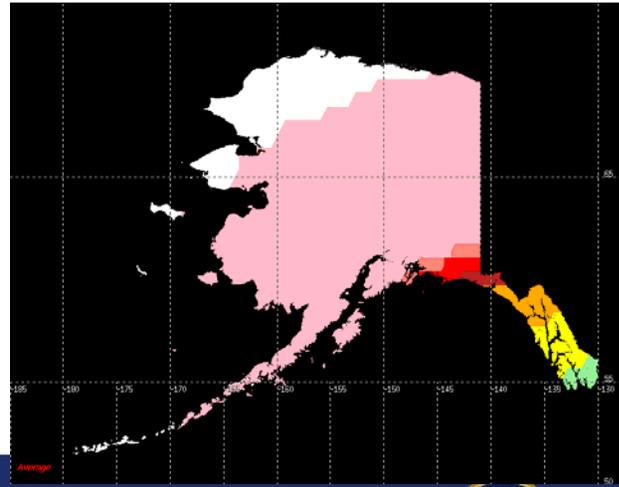
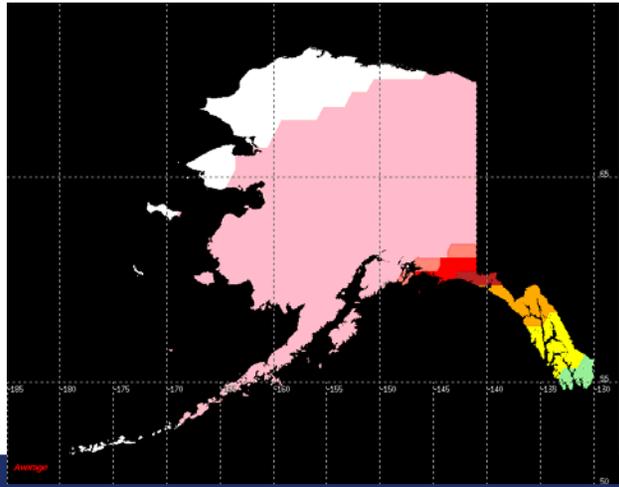
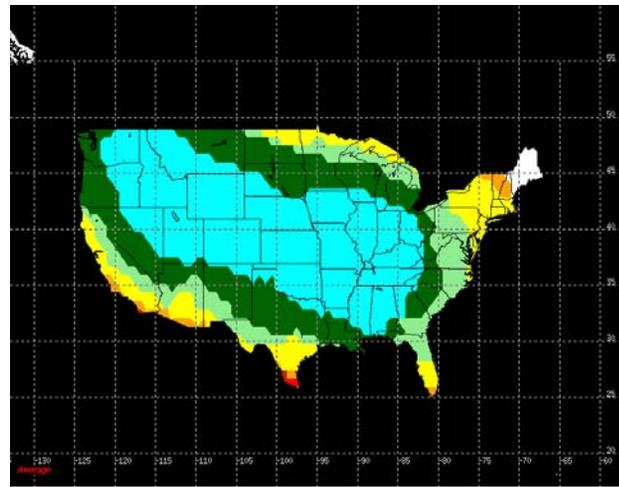
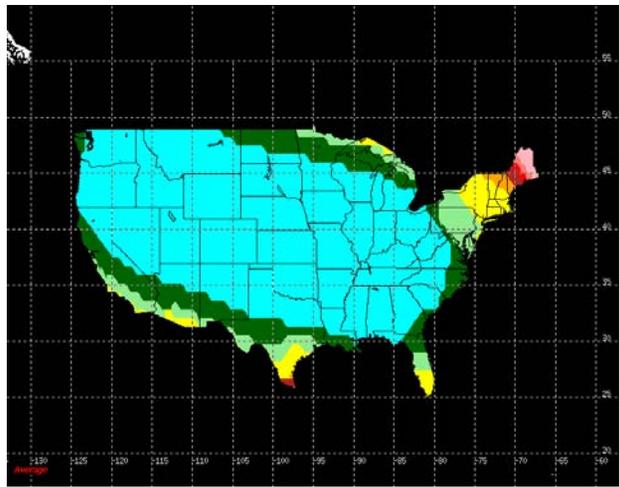
GEO Transfer from 54 W to 142 W

New changes (unrelated to release)  
 • 142 W GEO used only as a data-link

GEO LOCATIONS  
 • POR: 178 E (UDRE = 50 m)  
 • AOR-W: 142 W (UDRE = NM)

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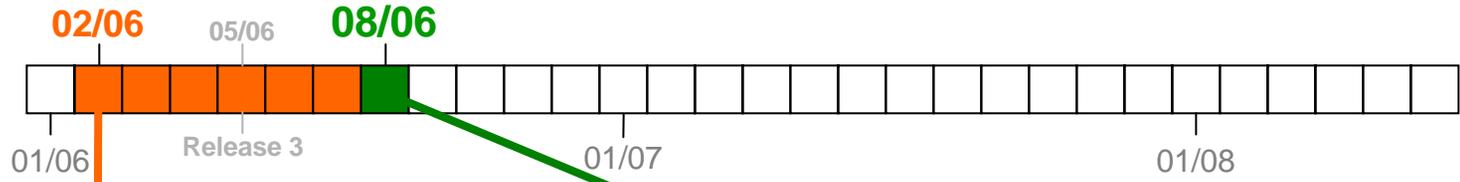
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AVAILABILITY



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**GEO Transfer from 54 W to 142 W**

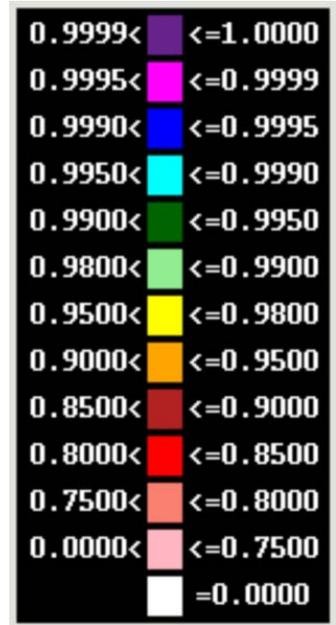
**\*\* Release 4**

**New changes in Release 4**

- 4 additional WRS in Alaska

**GEO LOCATIONS**

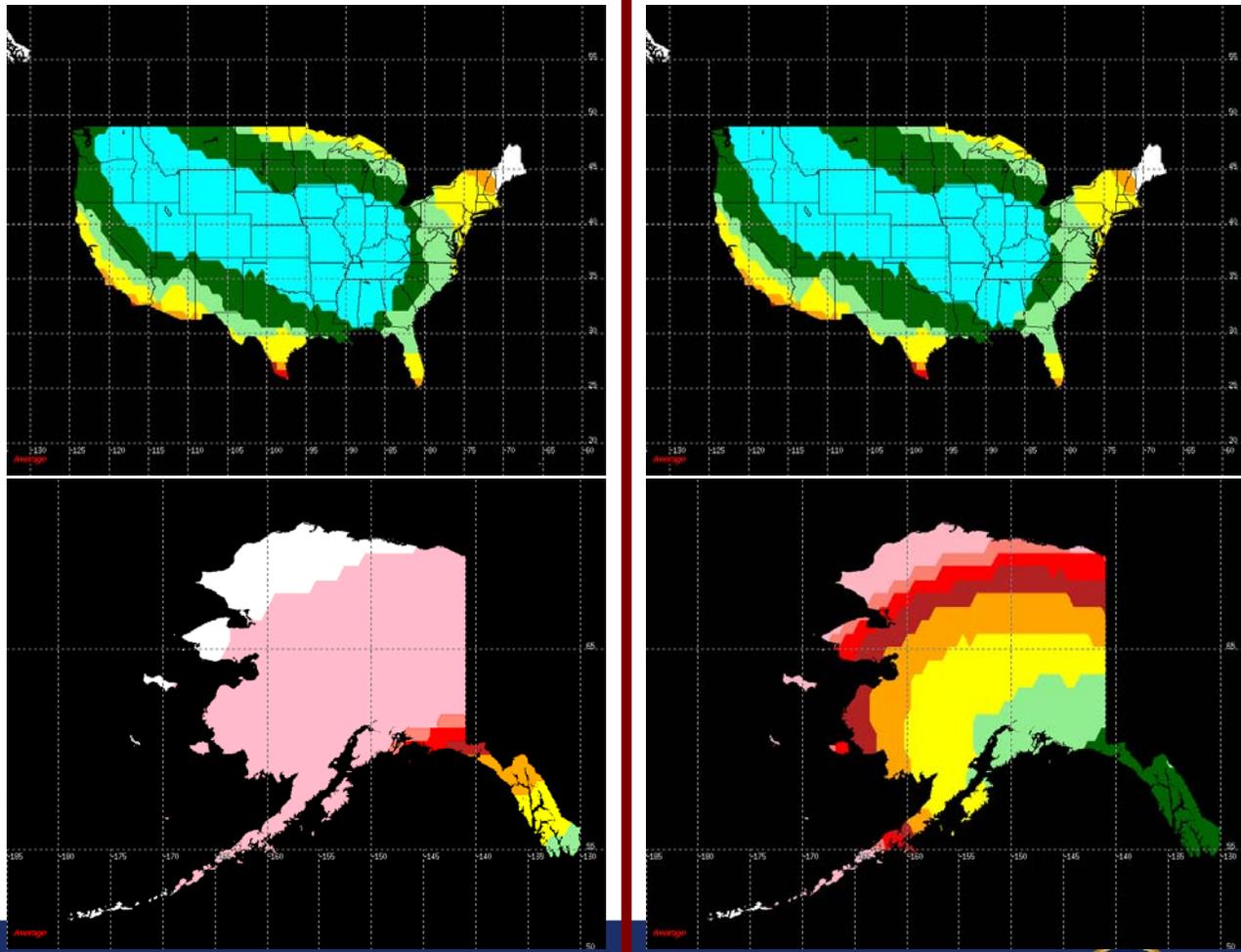
- POR: 178 E (UDRE = 50 m)
- AOR-W: 142 W (UDRE = NM)



**AVAILABILITY**

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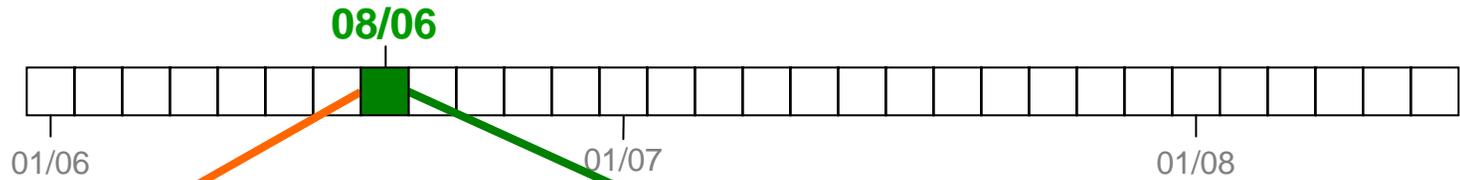
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\*\* No impact to availability in Release



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Release 4

Release 5a

**New changes in Release 5a**

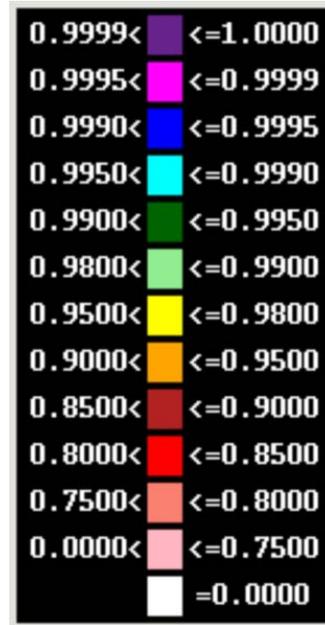
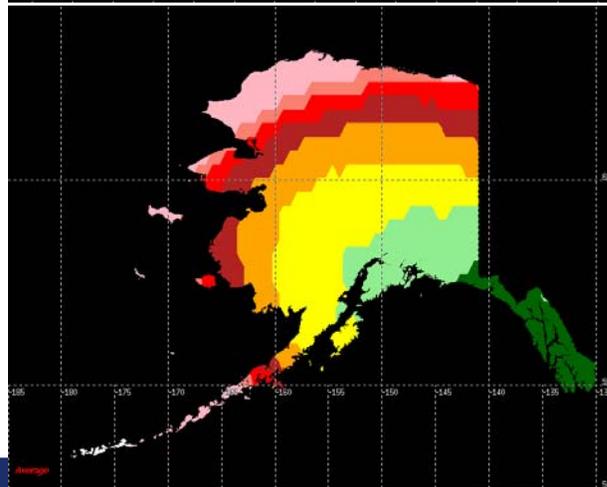
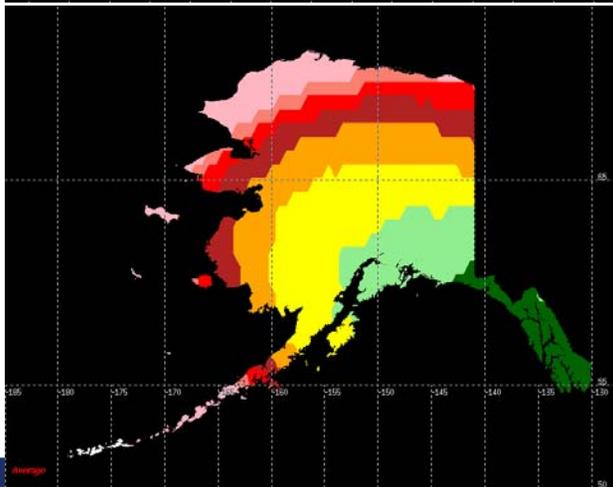
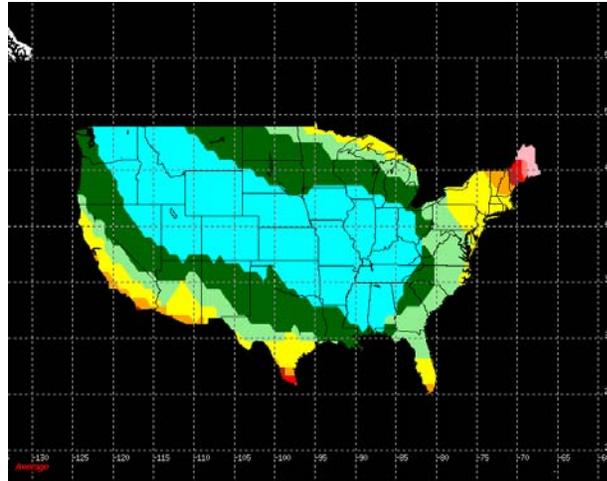
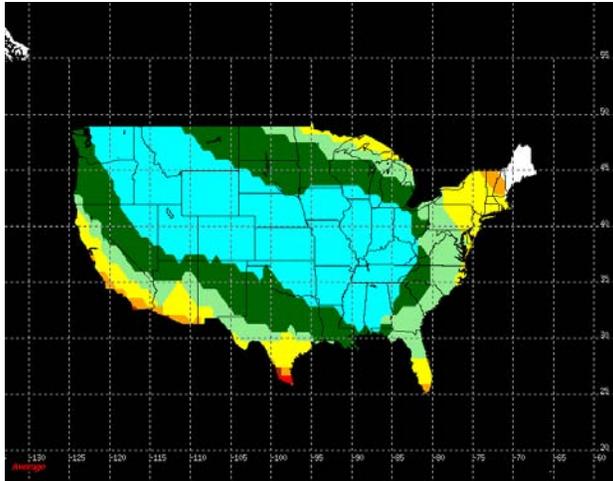
- 133 W GEO used only as a data-link

**GEO LOCATIONS**

- POR: 178 E (UDRE = 50 m)
- AOR-W: 142 W (UDRE = NM)
- Panamsat: 133 W (UDRE = NM)

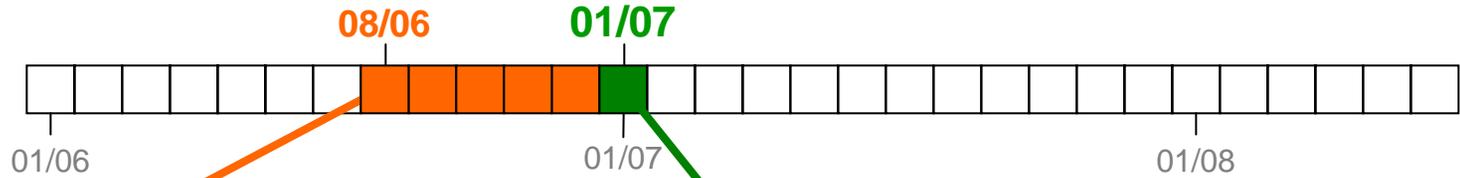
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**AVAILABILITY**





**Release 5a**

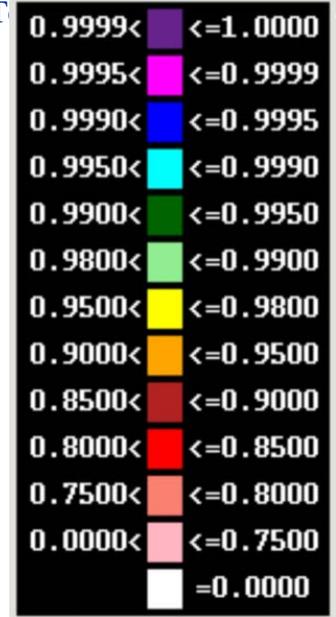
**Release 5b**

**New changes in Release 5b**

- 107 W GEO provides both data-link and ranging

**GEO LOCATIONS**

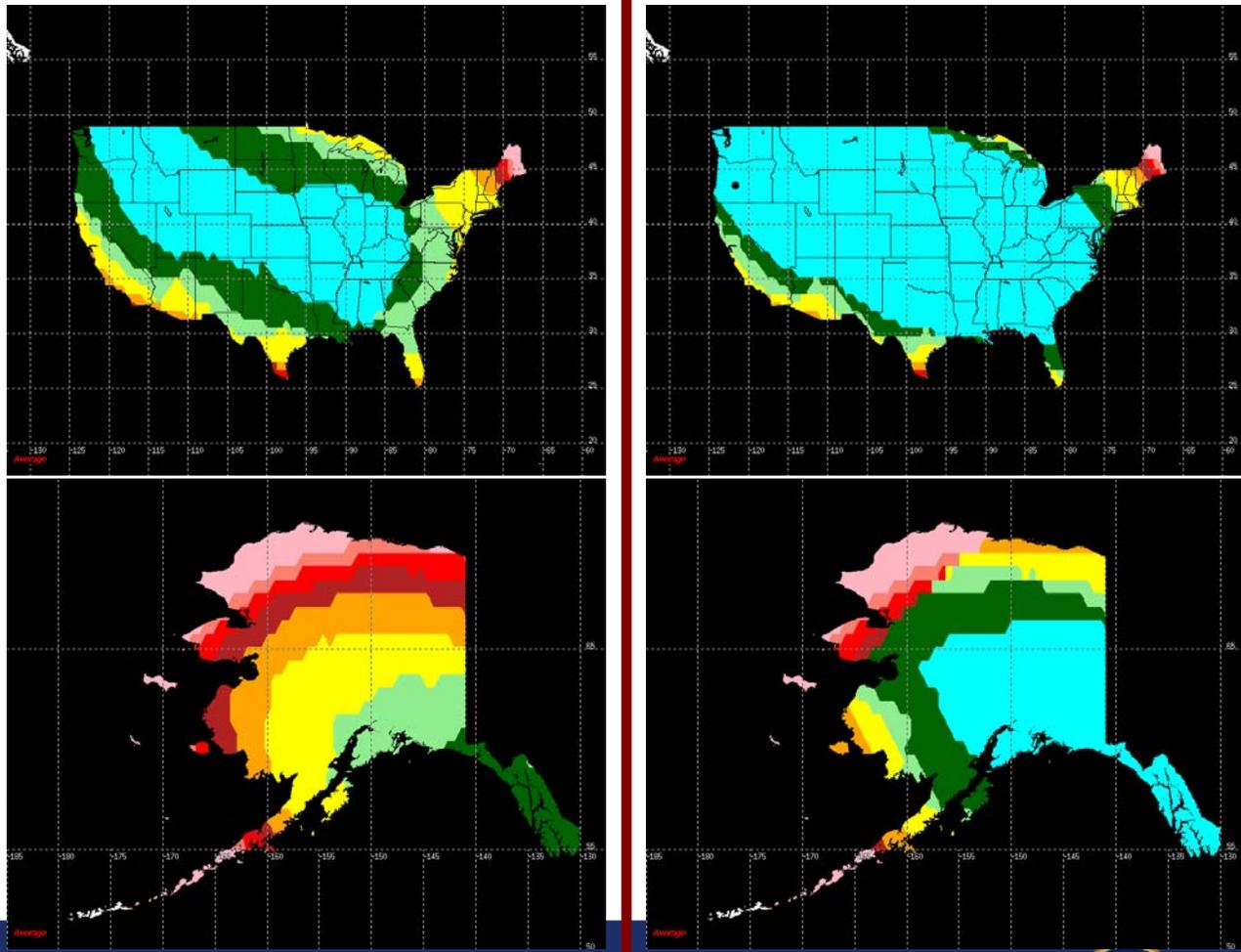
- POR: 178 E (UDRE = 50 m)
- AOR-W: 142 W (UDRE = NM)
- Panamsat: 133 W (UDRE = NM)
- T .5 m)

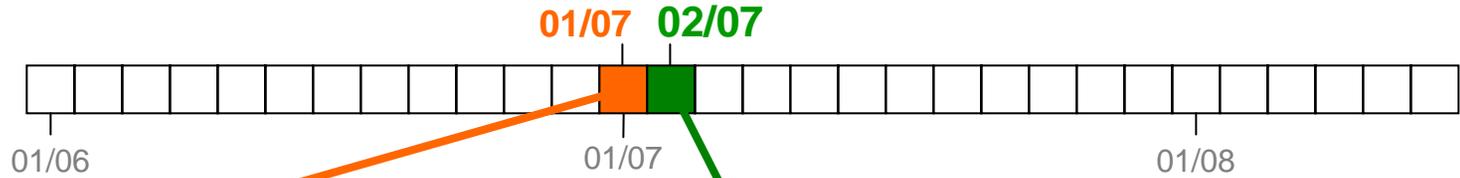


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**Release 5b**

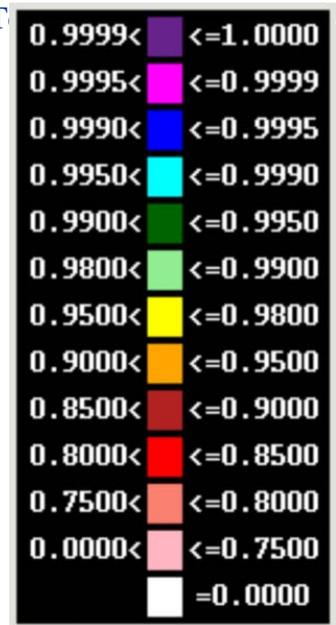
**Release 5c**

**New changes in Release 5b**

- 133 W GEO ranging is turned on

**GEO LOCATIONS**

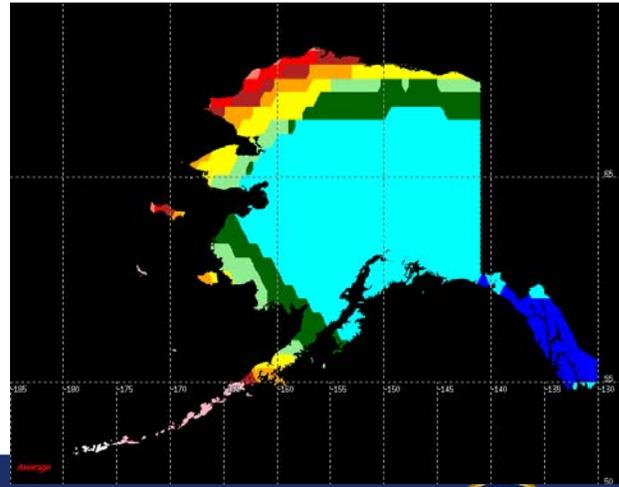
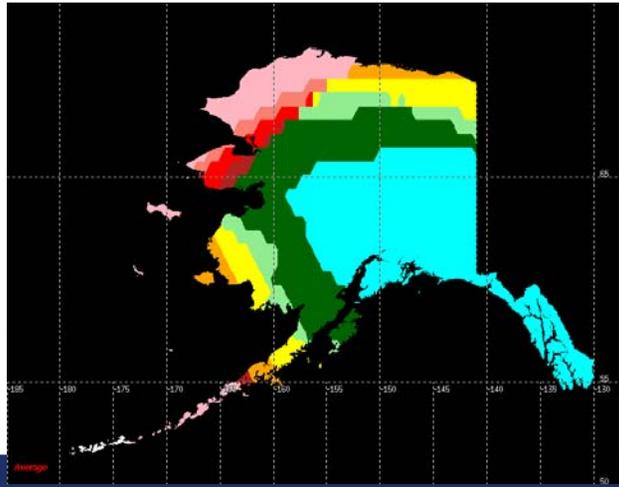
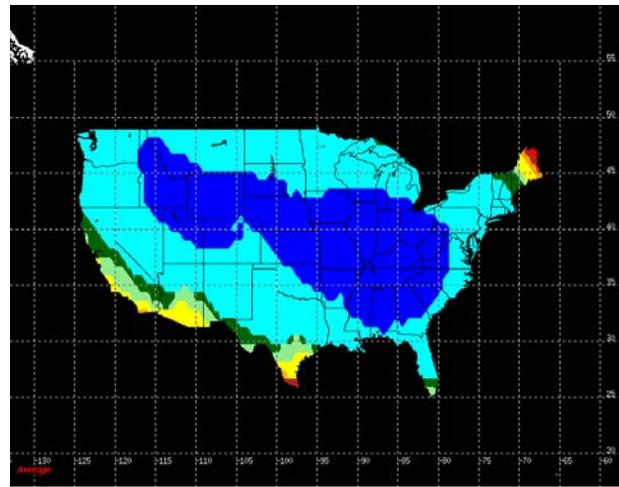
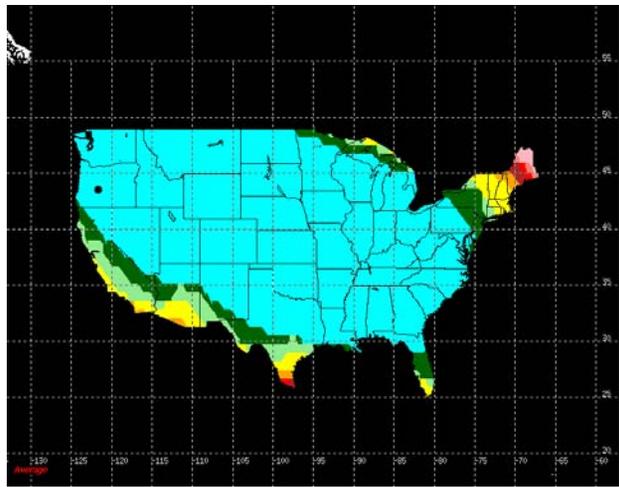
- POR: 178 E (UDRE = 50 m)
- AOR-W: 142 W (UDRE = NM)
- Panamsat: 133 W (UDRE = 4.5 m)
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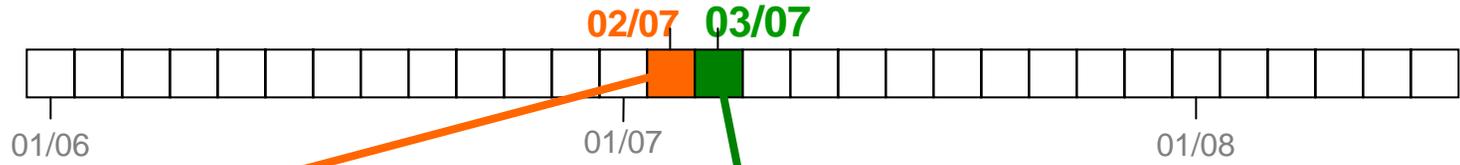


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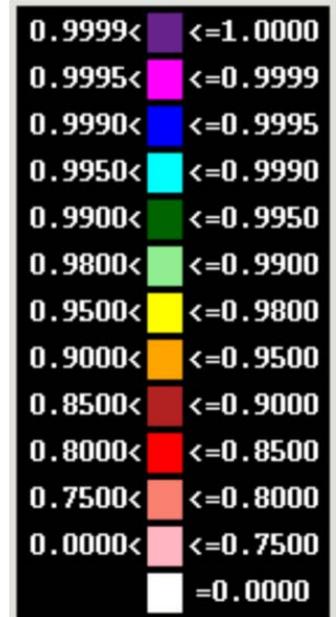


**Release 5c**

**Release 6/7**

- New changes in Release 6/7**
- GIVE Monitor Upgrade (PB1)
  - 2 New WRS in Canada
  - 3 New WRS in Mexico
  - Extended IGP Mask (incl. Band 9)

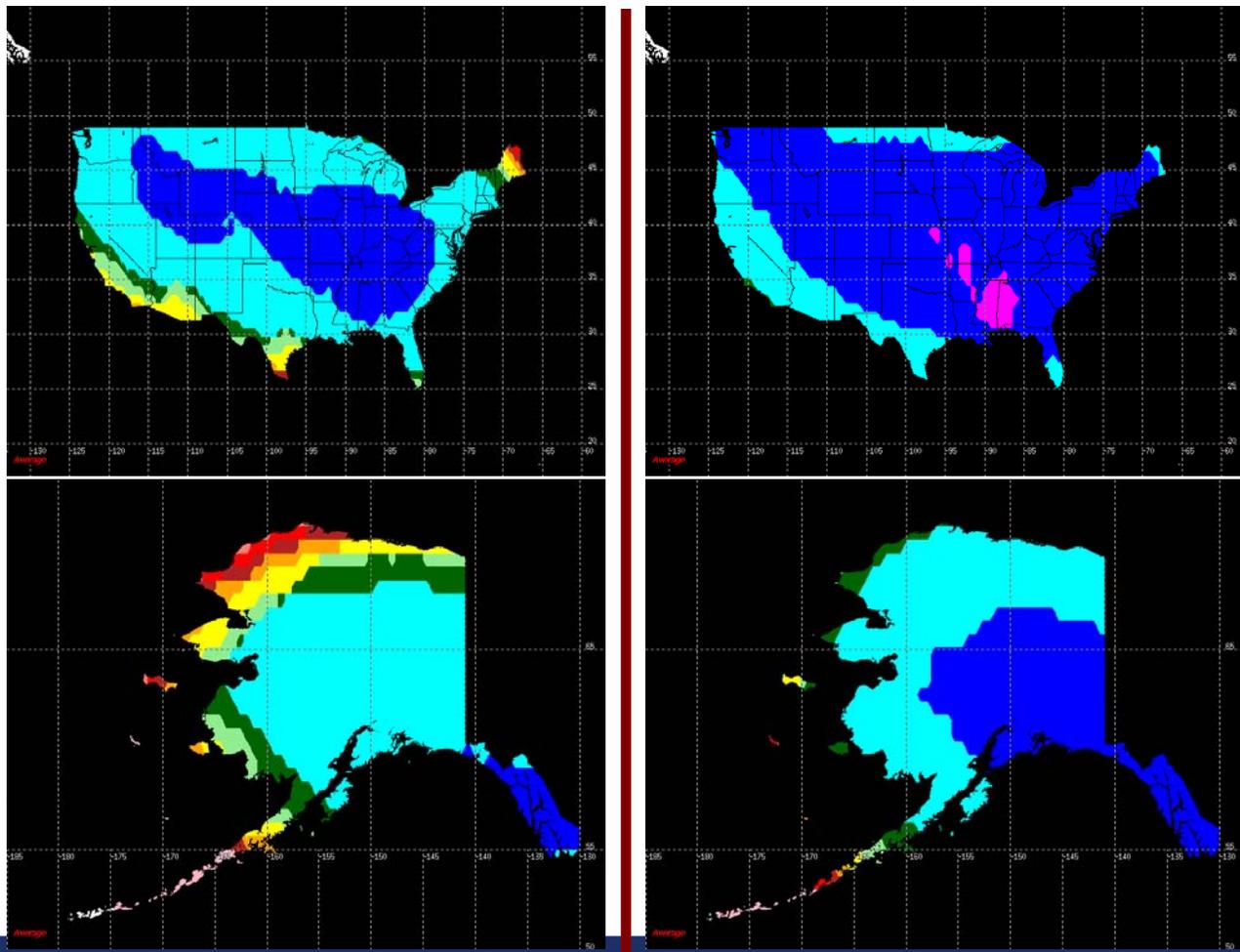
- GEO LOCATIONS**
- POR: 178 E (UDRE = 50 m)
  - AOR-W: 142 W (UDRE = NM)
  - Panamsat: 133 W (UDRE = 4.5 m)
  - Telesat: 107 W (UDRE = 4.5 m)



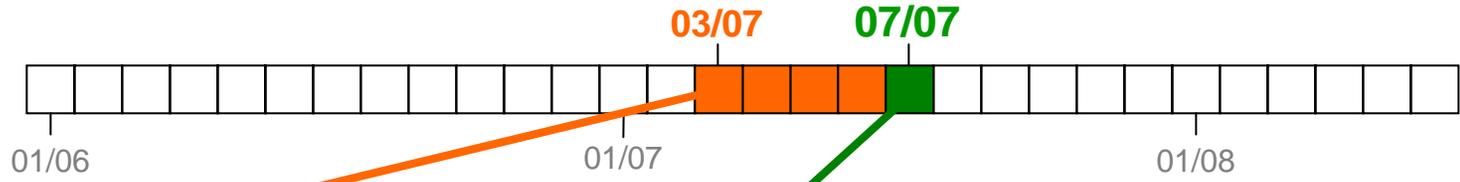
**AVAILABILITY**

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Federal Aviation Administration



**Release 6/7**

**POR and AOR-W shut-off**

New changes (unrelated to release)

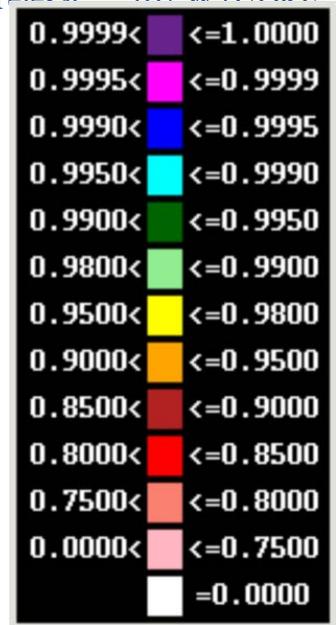
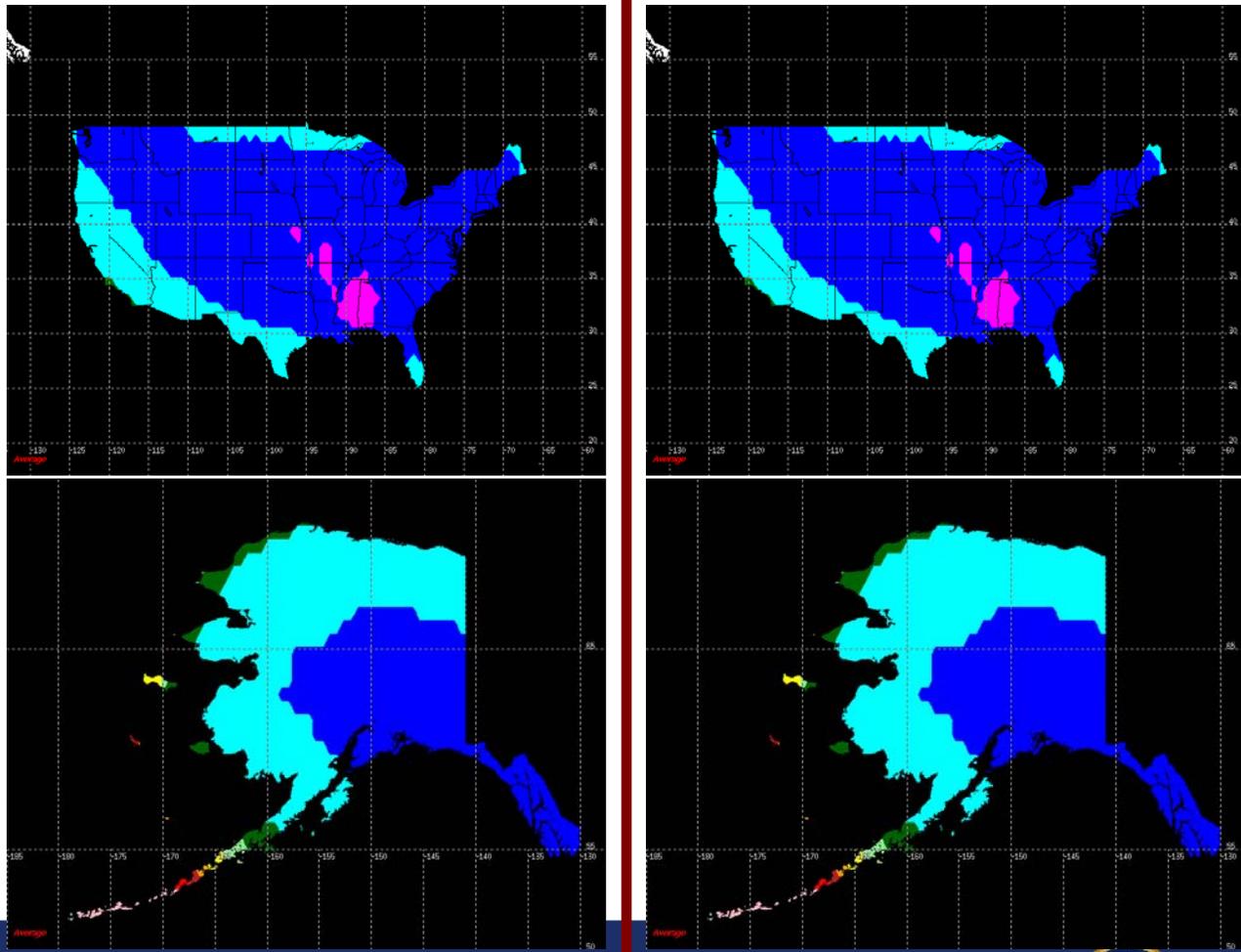
- 178 E GEO is turned off
- 142 W GEO is turned off

GEO LOCATIONS

- Panamsat: 133 W (UDRE = 4.5 m)
- Telesat: 107 W (UDRE = 4.5 m)

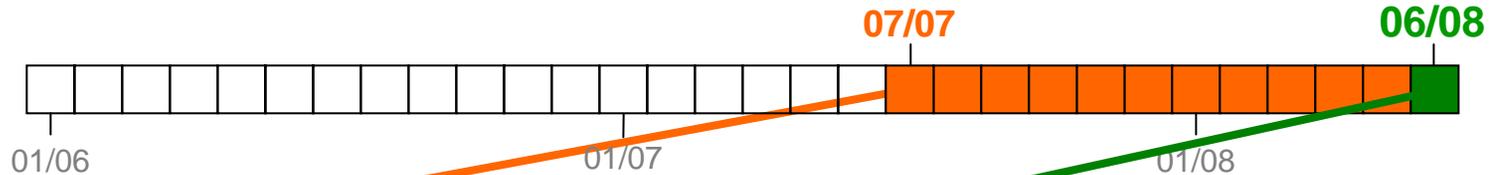
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**AVAILABILITY**





**POR and AOR-W shut-off**

**Release 8/9**

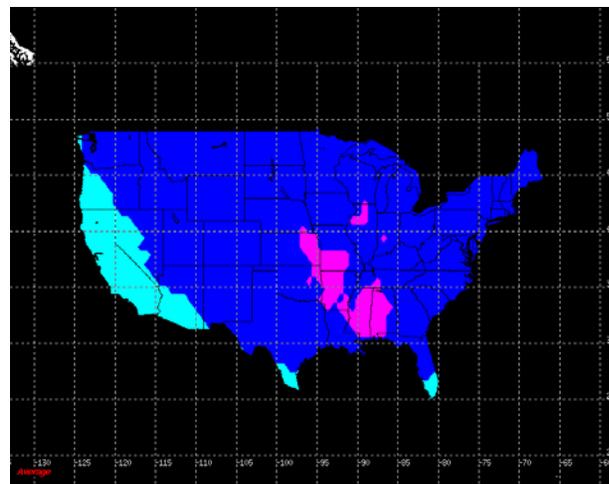
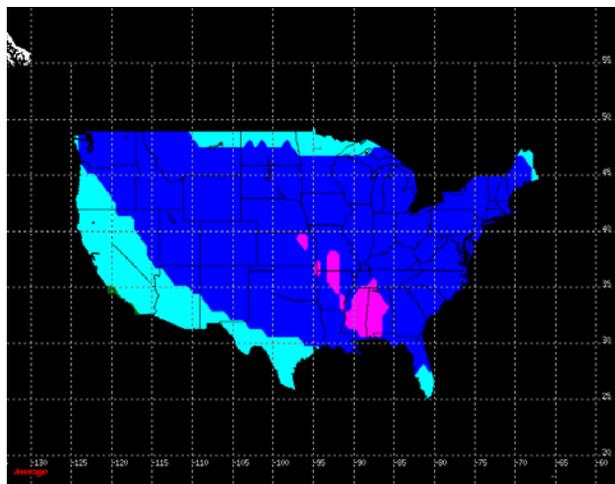
New changes in Release 8/9

- 2 additional WRS in Canada
- 2 additional WRS in Mexico

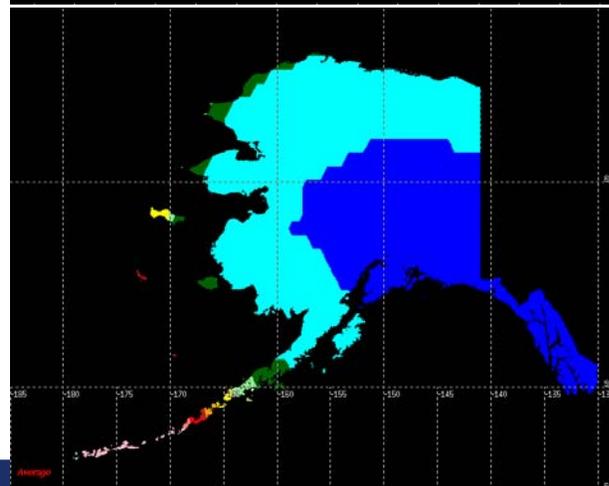
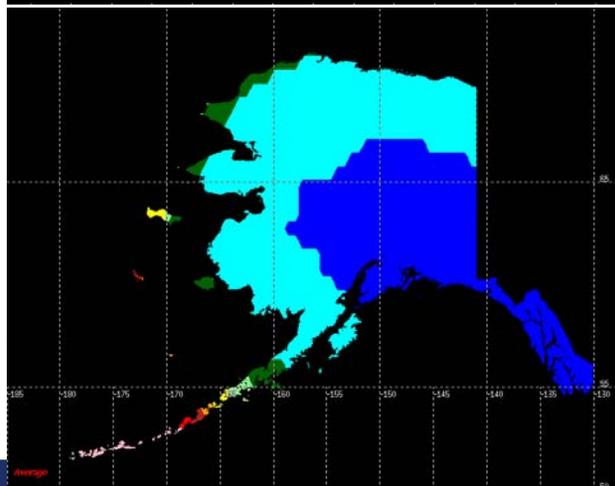
GEO LOCATIONS

- Panamsat: 133 W (UDRE = 4.5 m)
- Telesat: 107 W (UDRE = 4.5 m)

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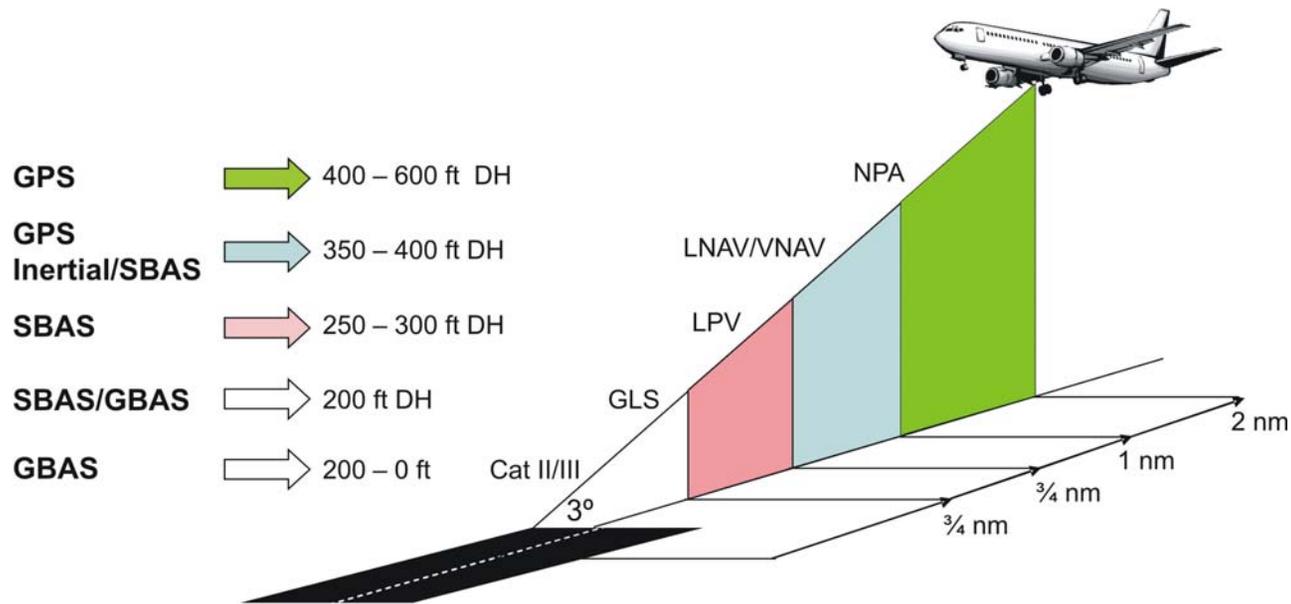
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**AVAILABILITY**



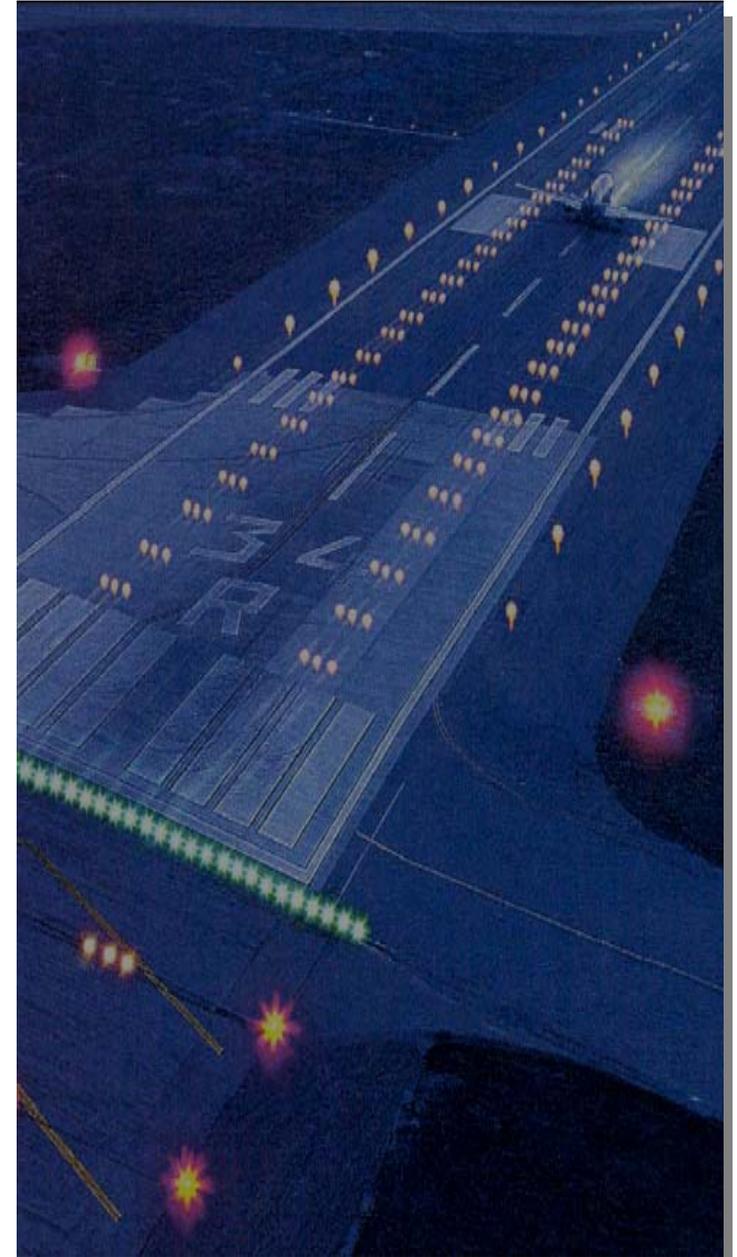
# Approach Procedures



- Existing Procedures: 1/19/06
  - 3,827 NPA (LNAV/GPS)
  - 834 LNAV/VNAV
  - 319 LPVs
- Procedure Production
  - Plan to add 539 LPV procedures in FY06
    - 388 Will Be at Non-ILS runway ends



# Airport Surveying



# Vision

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Enhance airport surveying by establishing a standardized repeatable program to capture data in an appropriate format both accurately and consistently



# Purpose

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- Increase the Number of Surveys Conducted Annually
- Provide data for a standard GIS database capable of supporting the needs of the FAA as a whole
- Move toward the implementation of Digital ALPs and OC Drawings.



# Purpose

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- Reduce the FAA's use of NGS for field surveys and transition the requirements for aeronautical and airport surveys to commercial enterprises
- Allow surveys conducted by commercial enterprises to use State & Local Aviation Resources as well as Federal Grants.
- **Standardize** the process of airport and aeronautical surveys in a **cost-effective and expedited manner**



# Surveying Objectives

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- Create a Standardized Process for conducting airport and aeronautical surveys – Advisory Circulars
  - AC 150/5300 –16 “General Guidance and Specifications for Aeronautical Surveys: Establishment of Geodetic Control and Submission to the National Geodetic Survey”
  - AC150/5300 – 17 “General Guidance And Specifications For Aeronautical Survey Airport Imagery Acquisition And Submission To The National Geodetic Survey”
  - AC 150/5300-18 “General Guidance and Specifications for Submission of Aeronautical Surveys to NGS: Field Data Collection and Geographic Information System (GIS) Standards “



# Surveying Objectives

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- Guidance and specifications allowing airports to produce digital ALP data meeting FAA needs
- Develop tools for airports and surveyors to capture and provide survey data in digital form (ADCAT program)
  - Provide a means to acquire essential data as it is created in a digital form with associated metadata
- Develop technical guidance, instructions and templates on contracting out and/or conducting aeronautical surveys for airport sponsors



# Airport Planning Considerations

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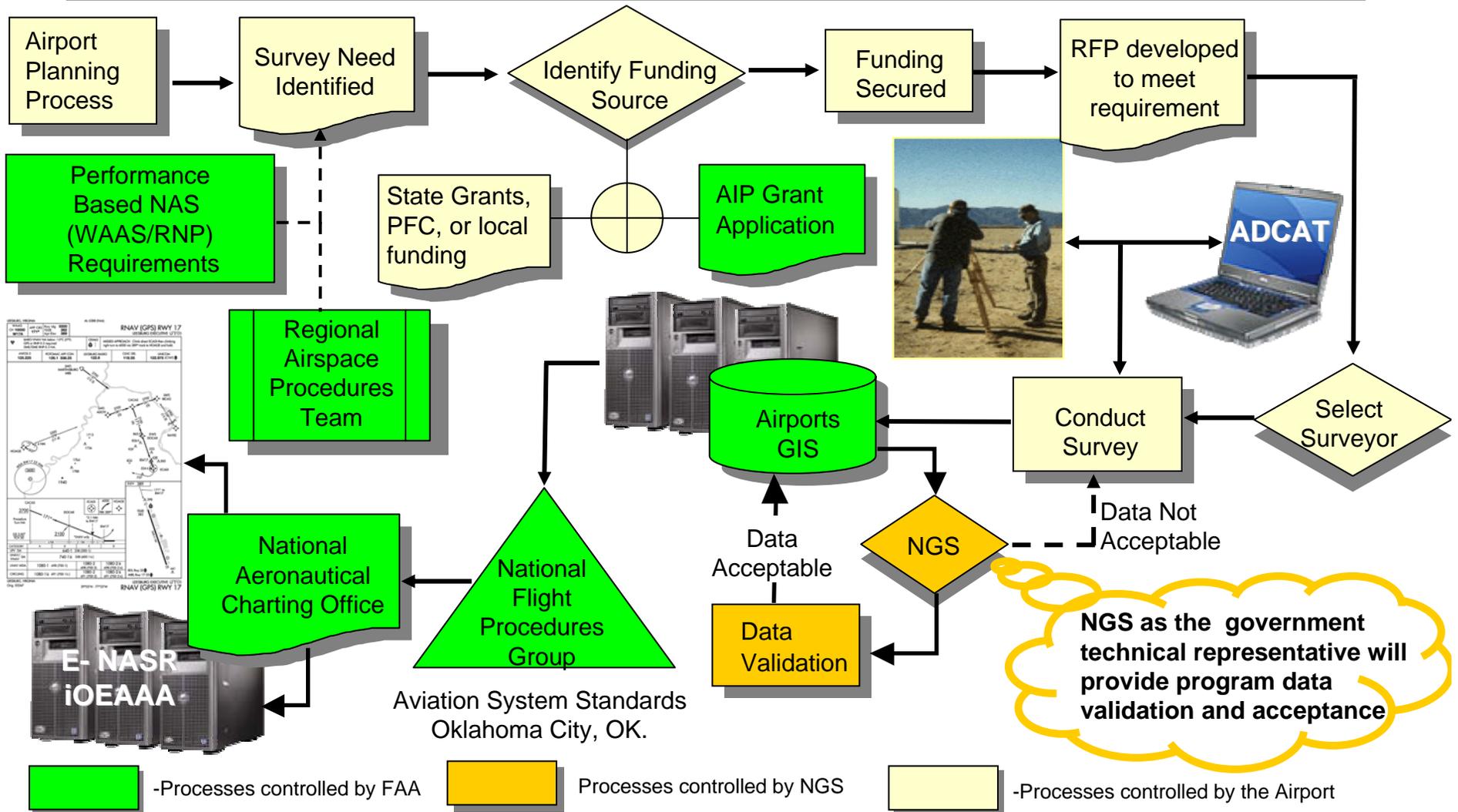
FAA requires airport sponsors/proponents to ...

- Provide updated AIP
- Submittal of standard assurances
- Exhibit “A” property map
- Project application with plans and specifications

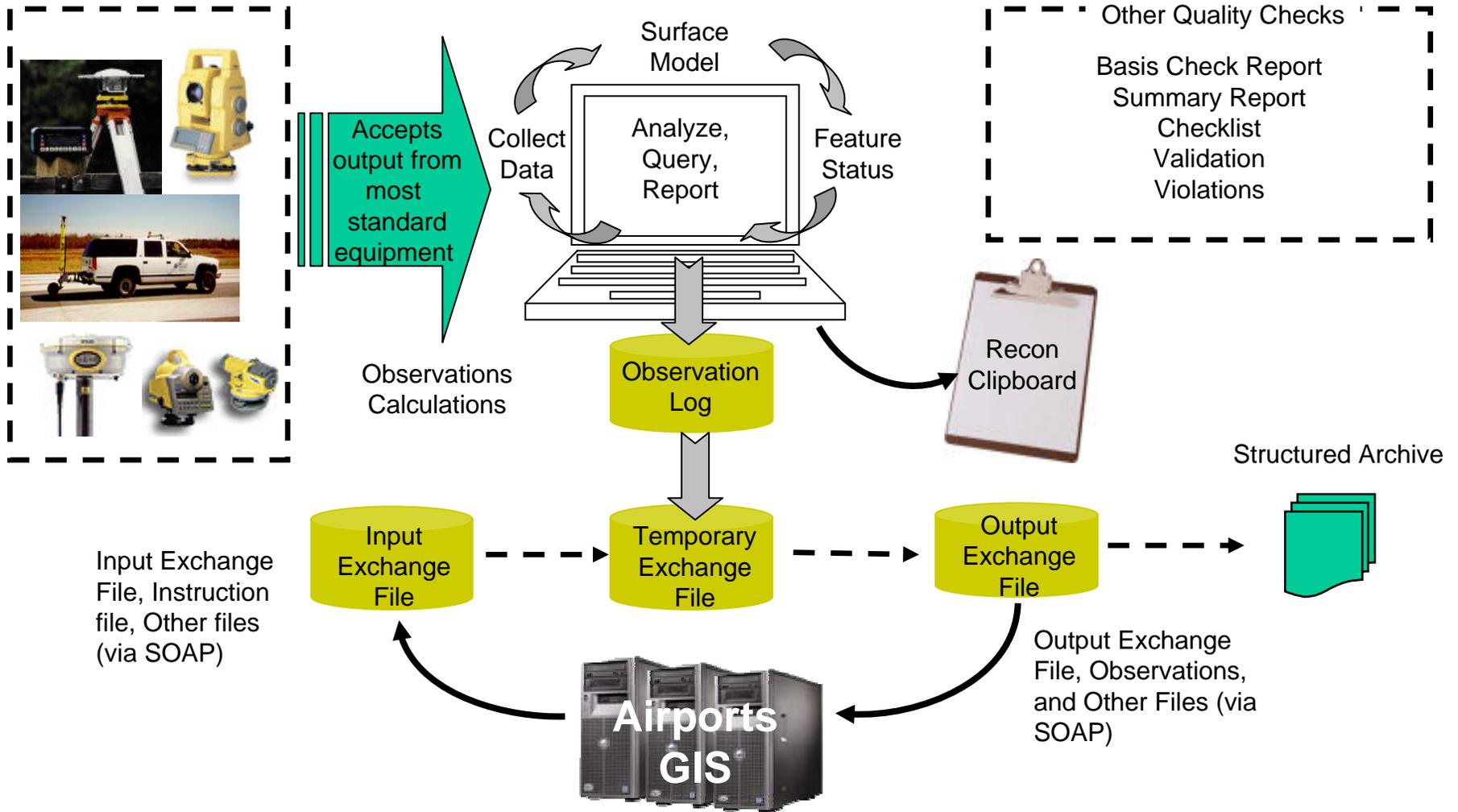
The lowest approach and departure minimums may be achieved where the obstacle environment is benign and the airport infrastructure requirements of AC 150/5340-1, Marking of Paved Areas on Airports, and AC 150/5300-13, Airport Design, Appendix 16 are met.



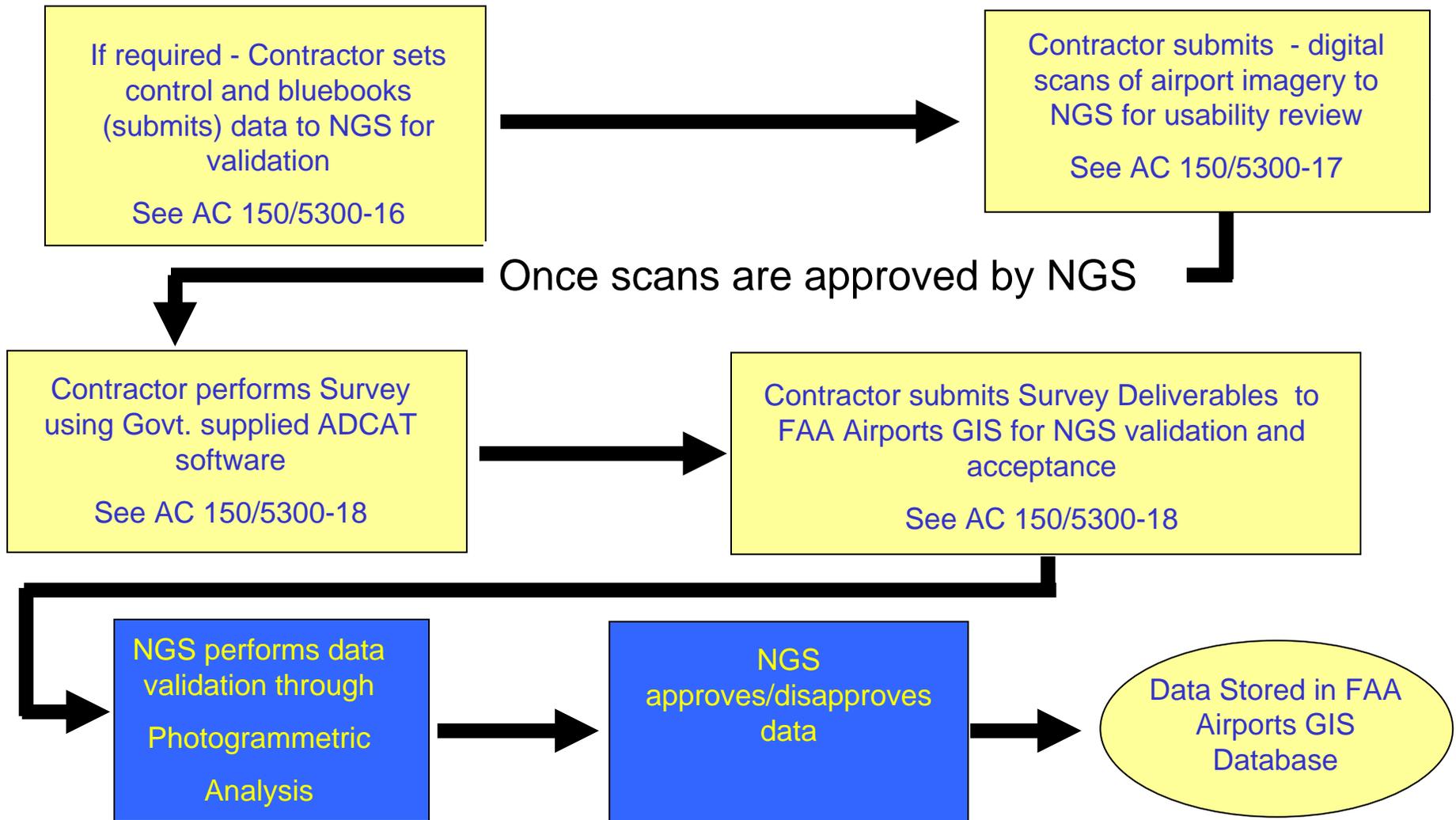
# Airport Surveying Process

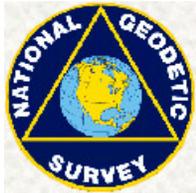


# How Does the ADCAT Work ?

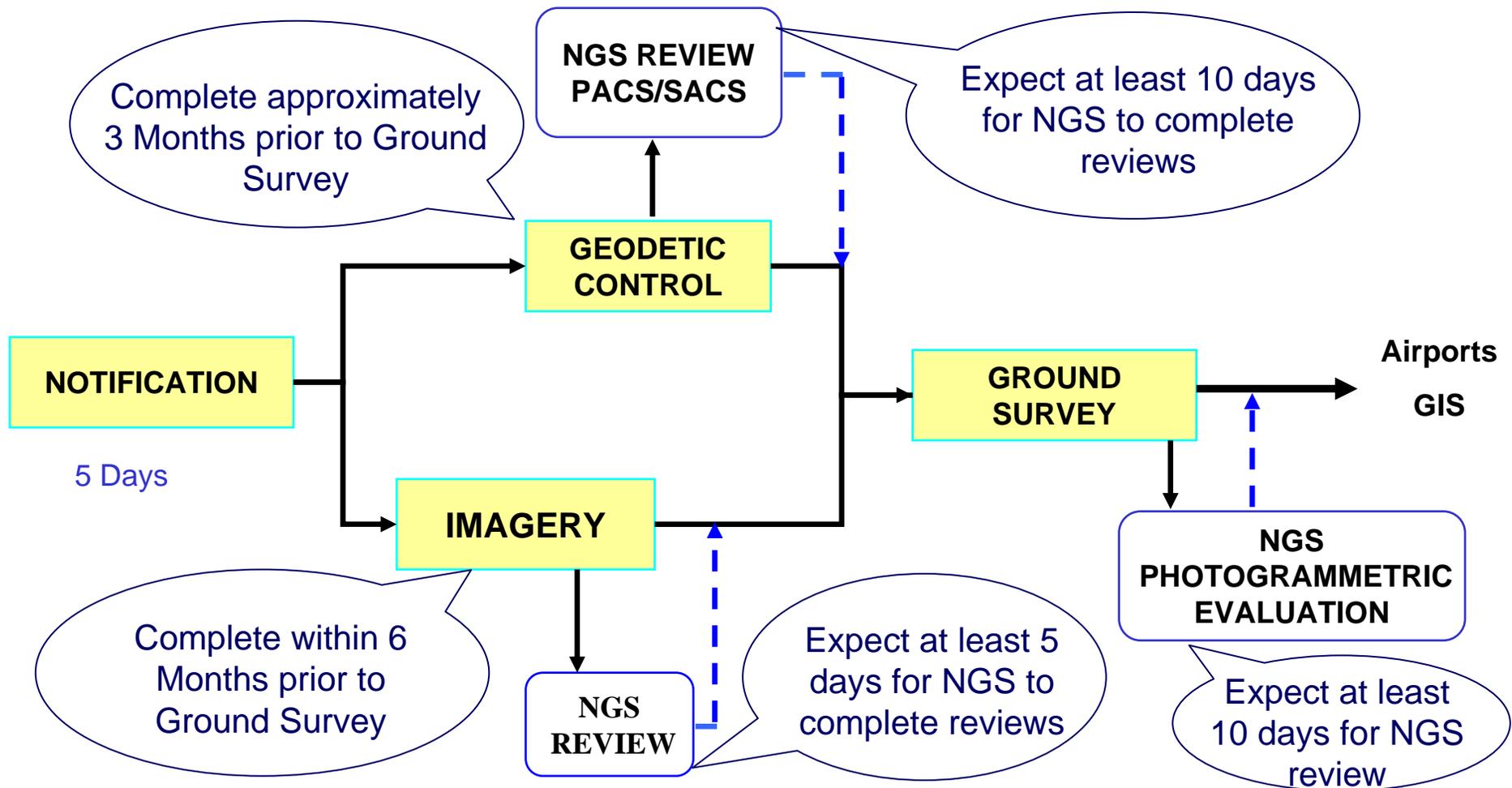


# Program Approval Data Flow

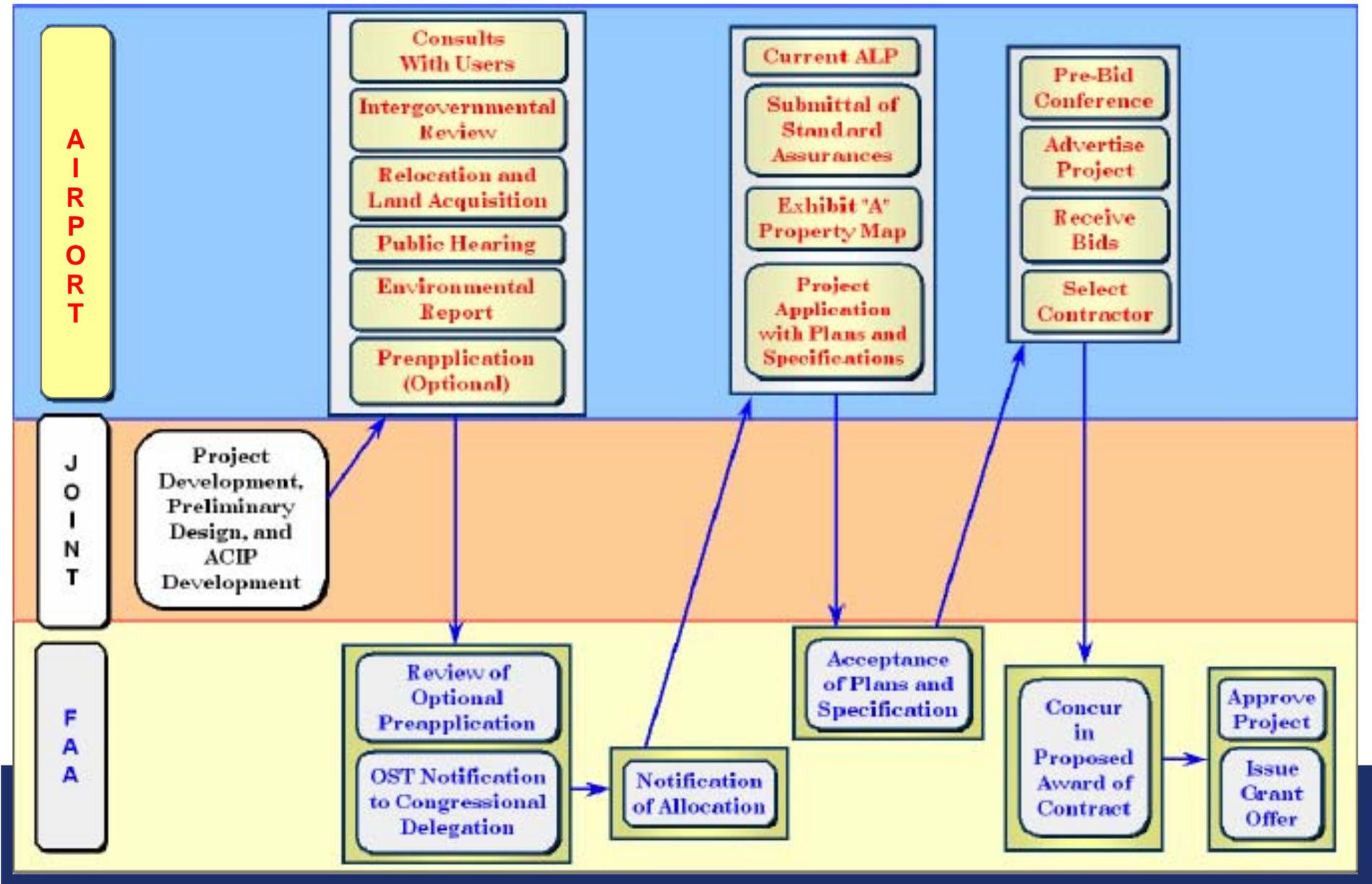




# VALIDATION TIMELINE



## Pre-Grant AIP Process



Slide 31

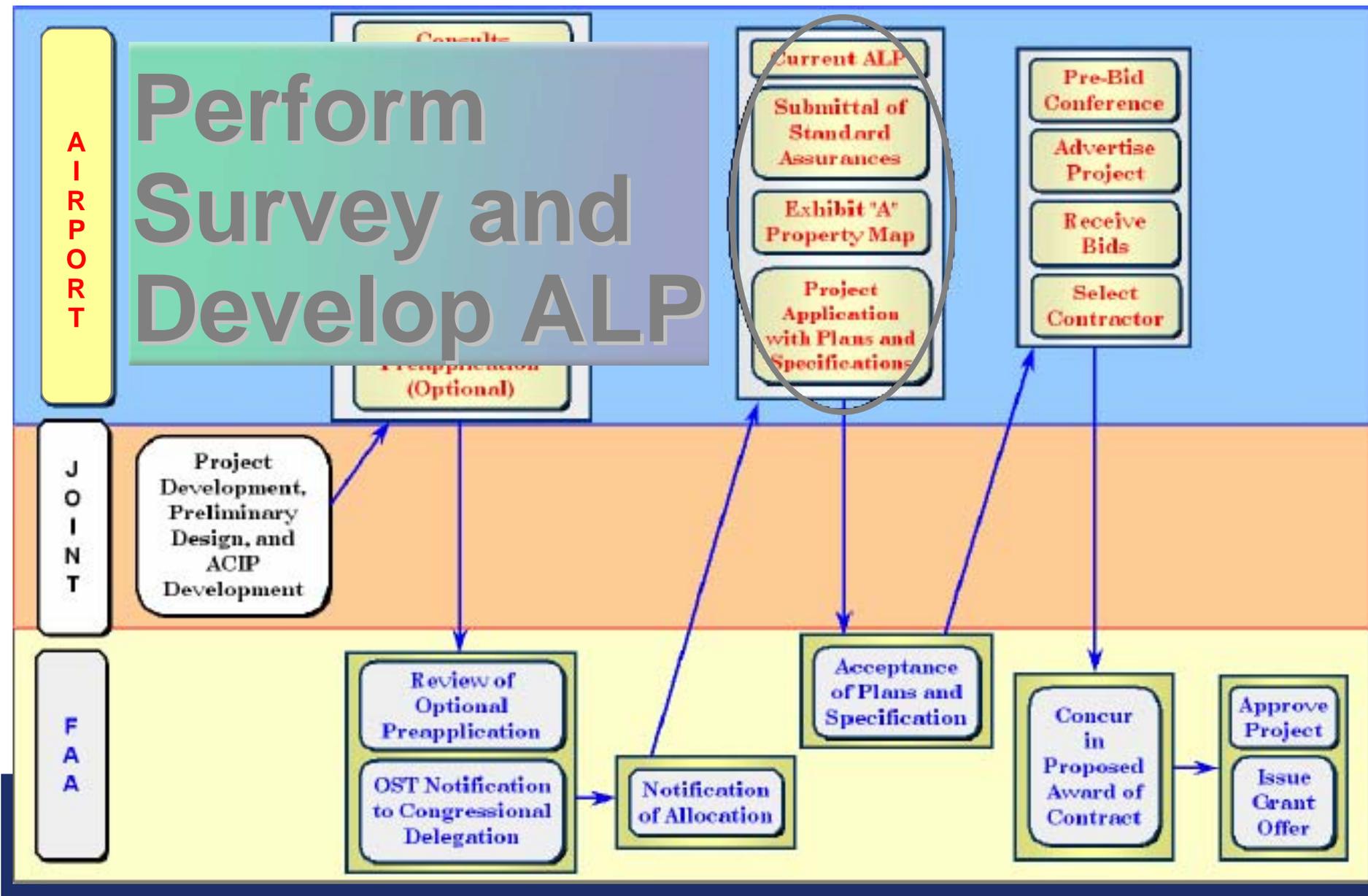
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t1

This looks like the current process ....

troe, 5/13/2004

# Pre-Grant ALP Process



## Slide 32

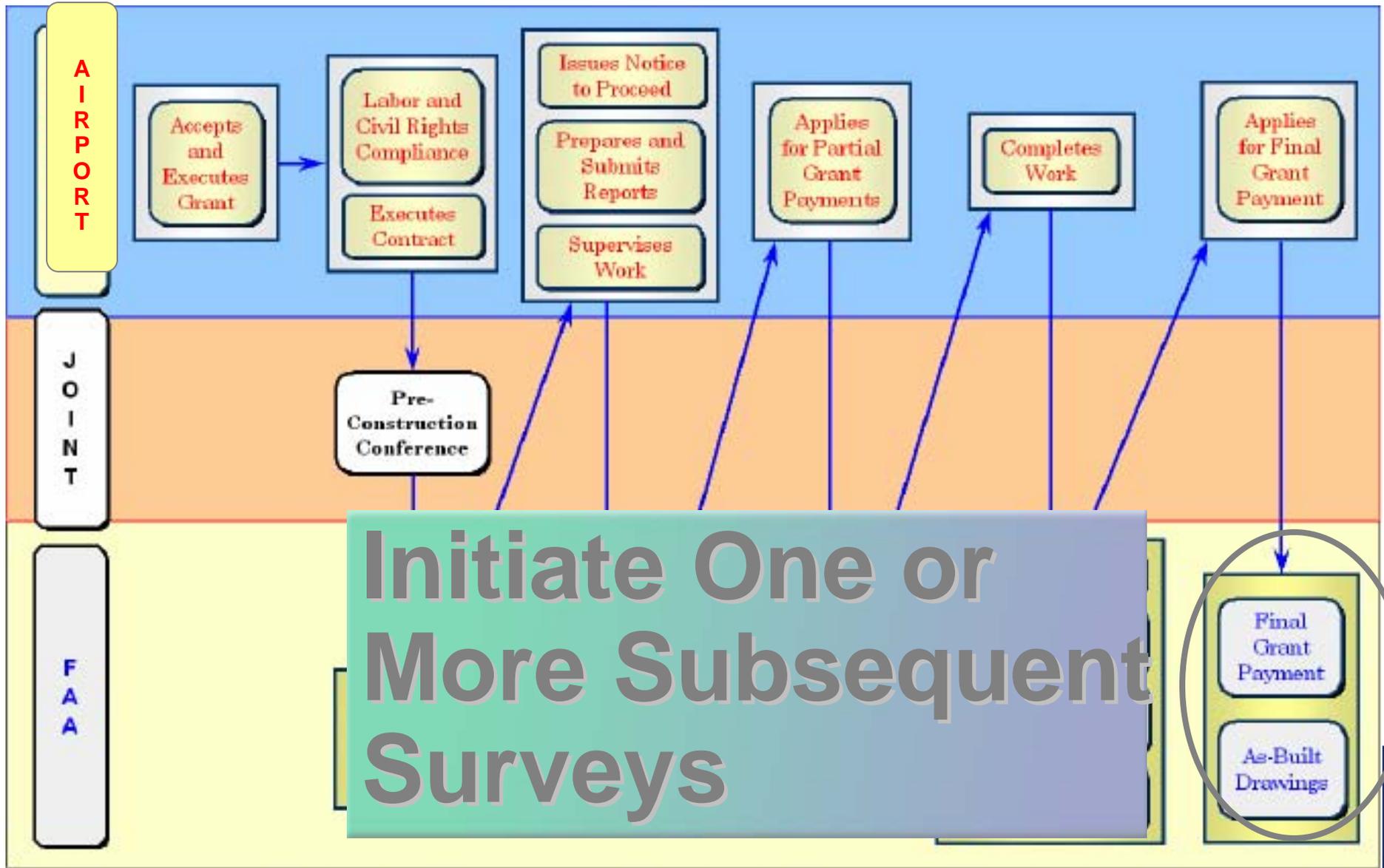
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t2

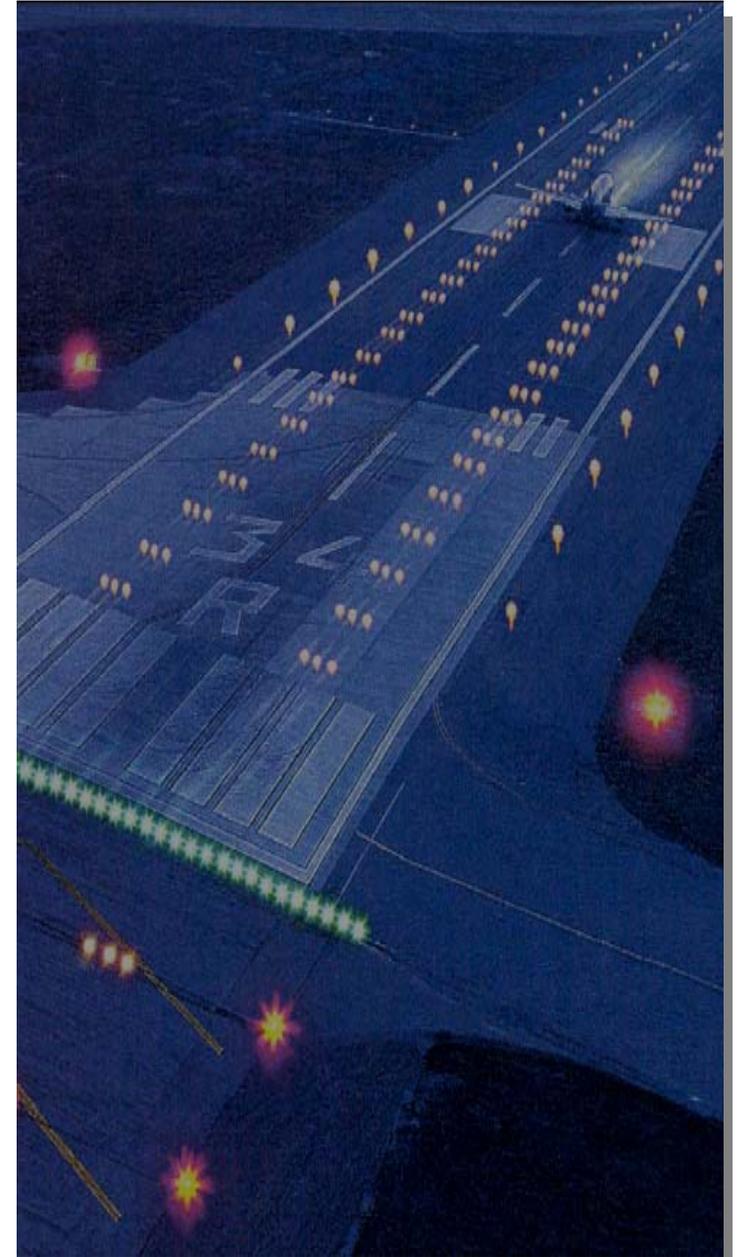
Okay, this is where I get confused. This is the same slide as the previous except, there is a box with perform survey and develop ALP and an area circled. Is the circled area where we are going to perform the survey and develop the AIP instead of the circled tasks?

troe, 5/13/2004

# Post AIP Grant Process



# Airports Geographic Information System



# Vision

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Provide an interoperable web-based GIS system (Airports-GIS) for the collection, management, and maintenance of airport data.

Addressing the needs of all FAA lines of business collectively rather than individually.



# GIS Objectives

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- Consolidate all FAA airport data requirements into a new standard for airport layout data to support FAA and industry
- Develop a comprehensive airport spatial data standard
  - RTCA DO-272, “User Requirements for Aerodrome Mapping Information”
  - RTCA DO-276, “User Requirements for Terrain and Obstacle Data”
  - AirMAT Model
  - EuroControl AICM/AIXM
- Collect and maintain Airport data digitally



# GIS Objectives

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- Provide an interoperable web-based GIS system (Airports-GIS) for managing airport data
  - Foundation for connecting the airports, FAA, and other agencies
  - Central database for storing airport survey data, spatial airport data, charting, analysis, and planning
  - Flexible interface to maximize ease-of-use
- Eliminate redundancy
  - Fewer airport surveys
  - Standard feature identification scheme
- Eliminate disparate data sets



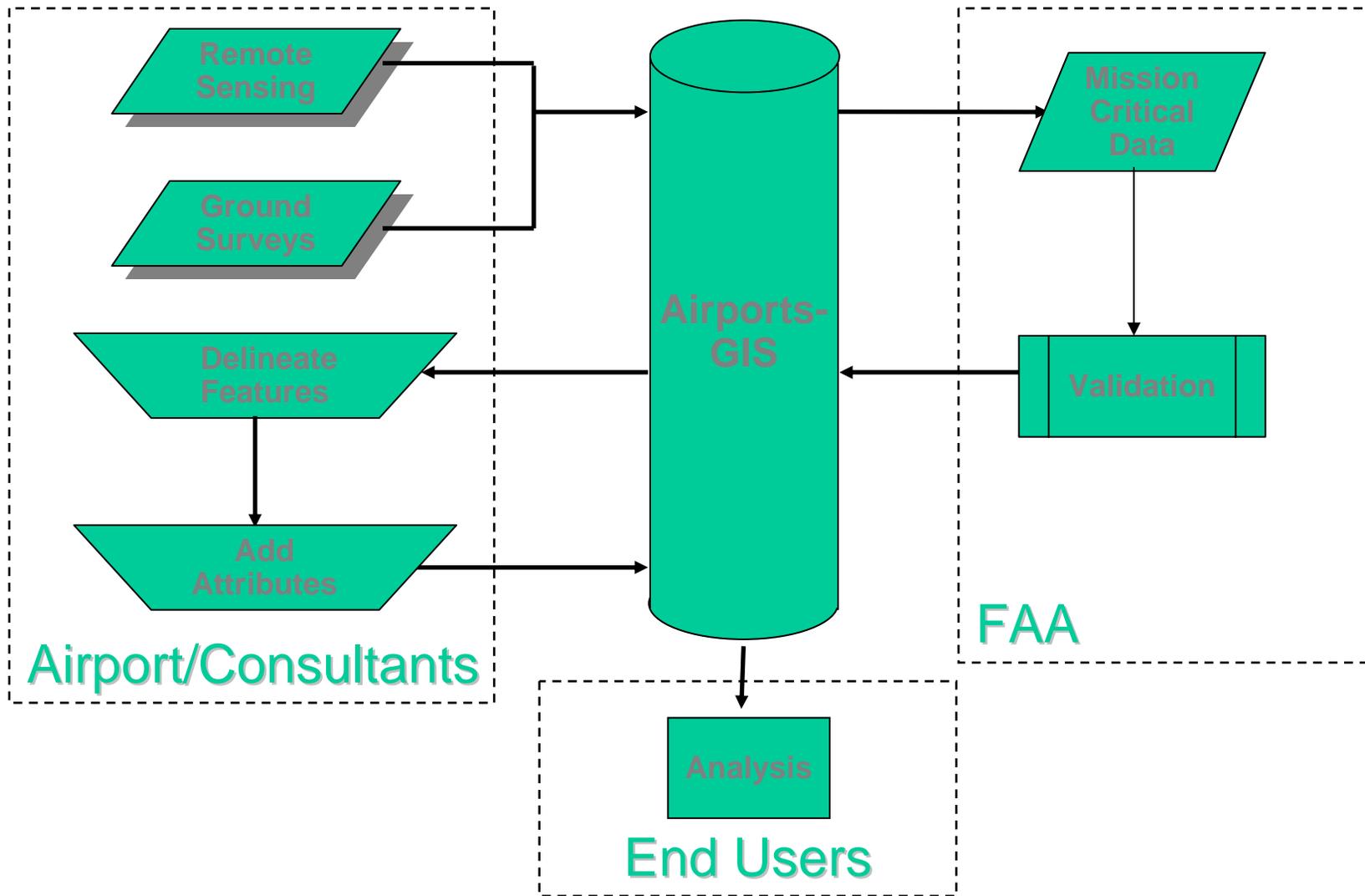
# Airport Surveying – GIS Program

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- ALPs contain a lot of information that is important to FAA
  - What if... the FAA could capture *important* information from the ALP and make it available electronically for whoever needs it?
- Airport Geographic Information Data Standard
  - Replaces Appendix 15 in AC 150/5300-13
  - Industry Standards and Support
  - Contents
    - Features
    - Attributes
    - External Data Tables
    - Imagery



# Airports GIS Process



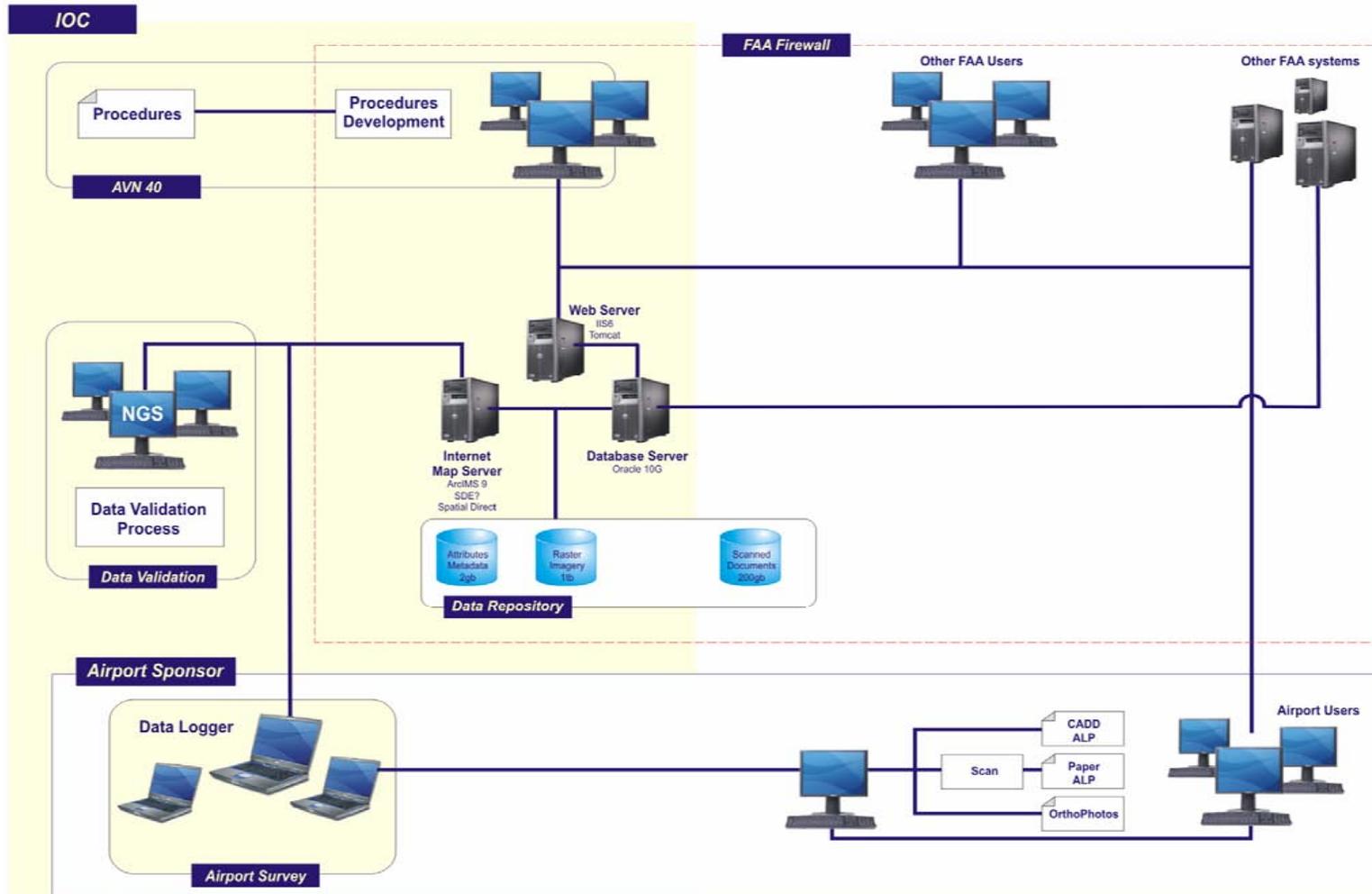
# Airports GIS System Features

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- Web-based interface
- Support conversion between three file formats
  - AutoCAD
  - ESRI Shape Files
  - Microstation
- Web-based map viewer
- FGDC Metadata
- Multiple configuration/version support
  - Analysis, Planned, Pending, Validated
- Obstruction Chart creation and printing
- XML support



# Airports GIS System Technical Architecture



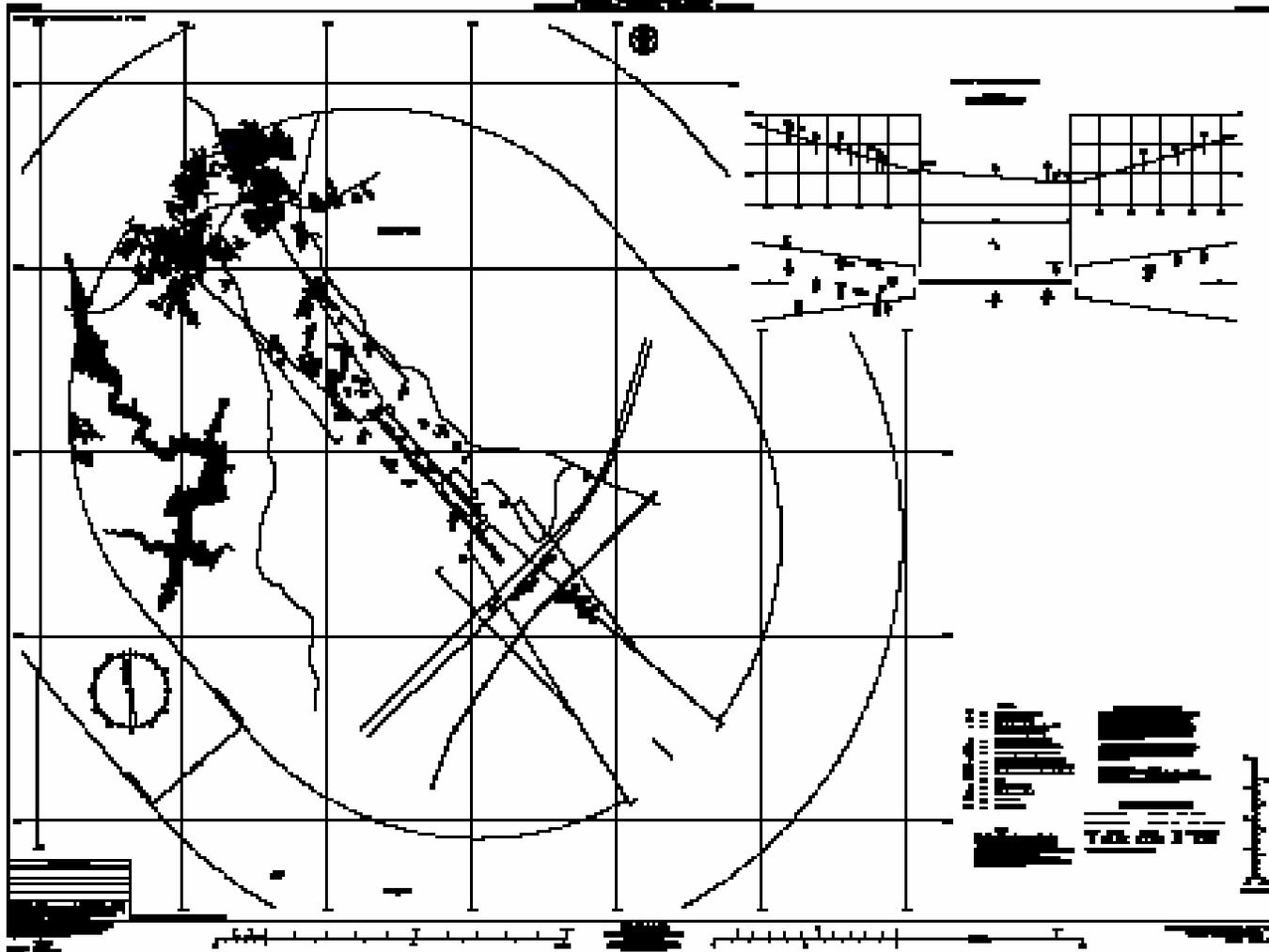
# Airports GIS Applications

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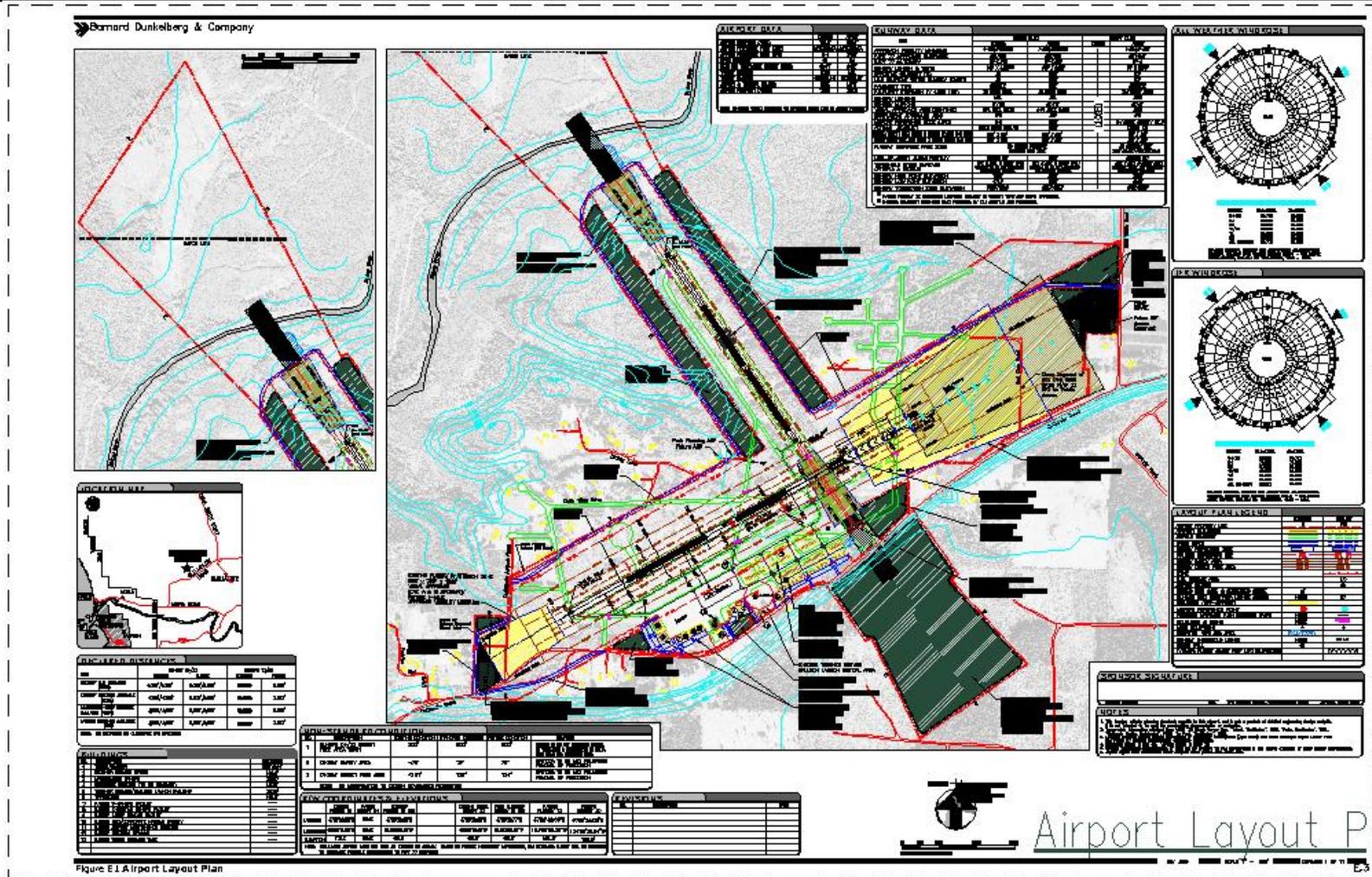
- Obstruction Evaluation
- Airport Airspace Analysis
- Construction Projects
- Aviation Notices (NOTAM)
- Approach Procedures
- Environmental Analysis
- Airport Design
- Utility Management
- Wildlife Strikes
- Moving Maps
- Airport and System Planning
- NAVAID Establishment
- Ground Transportation
- Land Use
- Noise Monitoring
- Property Management
- FAA & Industry Publications
- ATCT Procedures
- Simulation & Training
- Pavement Management



# Next Phase- Digital Obstruction Charts



# Next Phase- Digital ALP



# ? Questions ?

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