Airports GIS

AC 150/5300-18
Data Collection and Data Standards

Presented to | FAA Regions | Alaskan
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Agenda
- Background (10 min)
- Requirements (30 min)
- Best Practices/Lessons Learned (10 min)
AC 150/5300-18 | Quality Control and Data Model

- 480 Pages!
  - Chapter 1-4: 105 pages
  - Chapter 5 (Data Model): 315 pages
  - Appendices: 60 pages
- Safety-Critical Data (Table 4-1)
  - Runways, NAVAIDS, Obstacles, Geospatial (Profiles, Elevation, ARP)
  - NGS Verification
- Verification vs. Validation
- Accuracy and Reporting Criteria
- Table 2-1
- Object Identification Surfaces
  - Vertically Guided Approaches
  - Non VG Approaches
- Data Translation, Use of Existing Data & Data Migration Tool
- GIS Schema (Data Model)

-18 Highlights | Chapter 1

- NSRS Datum
  - NAD83, NAVD88, GEOID09
- Naming Convention
  - Files and Photos
- Photographs
  - Type 1 — close up
  - Type 2 – eye level at 5 to 6 feet
  - Type 3 – horizontally 10 to 30 feet
-18 Highlights | Chapter 2

- Independent verification and validation of airport safety data
  - **Airport Safety-Critical Data**: typically, features associated with the airport’s movement areas, navigational systems, or those affecting navigable flight such as objects surrounding the airport
  - **Verification**: the confirmation by examination and provision of objective evidence that the specified requirements are fulfilled
  - **Validation**: the confirmation by examination and provisions of objective evidence showing the data set meets the particular requirements of the intended use

- Survey and Quality Control Plans
- Final Report
- Table 2-1

-18 Highlights | Chapter 2 (continued)

- **Project Types**
  - Landside, Airside, ALP, Mapping, Approach Procedure, etc.

- **Airport Airspace Analysis**
  - Runways with Vertically Guided Approaches (VG)
  - Runways w/o Vertical Guidance (NVG)

- **One Engine Inoperative**
  - Per AC 150/5300-13, Ch 15 (required until after January 1, 2012)*

* Pending AAS approval
Vertically-Guided Object Identification Surfaces

- LPV and ILS Approaches require use of Vertically Guided Object Identification Surfaces
  - -18, Sect. 2.7.1.1
- One set of object identification surfaces per runway -
  - not approach-end dependent
  - horizontal and conical surfaces not combined into an airport surface
- Airport Airspace Analysis (object identification)
  - requires airport elevation and ARP, therefore AAA for a runway requires information about all other runways
VGATS, VGRPS, and VGPCS

VGRPS and VGPCS Extend 200' beyond runway ends

VGRPS and VGPCS Analysis

Figure 2-9. Illustrates the VGRPS and VGPCS object representations.
The VGPS

Note: VGPS (underlies the GQS) starts at the end of the runway

VG Horizontal and VG Conical Surface Analysis

- Divide the VGCS into quadrants (as depicted by the red lines in Figure 2-13), extended to the outer edge of the VGCS, centered on the meridian and parallel intersecting the ARP
-18 Highlights | Chapter 3

- Geometry
  - For the purposes of these specifications: points, lines, and polygons describe geometry
  - Refer to Chapter 5 for specific requirements for each feature type

-18 Highlights | Chapter 4

- Use of Existing Data
- Safety Critical Data (Table 4-1)
- Data Migration Tool (no longer supported)
- DMT replaced by Templates (Download from Website)

<table>
<thead>
<tr>
<th>Item</th>
<th>Publication Resolution (Unit of Measurement)</th>
<th>Integrity Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airport Control Area (Airspace)</td>
<td>1 arc second in latitude and longitude</td>
<td>1 x 10^-7</td>
</tr>
<tr>
<td>NAVAs located at the airport/heliport</td>
<td>1/10 arc second in latitude and longitude</td>
<td>1 x 10^-7</td>
</tr>
<tr>
<td>Obstacles in the circling area and at the airport/heliport</td>
<td>1/10 arc second in latitude and longitude</td>
<td>1 x 10^-7</td>
</tr>
</tbody>
</table>

- Safety Critical Features
  - Runway
  - RW Ends (Thresholds)
  - CL Profile
  - ARP, Airport Elevation
  - Obstacle
  - NAVAID
  - Stopway, Clearway
  - Obstacle Identification Surfaces
  - Landmark Features
### Highlights | Chapter 5 – GIS Schema

- Each feature is described by geometry type, feature group, information assurance level, requirements, positional accuracy, data capture rule, and the attributes required to provide the data to the FAA.

#### Table 5-1: Feature Types

<table>
<thead>
<tr>
<th>Feature Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Point</td>
<td>Point</td>
</tr>
<tr>
<td>Line</td>
<td>Line</td>
</tr>
<tr>
<td>Polygon</td>
<td>Polygon</td>
</tr>
<tr>
<td>Surface</td>
<td>Surface</td>
</tr>
</tbody>
</table>

### Chapter 5 – GIS Schema (continued)

#### Related Features

<table>
<thead>
<tr>
<th>Data Capture Rule</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Runway End</td>
<td>The end of the runway surface suitable for landing or taking off of aircraft. Runway end is described for the approaches to a runway. The Runway End is the end of the runway. When the threshold is not displayed, the Runway End is the end of the runway.</td>
</tr>
<tr>
<td>Runway Start</td>
<td>The beginning of the runway surface suitable for landing or taking off of aircraft. Runway start is described for the approaches to a runway. The Runway Start is the start of the runway. When the threshold is not displayed, the Runway Start is the start of the runway.</td>
</tr>
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#### Monumentation

<table>
<thead>
<tr>
<th>Survey Point Location</th>
<th>Description</th>
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<tbody>
<tr>
<td>Survey Point Locator</td>
<td>The limit of construction or the trim line of a runway end, as described in the approach area of the runway. Survey Point Locator is the limit of construction or the trim line of a runway end, as described in the approach area of the runway.</td>
</tr>
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#### Survey Point Location

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GIS Schema | Feature Attributes and Enumeration

Feature Attributes - RunwayEnd 5.4.26

<table>
<thead>
<tr>
<th>Feature Attributes</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RunwayEnd</td>
<td>Description of the feature's end.</td>
</tr>
<tr>
<td>RunwayEndType</td>
<td>Domain values (think pick lists)</td>
</tr>
</tbody>
</table>

Enumeration Tables

- RunwayEndType
  - AG: Asphalt-renewed
  - AN: Asphalt and turf
  - ANU: Asphalt-unrenewed
  - DC: Dope-cloth
  - EC: Concrete and asphalt
  - CG: Concrete and turf
  - CS: Concrete and stone
  - CN: Concrete ungrouted
  - DS: Dope-Sand
  - DT: Dirt
  - EM: Entrained Material Airfield System
  - FG: Fresh Grass
  - GB: Gravel
  - KS: Kerb stone
  - TN: Tarmac
  - SH: Salt water
  - WR: Water

GIS Schema | Runway Collection/Attribution

AAL Survey

- Lateral survey:
- Vertical survey:
- Feature Class:
- CASR Specific Requirements:
- Accuracy Requirements:
- Feature Attributes:
  - Length:
  - Width:
  - Height:
  - Surface:
  - Date:
  - Surface:
  - Noise:
  - Dimension:
  - Material:
  - Condition:
  - Classification:
  - Limitations:
  - Ballast Type:
  - Insulation:

Survey Point Location

The rectangles on the survey show the collection of the runways at an airport.
Lessons Learned and Best Practices

- Real Time Kinematic (RTK)
  - Runway Profiles
  - Collect Data Rapidly
  - Utilizes Base Station
  - Both Directions - Continuous Readings (10”-values)

Lessons Learned and Best Practices (continued)

- Survey Documentation adds costs, but is necessary

- Runway End is not the end of Pavement
Review Questions

1. Where is the correct Horizontal and Vertical Survey location for a Localizer?

-18B, 5.10.12.

NAVAID Equipment – LOC

Is Imagery required for a NAVAID siting project?

-18B, Table 2-1
- The Sponsor has a proposed runway that is not needed (justified) for more than 10 years, what Status Code value should the Sponsor use to designate this runway?

-18.5.4.22. Runway

- The Sponsor needs to delineate a wetlands area. What horizontal and vertical accuracy is required?

-18.5.7.12. Wetland
How many survey locations are required for a 4-box PAPI?

-18.5.10.19.  PAPI