**San Francisco International Airport**

**Geographic Information System**

**Data Standard**

Version 1

June 2018



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Revision History

As changes to this document are indicated and accepted, this document will be updated accordingly. The following revision history will log when these revisions occur, why they will occur, and who documented them.

Table - Revision History

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Date** | **Reason for Change** | **Version** |
| Marianne Cardwell | 6/12/2018 | Initial draft | 1.0 |

1. Introduction
   1. Purpose

San Francisco International Airport (SFO) Infrastructure Information Management (IIM) and Geographic Information System (GIS) staff (SFO GIS) maintains the airport’s geospatial data and corresponding attributes. This document details the specifications and processes that must be followed by both SFO employees and outside consultants during the development of SFO geospatial data.

SFO GIS serves as the Airport’s primary central digital GIS Enterprise database repository of primary and secondary facility asset and infrastructure information originating from multiple airport sources, systems and stakeholders, serving as a critical foundation for the preventative maintenance and preliminary planning of future design and construction work at SFO.

The availability of standardized data products and drawing files for use on future projects enhances the value of the original data creation effort in addition to providing one central source of truth to represent the Airport’s current geographical configuration. Standardization of this data allows drawing files and individual data layers to be integrated with other data components, ensuring consistency in the planning and design of SFO facilities infrastructure and presents a “common operational picture” of the Airport in GIS and mapping formats that can be incorporated into many airport data management systems and business processes.

Ensuring high quality data at the Airport is crucial not just for design and management purposes but also for safe flight operations. The Federal Aviation Administration (FAA) requires standardized airport geospatial data to be shared and distributed with other airports and their constituents, as well as internally within the FAA. Therefore, the FAA has developed GIS Data Standards governed by three advisory circulars, especially FAA Advisory Circular (AC) 150/5300-18B – General Guidance and specifications for Submission of Aeronautical Surveys to NGS: Field Data Collection and Geographic Information System (GIS) Standards. The geospatial data described in these documents are intended to support those standards and keep the Airport in compliance with FAA GIS data submittal requirements.

* 1. Document Scope

This document describes and details the GIS standards and requirements at the Airport. A related document is the Airport’s GIS Data Maintenance and Procedures, which documents all aspects of the maintenance and procedures currently being utilized by SFO GIS.

* 1. Intended Audience

This document is intended to be used internally to the Airport by SFO GIS staff.

* 1. References to Parties

The San Francisco International Airport’s Infrastructure Information Management Department is responsible for collecting and receiving all GIS related spatial and attribute information and content in accordance with the SFO GIS Standards.

The third party responsible for developing spatial data is referred to as the “Data Provider”. The Data Provider may be internal or external to SFO. If external, then the submittal is usually controlled by contract, and submitted through the Project Manager for the Airport. Other construction or survey design and as-built data submitted to SFO GIS may have originated from other Airport departments, city stakeholders, surveyors, planners, surrounding cities, counties, and municipalities.

The SFO employee who is responsible for updating and maintaining a certain feather class of geospatial and attribute data such as buildings, marking lines, or utilities is referred to as the “Data Owner”. Data Owners shall coordinate with the GIS Coordinator to ensure that all infrastructure changes in the field (both airside and landside) are properly updated and reflected within the central GIS Enterprise database in a timely fashion based upon proper data accuracy requirements.

1. GIS Data Standard
   1. Foundation

SFO’s Standard was built upon two main industry data standards: FAA AC 150/5300-18B and National CAD Standards. Additionally, the standard leverages Esri’s geodatabase data model.

* + 1. FAA AC 150/5300-18B

AC 150/5300-18B is a comprehensive standard that details the horizontal and vertical accuracy of geographic data, acceptable formats, geometric requirements, data layers and attributes. It contains information for both Computer-Aided Drafting and Design (CADD) and GIS environments. This standard focuses on both Airside and Landside features and generally does not apply to features inside a building.

This standard is available online at <https://www.faa.gov/documentLibrary/media/Advisory_Circular/150-5300-18B-chg1-consolidated.pdf>.

* + 1. National CAD Standard

The National CAD Standard (NCS) is the foundation that the SFO Surveying Department uses for capturing data in the field using GPS and Total Station technology (Leica Systems standard software/hardware), field surveys for descriptor key acronyms/terminology, horizontal, and vertical accuracy requirements, acceptable formats, CAD symbology (blocks) layering, coordinate systems, etc.

* + 1. Esri Geodatabase Data Model

SFO’s GIS data is stored in an enterprise geodatabase and as such takes advantage of some of the geodatabase’s capabilities, such as the use of attributes, domains, spatial references, and topology rules. Additionally, SFO’s Interior Data Model (SIDM) is based upon Esri’s Building Interiors Spatial Data Model in conjunction with SFO’s own internal Interior GIS Standards.

* 1. Data Schema
     1. Terminology

This section provides basic information on the central GIS data elements maintained by SFO. Additional “GIS 101” terms and definitions can be found at the ESRI on-line GIS Data Dictionary at: <http://support.esri.com/en/other-resources/gis-dictionary>.

* + - 1. Feature

A Feature is a representation of a real-world object on a map. GIS features have “spatial” information such as location, length, area, elevation, etc. A GIS feature at SFO could be any number of things such as:

* A polygon to represent the runway
* A polygon to represent the NAVAID critical area
* A polygon to represent a leasehold or easement area
* A polyline to represent a paint marking for a non-movement area line
* A polyline to represent the airport property acquired and added to the airport property
* A polyline to represent an underground utility line
* A point to represent a utility valve feature
* A point to represent an airfield light
  + - 1. Feature Class

A feature class, often called a layer, contains geographic features that have the same geometry (point, line, polygon), attributes, and spatial reference.

* + - 1. Table

An Esri table contains tabular information organized in rows and columns. A column represents a certain type of attribute while a row represents a different item. A table does not contain geometry (point/line/polygon). This is not to be confused with the more standard definition of a table, which could contain geographic information.

* + - 1. Attributes

Attributes are description information about a feature in a GIS. Attribute data is typically not geographical or spatial in nature but provides descriptive information about the feature itself.

For example, attributes of a taxiway might include its NAME, LENGTH and PAVEMENT CONDITION. Each distinct taxiway feature would have a similar attribute record as a “row” in the attribute table for the Taxiway Feature Class.

* + - 1. Domain

A domain defines and limits each distinct attribute value allowed to be entered in as data for each feature. This limitation reduces the amount of error in entering data by enforcing hard data constraints and ensuring data integrity.

* + - 1. Feature Dataset

A feature dataset is like a folder used for organizing a collection of feature classes sharing a common coordinate system. They can be used to spatially and thematically integrate related features by creating an interconnected topological network or building terrain datasets.

FAA Advisory Circular 150/5300-18B defines many GIS data feature classes that may be useful for different airports. There are over 10 primary feature datasets such as Airfield, Airspace, Environmental, Security, Utilities, etc. including over 60 different feature classes within these groups. These “AC-18B Feature Classes” are data that must be maintained and submitted to the FAA AGIS website to maintain compliance with FAA GIS data submittal requirements.

Feature classes that are not AC-18B feature classes but are maintained primarily to serve daily operations and other business needs at SFO do not need to be submitted to the FAA.

* + - 1. Geodatabase

A geodatabase refers to a database that stores geographic data. It was developed by Esri and is used throughout Esri’s ArcGIS software suite. It is available in several formats, detailed below:

* Personal Geodatabase, stored in Microsoft Access
* File geodatabase, stored as a set of files and folders
* Enterprise geodatabase, stored in a relational database such as Oracle, Microsoft SQL Server, PostgreSQL, Informix, or IBM DB2

A geodatabase holds a number of objects, including feature datasets, feature classes, tables, and domains.

The Airport currently utilizes Oracle 12G Standard as the central SFO GIS Enterprise Geodatabase used for development, staging, and production environments.

* + 1. SFO GIS Data Schema

Appendix A details SFO’s GIS data schema. All data delivered to SFO must be stored in compliance with this data schema.

* 1. Software

SFO GIS currently utilizes a variety of GIS and CAD based products from industry standard software companies Esri and Autodesk. Esri’s ArcGIS Enterprise Suite is primarily used for all desktop, server, online, and mobile applications and components. Latitude Geographics’ Geocortex is also being used for more complex GIS online development. Autodesk’s AutoCAD Map 3D is being used for receiving design and as-built construction drawings, which are converted to GIS. Open Spatial’s Munsys is used with AutoCAD based products for all utilities updating and maintenance within Oracle.

* 1. Coordinate System

In general, all data delivered to SFO should be developed in the California State Plane Coordinate System (US Feet) – NAD83 2011 Zone III using NAVD 88 for vertical measurements, NAD 83 for horizontal measurements, and US Survey Feet as the units of measurements.

At times, SFO GIS may request data to be developed in the SFO Local B coordinate system. The SFO-B coordinate system, both horizontally and vertically, is defined by Record of Survey #2925 (Vol. 43 of LLS Maps, Pages 44-45, San Mateo County Records). SFO-B establishes the horizontal axis (x-axis) as the centerline of Runway 10L-28R. Axes x and y, respectively, are parallel and perpendicular to the centerline of this runway. Vertical (z coordinates) coordinates shall be based on the North American Vertical Datum of 1988 (NAVD88). The origin of SFO-B is located 180 feet left of the threshold of Runway 10L on center.

* 1. Metadata Standards

All GIS data developed for SFO should include metadata using the Federal Geographic Data Committee’s (FGDC) geospatial metadata standards, specifically the FGDC Content Standard for Digital Geospatial Metadata (CSDGM). Detailed information about this standard can be found at <https://www.fgdc.gov/metadata/csdgm-standard>. This metadata can be easily created through Esri’s ArcGIS Desktop software suite by selecting the FGDC CSDGM Metadata style when populating a layer’s metadata.

In addition to the FGDC CSDGM metadata, stored as a separate file, attribute-based metadata, stored at the feature level, should be included. The following table details the fields that should be included for each data layer submitted to SFO.

Table - SFO Metadata Element Specifications

|  |  |  |
| --- | --- | --- |
| **METADATA FIELD** | **DESCRIPTION** | **METADATA DOMAIN VALUES** |
| Title (Heading) | A brief name of the dataset | “Building Footprints” |
| Format Type | The format in which the data is stored | “Shapefile”, “AutoCAD drawing”, “File geodatabase”, etc. |
| Thumbnail | A graphic representation of the entire dataset, as a small image |  |
| Tags | A list of keywords applicable for this dataset | “Buildings” |
| Summary | A brief description of the data | “Building footprints of the San Francisco International Airport” |
| Description | A more detailed description of the data | “Building footprints for all buildings located on the grounds of the San Francisco International Airport. Original building footprints were obtained from 3-inch 2016 aerial photography. |
| Credits | A general listing or description of the source of the imagery | “SFO GIS, Woolpert” |
| Use Limitations | General limitations for use | “Internal Use (SFO) Only Access Granted through Signed Agreement” |
| Extent (N, S, E, W) | Extent of largest data set |  |
| Scale Range | The range of scales at which this data should be used | “1:360 – 1:12,000” |
| Time Period of Content | Date the was created or for which the data is relevant/accurage | “07/01/2016” |
| Status | Status of data | “Complete, In-Process, ...” |
| Maintenance Frequency | Data update schedule | “As\_Needed, Annually, Continually, Daily,Irregular, Monthly, None planned, Unknown, Weekly” |
|  |  |  |

* 1. Data Delivery
     1. Formal Transmittal

All spatial data deliverables to SFO should include a formal transmittal letter. Each data delivery and format must certify that the data being delivered was reviewed by the Data Provider staff and found to be in compliance with the GIS Standard and approved QC plan. The transmittal must contain a summary of the data being delivered, the electronic format, and document any deviations from the standards or data submitted under an approved standards waiver.

The data shall be evaluated by the SFO GIS staff that will then determine whether or not the submitted data meets standards. Failure to meet standards will cause the delivery to be rejected.

* + 1. Acceptable GIS Data Formats

The following lists acceptable data formats:

* AutoCAD .DWG format, version 2013 or greater. Data attributes should be stored as object data.
* Esri file formats including file geodatabase (preferred) or shapefile.
* Google KMZ or KML.
  + 1. Acceptable Media

All data shall be submitted in a standard electronic media. The media format shall be of an acceptable type to SFO (FTP upload, CD, DVD, external hard drive, or external flash drive). If the delivery is larger than available space on a single device, an alternative delivery approach pre-approved by the SFO GIS Coordinator shall be acceptable.

1. FAA AGIS Data Update Compliance
   1. Required AGIS Feature Classes

The FAA AC 150/5300-18B Standard defines the geospatial components required for FAA AGIS compliant geospatial data used to conduct Airport aeronautical surveys. The AC does not necessarily contain all required GIS data stored and maintained within the SFO GIS Enterprise Database or the Airport Layout Plan (ALP).

However, it can be interpreted that several “safety critical” GIS feature classes are required for every aeronautical survey, and test datasets submitted to the FAA AGIS website will return a result that indicates if the feature class is a “required” value for the parameters selected.

Table 3 lists the “safety critical” GIS feature classes developed by the FAA and which can be found on the FAA’s AGIS website (https://airports-gis.faa.gov/) **Any project that results in changes to these feature classes should result in a timely submitted to the FAA AGIS system of the updated data.**

Table - FAA AGIS Safety Critical Features

|  |  |
| --- | --- |
| Section 5.8.1 | Airport Control Point – Runway Intersection Point |
| Section 5.8.2 | Airport Control Point – Airport Elevation |
| Section 5.8.3 | Airport Control Point – Centerline Perpendicular Points |
| Section 5.8.4 | Airport Control Point – Displaced Threshold Point |
| Section 5.8.5 | Airport Control Point – Stopway Ends |
| Section 5.8.6 | Airport Control Point – Profile Points |
| Section 5.8.7 | Airport Control Point – Touchdown Zone Elevation (TDZE) |
| Section 5.8.8 | Airport Control Point – Primary and Secondary Airport Control Stations (PACS/SACS) |
| Section 5.5.1 | Landmark Segment |
| Section 5.4.19 | Marking Area (for Runway) |
| Section 5.4.20 | Marking Line (for Runway) |
| Section 5.10.2 | Navaid Equipment – Airport Beacon (APBN) |
| Section 5.10.3 | Navaid Equipment – Air Route Surveillance Radar (ARSR) or Airport Surveillance Radar (ASR) |
| Section 5.10.4 | Navaid Equipment – Approach Light System (ALS) |
| Section 5.10.5 | Navaid Equipment – Back Course Marker (BCM) |
| Section 5.10.6 | Navaid Equipment – Distance Measuring Equipment (DME) |
| Section 5.10.7 | Navaid Equipment –Glide Slope – End Fire (GS) |
| Section 5.10.8 | Navaid Equipment – Fan Marker (FM) |
| Section 5.10.9 | Navaid Equipment – Glideslope (GS) |
| Section 5.10.10 | Navaid Equipment – Ground Controlled Approach (GCA) Touchdown Reflectors |
| Section 5.10.11 | Navaid Equipment – Inner Marker (IM) |
| Section 5.10.12 | Navaid Equipment – Localizer (LOC) |
| Section 5.10.13 | Navaid Equipment – Localizer Type Directional Aid (LDA) |
| Section 5.10.14 | Navaid Equipment – Middle Marker (MM) |
| Section 5.10.15 | Navaid Equipment – MLS Azimuth Antenna (MLSAZ) |
| Section 5.10.16 | Navaid Equipment – MLS Elevation Antenna (MLSEZ) |
| Section 5.10.17 | Navaid Equipment – Non-Directional Beacon (NDB) |
| Section 5.10.18 | Navaid Equipment – Outer Marker (OM) |
| Section 5.10.19 | Navaid Equipment – Precision Approach Path Indicator (PAPI) System |
| Section 5.10.20 | Navaid Equipment – Precision Approach Radar (PAR) Touchdown Reflectors |
| Section 5.10.21 | Navaid Equipment – Pulse Light Approach Slope Indicator (PLASI) System |
| Section 5.10.22 | Navaid Equipment – Pulsating Visual Approach Slope Indicator (PVASI) |
| Section 5.10.23 | Navaid Equipment – Runway End Identifier Lights (REIL) |
| Section 5.10.24 | Navaid Equipment – Simplified Directional Facility (SDF) |
| Section 5.10.25 | Navaid Equipment – Tactical Air Navigation (TACAN) |
| Section 5.10.26 | Navaid Equipment – Tricolor Visual Approach Slope Indicator System (TRCV) |
| Section 5.10.27 | Navaid Equipment – “T” Visual Approach Slope Indicator System (T-VASI) |
| Section 5.10.28 | Navaid Equipment – VHF Omni Directional Range (VOR) |
| Section 5.10.29 | Navaid Equipment – Visual Approach Slope Indicator System (VASI) |
| Section 5.10.30 | Navaid Equipment – VOR/TACAN (VORTAC) |
| Section 5.5.2 | Obstacle |
| Section 5.5.3 | Obstruction Area |
| Section 5.5.4 | Obstruction ID Surface |
| Section 5.4.22 | Runway |
| Section 5.4.25 | Runway Blast Pad |
| Section 5.4.8 | Runway Centerline |
| Section 5.4.12 | Runway Element |
| Section 5.4.26 | Runway End |
| Section 5.4.27 | Runway Label |
| Section 5.4.13 | Stopway |
| Section 5.4.18 | Touchdown Lift Off |
|  |  |
|  |  |

* 1. Non-Required AGIS Feature Classes

FAA AGIS geospatial data required for FAA approved aeronautical surveys according to AC 18B requirements will typically consist of one submittal of “safety critical” and “non-safety critical” data as part of the survey itself.

Features and their corresponding GIS data are continually changing on airports and while much of this “non-safety critical data” is not part of the FAA’s analysis of data for air navigation, many of these layers may be very important layers to depict airport features such as taxiways, aprons and other on-airport buildings – all of which are not required for a pure aeronautical survey.

Current guidance from the FAA is for these “non-safety critical features” to be submitted as an “existing airport data” AGIS project dataset. They may also be included as other proposed changes to “safety critical” data in the FAA AGIS design/build workflow .

* 1. Required AGIS Data Updates: Frequency and Contents

In its current form, AC-150/5300-18B does not specify how often safety critical and non-safety critical data should be updated to the AGIS system. The general thinking among airports is that updates of non-safety critical data should be submitted on a basis that makes sense for the particular airport’s circumstances and FAA AGIS projects. As each data submittal to AGIS requires several administrative document submittals, the general consensus is updates to non-safety critical data can be accumulated and then submitted to AGIS when a significant change to the airport facility is occurring, or safety critical data has changes and requires an AGIS data submittal.

Currently there is no guidance from the FAA for when to submit multiple changes to safety critical information, such as occurs when different phases of one large “program” occurs over a multi-year timeframe.

1. Data Quality Control and Acceptance

All data entered into the SFO GIS database will be subjected to a comprehensive quality control process described below to ensure it is compliant with this Standard.

The Data Provider will perform an electronic, pre-submission quality control check of each spatial data deliverable. A quality control (QC) checklist/report documenting the results of the data Provider’s QC process shall be created for each deliverable and submitted to SFO upon request.

The GIS data quality assurance (QA) requirements are detailed in the following sections.

* 1. Quality Assurance/Quality Checking (QA/QC)

As defined in this Standard and any GIS Level of Service agreements for GIS data developed by SFO staff or contract scopes for consultant Data Providers, GIS data submitted or delivered to SFO GIS must first pass the quality control testing standard for both the spatial accuracy and proper attribute completion.

For data that does not pass SFO’s data review, a quality control report must be provided to SFO that documents the quality control testing performed prior to data delivery, the reported results and any corrective action taken prior to delivery. If any waivers to the Standard were granted, those waivers must also be documented in the testing report.

Acceptable methods to randomly or manually sample a subset of data for QC testing are discussed below and the final approved method appropriate for the particular datasets being delivered shall be defined in the approved GIS Data QC Plan.

* + 1. Spatial Data Accuracy

The FGDC developed the National Standard for Spatial Data Accuracy (NSSDA). This standard will be applied to all data being developed for SFO GIS. This standard can be found at <https://www.fgdc.gov/standards/projects/FGDC-standards-projects/accuracy/part3/chapter3>.

Spot checks shall be performed on a sample of data using a statistically significant sample size based on random selection methodology. The accuracy of each feature in the sample set will allow an average confidence interval to be calculated. This sample testing must demonstrate that the spatial accuracy of the sample set is within the parameters of the requirements.

For example, as mentioned, AC-18B might have accuracy requirements within +/- 5 feet whereas our standards may be within +/- 1 foot. Data shall be checked and if within the +/- accuracy requirements defined by the FAA Standard (or SFO standard), the data point shall be considered acceptable for that location.

Data Providers should perform their own checks prior to delivery to ensure successful testing by SFO. This test should document the procedures were undertaken and confirm that the results were within the standard for spatial accuracy to permit data to be submitted to SFO.

* + 1. Attribute Data Accuracy

Attribute data for each feature shall be correct, for both required attribute values, blank attribute values, and the correct attribute assignment applicable to the feature.

This requirement will typically be evaluated by programmatic checks and/or spot checks versus original source documents for the type of feature being checked. Prior to delivery to SFO, the Data Provider shall perform a spot check using a statistically significant sample size based on the approved random selection methodology. This test should document the procedures undertaken and that the actual results obtained were within the standard for attribute accuracy.

* 1. Acceptance Testing Conformance Procedures

Acceptance of a spatial data delivery for loading into the SFO GIS shall be evaluated against the criteria in this Standard.

SFO GIS staff shall run quality control checks on the submitted data to check for compliance with the standard for spatial accuracy, attribution and compliance with the Data QC Plan and this Standard.

SFO may choose to reject submittals that do not meet the minimum quality thresholds, or may accept data with conditions depending on the non-compliance issues and deliverable status (initial draft, second draft or final). The quality control checks will include but not be limited to:

* Attribute domain conformance (attribute values are valid for those constrained by a domain)
* Attribute integrity (correct attribution for the associated feature)
* Proper geometry (feature geometry is appropriate for that type of feature)
* Topologic integrity (the data has the appropriate topology)
* Spatial accuracy (features accurately represent the real-world feature within the defined tolerances)
* Data format
* Coordinate system

**If the Data Provider believes that the data creation rules should be modified, this information must be submitted to SFO for review at least 90 days prior to submitting the data.**

* + 1. Spatial Accuracy Review

Spatial accuracy will be evaluated through a visual inspection procedure, comparisons with other data and actual field measurements where appropriate. The visual inspection will be performed by comparing the new GIS features with existing GIS features, survey control data or surveyed features, and digital orthophotos where available. Any anomalies uncovered during the inspection will be identified and the Data Provider notified for correction or further investigation.

* + 1. Geometry Accuracy Review

All features must be stored using the correct geometry (point, line, polygon) as defined in the geodatabase schema. Features that fail this criterion will be flagged.

* + 1. Attribute Integrity Review

All attributes will be evaluated against the attributes defined in the geodatabase schema for each feature class. Any values that fail these criteria will be flagged.

* + 1. Attribute Domain Review

All attributes will be evaluated against the domains defined for each feature class and particulate attribute. Any values that fail these criteria will be flagged.

* + 1. Network Topology Review

All topology will be evaluated against the geodatabase schema for each feature class. Any features that fail these criteria will be flagged. Examples of common topology rules that will be enforced are listed below:

* Polygons may overlap each other. In some cases, overlaps are not allowed (e.g. runway element). In these cases, polygon edges should be adjusted to remove the overlap and vertices of features should be snapped to corresponding vertices of adjacent features.
* Polygons may have slivers of unaccounted space between them. In these cases, polygon edges should be adjusted to remove the gap and vertices of features should be snapped to corresponding vertices of adjacent features.
* Line overshoots may need to be trimmed so that line segments end at a node, endpoint or point of intersection as appropriate.
* Line undershoots may need to be extended so that line segments end at a node, endpoint or point of intersection as appropriate.
* Vertices of features should be snapped to corresponding vertices of adjacent features.
* No features are duplicated.
* Networks will not have any missing or isolated nodes.
  + 1. Quality Control Findings

All data items that have been flagged from the quality control processes will be documented in a quality control report/memo. If the dataset fails the quality control criteria, the dataset will be returned to the Data Provider for correction. All updated data must be resubmitted by the Data Provider for SFO acceptance testing until it passes the criteria defined in this Standard and QC Plan.

* + 1. Accepted Data Report

Once the data has passed the quality control and SFO acceptance testing, it will be formally accepted by SFO and will be loaded into SFO’s GIS system.

1. Data Security and Security Sensitive Information Procedures

Data Providers must take care with any data provided by SFO for their use, or with data created for SFO use, to ensure data is appropriately handled and distributed to comply with Title 49 of the Code of Federal Regulations (CFR) Parts 15 and 1520 pertaining to Security Sensitive Information (SSI). 49 CFR Part 15 can be found at <https://www.gpo.gov/fdsys/pkg/CFR-2010-title49-vol1/pdf/CFR-2010-title49-vol1-part15.pdf> and 49 CFR part 1520 can be found at <https://www.gpo.gov/fdsys/pkg/CFR-2010-title49-vol9/pdf/CFR-2010-title49-vol9-part1520.pdf>. In addition to federal regulations, SFO has developed its own SSI standard. Data Providers must ensure they are following all applicable standards.

The Data Provider shall follow effective data management processes to ensure that prior to delivery, data in their possession about existing or proposed SFO facilities are not distributed to inappropriate parties. The Data Provider shall provide for transport of the data in a secure manner to the SFO GIS staff. Chain-of-custody documentation required for each formal delivery of electronic data shall include a formal transmittal, and, if not hand-delivered, a delivery handling receipt shall be retained by the data provider for data sent by messenger/package delivery service.

1. Data Distribution and Licensing
   1. Airport Internal vs. External Distribution Policy

All GIS data owned and maintained by SFO is only to be distributed using PDF read-only format unless otherwise specified. Any information that is requested to be distributed online via interactive web mapping is regulated through an online secure system of Level 1 or 2 named users with appropriately granted rights to view, author, and publish data as determined by their necessary use of the data. All other digitally formatted data requires that the Airport Project Manager (SFO PM) have all external parties (Consultant, sub-consultant, tenant, airline, municipality, etc.) fill-out, sign, and return the official Airport Data Release Agreement to SFO GIS before distributing the data.

* 1. Digital Data License Agreement

All contractors must sign SFO’s Digital Data license and Non-Disclosure Agreement prior to obtaining a copy of SFO’s data. All digital data provided by SFO is considered to be confidential information and can only be used in connection with services provided to SFO. See Appendix C or <http://sfo-dnc/gis/web/agreement.cfm> for a copy of the Agreement.

Appendix B – GIS Data Owners

Table - GIS Data Owners

| **FEATURE GROUP / FEATURE CLASS** | **DEPARTMENT** | **PRIMARY CONTACT** |
| --- | --- | --- |
| **Airfield** |  |  |
| AircraftGateStand | Civil Engineering | Robin Hansen |
| AircraftNonMovementArea | Civil Engineering | Robin Hansen |
| AirfieldLight | Electrical Engineering | Lalesh Sharma |
| AirOperationsArea | Airfield Operations | Barrett Krieger |
| AirportSign | Electrical Engineering | Lalesh Sharma |
| Apron | Civil Engineering | Robin Hansen |
| ArrestingGear | Civil Engineering | Robin Hansen |
| DeicingArea | Civil Engineering | Robin Hansen |
| FrequencyArea | Civil Engineering | Robin Hansen |
| MarkingArea | Civil Engineering | Robin Hansen |
| MarkingLine | Civil Engineering | Robin Hansen |
| MovementArea | Airfield Operations | Glenn Brotman |
| PassengerLoadingBridge | Engineering | Antonio Borjas |
| PassengerLoadingBrIdge | Engineering | Antonio Borjas |
| RestrictedAccessBoundary | Security Operations | Barrett Krieger |
| Runway | Civil Engineering | Tiffany Ip |
| RunwayArrestingArea | Civil Engineering | Tiffany Ip |
| RunwayBlastPad | Civil Engineering | Tiffany Ip |
| RunwayCenterline | Civil Engineering | Tiffany Ip |
| RunwayElement | Civil Engineering | Tiffany Ip |
| RunwayEnd | Civil Engineering | Tiffany Ip |
| RunwayHelipadDesignSurface | Civil Engineering | Tiffany Ip |
| RunwayIntersection | Civil Engineering | Tiffany Ip |
| RunwayLabel | Civil Engineering | Tiffany Ip |
| RunwayLAHSO | Civil Engineering | Tiffany Ip |
| RunwaySafetyAreaBoundary | Civil Engineering | Tiffany Ip |
| Shoulder | Civil Engineering | Tiffany Ip |
| Stopway | Civil Engineering | Tiffany Ip |
| TaxiwayElement | Civil Engineering | Tiffany Ip |
| TaxiwayHoldingPosition | Civil Engineering | Tiffany Ip |
| TaxiwayIntersection | Civil Engineering | Tiffany Ip |
| TouchDownLiftOff | Civil Engineering | Tiffany Ip |
| **Airspace** |  |  |
| LandmarkSegment | Surveying | Brad Luken |
| Obstacle | Security Operations | Barrett Krieger |
| ObstructionArea | Security Operations | Barrett Krieger |
| ObstructionIdentSurface | Security Operations | Barrett Krieger |
| ObstructionIdSurface | Security Operations | Barrett Krieger |
| RunwayProtectArea | Civil Engineering | Tiffany Ip |
| **Cadastral** |  |  |
| AirportBoundary | Surveying Management | Brad Luken |
| AirportParcel | Planning | Chris Diprima |
| County | San Mateo County | Ayelet Greenberg |
| EasementsAndRightsofWay | Surveying | Brad Luken |
| FAARegionArea | FAA (ADO) | Roy Dickerson |
| LandUse | Planning | Chris Diprima |
| LeaseZone | Planning | Chris Diprima |
| Municipality | San Mateo County | Ayelet Greenberg |
| Parcel | San Mateo County | Ayelet Greenberg |
| State | San Mateo County | Ayelet Greenberg |
| Zoning | San Mateo County | Ayelet Greenberg |
| **Environmental** |  |  |
| EnvironmentalContaminationArea | Environmental | Houshang Esmaili |
| FaunaHazardArea | Environmental Planning | Houshang Esmaili |
| FloodZone | Environmental Planning | Houshang Esmaili |
| FloraSpeciesSite | Landscaping | Jim Basil |
| ForestStandArea | Environmental Planning | Houshang Esmaili |
| HazardousMaterialStorageSite | Environmental | Houshang Esmaili |
| NoiseContour | Noise Abatement | Bert Ganoung |
| NoiseIncident | Noise Abatement | Bert Ganoung |
| NoiseMonitoringPoint | Noise Abatement | Bert Ganoung |
| SampleCollectionPoint | Environmental | Houshang Esmaili |
| Shoreline | Environmental Planning | Houshang Esmaili |
| Wetland | Environmental | Houshang Esmaili |
| **Geodetic** |  |  |
| AirportControlPoint | Surveying Management | Brad Luken |
| CoordinateGridArea | NA | NA |
| ElevationContour | Surveying | Brad Luken |
| ImageArea | Surveying | Brad Luken |
| **Navigational Aids** |  |  |
| NAVAIDCriticalArea | FAA (ADO) | Roy Dickerson |
| NAVAIDEquipment | FAA (ADO) | Roy Dickerson |
| NAVAIDSite | FAA (ADO) | Roy Dickerson |
| **SeaPlane** |  |  |
| AnchorageArea | NA | NA |
| DockArea | NA | NA |
| NavigationBuoy | NA | NA |
| SeaplaneRampCenterline | NA | NA |
| SeaplaneRampSite | NA | NA |
| TaxiChannel | NA | NA |
| TurningBasin | NA | NA |
| WaterLaneEnd | NA | NA |
| WaterOperatingArea | NA | NA |
| **Security** |  |  |
| SecurityArea | Security Operations | Barrett Krieger |
| SecurityIdDisplayArea | Security Operations | Barrett Krieger |
| SecurityPerimeterLine | Aviation Security | Barrett Krieger |
| SterileArea | Security Operations | Barrett Krieger |
| **Structures** |  |  |
| Building | Aviation Management | Eric Yee |
| ConstructionArea | Civil Engineering | Daniel Lee |
| Fence | Security Operations | Barrett Krieger |
| Gate | Security Operations | Barrett Krieger |
| Roof | Architectural | Sam Harrison |
| Tower | FAA (ADO) | Roy Dickerson |
| **Surface Transportation** |  |  |
| Bridge | Traffic Engineering | Martin Munoz <martin.munoz@flcom> |
| DrivewayArea | Traffic Engineering | Martin Munoz <martin.munoz@flcom> |
| DrivewayCenterline | Traffic Engineering | Martin Munoz <martin.munoz@flcom> |
| ParkingLot | Traffic Engineering | Martin Munoz <martin.munoz@flcom> |
| RailroadCenterline | Traffic Engineering | Martin Munoz <martin.munoz@flcom> |
| RailroadYard | Traffic Engineering | Martin Munoz <martin.munoz@flcom> |
| RoadCenterline | Traffic Engineering | Martin Munoz <martin.munoz@flcom> |
| RoadPoint | Traffic Engineering | Martin Munoz <martin.munoz@flcom> |
| RoadSegment | Traffic Engineering | Martin Munoz <martin.munoz@flcom> |
| Sidewalk | Traffic Engineering | Martin Munoz <martin.munoz@flcom> |
| Tunnel | Traffic Engineering | Martin Munoz <martin.munoz@flcom> |
| **Utilities** |  |  |
| TankSite | GIS Utilities Engineering | Carlos Tanquilut |
| UtilityLine | GIS Utilities | Carlos Tanquilut |
| UtilityPoint | GIS Utilities | Carlos Tanquilut |
| UtilityPolygon | GIS Utilities | Carlos Tanquilut |

Appendix C – Digital License and Non-Disclosure Agreement