

PORT OF OAKLAND GEOGRAPHIC INFORMATION SYSTEM (GIS) STANDARDS OF PRACTICE (SOP)

The Port of Oakland (“the Port”) maintains a robust GIS system in the Engineering Services Division. The system is ESRI based and utilizes ArcGIS Pro and ArcGIS Online. Consultants’ GIS data and systems should interface with the existing GIS platform.

The following standards are to provide administrative and technical guidance to all users of GIS within the Port of Oakland as well as outside consultants. It is the responsibility of the Port and consultant GIS users to follow the guidance in this document. The Port should utilize services from GIS vetted consultants: [Esri Partners](#). Before consultants are selected, they must provide work examples that demonstrate their GIS capabilities within their Submittal of Proposals/Qualifications and their interview. This can include figure export(s) in pdf format, map package(s), and/or links and demonstration of ESRI COTS (Commercial-off-the-shelf) apps and/or web maps. Project teams will engage the GIS Administrator during project scoping and kickoff. A GIS kickoff meeting between the GIS Administrator and the consultant(s) is required. Consultants must engage with the GIS Administrator throughout the project’s duration. The GIS Administrator must be contacted directly via email for any GIS data release requests. Outside firms requesting GIS data are required to sign a GIS Data Release Waiver before data can be sent to consultants. GIS data shall be supplied exclusively by the GIS Administrator. If outside firms need to access the Port of Oakland GIS Portal, they will be required to sign the Vendor Remote Access Agreement. This document is still under construction and is subject to change.

- Software
 - ArcGIS Pro
 - ArcGIS Online
- Spatial Reference – NOTE: All geospatial deliverables must reference the Port’s preferred coordinate system format.
 - Projected Coordinate System – NAD 1983 (2011) StatePlane California III FIPS 0403 (US Feet)
 - Vertical datum – NAVD88 (ftUS)
- Data Management
 - Data Models
 - Data models must be utilized to maintain consistency.
 - Consultants must use the data model(s) provided by the GIS Administrator. However, data models can be adjusted to align with project specific needs pending authorization from the Port of Oakland’s GIS Administrator and the Port Project Manager.
 - Project deliverables related to Oakland Airport shall comply with the Port of Oakland’s Aviation data model. The Port’s Aviation data model aligns with the FAA 18B data model, with a few modifications based on the Port of Oakland’s needs.
 - <https://pro.arcgis.com/en/pro-app/latest/help/production/aviation/faa-18b-schema.htm>
 - <https://storymaps.arcgis.com/stories/cb5952652fa04d87a7865267c9433bca>
 - Project deliverables related to the Seaport shall comply with the Port of Oakland’s Seaport data model. The Port’s Seaport data model aligns with the ESRI Maritime data model, with a few modifications based on the Port of Oakland’s needs.
 - <https://community.esri.com/t5/ports-and-maritime-blog/maritime-ports-data-model-2023/ba-p/1249510>
 - Project deliverables related to utilities will comply with the Port of Oakland’s Utility data model. The Port’s Utility data model aligns with the Local Government Information Model (LGIM), ASCE 38-22 & 75-22, with a few modifications based on the Port of Oakland’s needs.
 - <https://www.asce.org/publications-and-news/civil-engineering-source/society-news/article/2022/07/newly-updated-asce-38-22-utility-engineering-standard-and-new-companion-standard-asce-75-22-now-available>
 - The Port-Wide data model is based on a combination of the Esri Maritime data model and the FAA 18b data model. Consultant will confer with the Port’s GIS Administrator to determine appropriate data schema for Port-Wide geospatial deliverables.
 - Depending on deliverable type, additional data attribute schema may be required to comply with Port’s Enterprise Asset Management (EAM) system. The Port’s EAM is run on the IBM Maximo platform. Additional Maximo data schema may be required for certain Geospatial consultant deliverables. **This is still under construction.**
 - Data Format

- The Esri file geodatabase is the standard geospatial data format at the Port of Oakland.
- A feature class is a collection of geographic features within the same geometry type (point, line, or polygon), the same attribute fields, and the same spatial reference. A feature class is stored within a geodatabase, and individual feature classes may be organized within a geodatabase using feature datasets. Feature classes with different geometry types may be stored in a feature dataset. When possible and/or necessary, feature classes should be organized within a feature dataset. Geospatial deliverables must be provided in ESRI file geodatabase format.
 - Other geospatial file types (e.g. shapefile, .kml, .kmz) may be provided as supplemental deliverables, along with the mandatory ESRI file geodatabase geospatial deliverable.
- Metadata
 - Detailed metadata should be created for geospatial data as dictated by the project requirements.
 - <https://pro.arcgis.com/en/pro-app/latest/help/metadata/create-fgdc-csdgm-metadata.htm>
- Cartography
 - Understand the design principles of cartography.
 - Utilize Port provided figure templates.
 - The template includes a scratch data geodatabase. This is only for processing purposes. Data provided to the Port should be in a finalized geodatabase.
 - Data frames and legend areas can be adjusted based on figure needs. Reach out to the Port's GIS Administrator for any questions regarding this topic.
- Quality Assurance
 - Consultants must employ quality-assurance (QA) for all GIS deliverables, including data, figures, analysis, results, calculations, applications, web maps, etc.
 - When delivering spatial data in polygon format, the consultant will be responsible for creating and running a topology for coincident geometry prior to data submittal.
 - When delivering spatial data of any geometry type, consultant will be responsible to deploy vertices snapping for coincident and overlapping geometries prior to data submittal.
 - Anything that does not align with the Port of Oakland's GIS SOP, will be sent back to the consultant for revision.
- Field Work
 - If consultants are to go out in the field, they must provide information as to how they will ensure accuracy ahead of time.
 - Sub-centimeter is what should be aimed for.
 - When using tablet or mobile-based field solutions, a handheld GNSS receiver shall be required to be paired with devices to ensure higher spatial accuracy.
 - If field work includes non-spatial data types (paper inspection records; CCTV inspection runs; site photos) – consultant will be responsible for providing link to spatial data through relative path in spatial data attributes.
 - Non-spatial field data shall be delivered in an organized folder according to Engineering Services Division data management standards.
- Google Earth
 - Only to be used for visualization purposes
 - Must **NOT** be used for any creating, editing, or adjusting of locations. All editing must be done within Esri.
- CAD Data
 - All CAD data shall follow the Spatial Reference system specifications detailed above.
 - Local datums shall not be used to create data within the CAD environment.
 - Clear and standardized layer naming conventions shall be applied for all spatial layers (see data model section).
 - Block reference layers and other combined layer types that require post-processing, shall be removed by consultant prior to submittal.
 - If the project plans to use AutoCAD Object Data tables to store data, consult with the GIS Administrator before proceeding.
 - Before transferring the CAD data, identify and solve any issues that affect the data quality. Ensure it meets data model standards (see data model section) and repair the geometry (such as snapping lines).



- If spatial data has been created or edited within a CAD environment, original CAD files must be included in data transfer to Port of Oakland GIS.
 - A .dwg or .dgn file format is required; any rendered drawings, Exhibits or As-Builts pdfs generated from CAD shall be included in the transfer.
- Spatial Data from Utility Modeling Programs
 - If a project deploys spatial data for the purpose of Utility Modeling (i.e. hydrologic flow modeling, subsurface geologic modeling) the project consultant shall engage the GIS administrator during scoping and kick-off phase.
 - Ensure data interoperability between Esri spatial data and specific modeling software.
 - Spatial data must be in the spatial reference system detailed above.
- Deliverables: Web Maps and Commercial Off-The-Shelf (COTS)
 - Any web maps or COTS apps must be designed to ensure effortless transfer to the Port upon project completion.
 - Documentation:
 - Provide comprehensive documentation for web maps and COTS apps, detailing configurations, data sources, data types, any specific data requirements, and dependencies.
 - Document the workflow and processes involved in creating and maintaining the web map and apps.
 - Data Packaging: See Deliverables: Data and Figures section.
 - Configuration Records: Maintain a record of all configurations, settings, and customizations made to web maps and COTS apps during the project.
 - Dependency Management: Clearly identify and document any dependencies on external services, plugins, or resources, provide guidance on how to manage them during the transfer, and include contingency plans for cases where certain dependencies may not be transferable.
 - Testing Procedure: Testing protocols must be enacted to verify the functionality of the web maps and COTS apps after transfer, ensuring they perform as intended in the new environment.
 - User Training: Provide guidelines for training personnel on the use and administration of the web maps and COTS apps to facilitate a smooth transition.
- Deliverables: Data and Figures
 - All naming conventions should be clear and concise. Consult the GIS Administrator on naming conventions if needed.
 - Provide clear and up to date metadata that aligns with FGDC standards.
 - The consultant must be review and post-process deliverables in an ESRI desktop program, to ensure that all QA standards have been satisfied.
 - All deliverables must be provided within a finalized folder that has the geodatabase, map package, CAD drawing files, figure exports, and/or any other requested data.
 - Folder naming convention: Year_MonthDate_CompanyName_ProjectName (example: 2023_0823_KimleyHorn_APMS)
 - Folder should be placed within Port provided sharepoint Received_files link
 - Folder organization:
 - Year_MonthDate_CompanyName_ProjectName (example: 2023_0823_KimleyHorn_APMS)
 - Data
 - Images
 - Any aerial imagery placed in here naming convention: SOURCE_DATEOFCAPTURE (example: nearmap_20230823)
 - KML
 - Kmz/kml naming convention: DATATYPE (example: utility_point.kmz)
 - CAD
 - Drawing_files
 - .dwg



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- Naming convention should align with as-built or exhibit naming convention.
 - .dgn
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 - PDFs
 - As-Built
 - Naming convention should align with associated .dwg or .dgn file name.
 - Exhibits
 - Naming convention should align with associated .dwg or .dgn file name.
- Maps
 - Map package
 - The map package should accurately mirror the content of the web map(s), COTS app(s), and/or figure export(s)
 - Geodatabase (.gdb)
- Outputs
 - Pdfs
 - Naming convention: FigureTitle_YearMonthDate (example:PortofOakland_DrinkingWater_20230823.pdf)
 - Xls
 - Naming convention: TableName_YearMonthDate (example:GroundwaterElevations_20230823.xls)
- Metadata
 - Any XML files related to metadata.
 - Naming convention should align with the feature class (example: utility_point.xml)
- Inspection
 - Inspection Reports
 - Consult the GIS Administrator for naming conventions.
 - Other Media
 - Consult the GIS Administrator for naming conventions.
 - Videos
 - Consult the GIS Administrator for naming conventions.