MSB Spatial Data Standards

Summary

Borough projects which are outsourced often generate complex GIS, spatial, and tabular datasets. For the purpose of this standard, spatial data is information which identifies the geographic location of features and boundaries on or near the earth's surface. The Borough also recognizes that work generating spatial data may be of a GIS nature, a survey, or design nature. These datasets often need be incorporated into Borough GIS databases and made available to a wide range of users. To facilitate this integration, the following standards and product specifications will be used by organizations working on Borough projects which generate spatial data. This document provides general standards for spatial data collection and submission. Specific work may require further specifications. Any deviation from these standards must be approved by the Borough's Chief Information Officer.

Deliverables

All digital and hardcopy information pertinent the project must be delivered, including GIS data, GPS data, reports, metadata, photos, and other supporting materials. Complete and verified data will be delivered via hardcopy, portable digital storage media, or the internet, as directed by the Borough. The Borough may require the Contractor to maintain a complete copy of the project deliverables which are available for delivery for a period of time subsequent to the project completion date.

1. Required:
    a. Descriptive document
    b. Spatial data
    c. Attribute data
    d. QA/QC documentation
    e. FGDC-compliant metadata (for GIS projects)
2. As Specified:
    a. Hyperlinked documents, web pages, and/or macros
    b. Intermediate deliverables; documents, processes, etc.
    c. Other project specific files such as map documents and drawing files (.mxd, .dwg), scripts/macros, database models, look up tables, spreadsheets, documents , photographs, etc.

Descriptive Document

A digital document describing each data set will accompany any submission and provide all necessary information for understanding the submittal. This includes, but is not limited to, the following:

1. Contents of the data submittal (including the number of files and file sizes);
2. Recommended "official" name for the data;

3. Version and date of the data;
4. Contact information for those responsible for the data;
5. Security and/or copyright issues (if any exist);
6. Data dictionary for all attribute and database tables. For complex database structures a relationship diagram/database flow chart should also be included as part of the deliverables;
7. Linking fields (if applicable, to documents, Microsoft Access databases, digital photographs);
8. Concise summary of QA/QC procedures used;
9. Viewing scale thresholds (if applicable); and
10. Software and versions used to process, collect, and or create data.

Metadata

The Borough recognizes that metadata requirements may differ between GIS, survey, and design projects. All spatial data submitted for GIS projects must include metadata that conforms to the Federal Geographic Data Committee Standards (FGDC) standards. For more information visit: http://www.fgdc.gov/metadata.

At a minimum, metadata submitted with geospatial data should answer the following questions:

1. Who created the data?
2. When was the data created?
3. Why was the data created?
4. How often is it updated?
5. What kind of data is it?
6. How accurate is the data?
7. Where is the data located?

The Scope of Services should identify, at minimum, which FGDC compliant metadata will be submitted with GIS projects as well as specify metadata standards for survey and design projects. If such requirements are not stated, the Contractor Project Managers must contact the Borough's Project Manager for specific requirements.

All data in ESRI formats should have metadata that can be viewed in the FGDC ESRI style sheet in ArcMap and ArcCatalog.

The Borough may require FGDC-compliant metadata for survey/design projects as specified.

Data Collection Methods

Several approaches to capturing digital data can be employed including digitizing features from maps, GIS base layers, aerial photographs, remote sensing, land survey, and GPS (Global Positioning System) collection. The appropriate method should be determined in the project Scope of Services. When digitizing features from maps or photographs, the source, scale, date, and methods (i.e., process steps) must be recorded in the Metadata section of the deliverables

and discussed in the descriptive document referenced under the Deliverables section. When using GPS collection, the GPS unit type, averaging method, post processing, and other criteria must be recorded in the Metadata section and discussed in the descriptive document.

Scale and Spatial Resolution

Scale, spatial resolution, and accuracy requirements should be clearly stated in the Agreement, Scope of Services, or other defining document. If such requirements are not stated, the Contractor Project Manager must contact the Borough's GIS Division for specific scale and spatial resolution requirements for GIS, survey, or design data.

Horizontal and Vertical Accuracy

All spatial data collected must be analyzed for spatial accuracy and meet or exceed the National Standard for Spatial Data Accuracy (NSSDA) for the appropriate scale (for more information see http://www.fgdc.gov/standards/projects/FGDC-standards-projects/accuracy/part3/chapter3). Longitude and Latitude coordinates for geographic data must be formatted to decimal-degrees, will be recorded to a minimum of (6) six significant digits to the right of the decimal point and stored in double precision attribute or database fields. Any calculations conducted with coordinates should be done at double precision with the results rounded or truncated to the appropriate propagated error limits. All calculations and processing completed on the spatial data must be reported in the Metadata section of the deliverables.

Spatial Data

1. Naming Conventions

   Clear and meaningful file names should be used which should convey the nature of the data, subject, and attributes represented. File names typically should not contain spaces or special characters. All file names should adhere to the naming standards recommended for the data format that is being developed.

   Examples of name conventions can be found at the following links:

   a. ArcGIS Field Names and Table Names;
   b. Geodatabase Size and Name Conventions;
   c. ESRI Naming Rasters; and
   d. ESRI Shapefile Naming Conventions.

2. Coordinate Systems

   All spatial data collected or submitted for Borough projects must be projected, or geo-referenced to the following coordinate system:

   Alaska State Plane Zone 4 (FIPS Zone 5004)
   Units: US Survey Feet
   Horizontal Datum: NAD83
   Vertical Datum: NAVD88

   The most recent NGS-approved Geoid model must be used to perform conversions from ellipsoidal heights to orthometric heights. Conversion factors necessary to reference local coordinate systems to "real world" projections and datums will be included with each submittal.

3. Data Formats

The Borough uses Environmental Systems Research Institute (ESRI) and Autodesk software for managing spatial data. For GIS projects, the preferred deliverable formats are feature classes nested in a file geodatabase. All efforts should be made to avoid the submittal of shapefiles for GIS projects. For survey, design, and other CAD based projects, the preferred deliverable format is Autodesk CAD drawing files (dwg).

ESRI GIS Mapping Products

- ArcGIS10 is the preferred version for submittal of ESRI GIS mapping products. However, products produced with versions prior to ArcGIS10x may be accepted providing they are fully compatible with ArcGIS10x. No products produced with versions of ArcView 3x will be accepted.
- Preferred data format is File Geodatabase. Submittal of ESRI Shapefiles should be avoided as shapefiles do not preserve true arcs, cannot have topologies and have many tabular restrictions. Any map documents (.mxd), layer files, layer packages, map packages, symbology, or associated files pertinent to the project will be submitted. An Adobe PDF file is also required of any related GIS cartographic products.
- All datasets should have FGDC compliant metadata included stating at minimum source, accuracy, construction process, and other related data information. See the Metadata section below for more information.
- When appropriate, topology checks should be identified, created within a feature dataset, validated, and accompany data delivery.

Autodesk CAD Mapping Products (AutoCAD,MAP, Land Desktop, Civil 3D)

- Autodesk version 2004-2012 drawing files and any associated project files (.shx, .ctb, .fmp). **AutoCAD's eTransmit transmittal method preferred.**
- All CAD data should be geo-referenced to NAD83, Alaska State Plane Zone 4, US Survey Feet.
- All Autocad deliverables will be accompanied by a descriptive document as described above.
- An Adobe PDF file is also required of any related CAD cartographic products.

Raster Products

- Uncompressed GeoTIFF image format. Compressed file formats such as mrsid and/or jpeg2000 may be required. World coordinate files (.tfw) for each orthophoto file are required.
- Geotiff DEM or DSM format for elevation rasters.
- Other formats as required/specified.

GPS Data Products

- All raw GPS data and associated information used to process raw data.
- Raw GPS data will be converted to formats interoperable with either CAD or GIS systems (as specified) and held to metadata and documentation standards specified in this document.
- GPS data should include unique identifiers for each point with associated descriptions either in the data file or held in a spreadsheet or table with matching point identifiers.

Quality Assurance / Quality Control (QA/QC)

All projects should include a QA/QC plan. The quality assurance portion should include clearly identified workflows, procedures, and standards for data development. The quality control portions typically involves using a combination of GIS or other analytical tools and methods, along with visual inspection of the data to find features and attributes that don't conform to a specified standard or other criteria.

In general, attribute data entry and quality control should follow good data management practices including verification of precise data entry and validation of possible domain values. All attribute accuracy assessments and corrective actions should be detailed in the descriptive document.

Linked Documents

Documents, webpages, and macros can be linked to map features through the use of hyperlinks. If a project calls for hyperlinks, all associated content should be identified and/or provided as part of the deliverables. Hyperlinks will use relative paths to ensure that links are not broken as project deliverables are moved from one folder to another.

Intermediate Process Deliverables

Large GIS, survey, or mapping projects may require review of data at intermediate process points. This may be in the form of pilot projects, proof of concepts, review of "look and feel" of GIS deliverables, review of analysis processes, and workflows. If this is the case, the Borough will establish a schedule for delivery and review of intermediate process deliverables.

Other Project Specific Files

Many GIS and survey/design projects have project specific needs. Occasionally alternative formats or additional data identified in the RFP, Scope of Services, or other document, or at the request of a GIS Division Manager which is not described in this document will also need to be delivered to the Borough GIS Division upon project completion.