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Memorandum

To:	Anne Roderer and David Ashwood, JHU
From:	AKRF, Inc.
Date:	September 30, 2013
Re:	Homewood Campus Utility Survey Requirements
cc:	Wendy Ciemiewicz; Shandor Szalay File#51143.0006

This memorandum describes procedures for collecting, drafting and presenting utility survey data produced for the Johns Hopkins University (JHU). JHU will use these data to prepare detailed campus redevelopment plans and to update the existing JHU Geographic Information System (GIS) utility geodatabase. Therefore, utility survey data related to all surface and subsurface utilities must be presented in a standard format that can be easily integrated with the existing JHU GIS utility geodatabase. Utility surveys will include the following tasks and deliverables, which are described in more detail within the body of this memorandum:

- Perform field survey of utilities;
- Create digital computer-aided design (CAD) files representing the survey;
- Create digital tabular data files associated with features depicted in the CAD files;
- Create documentation of data collection, feature representation, layer management, and descriptive data management; and
- Transfer required files to JHU.

SURVEY DATA COLLECTION

Work with JHU staff to identify a list of all data collection needs. Ensure that the following minimum standards are met during survey data collection:

- Perform survey using a surveyor licensed in the State of Maryland.
- Perform survey consistent with the American Society of Civil Engineers (ASCE) utility quality level agreed upon with JHU for the survey scope of work.
- Collect horizontal and vertical measurements for each survey data point.
- Collect horizontal survey data in NAD 1983 State Plane Maryland FIPS 1990.

- Collect vertical survey data in Baltimore City Datum.

- Collect survey data points sufficient to represent all surveyed features as described in the CAD Files Section.

- Collect descriptive data associated with each survey data point sufficient to describe all surveyed features as described in Tabular Data Files Section.

CAD FILES

Prepare georeferenced CAD files to provide location data for the surveyed features. Prepare digital files according to the following datum, projection, and format requirements:

- Provide horizontal survey data in NAD 1983 State Plane Maryland FIPS 1990.

- Provide vertical survey data in Baltimore City Datum.

- Georeference all CAD files and provide in AutoCAD 2011 or more recent.

- Provide any externally referenced files with the survey files.

FEATURE REPRESENTATION

Represent surveyed features as points (i.e., coordinate geometry [COGO] points), lines (i.e., 2D polylines), or polygons (i.e., 2D closed polylines). Ensure that the following representation requirements are met:

- Always represent feature types consistently.

- Depict infrastructure junctions as COGO points located at the centroid of the feature. Infrastructure junctions (e.g., manholes) are surface-accessible features that connect and/or provide access to subsurface features.

- Depict linear features (e.g., pipes, cables, etc.) as 2D polylines.

- Depict stormwater management facilities or other major utility structures as 2D closed polylines.

- Draw any feature that connects to a junction feature (e.g., a pipe connecting to a manhole) such that a single 2D polyline is snapped to the centroid of the junction feature.

- Draw linear features such that polyline segments are broken by junctions, horizontal bends, or changes in attribute (i.e., material, dimension, etc.).

- Assign a unique feature ID to each feature and label that feature on a corresponding CAD text layer.

LAYER MANAGEMENT

Organize CAD file layers to facilitate accurate migration of CAD data into GIS. Prepare CAD drawings according to the following layer management requirements:

- Limit CAD object types to COGO points, 2D polylines and 2D closed polylines.

- Include a single CAD object type on any individual CAD layer.

- Label unique feature IDs on a CAD text layer corresponding to the CAD object layers.

- Include a 2D closed polyline layer defining the survey extent.

Features should be grouped on CAD layers by infrastructure type (i.e., sanitary sewer, telecommunications, etc.) and by CAD object type (point, 2D polyline, etc.). For example, sanitary sewer mains and sanitary sewer laterals are within the same infrastructure category (e.g., sanitary sewer) and would be represented with 2D polylines; therefore these features types would be included on the same sanitary sewer polyline layer. Similarly, sanitary sewer manholes and vents are within the same

infrastructure category, but would be represented with COGO points; therefore manholes and vents would be drawn on a separate sanitary sewer CAD layer than the pipes. The following CAD layers represent this example:

- Sanitary sewer polyline layers: "SS_Main" and "SS_Lateral";

- Sanitary sewer COGO layers: "SS_Manhole" and "SS_Vent"; and

- Sanitary sewer text layer: "SS_txt".

TABULAR DATA FILES

Provide tabular data using MS Excel files to present all descriptive data (e.g., feature types, measurements, observations, etc.). Ensure that the following minimum standards are met when creating tabular data files:

- Provide tabular data within separate worksheets of a single MS Excel file.

- Organize and name tabular data worksheets according to the CAD layer structure and nomenclature (i.e., each CAD layer has a corresponding worksheet).

- Provide a unique feature ID for all surveyed features and ensure that this feature ID corresponds to the feature ID label included in the CAD text layer.

- Include fields for X-coordinates and Y-coordinates associated with all COGO point layers.

- Use consistent nomenclature when presenting descriptive data.

- For junction features, include the unique feature ID for all adjoining linear features and the invert elevations at which the adjoining feature intersects the junction features.

- For linear features, include invert elevations at all points of intersection.

DOCUMENTATION OF DATA COLLECTION AND PRESENTATION

Provide documentation of the survey collection methods including the following requirements:

- The type of survey equipment (e.g., total station, ground penetrating radar, etc.) employed during the survey;

- The accuracy of horizontal, vertical, and measurement data collected;

- The ASCE utility quality level of the survey; and

- If ASCE utility quality level C was performed, the certainty of the inferred pipe data.

Provide documentation of the feature representation and layer management system applied to the CAD files in a MS Word document including the following requirements:

- A list of all layer names and identification of the CAD object type assigned to each layer;

- A list of all feature types assigned to each layer; and

- Definitions of all abbreviations used for layer names.

Provide documentation of the descriptive data management system applied in the Tabular Data Files in a MS Word document including the following requirements:

- A list of all feature types collected (e.g., communications manhole, sanitary sewer pipe, etc.);

- A list and description of measurements (e.g., invert elevations) and observation data types (e.g., pipe material) collected for each feature type; and

- Definitions of all abbreviations used for measurements, feature types and other categorical observations.

DATA TRANSFER

Upload MS Excel, MS Word, and AutoCAD files to an ftp/webfolder provided by JHU staff. Create a single project folder, and organize document within the following subfolders:

- CAD—AutoCAD file and any supporting external references;

- Tabular—tabular (MS Excel) data files;

- Protocol—MS Word files documenting the data management used by the surveyor; and

- Images—image and CCTV (video) files, if applicable.

JHU staff will review the uploaded files and return them for revision if they do not meet the guidelines outlined in this memorandum.