Asset Management CAD/BIM/DATA Specifications

City of Cleveland (COC)

Department of Port Control (DPC)

Asset Management (AM)

Version 0.9 8-19-2019

Questions pertaining to these specifications can be addressed to the DPC Asset Management Section. Any modifications to these specifications must be approved in advance of work performed and in writing by the AM section.

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RATIONALE:

The intent of these specifications is to standardize and organize the electronic data collected from the consultants/contractors performing services on DPC Premises. This data will be imported or directly entered into the DPC Building Information Model (BIM), DPC GIS and/or DPC Computerized Maintenance Management System (CMMS). These specifications will change over time as technology changes or the DPC updates their systems. The electronic model data at each step of a project is considered the property of the DPC and therefore its collection, organization, and format shall be under the DPC's direction. Permits/payments will be withheld until data delivery is accepted by AM.

DEFINITIONS:

As-builts: During and after construction, field measurements shall be taken under the oversight of a licensed Professional Surveyor in the State of Ohio. In addition to being used by construction management and the design consultant to verify that improvements were installed according to design, a final set of electronic improvement plans, labeled "as-built" will be certified and submitted to DPC AM following these specifications.

Coordinate System: Ohio State Planes North Zone US Foot (OH83-NF)

Electronic Deliverables: Shall include but not be limited to Autodesk's AutoCAD drawing files (DWG), Portable Document Format (PDF), Microstation Design File (DGN), ESRI Data Files and Geodatabases (SHP), Autodesk's Revit models (RVT), Standard text data (TXT), All Microsoft Office applications data files, etc…

First Generation PDF: The creation of a PDF from any design product shall be generated by use of the native tools built into the software. The purpose is to achieve a searchable file as well as have the ability to turn layers on and off. For example, Autodesk AutoCAD based products have a plotter type named DWG to PDF. This tool should be used in lieu of the Adobe Acrobat plotter because it will generate the searchable format desired. It is **not** acceptable to print to paper and then scan to PDF/TIF.

Facility Modification Permit (FMP): The FMP application process must be followed for all improvements or modifications to any DPC facilities or premises.

Operating Software: The DPC utilizes the following file applications for the disciplines involved:

- Architecture: Autodesk Revit Architecture (RVT)
- Civil Engineering: Autodesk Civil 3D (DWG)
- Mechanical, Electrical, Plumbing: Autodesk Revit MEP (RVT)
- Structural: Autodesk Revit Structure and Robot (RVT)
- GIS: Autodesk Map (ESRI SHP)
- Project Integration Management: Autodesk Navisworks (NVD)
- Point Clouds: Autodesk ReCap Pro and Leica Cyclone

Owner: City of Cleveland, Department of Port Control, Asset Management

PDF: Portable Document Format, originally created by Adobe, but can be generated by various design software and applications.

Point Cloud: LIDAR data collected via aerial, terrestrial, or mobile methods shall be provided to the owner in both its RAW format and in a registered format. The data shall be provided in the file types requested by the owner. The storage devices used for the delivery of this data must be as directed by the owner.

BEST PRACTICES:

AutoCAD:

1) The base point of any DWG delivered to the owner shall be 0,0,0. (Type BASE at the Command prompt)

2) All deliverables to the owner shall have the UCS set to its default state. Only rotations utilizing DVIEW Twist will be accepted. No coordinate system transformations are permitted.
3) All drawing objects shall have their properties defined as BYLAYER.
4) Layers will meet the current DPC layer standards at the time of electronic drawing submittal.
5) Linework/models and their associated labels/text shall be on separate layers.
6) No exploded dimensions or drawing elements.

Revit:

1) The base point and rotation of any Revit model will be referenced to the survey base point assigned by the project's site engineer/surveyor. In the event that the project is interior only, exterior control shall be translated to the interior columns for accurate coordinate location. In the event the DPC has existing model data, it will be provided as the basis for all subsequent work and the data shall be submitted so that it can easily be added to the DPC's master model.

GIS:

1) All GIS data delivered to the owner shall be in the form of ESRI SHP files or ArcSDE as directed by the owner on a project by project basis.

DELIVERABLES:

CAD

A) All Electronic Deliverables delivered at any completion stage (30%, 60%, 90%, Bid Set and As-builts) shall be on the coordinate system directed by the owner. These deliverables shall also be in a format approved by the owner and on the current operating software.

B) Existing conditions files shall be provided to the owner in completed model form and raw data form ready for import and in the following formats:
   1) A PNEZD comma delimited coordinate file, post processed, on the coordinate system and using the DPC Survey Code List and line-work generation methodologies.
   2) An ETRANSMITTED DWG file representing the existing conditions in model form representing verbatim what is being submitted via PDF/copies. No alterations, exploding, bursting or other CAD detriment will be accepted.
   3) Each surface shall be submitted in a separate XML file, when applicable.
   4) Each alignment shall be submitted in a separate XML file, when applicable.
   5) The raw data provided should include everything necessary to generate the existing conditions base map without any additional manual drafting efforts. This includes but is not limited to:
      a. The PNEZD file as described above
      b. The Figure Prefix Library necessary to generate the linework as required

c. The Civil 3D template set up sufficiently to handle all the imported points, their descriptions, point styles and label styles for the purpose of generating a model of existing conditions.
d. Acceptance of the final deliverable will include the effort of importing the above information with the successful results ready for use.

C) A comprehensive first generation PDF including all project plan sheets shall be submitted when providing deliverables to the DPC. Separated PDFs will be rejected. Text based specifications can be submitted in a separate file, when properly named and identified.

POINT CLOUDS

Point Cloud files are considered property of the owner and shall be provided to the owner in the following formats:

1) The RAW scans in the format provided by the hardware manufacturer.
2) A post processed, registered point cloud with a registration error report in the native hardware format. Registrations must meet the owner's requirements and approval.
3) The post-processed, registered point cloud in the RCP format for use with Autodesk applications.
4) Data shall be delivered on media approved for the size of the data sets including but not limited to, high speed USB flash drives, high speed external hard drives, blu-ray discs. Format to be coordinated and approved before delivery. In some instances, depending on the magnitude of a project, a hard drive array will be required as part of the project for storage and delivery of the data. The DPC reserves the right to have the data electronically sent to a cloud based or local storage array controlled by the DPC.
5) The consultant is expected to maintain a copy of this data for the entire project duration and a period of 3 years after final payment. In the event of extended projects, the consultant will maintain the data indefinitely until the owner provides a written release of responsibility for the data.

Point Clouds for as-built deliverables, in addition to the above requirements:

1) Point cloud comparisons will be provided in rendered results showing discrepancies. Both data sets used for these analyses shall be provided to the owner. A procedure list showing analysis technique steps will be provided to the owner as part of the as-built effort.
2) Standard project as-built line-work will be generated from the point cloud as well as surfaces for the purpose of comparison to proposed design.

GEOTECHNICAL

All geotechnical exploration shall be submitted in the following format, tested and functional before final acceptance. It is expected that the Geotechnical model in AutoCAD Civil 3D will be able to import these directly.

The following three comma separated values (CSV) are required:

1) Location Details.csv : this is **required** and contains the hole location details on the DPC coordinate system.
2) Field Geological Descriptions.csv : this is **required** and contains the geological strata information
3) Orientation and Inclination.csv : this file is optional and is used for inclined borings.

1) Location Details.csv

This file contains a row for each individual hole location, the table below gives details of the individual column headings and which fields are mandatory.

Column Heading	Description	Mandatory	Example
Location ID	Location unique ID	Yes	BH0001
Location Type	Type of activity at location	Yes	RC
Easting	Easting or longitude of the location of hole	Yes	123456.4
Northing	Northing or latitude of the location	Yes	232467.3
Ground Level	Ground level relative to datum of location or start of traverse	Yes	35.43
Final Depth	Final Depth		8.37

Below is an example of the Location Details.csv, note the case and spacing in the column headers. These headings must be exact or the data will not import properly into the DPC systems. Sample files can be provided upon request.

```
Location ID,Location Type,Easting,Northing,Ground Level,Final Depth
BH127,CP,399838.29,301075.08,13.45,12.5
BH128,CP,399809.58,301145.9,13.69,11.75
BH129,CP,399802.58,301195.2,13.6,21.95
BH130,CP,399758.58,301221,14,20
BH134,CP+RC,399757.08,301268.1,13.89,52.7
BH135,CP,399795.91,301272.33,13.69,30.15
BH136,CP,399725.18,301339,11.69,10.05
BH137,CP,399671.18,301433,6.4,10.05
BH138,CP,399657.18,301492,5.69,10.05
BH139,CP,399737.18,301399.9,5.19,6.1
BH140,CP,399796.18,301321.1,11.89,5.05
```

2) Field Geological Descriptions.csv

Contains the strata or banding data per location of stratum, the four columns Legend Code, Geology Code, Geology Code2 and BGS Lexicon are not all mandatory, but at least one should be fully populated to allow the software to correctly band the boreholes and strata.

Column Heading	Description	Mandatory	Example
Location ID	Location identifier	Yes	BH001
Depth Top	Depth to the TOP of stratum	Yes	7.43
Depth Base	Depth to the BASE of description	Yes	8.12

Legend Code	Legend code	102
Geology Code	Geology code	LC
Geology Code2	Second geology code	SAND

Below is an example of the Field Geological Descriptions.csv, note the case and spacing in the column headers. These headings must be exact or the data will not import properly into the DPC systems. Sample files can be provided upon request.

```
Location ID,Depth Top,Depth Base,Legend Code,Geology Code,Geology Code 2,BGS Lexicon,Description
BH127,0,0.65,101,FILL,,,TOPSOIL
BH127,0.65,1.1,102,FILL,,,Sandy grey brown soil with many fragments of glass and plastic. MADE GROUI
BH127,1.1,2.7,404,GLACIAL TILL,,,Dense grey-brown SAND with medium poorly graded gravel of mudstone
BH127,2.7,9.2,220,BOULDER CLAY,,,Firm brown very sandy CLAY with a little subangular to subrounded r
BH127,9.2,12.5,205,BOULDER CLAY,,,Brown CLAY with a little well rounded medium cobbles.
BH128,0,2.6,101,FILL,,,TOPSOIL
BH128,2.6,6.3,404,GLACIAL TILL,,,Dense grey-brown SAND with medium poorly graded gravel of mudstone
BH128,6.3,11.75,220,BOULDER CLAY,,,Firm brown very sandy CLAY with a little subangular to subrounde
BH129,0,0.5,101,FILL,,,TOPSOIL
BH129,0.5,1.8,102,FILL,,,Sandy grey brown soil with many fragments of glass and plastic - MADE GROUI
```

3) Orientation and Inclination.csv

The third file, Orientation and Inclination.csv, is optional and contains information on the direction of the bore hole.

Only entries for when the borehole is not vertical need to be added.

Note: the inclination for a standard vertical hole is 90°, and inclination of the 0° would create a horizontal borehole, and inclination of -90° would create a vertical hole going upwards.

Column Heading	Description	Mandatory	Example
Location ID	Location identifier	Yes	BH001
Orientation	Orientation of hole (degrees Clockwise from north)		135
Inclination	Inclination of hole (measured positively down from horizontal in deg)		75

Below is an example of the Orientation and Inclination.CSV file. Note the case and spacing in the column headers. These headings must be exact or the data will not import properly into the DPC systems. Sample files can be provided upon request.

```
Location ID,Orientation,Inclination
BH129,210,74
BH135,135,75
CPT1,,90
```

NAMING CONVENTIONS AND COMMUNICATIONS

When submitting files electronically (by email, links or other methods) to the DPC, a date prefix shall be added in the form of YY-MMDD, where YY equals a two digit year, MM equals a two digit month and DD equals a two digit day. For example, the date July 11, 2017 is represented by 17-0711. This prefix shall be added to any file submitted in addition to a descriptive name and project reference. For example, a full plan set plot submitted by a consultant on July 11, 2017 for the Access Control Project will be named:

17-0711 Access Control Full Set.PDF

When corresponding with the DPC on any asset management related correspondence, the email subject line shall include the FMP application number, task/project name reference and description of content. For example, if the contractor is sending a message for a budget meeting regarding the SRE/VMB building project, the subject line should contain sufficient information to recognize the content by a passive review of the subject lines. For example…

Subject: 17121501 SRE/VMB Budget Mtg.

It is not permissible to submit subject lines like the following:

Subject: Mtg.

Subject: FW:

Subject: Building Project

Subject: Follow up to mtg.

PLAN AND FORM REQUIREMENTS

The DPC will provide templates, where applicable for various submittal requirements.

1) As-built Title Sheet: Upon request, the DPC will provide a template to be used for all plan sheet submittals.
2) Submittals: Upon request, the DPC will provide templates for the various forms required to do business with the City of Cleveland Department of Port Control.