

Consultant's CAD & Survey Standards

Purpose:

The purpose of this document is to define a minimum standard of data management for consultants who produce survey data and/or construction drawings for the Akron Engineering Bureau. In addition, it applies to the composition of electronic drawing files required to complete a set of plans, both electronic and hard copies.

These guidelines are essential for seamless coordination between the AEB and our consultants. All standards are to be implemented unless otherwise stated. Drawings will be returned that do not meet standards and corrections will be made by the consultant at no additional cost to the City of Akron.

There are typically three types of project data provided by consultants that have different requirements to meet AEB standards.

1. Survey Data Only
 - A. Format

2. Survey Data and Base Drawing Only
 - A. AEB CAD Standards
 - B. Format

3. Specified Individual Sheets or Complete Project (Record Drawings)
 - A. AEB CAD Standards (as pertains to hard copy appearance only)
 - B. Format

Minimum Requirements:

File Sources/Formats

1. Files sent to AEB

A. Preferred:

Architectural – Autodesk Architectural Desktop(ADT). An ADT Building Design Model is the preferred method for submitting building design data. Our standard CAD software for the current year is ADT 3.3.

Civil/Environmental – Autodesk Land Desktop (LDT). Civil Design Objects and corresponding project data is the preferred method for submitting civil/environmental design data. Our standard CAD software for the current year is LDT 2004 format with the Civil Design and Survey modules.

Survey Data Only – ASCII text file in comma or space delimited format or “CSV” spreadsheet format. Data required includes Point Number, Northing, Easting, Elevation, Description Code.

B. Standard:

AutoCAD. If ADT or LDT is not available, 2d AutoCAD pure “dwg” format files are acceptable. AutoCAD 2004 format for the current year.

C. Minimum:

Files exported to “dwg” format from other applications are acceptable with the following provision. We will not accept any files that require significant additional work to make the data usable in AutoCAD.

D. General Non-Cad Files:

We can accept non-cad files from Microsoft Office 97/2000/XP (Access 97 only), PDF and most raster image formats.

2. Files sent from AEB

A. Preferred:

Architectural – Autodesk Architectural Desktop. AutoCAD “dwg” format with AEC objects. These will work with ADT and “AEC Object Enabler Capable” Products.

Civil/Environmental – Autodesk Land Desktop. Autocad “dwg” format with AEC objects and corresponding project data. These will work with LDT and “AEC Object Enabler Capable” Products.

Survey Data Only – ASCII text file in comma or space delimited format or “CSV” spreadsheet format. Data includes Point Number, Northing, Easting, Elevation, Description Code.

B. Standard:

AutoCAD. For the current year, AutoCAD 2004 “dwg” format with AEC objects exploded. These may result in larger file sizes as the AEC Objects explode to larger file sizes than the original objects.

C. Minimum:

Drawing Web Format (DWF). DWF files are created in a compressed vector-based format that ensures precision is maintained during zoom operations. DWF files can be opened, viewed, and plotted by anyone using Volo View Express or Express Viewer. These are available from <http://www.autodesk.com>. DWF files are an ideal way to share AutoCAD drawing files with others who do not have AutoCAD but want some control how the drawing is displayed and printed.

General Non-Cad Files:

We can supply non-cad files as Microsoft Office 97/2000/XP (Access 97 only) and most raster image formats.

CAD File Requirements

1. Electronic Files

All electronic files (zipped and all cad file types) (exe's are not acceptable) must either be generated with the E-Transmit feature of AutoCAD or be accompanied by a separate Support folder that contains the following files:

- a. Your company's *.ctb files that controls the plotted pen weights. Modified default *.ctb's (acad.ctb, grayscale.ctb, etc) will not be acceptable unless renamed intuitively.
- b. All xref files that are associated with the *.dwg.
- c. All font files that are associated with the *.dwg.
- d. All custom linetype files that are associated with the *.dwg.
- e. All raster image files that are associated with the *.dwg.

2. Filenames

Any file naming system is acceptable as long as the name remains consistent for revisions and updates. For active projects we Xref base files to sheet drawings so maintaining the file name enables these to update seamlessly as the design progresses.

3. Xref's

- a. Send xref files without binding.

4. Units and Scale

- a. All architectural drawings shall be drawn in architectural units (inches), civil/environmental drawings shall be drawn in decimal units (feet).
- b. Our standards specify that all "real world object" other than annotations are created at full size 1 unit = 1 unit in model space.
- c. Any drawings not adhering to this must be clearly marked in the file and also in the transfer Email.

5. Layers and Linetypes

- a. AEB standard layers shall be used unless otherwise specified. Any intuitive layer name system may be acceptable as long as all objects are on separate layers with corresponding text notations.
- b. Layer 0: No objects shall not be placed on Layer 0.
- c. Defpoints Layer: No objects shall be placed on Defpoints layer. Non-printing items (drafting notes, instructions, viewports, etc) can be on this layer but it is preferred these be on a separate layer with plot setting turned off.
- d. All objects and text shall have the layer, linetype and color property of "Bylayer".
- e. AEB standard linetypes shall be used unless otherwise specified.

6. Symbols

- a. AEB standard symbols shall be used unless otherwise specified. Any symbol with intuitive names may be acceptable as long as all symbols are on the correct layers (not Layer 0) and not exploded. Symbols created as blocks with attributes are acceptable. Symbols created using non-Autocad software are not acceptable.

7. Hatch Patterns

- a. AEB standard hatch patterns shall be used unless otherwise specified. Hatch patterns are not to be exploded or created en masse (one hatch object for multiple separated areas).

8. Text/Fonts

- a. AEB standard font styles shall be used unless otherwise specified. All text will be created at the defined plot scale for the specified drawing.
- b. True Type fonts are not acceptable. Using Autocad's Standard text style is not acceptable.

9. Title blocks

- a. Preferred: Title blocks supplied by AEB are to be in Layouts (paper space). Title blocks in Layouts are not to be scaled. Plot scale in Layout will always be 1=1 for full size, 1=2 for half size.
- b. Acceptable: Title blocks in model space on their own clearly defined layer. Title block text needs to be on a separate layer than documentation annotations.
- c. AEB titleblocks contain attributes and are not to be exploded.

10. Dimensions

- a. Dimensions are not to be exploded or overridden. The only option is to reduce the precision.

11. Z-Plane

- a. True 2-D drawings shall all be on the same plane, preferably zero (0). Exceptions are contour and point data.

12. State Plane Coordinate System

- a. Refer to the 'Survey Requirements' section for the SPCS definition.
- b. All drawings created in the SPCS shall not be rotated, moved, or copied from its original location. The User Coordinate System (UCS) in Autocad shall remain set to "World". Use of the Dview command will help eliminate changing the UCS by changing the view to be parallel with the screen.

Survey Requirements

All surveys performed for the City of Akron will be tied to, and closed upon, the Ohio State Plane Coordinate System, North Zone, North American Datum of 1983. The survey shall meet the required standards of accuracy as defined in Ohio Revised Code section 4733.37.

1. Horizontal Control Sheet

- a. Refer to the 'CAD File Requirements' section for AEB standards when creating drawing files.
- b. A Horizontal Control Sheet shall be prepared and included in the plans. The Horizontal Control Sheet shall show the complete survey, including the initial tie to a main scheme station. This sheet shall be prepared by, and include the name and seal of, the Professional Land Surveyor responsible for the preparation of the sheet. The date, statement of accuracy, and scale factor for the sheet shall be determined and displayed on the sheet.
- c. The Horizontal Control sheet shall be completed in accordance with the requirements stated below and shall be used to show the street right-of-way, street intersections, angle points, curve data, property line corners, and other project horizontal control points used or determined during the design phase of the project. 3 point ties shall be displayed for all control points shown on this sheet.
- d. If the improvements will be constructed from an alignment other than the centerline of the street right-of-way (such as a base line, construction line, etc.), this line shall be shown on the horizontal control sheet and tied to the centerline of the streets and/or property corners in the vicinity of the project limits.

Horizontal Control

- 1) All properties fronting on streets and on easements affected by this project shall be searched for property line markers. Property line markers shall be identified on the horizontal control sheet and on the plans, including type, offset from street right-of-way centerline, station and state plane coordinate position.
- 2) All monuments and property line markers shall be tied to the survey and displayed on the horizontal control sheet.
- 3) All intersections, angle points, curve data and control points, property line corners, manholes and main line valves shall be tied and adjusted to the Ohio State Plane Coordinate System, North Zone, North American Datum of 1983 and shall be included in a table shown on the plans.
- 4) If a baseline survey is performed, the centerline of streets right-of-way or property lines shall be tied to the baseline. The final plan stationing will be based on the street right-of-way centerline when the construction is in or parallel to the street right-of-way. Otherwise, the

final plan stationing shall be based on the construction centerline and tied to the baseline.

- 5) All pertinent existing items and proposed work shall be tied to the final plan stationing, including offsets.
- 6) Easements shall be described from, and tied to, the nearest property line(s) and existing property corner(s).

Vertical Control

- 1) All elevations shall be referenced to sea level via the "National Vertical Datum of 1929." The accuracy of Bench Circuit shall be "Second Order, Class I."
- 2) Where elevations are shown on the plan, elevations shall be determined by actual field observations, and shall be accurate to ± 0.05 feet on hard surface areas, and ± 0.10 feet on ground surfaces.
- 3) Primary bench marks shall be described on the plans, including location, elevation and reference datum. Temporary bench marks shall be set within the project limits, spaced not more than 250 feet apart and visible between each other.

All survey work shall be performed under the direct supervision of a Professional Land Surveyor registered in the State of Ohio.

Software

Obviously we cannot specify the software and working methods you use internally but we do require the ability to see our output without requiring extra work to process. Printing and viewing is possible with free software listed below.

1. CAD

- a. **Preferred:** Autodesk Architectural Desktop 3.3, Autodesk Land Desktop 2004, Civil Design 2004 and Survey 2004.
- b. **Acceptable:** ADT /LDT Object Enabler capable software and the current ADT/LDT Object enabler. For the current year, Full AutoCAD 2004 support object enabler technology. The enabler is available free from Autodesk at:
<http://usa.autodesk.com/adsk/servlet/ps/dl/index?siteID=123112&id=2334440&linkID=2475161> (watch for word wrap)
- c. **Minimum:** Free Autodesk Volo View Express + Free Object Enabler for viewing/printing. Free Autodesk Express Viewer. Both available from Autodesk at:
<http://usa.autodesk.com/adsk/servlet/index?siteID=123112&id=331041>

2. Other

Microsoft Office 97/2000/XP (Word/Excel)
Microsoft Office 97 (Access)