
		ESP 7.970W01
Energy Supply Projects Policy System		Revision: 1.8
TITLE:	Drawing Deliverable Standards (PSCo, NSP, SPS)	Page 1 of 15

Revision History

Date	Revision Number	Change
12-16-08	1.0	New
7-10-09	1.1	Updated Logo
7-15-10	1.2	Review for 2010 Audit, Minor formatting changes made
10-11-11	1.3	Modified for capital project requirements
3-27-14	1.4	- Revised for 2014 Audit. Minor formatting changes made. - Revised Section 1.2 – Added O&M Manual Deliverable information.
8-18-15	1.5	Consolidated Regional Drawing Deliverable Standard WI's into one applicable for all Operating Regions.
6.15-18	1.6	Triannual Review complete, removed names replaced with titles, cleaned up regional references, linked TitleBlock standards,
5-8-20	1.7	Revised to include 3D Model naming guidelines and ProjectWise storage.
11-24-21	1.8	Changed font style to Consolas in 1.7.4.1 and 1.7.4.2

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1.0 REQUIREMENTS

1.1 GENERAL

The Energy Supply Projects (ESP) of Xcel Energy are responsible for all engineering and design standards, including drawings and specifications for Xcel Energy Power Generation facilities throughout company's three operating regions as defined below:

1.1.1 **Public Service Company of Colorado (PSCo) Operating region:**
PSCo Power Plants located within the state of Colorado.

1.1.2 **Northern States Power (NSP) Operating region:** NSP Power Plants located within the states of Minnesota, Wisconsin, South Dakota, and North Dakota.

1.1.3 **Southwestern Public Service Company (SPS) Operating region:**
SPS Power Plants located in the states of Texas and New Mexico.

The EDDS department within ESP is responsible for setting and administering drawings and applicable standards for company owned generation facilities.


1.2 Existing Drawing Checkout: - The Architectural/Engineering (A/E) firm or Vendor shall request from EDDS department for drawings needed for revision or changes using the Engineering Document Services (EDS) Media Request form or via e-mail to the respective EDS e-mail address (reference EEC 7.955 Engineering Document Management). The A/E firm or Vendor shall clearly list the drawings needed and any CAD files required. EDDS will perform a verification of the information on the Media Request form including status of the requested drawing (CAD or Manual) and check out the electronic drawing file(s) to the A/E firm or Vendor submitted request. If the drawing is manual, ESP Design Staff will convert the drawing to electronic format (CAD/Tif Hybrid) for modification. Once EDS has completed checkout, a copy of the requested CAD files shall be placed on the project SharePoint Site and released for work to the A/E firm or Vendor. It is the A/E firm's or Vendor's responsibility to maintain the integrity and availability of the original electronic drawing file(s).

A redraw of an existing drawing shall only be done if it is faster to recreate the drawing versus making the revisions. If a drawing is redrawn, ALL information including existing revisions shall be carried over to the new file. This shall include, at minimum, latest three revision triangles as shown on the existing drawing as well as revision descriptions in the revision block. Both the existing original drawing and the new redrawn original drawing shall be sent to EDDS.

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1.3 New Drawing Request/Checkout: - A/E firm or Vendor shall contact (ESP) EDDS department for all new drawing requests. EDDS shall provide the following to the A/E firm or Vendor for all new drawings, according to the Regional Plant Operating requirements:

- Unique drawing numbers
- Standard Drawing Borders

Please contact the Regional Design Supervisors within EDDS for the Standard Drawing Border requirements.

In order to assign the new drawing number, Design Supervisors will need the A/E firm or Vendor to provide the following information:

- Plant
- Unit Number
- Plant System and Sub-system Code where applicable
- Discipline Category
- Drawing Type

Once the above information is received, Design Supervisors will coordinate with EDS to assign all new drawing numbers and properly reserve the drawing numbers in ProjectWise. Once reserved, Design supervisors shall communicate all new drawing numbers to the A/E firm or vendor via e-mail through the respective EDS e-mail address. All new drawings shall be identified as new.

1.4 DRAWING ISSUE PACKAGE:

When outside A/E firms or Vendors issue drawings, the following items shall constitute an issued package and shall not be considered complete unless all the deliverables are included, without exception. At time of issue, EDS shall be included on all transmittals and shall receive all items included in a drawing issue package. All drawing issue packages shall consist of the following items:

PDF of each Manual – One (1) unsecured pdf copy of all equipment manuals such as original equipment manufacturer (OEM), operation & maintenance, instruction and/or installation manuals. All final manuals must conform to, and include, all construction As-Built information.


Hard Copy of each Manual – Company’s plant or project manager will identify quantity of required equipment manuals such as OEM operation & maintenance, instruction and/or installation manuals. All final manuals must include all construction As-Built information.

Hard Copy Original Record Drawings: (See Requirements per Operating Region

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below)

- **PSCo Operating Region:** – No hard copy record drawing required, PDF/electronic are sufficient.
- **NSP Operating Region:** – No hard copy record drawing required, PDF/electronic are sufficient.
- **SPS Operating Region:** – No hard copy record drawing required, PDF/electronic are sufficient.

Image File of Drawing Being Issued – An unsecured image files of the official record drawings shall be provided. The image files shall be created electronically from the native file, if possible. The image files shall be the correct drawing size, clear, legible, and shall not be rotated and match the Hard Copy Original Record Drawing exactly. If this image files are not of the acceptable quality, the drawing issue package will be rejected and the A/E firm or Vendor will be asked to provide quality images with no additional charge to Xcel Energy. This requirement shall also apply include record drawings submitted for As-Built. Record drawings issued for construction shall be stamped by a licensed Professional Engineer (P.E.) in the state where the project is located. See 1.5 DRAWING FILE FORMATS for acceptable image file format.


CAD File – CAD files, shall be provided on all initial drawing issues for checking of drawing compliance, as well as final “As-Built” issues. Each CAD drawing shall have its own separate CAD Drawing file and shall not combine multiple drawings into one CAD drawing File. Each CAD file(s) shall correspond to the current revision of the official record drawing being issued. If the drawing requires further revisions, a copy of the current CAD file of the final/latest drawing shall be made and provided. See “**FORMATS**” for acceptable CAD file formats. Below are the requirements that must be included in the CAD file:

- ✓ Initials/Signatures typed in the titleblock of all originators, checkers, approvals, etc. This includes the titleblock as well as the revision block.
- ✓ Detailed descriptive reason of the revision in the revision block.
- ✓ All CAD drawings shall be drawn in such a manner that distances, radiuses, angles, areas & volumes may be correctly derived from the CAD file entities or elements & dimensions. If the production drawing (Cad file) is developed from 3D Model file(s), the 3D Model should be transmitted with the production drawing for use in verifying the above listed measurements.
- ✓ Clouds shall be placed around all the areas where the drawing was changed.
- ✓ Provided CAD files shall include all associated CAD references and 3D models used in the design. All Cad files and 3D models shall be in native format used to

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create the drawing files. Acceptable formats are MicroStation (.dgn) and AutoCAD (.dwg).

- ✓ All seed files associated with 3D model and CAD files.
- ✓ All CAD drawings shall include any customized fonts, plot styles, pen tables and any other custom drawing features used on the provided drawings.

If drawings, 3D models, seed files, or borders are referenced in the working drawing, then they should be submitted with all associated CAD files used in the design and shall be included as part of the Drawing Issue Package. Drawings should not be bound prior to submitting to Xcel Energy.

Transmittal – One (1) transmittal shall be provided for every drawing issue. The transmittal shall include the following:

- ✓ If applicable, the name of the Project Manager for the project which the drawings are being issued.
- ✓ The A/E firm or Vendor’s Project Manager
- ✓ The A/E firm or Vendor’s Administrative person who created the transmittal
- ✓ EDDS personnel
- ✓ The recipients of the drawings being issued
- ✓ Clear and concise description of what the drawings are being issued for (Preliminary, Bid Issue, Construction, Not to be Used for Construction, Demolition Sketch, As-Built), any specific instructions, or information pertinent to the drawings
- ✓ All drawings shall be collated to match the transmittal, if issued hard copy.


Design Services Review of AE Firm or Vendor Submitted Drawings: – Upon transmittal of a drawing package by an A/E firm or Vendor, Design Staff shall review the package for compliance with ESP Design/Drafting standards. This review shall be performed in parallel to any Engineering review of the drawing package. All comments shall be forwarded to the Project Manager or Project Lead to be incorporated along with any Engineering comments and returned to the A/E firm or Vendor for correction and revision.

When all the drawings are agreed upon as complete, and are in As-Built or final status, the “DDI Import Form” (reference Attachment A) for the Xcel specific operating Region shall be completed by the A/E firm or Vendor. This shall be completed at the end of the project or may be deemed necessary by the Project Manager at any time during the project. This information is required so Xcel ESP can easily import drawing information into Xcel Energy’s drawing management system. Drawing information entered on the DDI Import Form shall be as descriptive as possible. The A/E firm or Vendor is responsible for adding this information relating to all columns and rows

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within the spreadsheet (examples can be provided if requested).

1.5 DRAWING FILE FORMATS:

During the project, PDF image files and/or CAD files may be requested. The following are acceptable electronic files to be delivered to ESP. The A/E firm or Vendor shall inquire of the DS and EDS departments as to current versions being used by ESP. All other formats shall be approved by ESP prior to being used and/or As-Built submitted.

Acceptable CAD File Formats:

- DWG – AutoCAD 2018 - all files in Native Format
- DGN – Bentley MicroStation V8i - all files in Native Format

Acceptable Image File Formats:

- PDF – Adobe Acrobat Format Unsecured, electronically searchable, not a hard copy scanned document)

Acceptable GIS Data File Formats:

- Shapefiles/KMZ – All spatial data provided in native GIS file formats in addition to a KMZ file

1.6 FILE NAMING


1.6.1 PSCo File Naming: All new engineering drawings shall be drawn in CAD and shall have a unique PSCo drawing number assigned. EDDS will provide this unique number to the A/E firm or Vendor. All file names shall be identical to the assigned drawing number. The A/E firm or Vendor shall not change or alter any part of the drawing number/file names received from EDDS. No two (2) drawings will be assigned the same PSCo drawing number. The A/E firm or Vendor shall formally request from EDDS these assigned numbers.

1.6.2 NSP File Naming: All new engineering drawings shall be drawn in CAD and shall have a unique NSP drawing number assigned. EDS will provide this unique series number. All file names shall be identical to the assigned drawing number. The A/E firm or Vendor shall not change or alter any part of the drawing number/file names received from EDS. No two (2) drawings will be assigned the same NSP drawing number. The A/E firm or Vendor shall formally request from EDS these assigned series numbers.

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1.6.3 SPS File Naming: All new engineering drawings shall be drawn in CAD and shall have a unique SPS drawing number assigned. EDDS will provide this unique number. All file names shall be identical to the assigned drawing number. The A/E firm or Vendor shall not change or alter any part of the drawing number/file names received from EDDS. No two (2) drawings will be assigned the same SPS drawing number, even if the drawing prefixes (referring to dwg size) differ. The A/E firm or Vendor shall formally request from EDDS these assigned numbers.

1.6.4 3D Model File Naming

1.6.4.1 PSCo

1.6.4.1.1 File name should always begin with MOD followed by the System Number, and then a discipline alpha designator of S, M, or E.

1.6.4.1.2 Example: MODMCANM-01.DGN for a mechanical model for the Air Cooled Condenser System.

- MOD – Designates file type
- MCAN – Designates System/Subsystem
- M – Designates discipline
- 01 – Sequential Number (if necessary)

1.6.4.1.3 Stored in ProjectWise under \PLANT\CO\ (PLANT MNEMONIC)\CAD\MODELS folder

1.6.4.2 NSP

1.6.4.2.1 File name should always begin with MOD or PCL, followed by plant three letter mnemonic, three-digit unit code, three letter system code (if applicable), and discipline code followed by sequential model number

1.6.4.2.2 Example: MOD-SHC-100-CCL-E001.DGN

1.6.4.2.3 Stored in ProjectWise under \PLANT\ (STATE)\ (PLANT MNEMONIC)\CAD\MODELS folder

1.6.4.3 SPS


1.6.4.3.1 File name should always begin with P3D, followed by the two-digit plant code (PP), two-digit unit code (UU), three-digit system code (SSS), discipline/category identifier (M-Mechanical, S-Structural, C-Civil, E-Electrical, EQ-equipment, CCD-Controls), and a sequential model number (XXX).

1.6.4.3.2 Example: P3D-PPUU-SSS-MXXX (P3D-PN00-457-M0001.DGN)

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1.6.4.3.3 Stored in ProjectWise under \PLANT\STATE)\(PLANT MNEMONIC)\CAD\UNIT X\SUPPORT folder

1.6.4.4 KMZ File Naming

1.6.4.4.1 File name should begin with KMZ followed by three letter wind farm mnemonic.

1.6.4.4.2 Example: KMZ-BS1

1.6.4.4.3 Stored in ProjectWise under same folder as regional 3D models

1.6.4.5 Metadata for ProjectWise

1.6.4.5.1 File Name

1.6.4.5.2 MFR Drawing No. (if applicable)

1.6.4.5.3 Rev Date (last date touched by Xcel or received from AE firm)

1.6.4.5.4 File Type

1.6.4.5.5 Drawing Title: System name or description for model

1.7 DRAFTING STANDARDS

1.7.1 Standard Drawing Templates: Drawings created will use standard templates/seed files to setup the drawing. A/E firms or Vendors shall contact the appropriate Regional Supervisors for the standard templates/seed files.

1.7.2 TitleBlock and Revision Attributes: All checked and approved names/initials with complete dates shall be typed on all revisions and titleblocks on the electronic CAD files. A/E firms or Vendors shall contact the appropriate Regional Design Supervisors for the TitleBlock standards.

[NSP TitleBlock](#)

[PSCO TitleBlock](#)

[SPS TitleBlock](#)

1.7.3 Drawing Scale: All drawings shall be drawn full scale in Model space and plotted in Paperspace with the titleblock inserted at a scale of 1:1.


1.7.4 Standard Text Fonts: Only standard AutoCAD and MicroStation text font styles shall be used.

1.7.4.1 AutoCAD standard text shall be text style “ARIAL” except for electrical drawings. Electrical Drawings shall use text Style “CONSOLAS”

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1.7.4.2 MicroStation standard text shall be text style “ARIAL” except for electrical drawings. Electrical Drawings shall use text Style “CONSOLAS”

1.7.5 Standard Text Height:

1.7.5.1 PSCo Drawings:

- 3/32” (.100”) shall be the Standard Text Height for PSCo C, D, or E-Size drawings.
- 1/8” (.125”) shall be used for all sub-titles that require Medium-Height Bold Text such as Equipment Specifications or Designations, Titles for Notes and Highlighted Text.
- 5/32” (.150”) – shall be used for all Prominent Titles that require Large-Height Bold Text such as Equipment Titles, Detail Titles, Section Titles, Plan or Elevation View Titles, etc.
- 5/64” (.08”) - shall be used when space limitations on the drawing require deviation from the Standard Text Height. In this case the Standard Text Height for the entire drawing will be .08 consistent throughout the drawing ; subtitles and equipment designations will be .100” and Bold text, Prominent Titles will be .125 and Bold text.
- 5/64” (.08”) shall be the Standard Text Height for PSCo A or B-Size drawings.

1.7.5.2 NSP Drawings:

- 3/32” (.100”) shall be the Standard Text Height for NSP A, B, or C-Size drawings.
- 1/8” (.125”) shall be the Standard Text Height for NSP D or E-Size drawings.
- 5/32” (.150”) – shall be used for all Prominent Titles that require Large-Height Bold Text such as Equipment Titles, Detail Titles, Section Titles, Plan or Elevation View Titles, etc.


1.7.5.3 SPS Drawings:

- 3/32” (.100”) shall be the Standard Text Height for all SPS A, B, C, or D-size drawings.

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1.7.6 Drawing Units:

1.7.6.1 AutoCAD drawing units shall be Decimal, Engineering, Architectural, and Fractional. Use the appropriate drawing units for the type of drawing that is being created.

1.7.6.2 All MicroStation CAD files shall have the following working units:
 Master Unit = FT, Label = ‘; Sub-units = IN, Label = “.
 Coordinate Readout: Master Units, Accuracy: 0.12
 Angles – Format: DD.DDDD, Mode: Conventional, Accuracy: 0.123

1.7.6.3 Land Surveys & Topographic drawings shall have the following Drawing Units:
 Master Unit = FT, Label = ‘; Sub-units = IN, Label = “.
 Coordinate Readout: Master Units, Accuracy: 0.12
 Angles – Format: DD MM SS, Mode: Bearing, Accuracy: 0

1.7.7 Dimensions:

1.7.7.1 All drawings shall have dimension units shown in feet, inches, and fractions of inches with the exception of civil engineering drawings. Civil engineering drawings shall be dimensioned in feet and hundredths of a foot.

1.7.7.2 Dimensions on drawings shall be associative and shall not be exploded or dropped. Never override the default measurement on a dimension unless it is a hybrid drawing with an image file.

1.7.7.3 Dimension Precision shall be set to 0’-0 1/128” or 0’-0 1/256”.

1.7.7.4 Dimension text shall be the same size as all other text on the drawing and shall be configured to plot the same width as all other Standard text on the drawing. (See section 1.7.5 – Standard Text Height).


1.7.7.5 Dimension text shall be placed above the dimension line and centered between the extension lines except when the text will not fit. Then move text to the right or left.

1.7.7.6 Dimension, extension, and leader lines shall not cross each other unless absolutely necessary. A dimension line shall not be broken. Extension lines or leader lines shall not run through a dimension nor

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shall they be broken except where they pass through or are adjacent to arrowheads.

1.7.7.7 Sufficient dimensions shall be shown in the view that clearly define the size, shape, and position of the component. Dimensions shall be given as to minimize the need to calculate, scale, or assume any dimension during the construction or fabrication process.

1.7.7.8 Place dimension lines across the top of an object and along the left side. If additional dimensions are required to clearly dimension an object, they can be placed along the bottom and right side of an object.

1.7.8 Sections & Details:

1.7.8.1 PSCo Drawings: Sections and Elevations shall be labeled with Alpha characters. Details shall be labeled with Numeric characters.

1.7.8.2 NSP Drawings: Sections and Elevations shall be labeled with Alpha characters. Details shall be labeled with Numeric characters.

1.7.8.3 SPS Drawings: Sections and Elevations shall be labeled with Numeric characters. Details shall be labeled with Alpha characters.

1.7.9 Drawing Notes:

1.7.9.1 General notes affecting all the sheets per that drawing number shall be placed on the first sheet and always be placed in the upper right hand corner of the drawing. They may serve any of several purposes; it may be a note that would become repetitive if placed at each point of application, a note that applies to the drawing in general, or a lengthy note that would occupy excessive space on the drawing.

1.7.9.2 All notes shall be equally spaced with a space equivalent to the one line of text between each note. Note text shall be indented from the note number.


1.7.9.3 General notes shall be presented in a sequence that corresponds to the construction process.

1.7.9.4 Local notes are placed on the drawing, normally outside the outline of the affected object and as near as practicable to the affected region

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of the object. Information presented in these notes normally applies to a particular portion of the overall drawing.

1.7.10 North Arrow:

1.7.10.1 North arrows shall always be located in the upper left hand corner of all plan views.

1.7.10.2 The north arrow should never be positioned pointing down.

1.7.11 Symbology:

1.7.11.1 Symbols and nomenclature used to create the drawings shall conform to the existing nomenclature sheets established for that particular plant, or with Xcel Energy’s standard symbology sheets.

- Mechanical – Reference Mechanical Symbology & Nomenclature sheets.
- Instrumentation - Reference Instrumentation Symbology & Nomenclature sheets.
- Electrical – Reference Electrical Symbology & Nomenclature sheets.

1.7.12 Drawing Revisions:

1.7.12.1 When revising existing drawings, use existing layers/levels and colors.

1.7.12.2 Revisions shall be made by modifying the latest electronic version of that particular drawing.


1.7.12.3 Drawing revisions shall be clouded, being careful not to cross any text, dimensions, or notes. Clouds will be erased with the next revision, and the new changes will be clouded.

1.7.12.4 All revisions formally transmitted shall be routed and reviewed by appropriate ESP assigned personnel. All drawings formally transmitted “Issued for Comments” shall have an alpha character as a revision. Once all comments have been reviewed, addressed, and incorporated by the proper personnel, the drawings are ready to be

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transmitted for “Issued for Construction” and shall have numeric revisions starting with revision 0.

- 1.7.12.5** When drawings are being “Issued for Construction,” all previous preliminary revisions are removed from the revision block and shall only show Revision 0. All “Issued for Construction (IFC)” drawing shall be P. E. certified. If major design changes are made to the IFC drawings, AE firms shall revise recertify the current version of the IFC drawings and submitted to the Company for record, prior to the As-build drawing process.
- 1.7.12.6** Drawing revisions will be made by adding, deleting, crossing out the information, or by redrawing the drawing. The revision status is identified by a numeric revision number beginning with the number 0 (zero), and used in sequential order. Revisions to drawings shall be consistent with the original workmanship.
- 1.7.12.7** Once all drawing changes are As-Built and the drawing status is “Issue For Record,” the revision block shall have “Issue For Record” typed into the description along with the Project Name, and Project Number. Official P. E. certified record drawings my need to be resubmitted if major design changes are made to the drawings (see section 1.7.12.5. When issuing drawings as “Issue For Record,” there shall be no clouds on the drawings; only a revision triangle shall be used to identify the As-Built changes unless clouds are specifically requested. All signatures/initials shall be typed in the electronic CAD file so they may be kept electronically.

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ATTACHMENT A

DDI FORM

Energy Supply - Engineering & Construction Dept.

Drawing and Instruction Manual Submittal Form



Plant / Substation / Transmission-Line:

Plant Name Here

Today's Date:

City

State

Consultant / Vendor Name & Address:

Consultant / Vendor Project Transmittal # _____

Xcel Project # _____

Maximo Work Order # _____

Submitted Date:

USE CURRENT VERSION

Submitted By: _____ Phone #: _____ Mobile #: _____

Xcel Energy TS Coordinator: _____ Phone #: _____ Mobile #: _____

Project Title \ Description: _____

Comments \ Instructions: _____

Attached Files Created On: _____ Delivery Method: _____ Total Drawings: **0**

Total Manuals: **0**

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