
*Sanitary Sewer Overflow (SSO) Control
and Wastewater Facilities Program*

Draft CAD Requirements

**City of Baton Rouge/Parish of East Baton Rouge
Department of Public Works**



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1. Introduction

This document provides requirements for the preparation of design drawings associated with the City of Baton Rouge/Parish of East Baton Rouge (C-P) Sanitary Sewer Overflow (SSO) Control and Wastewater Facilities Program. The term Engineer is defined as an engineering design firm under contract with the C-P and producing engineering design work on the Program. These requirements are provided to encourage consistency in the design approach used by various Engineers.

While the purpose of these requirements is to assure uniformity, it is not intended to stifle Engineer's creativity, design innovation, and ingenuity. Engineers shall review these requirements and adopt them for design of the facilities for which they are responsible. Engineers are ultimately responsible for their design, and this responsibility is in no way diluted or absolved by these requirements.

It may be necessary for the Engineer to deviate from these requirements. In such cases, the Engineer shall immediately bring this matter to the attention of the Program Manager (PM) by completing and submitting the form included in the Program *Requirements for Engineers*. The PM reserves the right to allow or disallow the deviation from the requirements. If the deviation will impact design contract terms, then a Supplemental Agreement will be negotiated between the Engineer, the PM, and the C-P.

2. Scope and Goals

These *CAD Requirements* provide default standards governing CAD production and presentation, including the delivery of CAD files and drawings, for the program. This program has adopted the National CAD Standards (NCS) as the basis for its CAD Requirements. These requirements are a superset of the NCS, providing in most cases more specific detail, guidance, and/or variances.

Our intent is to use the NCS as the authoritative reference on standards issues, and to comply with them as much as possible to serve the needs of the City of Baton Rouge/Parish of East Baton Rouge. NCS standards apply on any issues not covered in these standards.

These standards are designed to be CAD platform neutral and easily maintained in any organizational environment. Adherence to this standard will result in consistency throughout the final project package. The final electronic deliverable to the client will be in AutoCAD.

The use of the standard setup and configuration files listed below will assist in meeting these criteria. These files are available on the Program Web site at http://www.brprojects.com/sewer/pages/contractor_guidelines.htm.

- Seed files/templates, which include:
 - Styles for text and dimension settings
 - Layers
 - Line styles
- Layer tables
- Standard pen tables – ctb file for printing
- Standard Border file – mn00bdr.dwg
- Border title attributes file – mn00title.dwg
- Standard Cover file – dn00Cover.dwg
- Standard symbols files
- Standard details files
- Abbreviations
- Legends

3. Project Requirements and Conformance

3.1 Conformance

Conformance to these instructions and standards is essential to producing a final document that is consistent in appearance and content.

3.2 CAD and Design Standards

Good drafting technique produces drawing files that are neat, legible, and uniform in appearance. Deliverable files make up the actual contract documents, or contract deliverable. These files contain all the information not usually referenced by other disciplines and scale-dependent information, such as text and patterning.

3.2.1 General Setup and Units of Measure

The Program's units of measure are US Survey Foot—feet and inch. Dimension units will comply with established styles in the template and will be shown using the feet (') and inch (") mark labels.

All master files (background files) will be developed in the aforementioned units and will be physically located according to the State Plane Coordinates.

All digital CAD files need to be georeferenced to:

NAD_1983_StatePlane_Louisiana_South_FIPS_1702_Feet
Projection: Lambert_Conformal_Conic

False_Easting: 3280833.333333
False_Northing: 0.000000
Central_Meridian: -91.333333
Standard_Parallel_1: 29.300000
Standard_Parallel_2: 30.700000
Latitude_Of_Origin: 28.500000
Linear Unit: Foot_US

GCS_North_American_1983
Datum: D_North_American_1983

All Engineers are also required to submit a list of all manholes and stations, and shall include dimensions for each segment between manholes and x, y, z coordinates and invert elevations for each manhole and station. These shall be clearly marked on drawings.

Refer to section 3.2.6, File Composition/Drawing Setup, for details pertaining to the development of the contract drawings.



3.2.2 File Naming and File / Drawing Types

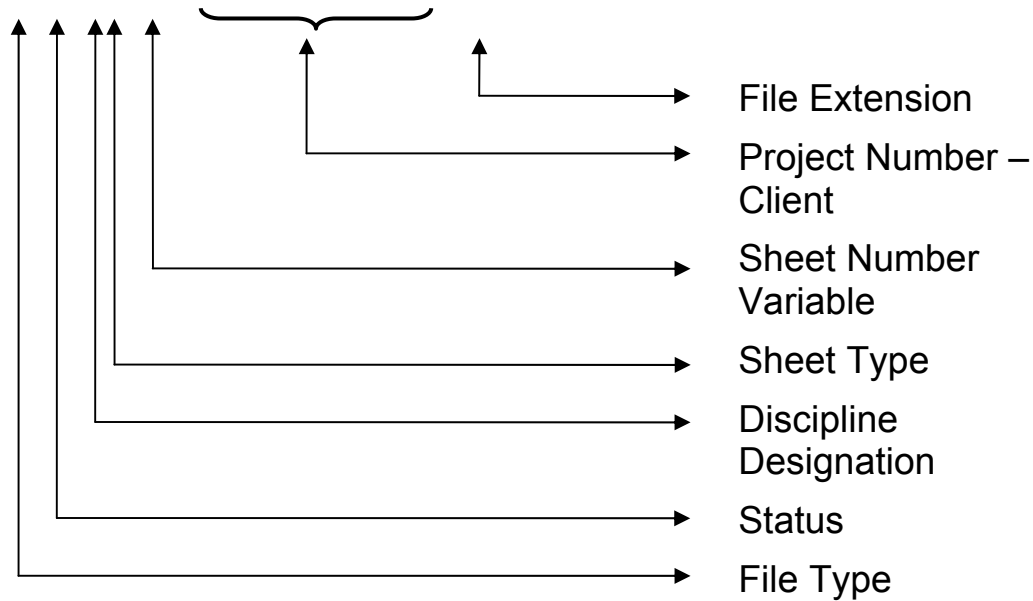
All files shall use a consistent file naming convention that will apply for models, masters, and deliverables, and will apply to all facilities and sitewide data generated for a project.

Below is the recommended file name structure. Engineers may use alternative systems subject to PM approval. The file name itself is broken down into six fields; each field has a set of variables that can be used when naming files.

Spaces were added in the figure below for clarity only.

Filename Structure

d n c 1 41_07PSBD0017 .dwg



File Type

The following code denotes the type of file

Designator	Type
D	Deliverable File
F	Figure
M	Master File



Status

Status codes denote the type on any particular drawing file (e.g., new, existing, demo, etc.).

Designator	Type
D	Demolition
F	Future
N	New
E	Existing

Discipline Designation

The following discipline designations shall be used wherever a reference to a specific discipline is required (e.g., drawing numbers, file naming, etc.).

Designator	Discipline
C	Civil
A	Architectural
S	Structural
E	Electrical
G	General
M	Process Mechanical
H	HVAC
P	Plumbing
I	Instrumentation and Control

Sheet Type

This code is used to indicate the particular type of focus of the drawing file.

Code	Focus
0	General
1	Plans
2	Elevations
3	Sections
4	Large Scaled Views
5	Details
6	Schedules, Diagrams, Schematics
7	Sheet Limits and Grids
8	Models
9	Isometrics, Photos, Images



Sheet Number Variable

General Sheets

01	First General Sheet (i.e., Index of Drawings)
02	Second General Sheet (i.e., Standard Abbreviations)

Master Plans

10	Lowest Level (if needed)
20	Second Lower Level (if needed)
30	First Lower Level (Below Grade) (i.e., wet well)
40	Foundation/First Floor/Ground Level**
45	First Floor Intermediate Level (if needed)
50	Second Floor Level
55	Second Floor Intermediate Level (if needed)
60	Upper/Roof Level

** Note: Maintain 40 as a constant and adjust numbers according to project needs.

Master Sections

01	First Section (i.e., Section A)
02	Second Section Extraction (i.e., Section B)
03	Etc.

Master Elevations

01	North Elevation (Looking North)
02	South Elevation (Looking South)
03	East Elevation (Looking East)
04	West Elevation (Looking West)

Civil—Digital Terrain Model or Master File

20	Contour Plans
30	Layout Plans
40	Grading/Paving Plans
50	Stakeout Plans
60	Erosion Control or Sedimentation Plans
70	Grading Profiles
80	Utilities and Yard Piping Plans
90	Sections and Details

Instrumentation and Control Drawings

01, 02...	Consecutive numbers in each flow PID category
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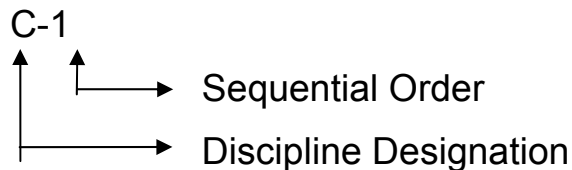


Deliverable Drawings (In General)

01, 02...	Consecutive numbers per Sheet Type (Sequence not to start with 00)
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3.2.3 Drawing Number Convention

The format of sheet numbers shall be according to the following standard. Spaces were added in the figure below for clarity only.



3.2.4 Layering

Drawing information shall be organized on layers using a consistent approach for each project. All layer specifications, (color, line type, line weight) shall be consistently followed. Program layer template files are available on the Program web site. Engineers may utilize alternative layering systems subject to PM approval.

Drawings using the Program layer templates will adhere to the following syntax and guidelines:

Discipline designator – Defined Major Category – Optional Defined Minor Category

3.2.5 Border and Title Block

The border file for the project is customized for this program and is named **mn00bdr.dwg**. When plotted full-size the cutlines will be 24" x 36" and when printed half size 11" x 17". (Note: this will not be true half-size, so it will not be scale-able and will be noted as such.)

The **mn00title.dwg** file contains attributes for tracking the border title block information. Use **ddinsert** to insert file as a block and leave placement (lower left corner at 0,0) and scale (1:1) as is. Use the attributes editing command to modify but do not explode to regular text. Do not explode title block or manipulate the position or existence of any attribute text. Please ensure that the title of the drawing truly represents the contents of the drawing. For example: if the drawing contains a plan and two sections then the title will say "PLAN AND SECTIONS."

A pdf version of the standard border and title block template is also included on the Program Web site.

3.2.6 File Composition / Drawing Setup

All drawing files shall utilize a consistent file composition/drawing setup system for each project. The Program template.dwg file available on the Program web site includes a



standard layout space for annotations, and a model space for referencing master data (files that contain elements that will need to be shown on multiple drawings). Engineers may utilize alternative systems subject to PM approval. The following sections provide detailed guidance for use of the Program template.

Compose the Drawing

Use the following File Composition setup for all deliverable drawing files.

Masters/Xrefs

Discipline specific base files with information needed by others to convey design shall be placed in model space at true size or 1:1.

Referencing master data is critical for proper coordination between disciplines, as well as ensuring that the most up to date information is being used by the entire program team throughout design and construction drawing preparation. Common CAD applications support file/model referencing and the following guidelines ensure useful and streamlined referencing.

- Keep reference data portable. Do not reference files using a saved full path specification regardless of the location of the file. Use available program environment variables that have been defined for use at all times when attaching reference files or models.
- Do not copy reference data directly into a construction drawing or another design model unless:
 - It will be used to represent an enhanced detail figure specifically for that drawing
 - It will be used as a template to create other similar objects in the design model
- Position reference data within the model space or design model at real world coordinates.
- Position reference data within the drawing by moving the main reference (view port within the layout in AutoCAD) to align within the border.
- Position multiple views to be shown on the same sheet by creating additional references by creating multiple view ports.
- Use a view port for limiting the amount of master data required for display within a drawing.
- Use of a wipeout entity shall be used to eliminate specific reference data from display within the drawing as needed. Master data that may not be appropriate for display includes redundant or unnecessary peripheral data that may cause confusion when reading the drawing.

Deliverables

Model Space (Tab)

- All master/xref files are to be referenced in model space.
- **There will be NO ROTATION of REFERENCE FILES in the model space – insertion point 0,0.**



Layout/Paper Space (Tab)

- There will be no rotation of UCS in the layout space
- Create viewport with appropriate scale
- **There will be NO ROTATION of VIEWS in the Layout space**
- **If needed, rotate a viewport**
 - At command line enter MVSETUP
 - Select – align (A)
 - Select – Rotate (R)
 - Keyin desired rotation from basepoint
- Basepoint
 - Hold the lower left corner of a structure as your rotation point
 - Hold the center point for any circular structures
- View options in Layout space
 - Create multiple viewports with desired scale to view or
 - Pre-arrange drawing in model space as you wish them to appear in layout space and view with 1 viewport at desired scale
- Xref the Border reference file (mn00bdr.dwg) using overlay in Layout and at 0,0 and scale = 1
- Insert mn00title.dwg at 0,0, scale = 1 and do not explode
- The **Border** reference file will **NOT be rotated**
- All annotation is to be in the Layout space - inclusive of text, north arrows, key plans, notes, revision triangles, detail callouts, sections cuts, and any other associated items
- All elements and notations shall be placed in the Layout space for one-line diagrams, control diagrams, schedules and P&IDs.
- Nothing shall be placed outside the border of the deliverable files. If there are items which need to be saved separately for possible use later, those items shall be saved in a separate file, not outside the border of the deliverable file.
- Information that a discipline deems unique to that discipline will be shown in the deliverable file.
- When two or more plans are to be shown in a drawing, the lowest elevation will set the location (true position). Higher elevation plans will be moved to fit within the drawing border.



- Use correct layer assignments-change the layer of elements to conform to the standard program layer assignments only.
- Avoid excessive use of patterning or hatching

3.2.7 Annotation and Dimensioning

If the Program layer templates are used properly, all annotation and dimensions will receive the correct symbology. Any approved alternative system must ensure consistent symbology for all annotation and dimensioning.

The following guidelines will be followed when creating general or keyed notes on deliverable drawings:

- Notes shall be located on the right side of the drawing.
- Use capital letters for all notes and titles.
- Keyed notes shall be used on plans.
- Do not use keyed notes on sections and details unless specified at the project level.
- Specification information shall not be duplicated by drawing notes, except where the information facilitates interpretation of the drawings. When possible, refer to notes on other drawings to avoid repetition.

The following guidelines shall be followed when creating general notes:

- Use text style "Sub" for the title of general notes on a drawing. The title is not underlined, and no symbol is used after the title.
- Use text style "General" for all notes.
- General notes are indicated with letters, not with numbers. The letter designation is separate from the body of the note.
- Lines of general notes may consist of single entities of text or multi line text.
 - **If single entities/lines of text:** Start the first string at least a 1/4" from the border. Left justified note letter, then gap of at least 1/8" then start new left justified text string for body of note.
 - **If multi line text:** all text objects are contained inside its boundary. Try to keep the same spaces as above.
- No period is used after each note's letter.
- General notes are single spaced, and a double space is placed between each new note.

Keyed notes follow the same rules as general notes except they are indicated with a number value instead of a letter value.

The following image summarizes the points above.



GENERAL NOTES

A NOTE TITLES ARE DONE WITH THE STYLE "SUBTITLE" AT A SIZE OF 1/4"(6MM) LEFT JUSTIFIED.

B NOTE TEXT IS CREATED WITH THE STYLE "STANDARD" AT A SIZE OF .1111 LEFT JUSTIFIED.

C NOTE IDENTIFIER AND NOTES WILL NOT BE A PART OF SAME STRING. MAKE SURE EACH IS SEPARATE.

D. PROVIDE THE FOLLOWING SPACINGS:

- * 1/4"(6MM) FROM EACH SIDE OF BOUNDARIES.
- * SINGLE SPACE BETWEEN CONTINUOUS STRINGS OF TEXT.
- * 3/16" BETWEEN EACH NEW TEXT STRING.
- * 1/8"(3MM) BETWEEN NOTE IDENTIFIER AND START OF NOTE.

KEYED NOTES

1 PLEASE SEE STYLE, TEXT SIZES, SPACING AND LOCATION FROM ABOVE DESCRIPTIONS.

2 ONLY DIFFERENCE IS KEYED NOTES USE NUMBERS INSTEAD OF LETTERS.

3 EXAMPLE TEXT

3.2.8 Text Styles and Font

Use of text styles will ensure the correct size and font. The three text styles used are all based on the Romans.shx font. Drawings must be easily readable in half-size format. Engineers may use alternative fonts subject to PM approval.

Text Style	Description	Color	Full-Size Plotted Height
GENERAL	Notes and all common text needs	Green	1/8" (.12) high & 1/8" (.12) wide
SUB	General Note and Detail Headers	Cyan	3/16" (.18) high & 3/16" (.18) wide
MAIN	Title Blocks and to call out Objects	Blue	1/4" (.25) high & 1/4" (.25) wide

3.2.9 Dimensioning

The dimension attributes and standards are pre-set in all of the seed files using Architectural for fractional and Standard for decimal as the dimension style. Closed filled arrowheads will be used. All dimensioning will be associative and at no time will their complex status be dropped for editing.

Follow the concepts listed below for dimensions on 2D deliverable drawings:



- Only in tight spots will slashes be used instead of filled arrowheads.
- When dimensions are taken from existing drawings, electronic files, or documents and used in new drawings, a note to field verify is to be placed with the dimension or referred to in a general note. For example, “Contractor shall verify dimensions and conditions of existing construction before proceeding with his work.” Dimensions may be taken from client originated backgrounds, vendor equipment files, or drawings from major equipment suppliers, contractors and surveyors.
- In rare circumstances where dimensions may be “Not to Scale” shall be noted with notation NTS directly under the dimension text. Sections and details not drawn to scale shall be noted NTS below their title. Drawings not drawn to scale shall be noted “Not to Scale” in the title block.
- Avoid repetitious dimensioning. Where dimension lines continue, make sure only one line exists.
- Locate dimensions outside the floor plan or other view being dimensioned. This minimizes clutter and overlap with other graphics. Dimensions outside the view will be located at the top and/or the right side of the plans whenever possible.
- Horizontal dimensioning slashes are to be oriented low end to high end and left to right. Vertical dimensioning slashes are to be oriented similarly as viewed from 90 degrees.
- Avoid adding leader lines to dimensions in already overcrowded areas.
- Avoid repeat dimensions or member sizes from view to view. Entering information in one place avoids possible errors in editing later. However, grid and datum dimensions on new sheets can be repeated if they will clarify important concepts to the contractor in the field.
- When possible, don’t close dimension lines. i.e., if you show an overall dimension, don’t provide a complete string of dimensions below it.
- Show tolerance dimension when closure is necessary.
- Identify dimension datum point in all drawings.

3.2.10 Symbols

These are objects which are managed and used by some or all of the Disciplines. Symbol templates are provided by Discipline on the Program web site. These symbols follow this basic pattern:

- All Graphic content within the block must reside on layer “0”. This allows symbols to assume the attributes of the layer it’s going to be inserted on.
- Text/ Attributes must reside on a defined layer. This allows these objects to assume the correct layer assigned to the blocks text value.
- No other layers will be assigned or used.
- Blocks will be purged of all non assigned entities.



- All Line-weights and colors are to be “ByLayer”
- Varying Line-weights may be accomplished with the use of “P-Lines”


Symbols will be organized into libraries or library areas by discipline using descriptive names. Symbols used in drawings are Scale Dependent (Actual printed size of the symbol depends on the scale of the drawing or view of the model), Independent (Actual printed size of the symbol is consistent no matter what the drawing scale. Its size is related only to the clarity and interpretation), or both.

Symbols used in drawings are constructed of various line widths. The following list is an example of standardized line weights of symbols:

- Existing objects and material symbols are drawn with a thin line.
- New objects are drawn with a medium line.
- Objects to be demolished or removed are drawn with a medium dashed line.

3.2.11 Leaders and Reference Indicators

The Leader command from the dimension toolbar will be used to place leaders. Linear style leaders with closed-filled or Integral arrowheads shall be used.

Arrow		Most commonly used Leader. This can be used anywhere.
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3.2.12 Symbology

Line Weight

Line weights are to be determined by the color of the layer and are set according to the pen table delivered.

3.2.13 Color

Color assignments are to be achieved using a ByLayer setting through the standard layer definitions in the template.dwg file.

Typical Element Colors

- Dimensioning and Leaders yellow (2)
- Arrowheads filled yellow (2)
- Primary design elements cyan (4)
- Secondary design elements green (3)

Color 9 is the assigned screening color for reference/background information. Printing/Plotting pen tables will also be provided to ensure a consistent output for those using the appropriate color assignments. Design elements will be drawn color, line width, and line type by layer to provide added control in the final deliverable sheet files for printing, plotting and exporting to .pdf formats when publishing.



3.2.14 Use of Screening—Existing Elements or Discipline References

Screened line work shall be used to indicate **Existing Elements** where applicable on all drawings. Screened line work will be applied to all referenced discipline line work other than the main discipline type of the drawing to emphasize the design.

3.2.15 Legends and Abbreviations

Standard legend sheets are provided on the Program web site based on the symbols libraries provided. Subject to PM approval, other symbols may be used as long as they are consistent throughout the project. If other symbols are used, provide a legend for those symbols.

Standard abbreviations provided will be used on this program. These will be referred to throughout the project to ensure that the drawings are produced using standard notations.

Refrain from using periods (.) after an abbreviation unless that abbreviation spells a word. If a necessary abbreviation is not listed or is not generally standardized within the industry, then spell out the word. If custom abbreviations are used, add to the abbreviations sheets provided.

3.2.16 Plotting and Deliverables

Plot configuration files will be provided to ensure a consistent output to plotters, printers, and exporting files for publishing.

The Program *Requirements for Engineers* specifies drawing submittal requirements for each project phase. In some cases electronic files will be required in pdf and AutoCAD format. Pdf files shall be created as full-size (24x36) drawings. For deliverable files in pdf format for Final Contract Documents, Conformed Documents, and Record Drawings, an individual pdf file shall be provided for each drawing, and each file name shall include the drawing number. Combined drawing pdf files are acceptable for preliminary submittals and shall also be provided with the Final Contract Documents, Conformed Documents, and Record Drawings submittals, along with the individual drawing files.

3.2.17 Drawing Set Development

The drawing set will be organized using the following discipline order.

- General – cover, location maps, index and legends
- Civil
- Landscaping
- Architectural
- Structural
- Process
- Mechanical – HVAC
- Plumbing
- Electrical
- Instrumentation and Control – P&IDs

Orient drawing file plan views with NORTH up. If not possible, orient NORTH to the left.



3.2.18 Scale Guide

Follow the following scale guidelines for Program projects when creating final drawings.

These are considered general guidelines only and there may be exceptions.

Plans	- 1/8", 1/4", 3/8", 3/16", 3/32"
Building elevations	- 1/8", 1/4", 3/8", 3/16", 3/32"
Building sections	- 1/8", 1/4", 3/8", 3/16", 3/32"
Full wall sections	- 3/8", 3/16", 3/32"
Mechanical sections	- 3/8", 3/16", 3/32"
Details	- 3/8", 3/4", 1-1/2", and 3"
Site plans	- 10', 20', 30', and 100'
Pipeline plan and profiles	- 1" = 50' (horizontal) and 1" = 5' (vertical)

4. Workflow and Communication

4.1 Document Management

All Engineers are responsible for their own document management. All deliverables will be uploaded to the Program Project Control System (PCS) by the PM.

4.2 Automation Software Selection

Client requirements are that all design files are to be delivered in AutoCAD file format. The version will be AutoCAD 2005 unless otherwise approved by PM.

In an attempt to circumvent problems in deliverable files, files containing proxy entities will not be accepted by the client, unless otherwise specified on a per project basis.

4.3 Communication

Communication is an integral component to the success of the coordination of the design. Any existing information deemed necessary for use on this program will be input into the drawings using dimensional information as available. References to scanned images and photos may be used as needed, but only when dimensionally accurate information is unavailable. Use dimensionally accurate information in all cases when relating design components to the structure or to each other.

4.4 Glossary

The following table provides a glossary of terms to clarify terminology used in this document.

Definitions	Descriptions
AutoCAD:	Autodesk's CAD platform. Used primarily for drafting. Required for vertical applications provided by Autodesk, Softdesk and other third parties.
AutoCAD Attribute:	A special type of text element that is associated with a block. The attribute has a definition and name, allowing information stored within the attribute to be searched, retrieved, modified or reported. Attributes are similar to MicroStation Tags. See Tags.
AutoCAD Block:	A CAD concept that combines individual graphical elements such as lines and circles into a single entity for manipulation.
CAD (computer-aided design):	Software used by architects, engineers, and drafters to create two-dimensional (2D) drawings or three-dimensional (3D) models. Also used as a software platform for some advanced design applications including schematics and intelligent 3D modeling.



Definitions	Descriptions
NCS (National CAD Standard):	A Standard used in preparing and presenting design information in a CAD format. Adopted by the National CAD Standards Project Committee in 1997 from a council originally formed by the National Institute of Building Sciences. This standard is endorsed by the American Institute of Architects (AIA), the Construction Specifications Institute (CSI), The General Services Administration (GSA), The DOD Tri-Service CADD/GIS Technology Center, the Sheet Metal and Air Conditioning Contractors' National Association (SMACNA), the U.S. Coast Guard, and the U.S. General Services Administration (GSA). The foundation of the National CADD Standards (NCS) was the AIA CAD Layer Guidelines, The CSI Uniform Drawing System, and the Tri-Service CADD Standards.
PDF (Portable Document Format):	A file format that captures all the elements of a printed document as an electronic image that you can view, navigate, print, or forward. PDF files are viewed using Acrobat Reader available from Adobe.
Screening:	A concept used in engineering construction drawing preparation to reduce emphasis on background information by using grayscale tones on black & white plots or color plots. May be used in different ways on different types of drawings. For example, structural drawings may screen back existing structures to emphasize new work. Mechanical sections may screen back Structural components to emphasize equipment and piping.
Symbology:	Term used within the context of the CAD/CAE environment to mean the specific color, line thickness and pattern or style of the linework representing an object. For example a uniformly dashed thin line is typically the symbology used to represent a centerline.
XREF (eXternal REFerence):	CAD Term used by AutoCAD to refer to CAD files that are displayed for reference purposes from another file. Externally referenced files cannot be manipulated and generally represent data supplied by another engineering discipline, another phase of the project, or existing elements on the site.