Real Estate and Construction Services

Computer Aided Drafting (CAD) – Guidelines

Revision Date: 05/25/2012

TABLE OF CONTENTS:

OVERVIEW

This computer aided drafting (CAD) guideline is for use on State of Minnesota facilities. These standards have been developed to serve as a guideline for the development of contractually required electronic data submittals to Real Estate and Construction Services (RECS). Consultants shall be responsible for obtaining the most current release prior to the commencement of any work. This document is available at http://www.admin.state.mn.us/recs/cs/mg-cadd-toc.html.

1.0   GENERAL REQUIREMENTS

The Consultant shall provide three sets on CD ROM, labeled, CAD and PDF record file drawings. These files shall include all record drawings and specifications for which the Consultant has generated. Files shall be submitted in **AutoCAD File Format Release 2009-2010** DWG and PDF format. These files are to be updated during construction to represent as-built conditions. Refer to Appendix A Checklist.

It shall be understood that the CAD drawings themselves are not record drawings. If the Consultant is unable to comply with this provision, arrangements must be made for generating vector-based computer drawings prior to executing a consultant agreement with the State of Minnesota. The Consultant should

contact RECS to make such arrangements.

2.0 REQUIRED DOCUMENTATION

The electronic data deliverable package will include the following:

Documentation	Format Required
Checklist	**Printed copy**
Letter size prints of drawings and each file to be used for reference (No scale required)	**Electronic file and printed copy** **These files should be in AutoCAD DWG and Adobe PDF format**
File Description Sheets - See Section 2.2	**Electronic file and printed copy**
Layering Documentation – See Section 5.0	**Electronic file and printed copy**
• **Original RFP**	**Electronic file and printed copy**
• **Bid Pack**	**Electronic file and printed copy**
• **Initial Contract**	**Electronic file and printed copy**
• **Addendums**	**Electronic file and printed copy**
• **Supplemental Agreements**	**Electronic file and printed copy**
• **All other project documents**	**Electronic file and printed copy**

2.1 DISK LABELING

All disks are to be labeled as follows:

STATEWIDE PROPERTY ID:	Statewide property identification number for the building in which the project is intended. (Obtained from RECS)
PROJECT:	Title of the project.
DATE:	The date the data was delivered to RECS for final acceptance.
RECS PROJECT NUMBER:	RECS Project number assigned to each project. (Obtained from RECS)
CONSULTANT:	Name of consultant to RECS.
TELEPHONE NUMBER:	Telephone number of consultant.
DISK NUMBER:	Disk number. Deliverables disks are to be numbered in coordination with File Descriptions.
FILES:	List of drawing files included on disk. or Title of files: e.g. Specifications Individual specification sections are not to be listed on the disk label. Limit file listing on text files to "SPECIFICATIONS".

2.2   FILE DESCRIPTION

Each disk is to be accompanied by a file description sheet on 8 1/2" x11" hard copy print out. Each file description sheet is to include the following information:

> STATEWIDE PROPERTY ID
> PROJECT TITLE
> DATE
> RECS PROJECT #
> CONSULTING COMPANY
> ADDRESS & PHONE NUMBER
> PROJECT MANAGER
> FILES (W/REFERENCE FILES)
> REMARKS

See Appendix B - Sample File Description Sheet

A copy of this sample sheet is available for download on the website at :
www.admin.state.mn.us/recs/cs-forms.html

3.0   REQUIRED FILE TYPES

Both text and graphic type files will be included in the electronic data deliverables. All files may be submitted on the same disk provided that all files of like type are on only one disk. If not, then they are to be submitted on separate disks.

3.1   TEXT FILES
Text files are to be saved in either Microsoft Word (.DOC), Rich Text Format (.RTF) or in PDF format. No other file formats will be acceptable for text files.

3.2   DRAWING FILES
All files are to be submitted in DWG format (**Release 2009-2010)** and a separate PDF file for each sheet in the document set. Any submittal found to have DWG format or PDF format drawings missing will be rejected.

All drawing files that are incorporated via xref are to be included on the disk. **Any submittal found to have missing xref's will be rejected.**

Raster images are not acceptable. All graphic images in the drawing files are to be vectorized images.

All files are to be delivered on CD-Rom or DVD-Rom accompanied by the 8 ½ x 11 hard copy file description and prints of PDF files. No compressed files (e.g. .zip) are acceptable.

3.3   PHOTOGRAPHS
All photographic images that are part of the electronic record for the project should be submitted on CD-Rom or DVD-Rom along with the rest of the record drawings.

4.0   SUGGESTED GUIDELINES

4.1   FILE NAMING
The following is a guideline for naming sheet files and model files. If your firm has a standard for naming sheets and model files, that standard may be followed. Please submit documentation as to what that naming structure is for reference.

4.1.1 DISCIPLINE CODES
Discipline is the primary method of classification for both file names and layer names. The discipline code provides a path back to the originator of the data. The code also provides a logical categorization of the CAD information.

A	Architectural	L	Landscape
C	Civil	M	Mechanical
E	Electrical	P	Plumbing
F	Fire Protection	Q	Equipment
G	General Information (non-discipline specific)	S	Structure
		T	Telecommunications
H	Hazardous Material	X	Other Disciplines
I	Interiors	Z	Contractor/Shop Drawings

4.1.2 GUIDELINES FOR SHEET FILE NAMES

Sheet File names start with the discipline code, followed by a user-definable numerical field that closely corresponds to the sheet sequence number. For example A-101 for architectural, floor plans, first floor.

Discipline is the primary method of classification for both file names and layer names. The discipline code provides a path back to the originator of the data. The code also provides a logical categorization of the CAD information.

Discipline Codes		**Sheet Type Designators**	
A	Architectural	0	General (symbols, legend, notes)
C	Civil	1	Plans
E	Electrical	2	Elevations
F	Fire Protection	3	Sections
G	General Information	4	Large scale plans
	(non-discipline specific)	5	Details
H	Hazardous Material	6	Schedules and Diagrams
I	Interiors	7	User Defined
L	Landscape	8	User Defined
M	Mechanical	9	3D views
P	Plumbing		
Q	Equipment		
S	Structure		
T	Telecommunications		
X	Other Disciplines		
Z	Contractor/Shop Drawings		

Sheet Sequence Numbers

Sheet numbers should be designated sequentially starting at "01" and continuing thru "99"

Examples:
The following are sample sheet file names:

A-101.dwg	Architectural, first floor plan, sheet 1.1
A-102.dwg	Architectural, second floor plan, sheet 1.2
A-103.dwg	Architectural, first floor reflected ceiling plan, sheet 1.3
A-201.dwg	Architectural, elevations, sheet 2.1
A-501.dwg	Architectural, details, sheet 5.1

4.1.3 MODEL FILE FORMAT

Model File names start with the discipline code, followed by a two letter drawing type, followed by a user-definable field. For example, A-FP01 for Architectural, Floor Plan, First Floor.

Discipline Codes

A	Architectural
C	Civil
E	Electrical
F	Fire Protection
G	General Information (non-discipline specific)
H	Hazardous Material
I	Interiors
L	Landscape
M	Mechanical
P	Plumbing
Q	Equipment
S	Structure
T	Telecommunications
X	Other Disciplines
Z	Contractor/Shop Drawings

Drawing type codes (all Disciplines)

*-FP	Floor Plan
*-SP	Site Plan
*-DP	Demolition Plan
*-QP	Equipment Plan
*-XP	Existing Plan
*-EL	Elevation
*-SC	Section
*-DT	Detail
*-SH	Schedules
*-3D	Isometric/3D
*-DG	Diagrams

Drawing type codes specific to particular Disciplines

Architectural
A-CP   Ceiling plans
A-EP   Enlarged plans
A-NP   Finish plans
A-RP   Furniture plan
Civil
C-EP   Environmental
C-GP   Grading
C-RP   Roads/Topographic
C-SV   Survey
C-UP   Utility
Plumbing
P-PP   Plumbing plan
Interiors
I-CP   Ceiling plans
I-EP   Enlarged plans
I-RP   Furniture plans
I-NP   Finish plans

Mechanical
M-CP   Control plans
M-HP   HVAC plan**s**
M-PP   Piping plans
Telecommunications
T-DP   Data
T-TP   Telephone
Electrical
E-CP   Communication
E-GP   Grounding
E-LP   Lighting
E-PP   Power
Structural
S-FP   Framing plan
S-NP   Foundation plan
Fire Protection
*-VP   Evacuation plan
(may be by other Discipline)
F-KP   Sprinkler plan

4.2   DRAWING FORMATS AND GRAPHICS

Sheet border, title block, consultant's stamp, logos and all other components of the sheet File shall be located in paper space.

All graphic representations of the project or facility and all related notes, dimensions, symbols, etc., shall be constructed in model space.

All graphic entities shall be comprised of representational and geometrically accurate entities, e.g. a circle shall be represented by circle entity and NOT a visually equivalent collection of line segments. Items shown in a dashed line type shall be created with the LINE TYPE feature and NOT by individual line elements.

4.3   STANDARD SHEET SIZES AND FORMATS

Sheet sizes are recommended to be (but not limited to) five standard formats. Required sheet size is specific to each project and should be coordinated with RECS Project Manager, they are as follows:

A Sized Plot	8 1/2" x 11"
B Sized Plot	11" x 17"
C Sized Plot	18" x 24"
D Sized Plot	24" x 36"
E Sized Plot	30" x 42"

4.4   GRAPHICS

4.4.1   TEXT

All font files (.SHX) used on project shall be submitted with electronic submittal.

All **text sizes** are to plot and display in accordance with the following **minimum** sizes:

Schedules	1/8"
Dimensions and Notes	1/8"
Grid Numbers	3/16"
Sheet Detail Title	3/16"
Sheet Title	1/4"
Sheet Number	3/8"

4.4.2   SPECIAL ENTITY REQUIREMENTS

Common symbols, doors, water closets, windows, equipment, etc., shall be blocks.
Entities to be shown as blocks:
- All Plumbing & Bath Fixtures e.g., water closets, urinals, lavatories, tubs, grab bars, accessories, mirrors
- All Electrical Devices & Hardware e.g., lighting fixtures, switches, outlets, panels
- Mechanical Equipment e.g., supply diffusers, return grilles, thermostats, air handlers
- Doors
- Windows
- Equipment
- Furniture
- Drawing Symbols
- Door and window marks, room # indicators, scale indicators, north arrows

4.5 DIMENSIONING

All dimensions shown in the project submittals shall be fully associative. Dimension definition points should be located with an appropriate Object Snap (**E**nd Point, **M**id Point, etc.) or otherwise located precisely on the project geometry. Manual input of dimension text or otherwise over riding the actual dimensions is NOT acceptable in submittals to RECS.

4.6 LINE WEIGHTS AND PEN ASSIGNMENTS

These pen/color assignments are provided to help RECS personnel in producing consistent hard copy output from the electronic submittals. If you are using a different scheme for color assignments you are required to submit a copy of your Plot Style Table (.cbt) file on the same disk as your drawing files. Please submit a copy of your plot style table with your electronic submittal.

RECS PEN/COLOR ASSIGNMENTS

AutoCAD Number/Color	Pen Size (mm)	Line type
1 Red	.25	Dark Screen
2 Yellow	.25	Solid
3 Green	.35	Solid
4 Cyan	.25	Solid
5 Blue	.50	Solid
6 Magenta	.25	Solid
7 White	.18	Solid
8 Dark Grey	.13	Solid
9 Color Varies	.25	Medium Screen
10 Color Varies	.70	Solid
11 Color Varies	1.00	Solid
12 Color Varies	1.40	Solid
13 Color Varies	2.00	Solid
14 Color Varies	.35	Solid
15 Color Varies	.25	Light Screen

5.0 LAYERING

RECS recommends following the AIA layering system. If your firm uses another layering system, please provide documentation as to describe that system with your submittal.

Checklist for CAD Record Drawing Submittals

Hard Copy Items
- ☐ Letter size prints of each drawing page (Section 2.0)
- ☐ File Description Sheet (Section 2.2)
- ☐ Layering Documentation (Section 5.0)

CD/DVD Items
- ☐ Drawings - including all x-referenced files in .dwg file format (Section 1.0)
- ☐ Specifications (Section 1.0)
- ☐ PDF files of letter size prints of all as-built drawings (Section 2.0)
- ☐ CBT file for pen style reference (Section 4.6)
- ☐ File Description Sheet (Section 2.2)
- ☐ Layering Documentation (Section 5.0)
- ☐ Original RFP (Section 2.0)
- ☐ Bid Pack (Section 2.0)
- ☐ Initial Contract (Section 2.0)
- ☐ Addendums (Section 2.0)
- ☐ Supplemental Agreements (Section 2.0)
- ☐ All other project documents (Section 2.0)
- ☐ CD/DVD Properly Labeled (Section 2.1)

Submit electronic and hardcopy record drawings and specifications as follows:
- ☐ 2 copies to State's Project Manager (one for internal file; one for archiving).
- ☐ 1 copy to user facility\agency
- ☐ 3 copies to Plant Management Division – for projects located on the Capitol Complex & other locations

Additions (additional items that are included in submittal)
- ☐
- ☐ _____
- ☐ _____

Exceptions
- ☐ _____
- ☐ _____
- ☐ _____

I certify that all items are including in this record drawing submittal except as noted:

_____
Consultant Signature / Title   Date

Real Estate and Construction Services
ELECTRONIC SUBMITTALS - FILE DESCRIPTION

Date:
RECS Project Number:
Project Name:
Agency:
Facility:
Building:
Statewide ID:

Prepared By:

CAD File Index

Sheet File	Sheet Number	Sheet Description