MnDOT CADD Standards

Figure caption (include alt text in image)

Sponsored By:

MnDOT Office of Project Management and Technical Support

Technology Support Group, Computer Aided Engineering Services Unit

MS 688

Transportation Building

395 John Ireland Blvd.

St. Paul, MN 55155-1899

For More Information

Visit: http://www.dot.state.mn.us/caes/index.html
Or Contact: caessupport@state.mn.us

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MnDOT CADD DATA Standards

PREFACE

The scope is to document and standardize the Minnesota Department of Transportation's CADD (computer aided drafting and design file specifications). The CADD standards contained herein are English based except as noted.

MnDOT's establishment of CADD data standards is to ensure consistent data aggregation, element symbology, object usage, and locational accuracy of project CADD data which effectively enables:

- Project data to be shared among functional business units in an integrated manner throughout the project design process.
- CADD data to be accessible for use in specialized non-design project design process.
- Engineering Consultant electronic deliverables to concur with MnDOT design and IRM policies.

The primary focus of the CADD specifications is the organization of the graphical model contained in the file and the format of the file(s). File ownership and data placement responsibilities are beyond the scope of this document. While the functional area sections define file types and data placement, district deviations in methodologies prevent this being a definitive ownership and placement reference. These standards are considered a baseline and contract language may require more or permit less rigorous standards to satisfy usage of the data. The project manager has final say regarding, and responsibility for, the specific CADD Data Standards of a particular project. Exceptions should only be granted when no remedy is available under the existing standards and should be fully documented. Copies of the documentation for exceptions to the MnDOT CADD Data Standards should be forwarded to the CADD Data Standards Manager.

USE STATEMENT

After reviewing the general file information contained in this section, select the functional area (hydro, bridge, etc.) for the type of data to be created.

FILE INFORMATION

COMPUTER AIDED DRAFTING & DESIGN (CADD) FILE TYPE

MnDOT CADD files will be binary graphics files created using ***Bentley Systems MicroStation or Power GEOPAK™*** at the current department standard version 08.11.09.722. MnDOT has determined that ***Bentley Systems MicroStationV8 SS3 or Power GEOPAK SS3™*** and prior to have met basic agency compatibility standards for file use. MnDOT reserves the right to specify explicit versions of the software, or superseding certified release platforms, on a project by project basis.

The file specifications are based on MnDOT's need to have complete file compatibility across different functional areas as they use CADD files. This facilitates use of automated software, consistent archival and retrieval procedures and organized business practices to maximize efficiency within the agency.

In the case of consultant files supplied under a state contract, it is required that all files be in the contract specified ***Bentley MicroStation V8/2004™*** format and a minimum version step of 08.05.02.55. Formats, translations, etc., and the accuracy of data contained therein will be the total responsibility of the contracted source. The files delivered under contract must work in the ***Bentley MicroStation V8/2004™*** environment as described above with no adjustments, modifications, translations or alterations while retaining all required element properties.

In cases of CADD data involvement with other agencies using public information, a school district map, for instance, MnDOT would review the translation issues individually.

FILE NAMING CONVENTIONS

MnDOT's file naming system for CADD is based on five components:

- Functional Group designator - (design, survey, right of way, etc.)
- State Project number or State Identifier number - (bridge, intersection)
- File Type designator - (construction plan, erosion control plan, etc.)
- Sub-file designator
- Software file extension

FILE MANAGEMENT STATEMENT

These file extensions and naming conventions are based on a sound model of MnDOT work flow and processes. It is required that this file naming convention be used. The most common CADD files are represented in this document. In the event you encounter a file type not addressed in this document, consult immediately with the project manager to determine the proper file parameters. Ultimate responsibility for adherence to the file naming and file management system rests with the project manager and systems managers. MnDOT's goal is to have uniform data practices for information exchange and management abilities.

CADD DATA DELIVERY SPECIFICATION LEVEL

MnDOT specifies two levels for delivery of project CADD data.

Level 1 Basic CADD Data Delivery Specifications: Data in CADD files must be organized according to the following:

1. Within ***Bentley MicroStation™*** files named using MnDOT file naming requirements for the appropriate data type
2. With elements on ***Bentley MicroStation™*** levels as delivered through MnDOT's customized MicroStation design libraries (.dgnlib file's). Individual element attributes for elements within those levels are defined within the ***Bentley GEOPAK™*** DDB, SMD, GFD, LSF databases (found at http://www.dot.state.mn.us/caes/index.html) or elsewhere as specified within this site or by directive of the CADD Data Standards Manager.

Level 2 Enhanced CADD Data Delivery Specifications: Based on the complete Level 1 requirements and extending them to add detailed element symbology definitions and specifying:

1. Individual element attributes for elements on those levels as defined within the ***Bentley GEOPAK™*** DDB, SMD, GFD, LSF databases (found at: http://www.dot.state.mn.us/caes/index.html)or as elsewhere as specified within this site or by directive of the CADD Data Standards Manager.
2. ***Bentley GEOPAK™*** file components; element components which may include non-graphic attributes; requirements for settings to perform quantity computations based on graphical and non-graphical data and documentation thereof; specifications of graphical and non-graphical content and specifications of file size as deemed necessary for certain file types.

Internal file requirements may be defined and modified by the unit supervisor or project manager but must respect utilization of the CADD data throughout the project life-cycle by all functional groups within MnDOT. Thoroughly review the delivery requirements of your project before initiating work.

Excluding the information explicitly covering enhanced delivery requirements for ***Bentley GEOPAK™*** & MnDOT Visualization CADD Data Delivery Specifications, all information in this web site are to be considered Level 1 Basic CADD Data Delivery Specifications. The ***Bentley GEOPAK™*** & MnDOT Visualization sections outline the requirements to meet the Level 2 "Enhanced CADD Data Delivery Specifications" that may be called for by the project manager or within the contract language in the case of consultant work.

GEOPAK™

GEOPAK™ is MnDOT's CAD engineering software. To meet the MnDOT Level 2 "Enhanced" CADD file standard the file(s) must meet the specifications defined in this document section.

In general, all GEOPAK–related files needed to regenerate any part of the design should be included in the deliverables to MnDOT. This includes, but is not limited to, GPK files, input files, criteria, auto-shape input files, sheet quantities files.

All of MnDOT's publicly available GEOPAK resources referenced in this document are found at (http://www.dot.state.mn.us/caes/index.html#geopak)

GEOPAK™ STANDARD SPECIFICATIONS

General

Each project shall have only one geometrics database, i.e. .GPK file. This one database will contain all alignments, profiles, and other elements necessary to derive the final geometrics. Alignments are required for all roadways, cross streets, retaining and noise walls, and other structural items. Profiles names should match the alignment names in cases of roadways. Top and bottom of walls and other structures should reflect the respective alignment. Ditch profiles are also to be stored in the database. Roadway alignments and profiles will include inplace as well as proposed where appropriate.

Field collected survey information (in the form of points and survey chains should also be included within the .GPK file. The Project Manager may approve the use of a second .GPK file for this information for large projects.

Documentation of the project geometrics should include a chart relating alignments and profiles in an approved spreadsheet format. All profiles and alignments within the database shall be included within the spreadsheet.

Design Files

The placement of all elements and text (including size) within a design file must conform to the MnDOT databases and MnDOT CADD Data Standards. This includes, but is not limited to, databases for the following GEOPAK tools:

- Design Database (DDB) Design and Computation Manager.

- Survey Manager database for field collection and use in the Survey Manager tools

- Legal description editor

- Drainage Library

Right of Way and Utility placement on cross sections: When utility and right of way information is placed on cross sections, the standard MnDOT cross section cell library will be utilized.

Generation of existing ground lines: When generating existing ground, a horizontal tolerance and a filter tolerance must be specified.

	horizontal tolerance	filter tolerance
English	0.3 feet	0.1 feet

This limits the creation of minute ground line elements, which impede the processing of proposed cross sections and may produce erroneous results in earthwork, while retaining accurate elevation data. Existing ground lines should subtend the limits of the topographic or digital terrain model corridor. GEOPAK™ cells should be a minimum of 10 master units past the ground line. Horizontal distance between cross sections and their component elements should be a minimum of 100 master units, measured from the right edge of the left cell to the left edge of the adjacent cell to its immediate right. The vertical distance between cross sections should be a minimum of 600 master units as measured from center of cell to center of cell.

Project Manager

The use of GEOPAK Project Manager is not mandatory, however, if it is utilized for project design, the appropriate files required to open and review all runs within the project must be included in the deliverables.

Project Setup

The existing ground lines, pattern lines, and shapes must be color coordinated for facilitation of proposed cross section processing. A cross section match line, when multiple alignments are utilized, must be supplied, in addition to the actual pattern line file. The match line diagram should have each pattern line labeled with the station. Symbology of the text should match the pattern line.

Superelevation

Shapes must be color coordinated to pattern lines. In addition, a visual difference between dependent and independent shapes must be utilized. Shaping should be done for all roadways, acceleration and deceleration lanes, truck climbing lanes, but should exclude shoulders, except by approval of the Project Manager.

Staged Construction

If staged earthwork or staged cross sections are required and earthwork cannot be computed on a single set, a separate working cross section file must be provided for each stage where earthwork is to be computed. For single set sections showing multiple stages, appropriate excavation limits must be drawn and separate earthwork input and log files must be delivered.

Cross Section Files

Each alignment must have its own set of cross sections with the exception of a multiple configuration which may be on the same set of sections. The maximum number of cross sections per file is 500, unless earthwork balancing is required. If an alignment has less than ten sections such as cross streets, it may be combined with other alignments; however the total number of cross sections for these files should not exceed 100. A viable GEOPAK™ cross section cell (i.e. recognizable by the GEOPAK™ Cross Section Navigator dialog) must be present on each cross section at the correct location.

Cross sections will be labeled according to MnDOT criteria. The element symbology of all cross section elements shall be dictated by standard MnDOT criteria, or if standard criteria is not available, the design databases shall be utilized. Under no circumstances will the top and bottom layer of any cross section feature have identical symbology including pavement features. Separate layers shall be

provided for each aggregate. Inplace features, including but not limited to topsoil, pavement and shoulders shall be drawn on the cross sections, if they affect earthwork quantities.

If cross section elements are generated with criteria generated or modified by the contractor, a copy of the criteria shall be delivered to MnDOT to use in its standard library. The standard variables (as listed in the sys*.var and project*.var) shall be used.

Earthwork

Earthwork shall be processed to a tolerance of 0.003 m (or 0.009 ft.) and all input, log files and sheet quantities files shall be included. The results of the log files must be consistent with the graphic cross sections. Add volumes are permitted for unique circumstances on the project, i.e. driveway grave gravel quantities, but shall not be used in lieu of graphic elements for consistent trends in the sections, i.e. pavement or topsoil removal. Comment lines added into the input file for each add volume shall specify the justification for the adjustment. Under no circumstances should existing features or proposed features extend beyond the limits of the GEOPAK™ cell. Earthwork shapes utilizing color stratification shall be included for all cross section files.

Match lines are permitted where necessary to match to adjoining alignments; however, they may not be placed where they dissect a superelevation shape. When placed for sheet separation, the original cell must be left intact. GEOPAK™ cross section cells should extend a minimum of ten master units beyond any cross section elements.

Proposed Cross Sections

All criteria files shall be provided so that if cross sections are re-run, they will coincide with provided sections for a minimum of 90% of the elements on the cross sections. An ASCII file denoting manual changes and the reason for changes shall be included. If manual changes are made, the appropriate construction text must be moved to the adjusted vertex.

All cross sections shall have text placed on the standard level "CNST TXT" to facilitate construction staking report creation. Text shall be standard text size, color 16 and line style zero. The text shall be center-center justified on the vertices of the elements and correspond to the marked point assigned in criteria. Centerline vertices must always have text. Bottom and top of pavement, and top of curb must also be marked. For inplace features, no text is required for topsoil removal elements. Muck, peat, and other layers affecting earthwork must be marked at the outer, lower limit and the tie down point with existing ground. Utilizing MnDOT criteria will address these standards. The specification of marked critical points and construction points can be found in the files Points.txt and Consttxt.doc and in the downloadable compressed file MNDOTV8GEOPAK.ZIP

Digital Terrain Modeling

The .TIN file shall be in GEOPAK™ binary format and its size shall not exceed 30 megabytes for traditional TINs and 150 megabytes for LIDAR or other imaging software. Any TIN files larger than these specifications must have prior approval by the Project Manager. Any supplemental information to the original .TIN (i.e., filling of voids) shall be incorporated into the .TIN and GEOPAK™ .DAT file(s) provided. All .TIN files must be GEOPAK™ validated (via Utilities > Check Triangulation) and the hull and voids must be displayable.

Corridor Modeling

The cm.dgn file shall include the proposed Model and any associated terrain, Corridor Modeling Superelevation is to be included as a model of the dgn or in a separate attached dgn. A project InRoads template library (.itl) is also to be included with the project files.

Tabulations

Any tabulations including but not limited to locations or quantities, should be delivered in the spreadsheet format, in addition to within the MicroStation file.

DATA TRANSFER DOCUMENTATION

Whenever CADD files are transferred between parties or functional areas as part of the project development process, a written record of the transaction must be created that specifies the associated project and the nature and content of the files.

Electronic "README" informational files used in lieu of paper documentation for CADD files will be ASCII format.

DATA FILE CHECK- LIST TO BE INCLUDED WITH DATA TRANSFER:

1. State Project Number
2. File Naming Codes that may have been used
3. Project Manager including contact information.
4. Designer/Draftsperson including contact information.
5. File history, revision dates, etc.
6. Directory structure-for reference files & archive information
7. All Reference file information including names, attachment details, etc.
8. Plotting notes
9. GEOPAK database information

It is very important that this information be included in all data exchanges. The file structure (reference file directory tree organization) and set-up parameters used to recreate plots and database relationships (GEOPAK™ Jobxxx .GPK) must be maintained.

DATA EXCHANGE FORMAT

The specific hard medium used for the physical, non-network, transfer of data must be specified. This should include file medium type (CD, DVD, etc.) general recording format and any compression formats. Both parties of a data exchange transactions should maintain a record of the formats agreed to and their intended use as part of the project documentation.

FILE COORDINATE SYSTEMS

MnDOT files are drawn in real world coordinates. The type of file that you are working in will dictate what coordinate system to use. The normal highway detail design or pre-design file will be in a County Coordinate system. State and Street series mapping files are usually drawn in State Plane Coordinate system. Some projects may be available with Universe Transverse Mercator. Contact the district surveyor or project manager to determine which system is acceptable for the project.

BASIC ELEMENT INFORMATION

OVERVIEW

MnDOT CADD files are to be considered models or real maps. Files should not be broken into sheets but drawn as contiguous layouts, maps, models, etc. MnDOT uses reference filing across the functional areas. Each area creates file information with specific levels and symbology allowing files to be added to or "stacked" as reference files to compile full engineering maps and models.

The files need to be created using base elements. *Bentley MicroStation or POWER GEOPAK*™ lines and arcs are generally the only element types needed. A filet as opposed to a curve, for example, is the preferred method of drafting a highway center line alignment. The fillet is a circle segment with endpoints and a radius point, as opposed to the curve which is a point to point chord approximation of the alignment. Automated software usually requires base elements for computation and manipulation. Complex *Bentley MicroStation or POWER GEOPAK*™ file elements (complex element chains, stream curves, etc.) are not to be used unless specified as a deliverable standard under this site or required by the unit or project manager. Cells, custom lines, and patterning are not considered complex elements within this context.

MnDOT CADD files are to be considered working engineering drawings with the appropriate accuracy, meaning exact mathematical models with only the computer pixels limiting their graphic accuracy, generally to be plus or minus 0.001 feet.

Actual computational accuracy is dictated, at times, by software but will always be expected to meet or exceed industry standards. (AASHTO, MnDOT, etc.)

BASIC DESIGN FILE SETTINGS

Units: All MnDOT road design and related project file measurement units will be specified on a project by project basis. The default measurement system is English.

Coordinate Readout: 123456.789 using X, Y, Z.
Angular Measurement: DD.MM.SS or DD.DDDD as required
Station Format: 1+12.123 for English.
Direction: Use Azimuths and Delta,
Active Angle: 0 Degrees @ azimuth of 90 Degree

DESIGN ELEMENT SIZE & SCALE

MnDOT's File structure and setup assumes drawing design elements as they exist in the real world. Scaling is handled in the plotting environment. MnDOT does most plotting with *Bentley*™ *InterPlot*™ software.

Existing CADD standards for annotation, custom line styles, scalable cells and are based on a base scale of foot per foot. The typical drawing scale for new Plan files should be 1:100, Cross Sections set at 1:20. Do Not use 1":100' or 1":20' or the elements will be scaled at a factor of 1:1200 or 1:240 respectively.

Office of Transportation Data and Analysis - GIM/Cartographic unit creates mapping files that may have different factors to consider and may vary from above. Contact the unit or project manager to determine the parameters and methodologies for your specific need.

Map files used as index maps, for example on the title sheet, are scaled in the reference file attachment.

ELEMENT ATTRIBUTES – CADD SYMBOLOGY

CADD file graphic symbology shall meet the current published standard MnDOT symbology as specified under the MnDOT CADD Data Standards web site on the day of contract acceptance for consultants or on the day of project initiation for MnDOT staff, and as will meet either Level 1 or Level 2 as required by MnDOT specification. Printed copies of the standards data from the web site must always be considered questionable when attempting to establish the correct version of the standards applicable. Copies of the web site material are valid for establishing the content on a specific date; however MnDOT records are the final determinant when questions arise.

Additional CADD graphic symbology resources provided by MnDOT include ***Bentley MicroStation™ or GEOPAK™*** format:

Cell libraries, which are symbolic graphic representations of common items used in drafting and design by the MnDOT functional areas. Some cell libraries are used throughout MnDOT, others are functional area specific.

Fonts – Contains the approved graphic text (fonts) allowed in MnDOT files.

Custom Line Style – Contains the approved custom line style definitions.

ELEMENT DISPLAY AND PLOTTING

MnDOT does not, at this time, specify or provide pen tables used for plotting to external clients. Because of the variety of plotting solutions, each external consultant is expected to have the necessary expertise in using their plot system to match MnDOT publication requirements. The primary evaluators for published black and white documents are (1) the printed width of MicroStation elements of specific weights and (2) text sizes based on plot scale and hard-copy size. For color plotting, source graphics are displayed in the correct screen color using the MnDOT Standard color table. Color plotting to hard copy should be verified with the project manager to verify that hard copy color meet and support the intended use for the document. The MnDOT Standard color table is available within the MnDOT CADD Standards downloads. This file may be used as a common base for color plotting. The color number is the critical specification for element attributes when setting color. The color number specified in the element is expected to be followed, regardless of how the operator defines the color to appear on computer screen. Plotting will not be addressed because of the large range of plotting hardware and plotting techniques.

PLOTTED LINE WORK - WEIGHT GUIDE

Use this as a cross reference for evaluating your plotter output, based on sheet size, when generating plans for delivery. MnDOT does not exceed line weights of 6 in published sheets.

The table below is based on a base weight of 0.00167 and delta of 0.00333

MNDOT LINE WEIGHT GUIDE FOR 11 X 17 PLOTTED SHEETS		
LINE WEIGHT	PLOTTED LINE WIDTH IN INCHES (IN)	PLOTTED LINE WIDTH IN MILLIMETERS (MM)
WT = 0	0.00167	0.0425
WT = 1	0.00500	0.1275
WT = 2	0.00833	0.2125
WT = 3	0.01167	0.2975
WT = 4	0.01500	0.3825
WT = 5	0.01833	0.4675
WT = 6	0.02167	0.5525
WT = 7	0.02500	0.6375
WT = 8	0.02833	0.7225

TEXT SIZING GUIDE(S)

This is the sizing guide for general text placement in MicroStation files. The sizes indicated are MicroStation file units. In English files the units are feet. These text sizes were developed based on plotting test files to 11" x 17" sheets. Title Sheet borders are an exception to this size limitation in order to allow the use of cartographic reference files for project area location. The line spacing information for placement of notes that require multiple lines of text is based on 2/3 (67%) the text height. The final condition of these guides is that text is to be placed in the file at the font, level, weight, color and line style in which it will be plotted. Element properties should not to be altered through the use of a pen table. Black and white color tables may be called out for black and white plotting. These are the only text sizes permitted for use.

If it is necessary to produce plans at a scale not specifically addressed by this chart, the user is required to use a multiple of the values in this chart. This chart governs text sizes for intended plot scales ranging from (1" = 1') to (1" = 500') English. The smallest size text on the chart is reserved for Surveys point numbering only. It is not to be used for any other text placement in any design file.

There are versions of this table for some of the functional groups that have identified what each size of text is to be used for (title block, existing feature label, etc.). Verify that you have located the chart that is appropriate for the type of file you are working on.

MnDOT English Text Size Guide - General For 11 x 17 Plotted Sheets											
Design	**Hydraulics**	**Land Management - Right of Way**	**Land Management - Survey**	**Materials / Soils**	**Site Development**	**Traffic**	**1:1**	**1:20**	**1:50**	**1:100**	**1:200**
			Surveys Point Feature				0.020	0.400	1.000	2.000	4.000
				Plan View - Borehole Number			0.040	0.800	2.000	4.000	8.000
Inplace or Existing Text - Plan, Profile & XS (Removals)				Profile & XS - Stratum Description, Water Depths	SP# in Title Block		0.050	1.000	2.500	5.000	10.000
Proposed Text - Plan, Profile & XS (i.e. lane widths, general labeling)	Inlet Drainage Area Information, Structure Labels			Profile & XS - Column Label		General Labels - Minimum Text Size	0.063	1.250	3.125	6.250	12.500
Alignment Stationing, Profile Labeling	Hydraulic Notes (Included in Plan)				General Labeling		0.075	1.500	3.750	7.500	15.000
Alignment, Profile & XS Names, Larger Labels		General Labels - Easements, Railroad, RW	General Labels		Note Indicator, Title Block Labels		0.010	2.000	5.000	10.000	20.000
Title block in Lower Right Corner	System Drainage Area Information	Parcel Flagging and Caption Blocks			Detail Identifier		0.125	2.500	6.250	12.500	25.000
							0.188	3.750	9.375	18.750	37.500
							0.250	5.000	12.500	25.000	50.000

FILE NAMING CONVENTION FOR CADD FILES

Mn/DOT's file naming convention utilizes five components (1) an identifier for the owner functional group; (2) the state project or identifier number; (3) the file type designator, (4) the base file or sub file identity, and (5) the software file extension. The tables following describe the application of component (1) and (2). Consultants use the same system with the addition of a preceding"C" as defined in the second table.Functional Group Identifier and Project Identifier

The list below defines the first character(s) that will be applied to a CAD file names when creating files that contain information and data controlled by the functional group indicated.

FUNCTIONAL GROUP IDENTIFIER	PROJECT IDENTIFIER	FUNCTIONAL GROUP
A	State Project #	State Aid
BR	Bridge #	Bridge
C	State Project #	Construction
D	State Project #	Detail or Final Design
F	State Project #	Maintenance
G	State Project #	GIS
H	State Project #	Hydraulics
LA	State Project #	Landscape Services
M	State Project #	Soils/Materials
P	State Project #	Transportation Planning or Preliminary Design
PH	State Project #	Photogrammetric
R	State Project #	Right of Way
S	State Project #	Surveys
S	Plate/Plan #	Design Standards (used no State Project number) - Generated by MnDOT internal only.
SD	State Project #	Site Development
T	State Project # (TMS, Lighting, Signing, Work Zone) or Intersection master/system # (Signals)	Traffic

FILE NAMING – FILE TYPE DESIGNATORS

The following table describes the File Type Designator. File type designators assign engineering data to specific files under a functional group. BASE files and SUB files extend those file type designators for sorting project data. BASE files represent major divisions of the project as deemed necessary by engineering staff. SUB files are divisions of the BASE files. If all appropriate data can be contained and shared in a single working BASE file (d934521_cp.dgn) effectively, then the BASE and SUB designators are not used. If the project is complex or large enough, it may be necessary to split the single project data into two or more project BASE files (d934521_cp.dgn becomes d934521_cpA.dgn, d934521_cpB.dgn), BASE files are designated by ALPHA characters. SUB files for BASE files may be named as NUMERAL additions (d934521_cpA.dgn becomes d934521_cpA1.dgn, d934521_cpA2.dgn, d934521_cpA3.dgn).

All functional groups will use the same V8 file designators in common. For example, any functional group that needs to create an "As built" plan will name it with the "_ab.dgn" designator. Example: Traffic = **t**283917**_ab**.dgn, Design = **d**283917**_ab**.dgn.

DESIGNATOR	DESCRIPTION
_ab.dgn	As built
_abt.dgn	Abutments details and reinforcement
_al.dgn	Alignment
_apl.dgn	Annotated planimetric, annotated topo
_app.dgn	Bridge approach panels
_atr.dgn	Automatic traffic recorders
_aut.dgn	ROW authorization map
_bdg.dgn	Building sketches
_bdr.dgn	Plan sheet borders for plotting
_bip.dgn	Bridge Input sheet, bridge survey sheet with grid embedded not referenced
_bp.dgn	Bypass plan
_bpp.dgn	Bypass plan profile
_brm.dgn	Building removal sheet
_bs.dgn	Bridge sign design
_cc.dgn	Control cabinet (r)
_cl.dgn	Color layout shapes for preliminary design plotting
_cn.dgn	Contours 2d/3d proposed or inplace by level
_cny.dgn	County map
_cp.dgn	Construction plans

DESIGNATOR	DESCRIPTION
_cty.dgn	City map
_dd.dgn	Details, Functional group Details B-Details, standard sheets, systems (Power, lighting, phone, signals), As-Built bridge data sheet
_des.dgn	Caption blocks
_dl.dgn	Detour layout
_dr.dgn	Drainage plans with profiles
_dsa	Drainage summary, casting Assemblies summary
_dt.dgn	Drainage tabulations & profile
_dtm.dgn	Digital terrain model (Binary/Graphical)
_ec.dgn	Erosion control environmental documentation tabulations, permanent erosion control & turf establishment plans
_est.dgn	Estimated quantities
_erw.dgn	Existing Right of Way
_exh.dgn	ROW exhibit - base and sub files
_exp.dgn	Expansion device details
_fe.dgn	Fencing plans
_fea.dgn	Existing and proposed site features
_fip.dgn	Field Input file (surveys origin), land corners-
_fmp.dgn	Final R/W maps
_fs.dgn	Freeway signing
_gl.dgn	General layout
_gm.dgn	Geometric layout base plan
_gr.dgn	Guard rail
_hyd.dgn	Drainage design information, areas and notes
_hyo.dgn	Drainage design information from non-MnDOT sources
_hyp.dgn	Drainage analysis profile graphics
_in.dgn	Intersection details - plan and profile
_ind.dgn	Index map
_ip.dgn	Interconnect Plan based on Master ID
_ld.dgn	Lighting details
_lid.dgn	Limits of Lidar coverage for GIS use

DESIGNATOR	DESCRIPTION
_lim.dgn	Const. limits
_lit.dgn	Composite lighting file for small project areas may incorporate the ld#, ll#
_ll.dgn	Lighting layouts
_ln.dgn	Landscaping
_map.dgn	ROW plat layout map
_md.dgn	Soils boring, material data,
_ml.dgn	Matching of extended plan data for Traffic Signals
_mod.dgn	3d model of proposed surface (may have inplace)
_obs.dgn	Obscured area or voids file
_ord.dgn	Title map (for attorneys), graphic commissioner order
_orw.dgn	Original Right of Way
_pa.dgn	Cross section pattern file
_par.dgn	ROW parcel sketch
_pcb.dgn	Concrete beam details
_pho.dgn	Limits of project coverage for GIS use
_pir.dgn	Pier details and reinforcement
_pj.dgn	Pavement joint layout
_plc.dgn	Traffic sign placement
_pln.dgn	Landscape plan sheets, photo/surveys planimetric,
_plt.dgn	R/W b-corner file, or (Final mapping) used to house a collection of r/w plat documents from districts, work in progress, or (Metro) ROW plat
_ply.dgn	polygons or shapes for area computations with attached GIS tags
_pm.dgn	Pavement marking plan
_pr.dgn	Profile file
_pre.dgn	Preliminary bridge plan
_prp.dgn	Property location file
_ps.dgn	Permanent signing (C & D signs)
_pst.dgn	Staging profile
_pt2.dgn	TMC graphics file
_qm.dgn	Quantities manager elements also to hold funding splits
_qud.dgn	Digitized U.S.G.S. topographic maps

DESIGNATOR	DESCRIPTION
_r.dgn	Signal plans
_ral.dgn	Railing, median details
_rdl.dgn	Redline
_rem.dgn	Removals
_rep.dgn	Repair
_rm.dgn	Ramp metering
_row.dgn	ROW final map
_s12.dgn	General plan and elevation, bridge layout, variable super charts, quantities
_sch.dgn	Traffic management schematic plan
_scn.dgn	Soils and construction notes
_sd.dgn	Signal details
_se.dgn	Superelevation, charts, profiles, Hatching
_sgl.dgn	Signal Plans that include layout, wire diagram, signing for signals, details, matchline, interconnect plan for an entire project in one file
_sgn.dgn	Signing plans
_sh.dgn	GEOPAK™ pavement superelevation/Slope mapping shapes
_sig.dgn	Composite signal file for archiving, etc.
_sit.dgn	Existing and proposed site base map
_sl.dgn	Signal layouts
_sp.dgn	Sign panels
_spn.dgn	Standard plans
_sq.dgn	Signal quantities
_ss.dgn	Signal signing
_ssd.dgn	Standard sign drawings
_std.dgn	Standard details
_stg.dgn	Staging plans
_stl.dgn	Steel: beams, framing detail, etc.
_stp.dgn	Striping plans, signing and/or striping plan
_str.dgn	Structure details

DESIGNATOR	DESCRIPTION
_sup.dgn	Superstructure, deck plan, framing plan, beams, railings, standard and b-detail sheets, Integral diaphragm, deck transverse and longitudinal sections, sidewalk and median sheets
_sur.dgn	Bridge survey: plan and profile
_svz.dgn	Site-GEOPAK visualized features including ponds, lots, facilities
_sw.dgn	Sanitary, Water profiles tabulations
_sys.dgn	Systems: power, lighting, phone, signals, TMC, etc.
_tb.dgn	Tabulations, Index of standard plates, General Notes
_tbk.dgn	ROW turn back map
_tc.dgn	Traffic control and traffic control for Work Zone
_te.dgn	Turf establishment
_tie.dgn	Tie sheets
_tmc.dgn	Traffic TMC graphics file
_top.dgn	Topographic file
_tpg.dgn	Test point graphics
_tr.dgn	Trees - protection, transplants, etc.
_trk.dgn	Truck station
_ts.dgn	Typical sections
_tsh.dgn	Title / cover sheet
_tsm.dgn	Title spotting map
_tum.dgn	Title and utility map
_ut.dgn	Utilities
_wd.dgn	Wiring diagrams
_wkm.dgn	ROW/District work map
_wn.dgn	Walls - noise profiles, tabulations, etc.
_wr.dgn	Walls - retaining, profiles, tabulations, etc.
_wrn.dgn	Water resource notes
_wet.dgn	Legally delineated wetland areas
_xp.dgn	Cross section plotting or "Sheet" files
_xse.dgn	Extended Cross section runs (culverts, entrances. Intersections) that will not be plotted to sheets
_xs.dgn	Cross section files - cross section files
_xsl.dgn	Cross section layout

Additional File Extensions Related to CAD

DESIGNATOR	DESCRIPTION
.cel	MicroStation cell library
.cri	GEOPAK criteria file (ascii text)
.dat	XYZ coordinates (Binary or ASCII)
.dgn	General design files
.dgnlib	Level library
_drf.dgn	Drainage file ascii text
.dxf	Auto-Cad design file
.dwg	Auto-Cad design file
.gpk	GEOPAK Geometric database file(Binary)
.inp	Input file Ascii text English
.ips	Interplot Organizer settings files
.lps	Landscape Plant Selector
.itl	InRoads Template Library
.mnu	MicroStation function key menu
.plt	Plot driver for MicroStation (not a Design file)
.rsc	MicroStation font or line style resource file, GEOPAK dialog box entries resource
.tin	Triangulated Irregular Network (binary digital terrain model)
.var	GEOPAK Variables file Ascii text

FILE NAMING FOR CAD FILES STORED TO ELECTRONIC DOCUMENT MANAGEMENT SYSTEMS AS RECORDS

The following naming standards are designed to address a requirement to insert records of project development benchmarks into the electronic document management system (EDMS). Two types of documents are currently identified to be inserted into the EDMS. They are the 1) Staff Approved Layouts and 2) Final Plan Sets. Below are the formal naming conventions that will be used.

Staff Approved Layouts saved as PDF format files for EDMS.

These will be saved as a PDF file format with the following naming convention:

SPSPSPSP_Staff_Approved_Layout.PDF

The "SPSPSPSP" represents the state project number. The entire Staff Approved Layout will be saved as a single PDF file representing what would normally be printed as a single roll plot. When it is deemed necessary to create two (or more) separate plots of the project data (long projects or curved projects for example) each of those separate plots will be included as separate pages in a single PDF.

Final Plan Sets saved as PDF format files for EDMS.

These will be saved as a PDF file format with the following naming convention:

SPSPSPSP_Final_Plan_Set.PDF

The "SPSPSPSP" represents the state project number. The entire Final Plan Set will be saved as a single PDF file with individual pages for each sheet of the plan set.

For both the Final Plan Set and the Staff Approved Layout, tracking of versions or later submissions of updated information will be done through the EDMS.

COLORTABLE

MnDOT has established a color table for the purpose of standardized display colors. Because MnDOT adheres to the American Disabilities Act in its workplace, color tables are not mandated as a standard for working in a CAD file. Color numbers, however, are a standard. Individual users may adopt their own color table to alleviate problems with color blindness or eye-strain. Accepting that, MnDOT stipulates the following requirements for the use of color tables in relation to display and publication.

- Regardless of the color table attached to a file for the individual users benefit or requirement, all elements color attributes will be assigned with the designated color number according to published MnDOT GEOPAK database standards.
- When files are shared with other functional groups as a finished product, the MnDOT Standard color table will be attached.
- When creating color plots, the standard color table will be specified for the generation of the color plot.

MnDOT's color table has established specific color numbers that are used for color publication by functional groups. Those colors RGB values are considered "locked" in that they will not be changed. This guarantees that published color plots containing data and elements from multiple functional groups are published in their intended colors.

COLORPLT04.TBL - Functional Group Required Display and Plotting Colors

POINT NUMBERING GUIDE

The following guide is used throughout the project delivery process to track point numbers.

POINT NUMBER RANGE	EXISTING OR PROPOSED NUMBERS	INFORMATION AT THE POINT
0001-0599	Existing	Horizontal Control Points
0600-0899	Existing	Photo Control
0900-0999	Existing	Bench Marks
1000-1999	Proposed	Proposed Alignment Points
2000-2999	Existing	Existing Alignment Points
3000-3999	Proposed	Property Lines & Right of Ways
4000-4999	Existing	Property Lines & Right of Ways
5000-5999	Proposed	Utilities
6000-6999	Existing	Utilities
7000-7999	Existing	Soils Boring Holes
8000-8999	Proposed	Bridge Working Points
9000-9999	Existing	Vertical Elevation Points
10000 & Greater	Existing	Conventional Cross Sections