MCDOT

CADD

Standards

FOR MICROSTATION V8i

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Maricopa County
Department of Transportation
2901 W. Durango Street
Phoenix, Arizona 85009

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PART I
SUBMITTAL GUIDELINES

1.1 MCDOT CADD STANDARDS

Originator: Engineering Division

INTRODUCTION

The Maricopa County Department of Transportation (MCDOT) Drafting Guidelines for MicroStation V8i sets forth requirements and regulates all CADD production by MCDOT personnel, consultants, and contractors.

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PURPOSE

The purpose of this document is to define the rules and regulations, and guidelines for visually communicating a project design.

APPLICABILITY

These standards shall apply to electronic drafting files associated with construction and reconstruction plans of transportation facilities.

AUTOCAD

AutoCAD DWG or AutoCAD DXF is not an acceptable file format at this time.

1.2 SUBMITTALS

Originator: Engineering Division

For most projects, there are two types of submittals required with a submittal. The first is a hard copy submittal and the second is an electronic file submittal. For specific submittal requirements, refer to the project scope of work.

ELECTRONIC SUBMITTALS

Electronic submittals consist of an "electronic project" on approved media. Refer to the "electronic project" section of this manual and the project scope of work for specific requirements.

Submittal Media
External hard drive with USB interface connection
Compact Disc (CD)
Digital Versatile Disc (DVD)

NOTES
Submitted media will not be returned.
Other media may be delivered as approved by MCDOT

1.3 ELECTRONIC PROJECTS

Originator: Engineering Division

Digital information associated with a project from conceptual design to as-built plans will be stored in an electronic project. The directory structure of an electronic project will be used to store the CADD graphics files, survey, and engineering data files. Digital terrain models, project transmittals, letters, memos and spreadsheets are also stored in an electronic project. The directory will be archived in its entirety to preserve the complete project.

ELECTRONIC PROJECT COMPONENTS

At the highest level, an electronic project consists of four main directories and their files below a project directory (the picture below shows the directory structure of an electronic project).

Figure 1 electronic project Directory Structure

DIRECTORIES & FILES

Electronic project directories group together a general type of project file. The table below lists the directory name and a description of the type of file that the directory contains.

Table 1 Electronic Project Directory Names

Directory Name	Directory Content / General File Type Description
data	Any file that is not directly used with the design graphics, i.e. correspondence, transmittals, email messages, reports, etc.
designsupport (Design Support)	Files that are used in coordination with design graphics files such as InRoads files, or MicroStation resource files
dgn (Design Graphics)	Any MicroStation DGN file that is used in plan set production
plot	A PDF file for each sheet in a set of plans or files used to configure a printer/plotter

DIRECTORY RESTRICTIONS

Each of the main directories in an electronic project has certain rules that must be followed in order to meet the minimum requirements. There are four directory restrictions in an electronic project.

Table 2 Directory Restrictions

Name	Description
File Type Restriction	The file type restriction limits the types of files allowed in the directory. All directories have a general file type restriction based on the name of the directory.
File Name Restriction	The file name restriction constrains the name of the file to the MCDOT file naming convention.
Subdirectory Restriction	The subdirectory restriction limits whether or not subdirectories may be created in the directory. All subdirectories inherit the restrictions of their parent directory. Subdirectory names must describe the content that is contained within them.
File Content Restriction	The File Content restriction limits the type of content within the file.

PART II
ELECTRONIC PROJECT CONTENT GUIDELINES

1.4 DIRECTORY CONTENT GUIDELINES

Originator: Engineering Division

OVERVIEW

The content guideline sets forth rules and restrictions that apply to the content in an electronic project. The guideline is divided into two parts, the first part discusses the directory content and the second part describes file content.

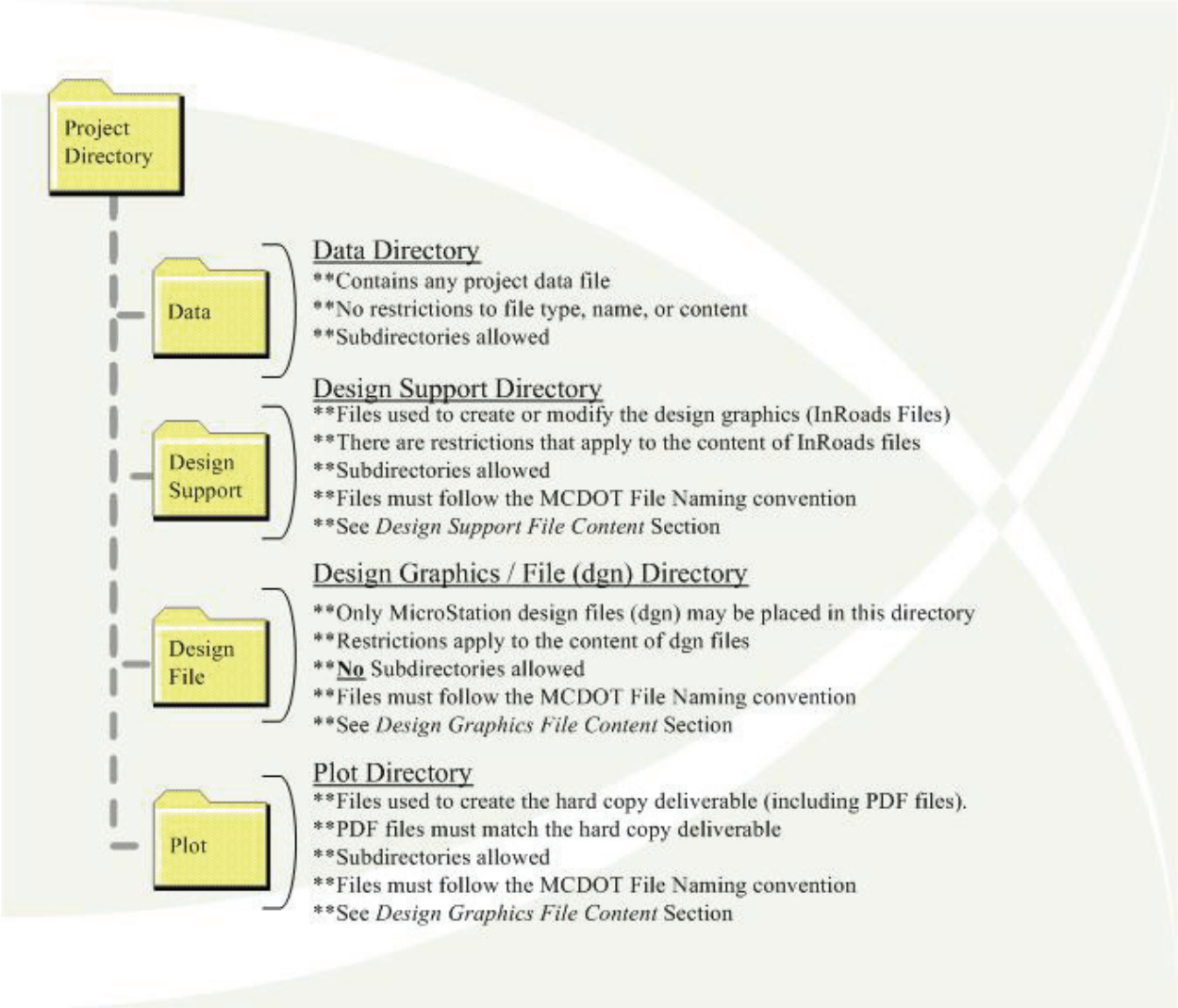


Figure 2 Electronic Project Content

ELECTRONIC PROJECT DIRECTORIES

Electronic project directories are used to group project files. Initally, there are five directories in an electronic project. The user has the ability to create unlimited subdirectories in three of the five main project directories.

PROJECT DIRECTORY

The top-level directory of an electronic project is the work order number assigned to the project by MCDOT.

PROJECT DIRECTORY RESTRICTIONS

Table 3 Project Directory Restrictions

Name	Constraints	Description
File Type	N/A	No Files shall be placed in the project directory.
File Name	N/A	No Files shall be placed in the project directory.
Subdirector y	Yes	No Subdirectories, other than the four main directories, shall be created in the project directory.
File Content	N/A	No Files shall be placed in the project directory.

DATA DIRECTORY (DATA)

The data directory contains project data not specifically associated with the design file graphics (i.e. correspondence, memos, transmittals, reports, etc.).

DIRECTORY RESTRICTIONS

Table 4 Data Directory Restrictions

Restriction Name	Constraint s	Description
File Type	No 1	Any file may be placed in the data directory.
File Name	No	The MCDOT File Naming convention is recommended but not required on files in the data directory.
Subdirectory	No	Any subdirectory may be created below the data directory
File Content	No 2	There are no restrictions on the content within a file in the data directory

[1] MicroStation DGN files may be placed in the data directory only if they are used for exhibits or report figures and are not attached as a reference file to a file in the dgn directory.
[2] Refer to the Project Scope of Work for additional File Content restrictions that may apply.

DESIGN SUPPORT DIRECTORY (DESIGNSUPPORT)

The Design Support directory includes all files used to support the design file graphics. Examples of design support files include all existing and proposed digital terrain models, geometry alignments, ASCII survey files, etc.

DIRECTORY RESTRICTIONS

Table 5 Design Support Directory Restrictions

Restriction Name	Enforced	Description
File Type	Yes	The type of file must be used in the creation and/or modification of the design file graphics, (InRoads, Conspan, Leap, etc.).
File Name	Yes	The MCDOT file naming convention is required.
Subdirectory	No	Subdirectories are permitted.
File Content	Yes	Most design support files have a restriction, see the Design Support File Content section.

COMMON DESIGN SUPPORT FILE TYPES

The table below lists some of the common design support files.

Table 6 Common Design Support File Types

INROADS FILES		
Name	**File Ext**	**Purpose**
Alignment	alg	Stores project horizontal and vertical alignment geometry data.
Surface	dtm	Stores existing and proposed 3D features data
Template Library	itl	Stores project typical section templates
Roadway Design	ird	Defines corridors and decision logic for a roadway using the project alignments and templates.
XML Report	xml	An InRoads generated XML report file
InRoads Drainage	sdb	Stores project drainage information
Survey Field Book	fwd	An InRoads Survey field book file
Preference File	xin	An InRoads preference file

Table 7 Common Design Support Resource File Types

COMMON DESIGN SUPPORT RESOURCE FILE TYPES		
Name	**File Ext**	**Purpose**
User Configuration File	ucf	A MicroStation Configuration File
Project Configuration File	pcf	A MicroStation Configuration File
Design File Library	dgnlib	A MicroStation Resource file
Symbol Resource	rsc	A MicroStation Resource file
MicroStation Cell Library	cel	A MicroStation Resource file
MicroStation Color Table	tbl	A MicroStation Resource file

DESIGN FILE DIRECTORY (DGN)

The design file directory is where all MicroStation DGN files are stored. It provides a single location for all project DGN files with the intent that no reference files will have broken paths if they are all located in the same directory.

DESIGN FILE DIRECTORY RESTRICTIONS

Table 8 Design File Directory Restrictions

Restriction Name	Applied	Description
File Type	Yes	Only DGN files shall be placed in the design file directory.
File Name	Yes	The MCDOT file naming convention is required.
Subdirectory	Yes	No Subdirectories shall be created in the design file (dgn) directory.
File Content	Yes	Content restrictions apply to all design files.

PLOT DIRECTORY (PLOT)

The plot directory contains PDF files created using the MCDOT PDF plot configuration file (see Plotting section).

PLOT DIRECTORY RESTRICTIONS

Table 9 Plot Directory Restrictions

Restriction Name	Applied	Description
File Type	Yes	Only PDF files and configuration files used to create them shall be placed in this directory
File Name	Yes	The MCDOT file naming convention is required.
Subdirectory	No	Any subdirectory may be created below the design support directory provided it is named correctly.
File Content	Yes	Content in a PDF plot must exactly match the hard copy delivered.

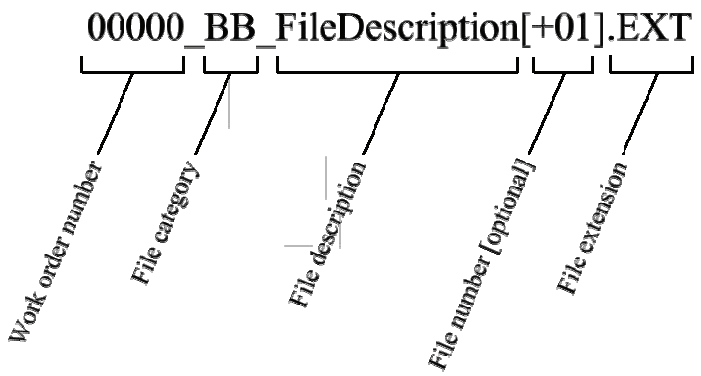
Table 10 Common Plot File Types

Name	File Ext.	Purpose
Adobe Acrobat	pdf	An electronic copy of the submitted hard copy plan set.
MicroStation Plot Config	pltcfg	File containing specified properties of your printed output
MicroStation Pen Table	tbl	ASCII text files that contain instructions for resymbolizing the printed output of design files

1.5 FILE NAMING CONVENTION

Originator: Engineering Division

MCDOT file names shall include the project work-order number followed by a file category designation and a file description. Optionally, an MCDOT file name might include a sequential file number.



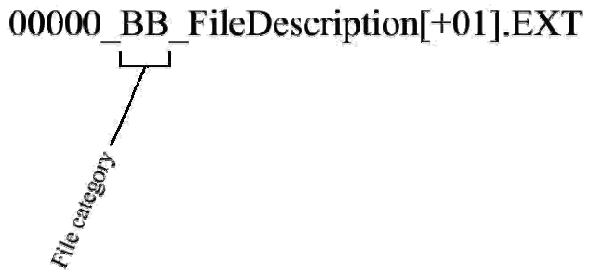
FILE NAMING COMPONENTS

- ◊ WORK-ORDER NUMBER
- ◊ FILE CATEGORY
- ◊ FILE DESCRIPTION
- ◊ FILE NUMBER (OPTIONAL)
- ◊ FILE EXTENSION

WORK-ORDER NUMBER

The first section of the file name shall be the work order number assigned to the project by MCDOT. It is a unique alphanumeric identifier for the project (i.e. TT123). An underscore character follows the work order number.

FILE CATEGORY

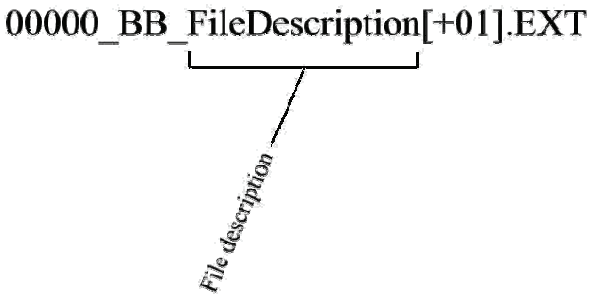


The file category is based on the file type and/or the design file category.

Table 11 File Naming Convention Categories

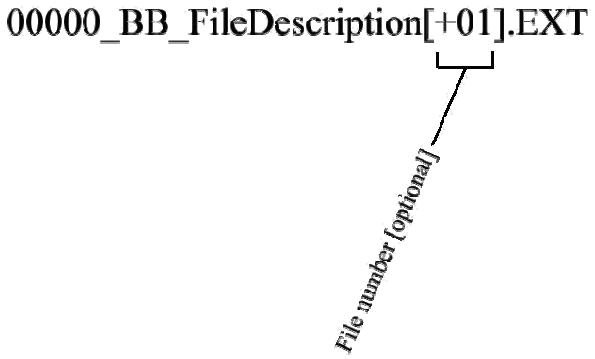
Base Files	
BB	Structures
BC	Survey Control Points
BD	Road Design
BE	(Existing) Topographic Survey
BH	Drainage
BN	Sheet Index
BP	Profile
BR	ROW
BS	Design Surface
BT	Traffic
BU	Utilities
BX	Cross Sections
Sheet Files	
SS	Standard Sheets
SD	Detail Sheets
SC	Construction/Design Sheets
ST	Traffic Sheets
Design Support / General	
DS	Design Support
GN	General (not related to design graphics)

FILE DESCRIPTION



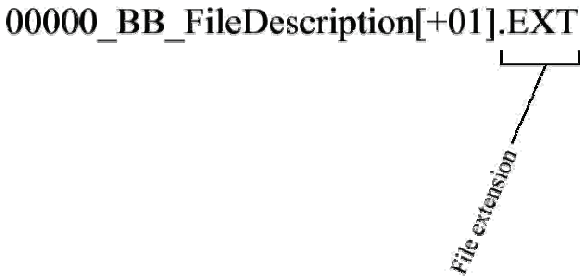
A description of what is included in the file. The description shall not be longer than 63 characters. The description shall be set by the user and shall provide enough information to adequately describe the contents of the file to someone unfamiliar with the project.

FILE NUMBER



The file number is a sequential number associated with the particular file. The brackets "[","]" shall not be included in the file name i.e. 00000_SS_QuantitySummary+01.dgn, 00000_SS_QuantitySummary+02.dgn

FILE EXTENSION



A standard Windows file extension. The user shall use the default file extension for the program unless approved by MCDOT.

1.6 ELECTRONIC PROJECT FILE CONTENT

Originator: Engineering Division

There are four types of files associated with an electronic project: data, design support, design file (dgn) and plot. A description of each is located at the beginning of this section.

DESIGN SUPPORT FILES

Design Support files create or modify the design graphics. They can be InRoads files or MicroStation resource files that modify the look of the design graphics. This section deals only with symbology and feature names inside InRoads files.

INROADS GEOMETRY NAMING

The InRoads alignment (ALG) file contains the geometric data for a design project. InRoads requires the creation of a geometry project. The name of the geometry project shall be given the same name as the ALG file name (i.e. if an ALG file is named TT123_DS_FirstStreet.alg, the geometry project within this ALG file should be named TT123_DS_FirstStreet).

Horizontal alignments within the geometry project shall be named using a two-letter identifier, the road name or clarifying description, and a numeric designation.

XX-Description_##

For instance, the first centerline alignment for First Street would be called CL-FirstStreet_01. The approved two-letter identifiers are shown in the table on the following page.

Vertical alignments and superelevation designs shall be named the same as their parent horizontal alignment with a numeric designation added to the end.

XX-Description_##_##

Continuing the previous example, the first vertical alignment for the First Street centerline would be called CL-FirstStreet_01_01.

The InRoads description for any horizontal alignment, vertical alignment, or superelevation must include the date of creation. It is also recommended the designer's initials be included in the description as well as the station location or any additional information that is easily understood by any future designer or reviewer.

Table 12 InRoads Geometry Naming Identifier

Identifier	Description
CL	Roadway Centerline Alignment
CC	Culvert Centerline Alignment
CH	Channel Centerline Alignment
DW	Driveway Centerline Alignment
EP	Proposed Edge of Pavement
EX	Existing Edge of Pavement
FL	Proposed Ditch Flow Line
PL	Property Line
RW	Right of Way Line
SC	Saw Cut Line
SL	Section Line

INROADS TEMPLATE LIBRARY

The MCDOT InRoads template library file, available to download on the website, shall be used.. Users may create new templates particular to their project but shall not modify the existing templates

TEMPLATE POINT NAMES

Point names are provided in the typical section library. The user shall use only point names found in the typical section library. Point names in the template library are built from a combination two-character sub-point names. The table on the next page contains the sub-point names.

The typical sections are divided into three zones. Zone 1 includes any points used in creating the roadway pavement. Zone 2 contains points used to construct the roadway shoulders. Zone 3 contains all other points used for creating the end conditions.

Any point name not already designated as right or left shall add a left or right designation to the name. For instance, a right roadway shoulder point name would be SH_Rt and a left shoulder point name would be SH_Lt.

If more than one of a particular point type is given within a zone, a numeric qualifier should be added to the point name before the left or right designation.

TEMPLATE SUB-POINT NAMES

Point names in the template library are built from a combination of these 2 characters sub-point names.

01	Slope 1:1
02	Slope 2:1
03	Slope 3:1
04	Slope 4:1
06	Slope 6:1
10	Slope 10:1
20	Slope 20:1
AB	Aggregate Base Course
AC	Asphalt Cement
AR	Asphalt Rubber
BB	Back Bottom (Curb)
BN	Bench
BT	Back Top (Curb)
CB	Curb
CL	Centerline
CT	Cut
DB	Ditch Bottom
EP	Edge of Pavement
FC	Face (Curb)
FI	Fill
GB	Gutter Bottom (Curb)
GT	Gutter Top (Curb)
IB	Inside Bottom
IN	Inside
IT	Inside Top
LB	Lip Bottom (Curb)
LT	Lip Top (Curb)
MD	Median
OT	Outside
RK	Slope (Rock) 1.5:1
SC	Sawcut
SG	Subgrade
SH	Shoulder
SP	Slope (Special) 1.5%
SW	Sidewalk
TE	Thickened Edge
VS	V-Swale

INROADS CORRIDOR NAMING

The InRoads roadway library file shall have the same base name as the geometry project file with the appropriate .ird extension attached.

1.7 DESIGN FILE CONTENT

Originator: Engineering Division

BASE REFERENCE FILES

The concept of reference files is important because a design change made to the reference file is reflected on each of the sheet files. Base reference files contain graphical data that is created during the design of a project. MCDOT base files are always created on a one-to-one scale. Each base file contains elements of a certain type. For example, a utility base reference file contains data such as telephone lines. When deciding what belongs in a base file versus what belongs in a sheet file it is helpful to think of the base file as “what is existing” or “what will be built” and a sheet file as “instructions on how to build it”. The table below lists all base files.

Base File	Abbr.*	Purpose
Structures	BB	Proposed Structures (bridges, box culverts, etc)
Project Control	BC	Existing Survey Control Points
Road Design	BD	Proposed Roadway Design and Earthwork
Existing Topo	BE	Existing Topographic Survey (all existing surveyed items)
Drainage/Pipes	BH	Proposed drainage including irrigation, and storm drain pipes
Sheet Index	BN	Plan set sheet index
Profile	BP	Alignment Profiles
ROW	BR	Existing & Proposed ROW
Design Surface	BS	Proposed DTM Features
Traffic	BT	Proposed Traffic Control Items
Utilities	BU	All existing and proposed utilities
Cross Sections	BX	Alignment Cross Sections

* For MCDOT File Naming Convention

SHEET FILES

Sheet files are the eventual products of a CADD-produced design. A sheet file represents the assembly of several of the base reference files to present the data required for a plan sheet. Each binary sheet file has a one-to-one correlation with a physical plan sheet. To produce the plan set, reference base files are created, then sheet files. Annotation and symbols placed in sheet files must be placed at a set scale corresponding to the desired plot scale.

BASE FILE RESTRICTIONS

There are a few content guidelines that apply to all base reference files.

- ◊ Base files shall not be broken into multiple files or models.
- ◊ All base files shall be drawn at 1:1 scale in a design model.
- ◊ Base files shall not include plan details or annotation that will appear in the plans.
- ◊ All linestyles shall be drawn with a 1.0 scale factor.

BASE FILE LEVELS

Each base file contains a core group of levels that a user can add to when needed. The table below lists the core level names in each base file.

Table 13 Base File Core Levels

STRUCTURES (BB)	EXIST TOPO (BE)	DESIGN SURFACE (BS)
ANNOTATION	ANNOTATION	ANNOTATION
BOXCULVERT	BARRIERS	CONTOUR
BRIDGE	BLUE STAKE	CORRIDOR
WALL BARRIER	BRIDGES	POINT
PROJECT CONTROL (BC)	CURB SIDEWALK	SUBGRADE
ALIGNMENT	DRAINAGE / HYDRO	SUPERELEVATION
ANNOTATION	FENCES	TEMPLATE
BOUNDARY	IRRIG / STORM DRAINS	**TRAFFIC (BT)**
MONUMENT	GROUND	ANNOTATION
OFFICE	IMPROVEMENTS	ITS
PLSS	MONUMENTS	SIGNAL
ROAD DESIGN (BD)	PIPES	SIGNING
ANNOTATION	RAILROAD	STRIPING
BARRIER	ROADWAY	**UTILITIES (BU)**
CROSS ROAD	TRAFFIC	COMM
CURB	TREES	FIBEROPTIC
GUTTER	VEGETATION	GAS
DRIVEWAY	UTILITIES	ELECTRIC
EARTHWORK	**DRAINAGE (BH)**	IRRIGATION
FENCE	ANNOTATION	RECLAIMED
GUARDRAIL	CHANNEL	SANITARY SEWER
ROAD	MAJOR STRUCTURES	UNK
SHOULDER	DRAINAGE	WATER
SIDEWALK	FLOOD HAZARD	**CROSS SECTIONS (BX)**
SHEET INDEX (BN)	FLOW	ANNOTATION
PLOTSHAPE	MINOR STRUCTURES	DESIGN
	STORM DRAINS	EXISTING
	ROW (BR)	FEATURE
	ALIGNMENT	GRID
	ANNOTATION	POINT
	BOUNDARY	**PROFILE (BP)**
	COGO	ANNOTATION
	EASEMENT	DESIGN
	POINT	EXISTING
	PROPERTY	GRID
	ROW	POINT

BASE FILE LEVEL NAMING GUIDELINES

These guidelines apply to the naming of new levels created in a base file.

- ◊ The name of the new level must start with the name of a core level in the base file.
- ◊ Separate the core level from the new level by using a plus (+) sign. "Bd_Road+EdgeUnpaved" is an example of appending EdgeUnpaved to the core level "Bd_Road".
- ◊ Do not create levels with duplicate purposes, within the same base file. If the level "Bd_Road+EdgeUnpaved" exists don't create a level named "Bd_Road+EdgeDirt"
- ◊ Place all nouns before adjectives when naming new levels. Put "Edge" (noun) before "Unpaved" (adjective) when creating the Bd_Road+EdgeUnpaved level.
- ◊ Do NOT use catchall words such as miscellaneous (misc), general or other non-descriptive words when creating new level names. All parts of the level name shall add to the meaning.
- ◊ Do NOT change the level names in the level libraries.

BASE FILE LEVEL SYMBOLOGY GUIDELINES

The user shall assign the level symbology based on a common sense approach, using the following guidelines:

- ◊ Only use linestyles from one of the MCDOT linestyle libraries.
- ◊ Colors above 100 shall only be used for grayscale items.
- ◊ Symbology shall be assigned to the level whenever possible and elements shall be created with "ByLevel" symbology.

STRUCTURES BASE FILE (BB)

The Base Structures file contains all structure designs. The levels shown in the table below are regularly updated and may not exactly match the downloaded DGNLIB.

STRUCTURES BASE FILE LEVELS (BB)			
Level Attributes			
Level Name	Number	Description	Core Level
ANNOTATION			
Bb_Anno			X
BOX CULVERT			
Bb_BoxCulvert			X
BRIDGE			
Bb_Bridge			X
Bb_BridgeAbut			
Bb_BridgeAbutCL			
Bb_BridgeCL			
Bb_BridgeDeck			
Bb_BridgePier			
Bb_BridgePierCL			
Bb_BridgeRailing			
Bb_BridgeApproach			
WALL / BARRIER			
Bb_Wall			X
Bb_WallBarrierConc			
Bb_WallHeadwall			
Bb_WallRetaining			

PROJECT CONTROL BASE FILE (BC)

The Project Control base file contains all project control, including geometric control, and centerline control. The levels shown in the table below are regularly updated and may not exactly match the downloaded DGNLIB.

PROJECT CONTROL BASE FILE LEVELS (BC)			
Level Name	No.	Description	Core Level
ALIGNMENT			
Bc_Alignment		Project Control Alignment Core Level	X
Bc_AlignmentStaTicks			
ANNOTATION			
Bc_Anno		Project Control Annotation Core Level	X
Bc_AnnoAlignment			
Bc_AnnoBreakline			
Bc_AnnoBoundaryEasement			
Bc_AnnoBoundaryProperty			
Bc_AnnoBoundaryRow			
Bc_AnnoCertNote			
Bc_AnnoDrafting			
Bc_AnnoLeader			
Bc_AnnoMatchline			
Bc_AnnoPlssSec			
Bc_AnnoPlssSecInfo			
Bc_AnnoPlssSecMid			
Bc_AnnoPlssSecSixteen			
Bc_AnnoPlssTownship			
Bc_AnnoProperty			
Bc_AnnoSrvMonCode			
Bc_AnnoSrvMonElev			
Bc_AnnoSrvMonNote			
Bc_AnnoSrvMonPointNumber			
Bc_AnnoStaAlign			
Bc_AnnoStaOffset			
BOUNDARY			
Bc_Boundary			X
Bc_BoundaryProperty			
Bc_BoundaryEasement			
Bc_BoundaryRow			
MONUMENT			
Bc_Mon			X

OFFICE			
Bc_Office			
PLSS			
Bc_Plss		Project Control PLSS Core Level	X
Bc_PlssSec			
Bc_PlssSecMid			
Bc_PlssSecSixteen			
Bc_PlssTownship			

ROAD DESIGN BASE FILE (BD)

The Roadway Design base file contains all two-dimensional roadway design graphics. The levels shown in the table below are regularly updated and may not exactly match the downloaded DGNLIB.

ROADWAY DESIGN BASE FILE LEVELS (BD)			
Level Naming			
Name	Number	Description	Core Level
BARRIER			
Bd_Barrier			X
Bd_BarrierTraffic			
CROSS ROAD			
Bd_CrossRd			X
Bd_CrossRdCL			
Bd_CrossRdEdgePaved			
Bd_CrossRoadEdgeUnpaved			
CURB/GUTTER			
Bd_Curb			X
Bd_Gutter			X
DRIVEWAY			
Bd_Driveway			X
Bd_DrivewayPaved			
Bd_DrivewayUnpaved			
EARTHWORK			
Bd_Earthwork			X
Bd_EarthworkCut			
Bd_EarthworkFill			
Bd_EarthworkTransCF			
Bd_EarthworkTransFC			
FENCE			
Bd_Fence			X
Bd_FenceBarbed			
Bd_FenceChainlink			
Bd_FenceBlock			
Bd_FenceTubularMetal			
Bd_FenceWood			
GUARDRAIL			
Bd_Guardrail			X

ROAD			
Bd_Road			X
Bd_RoadConstCL			
Bd_RoadEdgePaved			
Bd_RoadEdgeUnpaved			
SHOULDER			
Bd_Shoulder			X
Bd_ShoulderUnpaved			
SIDEWALK			
Bd_Sidewalk			X

EXISTING TOPO BASE FILE (BE)

The Existing Topo base file contains all existing information from a topographic survey. The levels shown in the table below are regularly updated and may not exactly match the downloaded DGNLIB.

EXISTING TOPOGRAPHY BASE FILE LEVELS (BE)			
Level Name	No.	Description	Core Level
ANNOTATION			
Be_Anno			X
Be_AnnoTopoCode			
Be_AnnoTopoElev			
Be_AnnoTopoNote			
Be_AnnoTopoPointNumber			
Be_AnnoTrafItsAboveground			
Be_AnnoTrafItsUnderground			
Be_AnnoTrafSign			
Be_AnnoTrafSignalAboveground			
Be_AnnoTrafSignalUnderground			
BARRIER			
Be_Barrier			X
Be_BarrierRetainingStructure			
BLUE STAKE			
Be_BlueStake			X
BRIDGE			
Be_Bridge			X
Be_BridgeBoxCulvert			
Be_BridgeSubStructure			
Be_BridgeSuperStructure			

CURB / SIDEWALK			
Be_Curb			X
Be_Gutter			X
Be_Sidewalk			X
Be_CurbConcrete			
Be_GutterConcrete			
Be_SidewalkConcrete			
DRAINAGE / HYDRO			
Be_Drainage			X
Be_Hydro			X
Be_HydroLinearConcrete			
Be_HydroLinearDirt			
Be_HydroPipe			
Be_HydroStructure			
Be_HydroSymbols			
FENCE			
Be_Fence			X
Be_FenceWall			
GATES			
Be_Gate			X
GROUND			
Be_Ground			X
Be_GroundContourMajor			
Be_GroundContourMinor			
Be_GroundGradeBreak			
Be_GroundSpotElev			
IRRIGATION / STORM DRAIN			
Be_Irrig			X
Be_StormDrain			X
IMPROVEMENTS			
Be_Improv			X
Be_ImprovLighting			
Be_ImprovSign			
Be_ImprovStructure			
RAILROAD			
Be_Railroad			X

ROAD			
Be_Road			X
Be_RoadLighting			
Be_RoadDriveway			
Be_RoadUnpaved			
Be_RoadPaved			
Be_RoadCL			
TRAFFIC			
Be_Traf			X
Be_TrafSign			
Be_TrafSignalLoopLine			
Be_TrafSignalSymbol			
Be_TrafStriping			
TREES			
Be_Tree			X
Be_TreeArid			
Be_TreeConifer			
Be_TreeDeciduous			
Be_TreePalm			
UTILITIES			
Be_Util			X
Be_UtilCommLine			
Be_UtilCommSymbol			
Be_UtilElectricLine			
Be_UtilElectricSymbol			
Be_UtilGasLine			
Be_UtilGasSymbol			
Be_UtilSanSewerLine			
Be_UtilSanSewerSymbol			
Be_UtilUnkUtilSymbol			
Be_UtilWaterLine			
Be_UtilWaterSymbol			
VEGETATION			
Be_Veg			X

DRAINAGE BASE FILE (BH)

The Drainage base file contains all proposed drainage information. The levels shown in the table below are regularly updated and may not exactly match the downloaded DGNLIB.

DRAINAGE BASE FILE LEVELS (BH)			
Level Naming			
Name	Number	Description	Core Level
ANNOTATION			
Bh_Anno			X
CHANNEL			
Bh_Channel			X
Bh_ChannelCL			
DRAINAGE			
Bh_Drainage			X
Bh_DrainageDitchConc			
Bh_DrainageDitchDirt			
Bh_DrainagePipe			
DAM			
Bh_Dam			X
FLOODHAZ (FLOOD HAZARD)			
Bh_FloodHaz			X
Bh_FloodHazFloodplain			
Bh_FloodHazFloodway			
FLOW			
Bh_Flow			X
Bh_Flowline			
IRRIGATION			
Bh_Irrigation			X
Bh_IrrigationDitch			
Bh_IrrigationDitchConc			
Bh_IrrigationDitchDirt			
Bh_IrrigationPipe			
MINOR STRUCTURES			
Bh_MnrStrct			X
Bh_MnrStrctCatchBasin			
Bh_MnrStrctRetentionBasin			
Bh_MnrStrctDetentionBasin			

SPILLWAY			
Bh_Spillway			X
Bh_SpillwayOverflow			
STORM DRAIN			
Bh_StormDrain			X
Bh_StormDrainManhole			
Bh_StormDrainPipe			
Bh_StormDrainPipeSmall			
Bh_StormDrainStructure			

SHEET INDEX BASE FILE (BN)

The Sheet Index base file contains the plot shape from each sheet in real world coordinates. The levels shown in the table below are regularly updated and may not exactly match the downloaded DGNLIB.

SHEET INDEX BASE FILE LEVELS (BN)			
Level Naming			
Name	Number	Description	Core Level
PLOT SHAPE			
__plotshape__			X

DESIGN PROFILE BASE FILE (BP)

The Design Profile base file contains all profile graphics. The levels shown in the table below are regularly updated and may not exactly match the downloaded DGNLIB.

DESIGN PROFILE BASE FILE LEVELS (BP)			
Level Naming			
Name	Number	Description	Core Level
ANNOTATION			
Bp_Anno			X
DESIGN			
Bp_Design			X
Bp_DesignRdEdgeLeft			
Bp_DesignRdEdgeRight			
Bp_DesignRdSurface			
Bp_DesignRdCurb			
Bp_DesignFeatureCrossing			
Bp_DesignSurface			
Bp_DesignSurfaceSubgrade			
EXISTING			
Bp_Exist			X
Bp_ExistFeatureCrossing			
Bp_ExistSurface			
GRID			
Bp_Grid			X
Bp_GridAxes			
Bp_GridMajor			
Bp_GridMinor			
POINT			
Bp_Point			X

ROW BASE FILE (BR)

The ROW base file contains all existing and proposed right-of-way, property and jurisdictional boundary graphics. The levels shown in the table below are regularly updated and may not exactly match the downloaded DGNLIB.

ROW BASE FILE LEVELS (BR)			
Level Attributes			
Level Name	Number	Description	Core Level
ALIGNMENT			
Br_Alignment			X
ANNOTATION			
Br_Anno			X
Br_AnnoBoundaryMunicipal			
Br_AnnoBoundaryPolitical			
Br_AnnoEsmt			
Br_AnnoExist			
Br_AnnoPlss			
Br_AnnoRow			
COGO			
Br_Cogo			X
Br_CogoCoords			
BOUNDARY			
Br_Boundary			X
Br_BoundaryCity			
Br_BoundaryCounty			
Br_BoundaryState			
Br_BoundaryFederal			
Br_BoundaryReservation			
Br_BoundaryPreserve			
Br_BoundarySection			
Br_BoundaryPark			
Br_BoundaryMunicipal			
Br_BoundaryTownship			
EASEMENT			
Br_Esmt			X
Br_EsmtDrainage			
Br_EsmtExist			
Br_EsmtSlope			
Br_EsmtTce			

POINT			
Br_Point			X
PROPERTY			
Br_Property			X
Br_PropertyCorner			
Br_PropertyLine			
ROW			
Br_Row			X
Br_RowExist			
Br_RowProp			

DESIGN SURFACE BASE FILE (BS)

The Design Surface base file contains all 3D design graphics. The levels shown in the table below are regularly updated and may not exactly match the downloaded DGNLIB.

DESIGN SURFACE BASE FILE LEVELS (BS)			
Level Attributes			
Level Name	Number	Description	Core Level
ANNOTATION			
Bs_Anno			X
CONTOUR			
Bs_Contour			X
Bs_ContourMajor			
Bs_ContourMinor			
CORRIDOR			
Bs_Corridor			X
POINT			
Bs_Point			X
SUBGRADE			
Bs_Subgrade			X
SUPERELEVATION			
Bs_Superelevation			X
SURFACE			
Bs_Surface			X
Bs_SurfaceFeature			
Bs_SurfacePerimeter			
Bs_SurfaceTriangle			

TEMPLATE			
Bs_Tmpl			X
Bs_TmplZ1			X
Bs_TmplZ2			X
Bs_TmplZ3			X
Bs_TmplZ1Cl			
Bs_TmplZ1EopL			
Bs_TmplZ1EopR			
Bs_TmplZ1ScL			
Bs_TmplZ1ScR			
Bs_TmplZ1SubL			
Bs_TmplZ1SubR			
Bs_TmplZ2BnL			
Bs_TmplZ2BnR			
Bs_TmplZ2ShL			
Bs_TmplZ2ShR			
Bs_TmplZ3CutL			
Bs_TmplZ3CutR			
Bs_TmplZ3DbL			
Bs_TmplZ3DbR			
Bs_TmplZ3FillL			
Bs_TmplZ3FillR			
Bs_TmplZ3FIL			
Bs_TmplZ3FIR			

TRAFFIC BASE FILE (BT)

The Traffic base file contains all proposed traffic control information. The levels shown in the table below are regularly updated and may not exactly match the downloaded DGNLIB.

TRAFFIC BASE FILE LEVELS (BT)			
Level Naming			
Name	Number	Description	Core Level
ANNOTATION			
Bt_Anno			X
Bt_AnnoGuardrail			
Bt_AnnoIts			
Bt_AnnoItsAboveground			
Bt_AnnoItsUnderground			
Bt_AnnoSignalAboveground			
Bt_AnnoSignalUnderground			
Bt_AnnoSignal			
Bt_AnnoSign			
Bt_AnnoStriping			
Bt_AnnoSymbol			
GUARDRAIL			
Bt_Guardrail			X
Bt_GuardrailLeft			
Bt_GuardrailRight			
ITS			
Bt_Its			X
Bt_ItsAboveground			
Bt_ItSUnderground			
Bt_ItsSymbol			
SIGNAL			
Bt_Signal			X
Bt_SignalConduit			
Bt_SignalSymbol			
Bt_SignalSawcut			
Bt_SignalLoop			
Bt_SignalAboveground			
Bt_SignalUnderground			
SIGNING			
Bt_Signing			X
Bt_SigningSymbol			

STRIPING			
Bt_Striping			X
Bt_StripingLane			
Bt_StripingEdge			
Bt_StripingCenter			
Bt_StripingSymbol			
Bt_StripingYellow			

UTILITIES BASE FILE (BU)

The Utilities base file contains all existing and proposed utility graphics. The levels shown in the table below are regularly updated and may not exactly match the downloaded DGNLIB.

UTILITIES BASE FILE LEVELS (BU)			
Level Naming			
Name	Number	Description	Container
CABLE TV			
Bu_CableTv			X
COMM			
Bu_Comm			X
Bu_CommLine			
Bu_CommSymbol			
FIBER OPTIC			
Bu_FiberOptic			X
GAS			
Bu_Gas			X
Bu_GasLine			
Bu_GasSymbol			
ELECTRIC			
Bu_Elec			X
Bu_ElecLine			
Bu_ElecSymbol			
IRRIGATION			
Bu_Irrigation			X
RECLAIMED			
Bu_Reclaimed			X
STORM DRAIN			
Bu_StormDrain			X
SANITARY SEWER			
Bu_SanSewer			X
Bu_SanSewerLine			
Bu_SanSewerSymbol			
UNKNOWN			
Bu_Unk			X

WATER			
Bu_Water			X
Bu_WaterLine			
Bu_WaterSymbol			

CROSS SECTIONS BASE FILE (BX)

The Cross Sections base file contains all cross section graphics. The levels shown in the table below are regularly updated and may not exactly match the downloaded DGNLIB.

CROSS SECTIONS BASE FILE LEVELS (BX)			
Level Naming			
Name	Number	Description	Core Level
ANNOTATION			
Bx_Anno			X
Bx_AnnoGrid			
Bx_AnnoLegend			
Bx_AnnoTitle			
DESIGN			
Bx_Design			X
Bx_DesignFeature			
Bx_DesignSurface			
Bx_DesignSurfaceSubgrade			
EXISTING			
Bx_Exist			X
Bx_ExistFeatureCrossing			
Bx_ExistSurface			
GRID			
Bx_Grid			X
Bx_GridAxes			
Bx_GridMajor			
Bx_GridMinor			
POINT			
Bx_Point			X

SHEET FILE CORE LEVELS

ANNOTATION (S_ANNO)	DETAILS (SD)
BORDER	DRAINAGE
CONSTRUCTION NOTES	ROAD DESIGN
DETAIL	STRUCTURES
DIMENSIONS	TRAFFIC
MAP	UTILITY
PATTERN	**CONSTRUCTION (SC)**
SYMBOL	PLAN
TABLE	PROFILE
TITLE	TABLE
TRAFFIC	**TRAFFIC (ST)**
BORDER (S_BORDER)	PLAN
GRID	PROFILE
LINEWEIGHT	TABLE
REVIEW BLOCK	
TABLE	
TITLE BLOCK	

SHEET ANNOTATION LEVELS

The Sheet Annotation levels apply to all sheets, regardless of the type. The levels shown in the table below are regularly updated and may not exactly match the downloaded DGNLIB.

SHEET ANNOTATION PATTERNS & SYMBOLS (S_ANNO)			
Level Attributes			
Level Name	No.	Description	Core Level
BORDER			
S_AnnoBorder			X
S_AnnoBorderNote			
S_AnnoBorderRemoveRelocateTitle			
S_AnnoBorderTextHeadings			
S_AnnoBorderTextSubstitute			
S_AnnoBorderTitleBlockTextUpper			
S_AnnoBorderTracsNo			
CONSTRUCTION NOTES			
S_AnnoConst			X
S_AnnoConstNotesTitle			
S_AnnoConstCallout			
DETAIL			
S_AnnoDetail			X

DIMENSIONS			
S_AnnoDim			X
S_AnnoDimAlignFeatures			
S_AnnoDimLeaders			
MAP			
S_AnnoMap			X
PATTERN			
S_AnnoPattern			X
SYMBOL			
S_AnnoSymbol			X
TABLE			
S_AnnoTable			X
TITLE			
S_AnnoTitle			X
TRAFFIC			
S_AnnoTraf			X

SHEET BORDER LEVELS

The Sheet Border levels apply to all sheets, regardless of the type. The levels shown in the table below are regularly updated and may not exactly match the downloaded DGNLIB.

SHEET BORDER (S_BORDER)			
Level Attributes			
Level Name	Number	Description	Core Level
GRID			
S_BorderGrid			X
S_BorderGridAxes			
S_BorderGridMajor			
S_BorderGridMinor			
LINE WEIGHT			
S_BorderWt			X
S_BorderWt1			
S_BorderWt2			
S_BorderWt3			
S_BorderWt4			
S_BorderWt5			
S_BorderWt6			
S_BorderWt7			
REVIEW BLOCK			
S_BorderReviewBlock			X
TABLE			
S_BorderTable			X
S_BorderTableQuantities			
TITLE BLOCK			
S_BorderTable			X

CONSTRUCTION SHEET LEVELS (SC)

The Construction Sheet levels apply only to Construction / Design Sheets. The levels shown in the table below are regularly updated and may not exactly match the downloaded DGNLIB.

CONSTRUCTION SHEET (SC)			
Level Attributes			
Level Name	No.	Description	Core Level
PLAN			
Sc_Plan			X
PROFILE			
Sc_Profile			X
TABLE			
Sc_Table			X

DETAIL SHEET LEVELS (SD)

The Detail Sheet levels apply only to Detail Sheets. The levels shown in the table below are regularly updated and may not exactly match the downloaded DGNLIB.

DETAIL SHEETS (SD)			
Level Attributes			
Level Name	No.	Description	Core Level
STRUCTURE			
Sd_Struct			X
Sd_StructHiddenLine			
Sd_StructRebar			
Sd_StructEdgeConc			
Sd_StructFoundation			
ROAD DESIGN			
Sd_RdDesign			X
Sd_RdDesignTurnout			
DRAINAGE			
Sd_Drainage			X
TRAFFIC			
Sd_Traffic			X
UTILITY			
Sd_Utility			X

TRAFFIC SHEET LEVELS (ST)

The Traffic Sheet levels apply only to Traffic Sheets. The levels shown in the table below are regularly updated and may not exactly match the downloaded DGNLIB.

TRAFFIC SHEETS (ST)			
Level Attributes			
Level Name	No.	Description	Core Level
PLAN			
St_Plan			X
PROFILE			
St_Profile			X
TABLE			
St_Table			X

PART III
MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION DRAFTING GUIDELINES

1.8 DRAFTING GUIDELINES

Originator: Engineering Division

PLAN SET SHEET LAYOUT

The sheets shall appear in this order if they are included in a plan set.

Face Sheet
General Notes
Quantity Summary Sheets
Typical Sections
Geometric Control
Paving Plan and Profile Sheets
Intersection Detail Sheets
Driveway Profiles
Paving Details
Strom Drain Plan and Profile Sheets
Connector Pipe Profiles
Culvert Profile Sheets
Drainage Detail Sheets
Irrigation Sheets
Bridge Sheets
Mass Diagram Sheet
Landscape Sheets
Traffic Signal Sheets
Signal Interconnect Sheet
Striping Sheets
Traffic Control (Detour) Sheets

DRAFTING WORKSPACE

SEED FILES

Seed design files are template files that contain the appropriate default settings and attributes. A new design file is actually a copy of the seed file. Seed files do not contain elements, but they do contain settings and view configurations. Having a seed file with customized settings keeps the user from having to adjust settings each time a new design file is created.

There are four Standard seed files for use on MCDOT projects. There is a two-dimensional and three-dimensional version of both the MCDOT Bridge seed file (seed2dB.dgn, seed3dB.dgn) and the MCDOT civil seed file (seed2d.dgn, seed3d.dgn). The civil seed files represent those files, which require the use of a plan section of the design in the true coordinate plane. The bridge seed files will be for structural details that require a higher degree of accuracy than the civil but may not need a true coordinate plane on which to work. New files created over the course of a project will utilize these seed files. Seed files are located in: ..\designsupport\Standards\seed\.

DESIGN FILE LIBRARIES

A Design File Library is a DGN file that contains data resources, such as cells, levels, and styles, that are shared throughout files and among users.
All MicroStation elements have attributes that control their appearance. Creating a consistent look for all construction plans produced by MCDOT requires that the elements attributes are set properly. Using the MCDOT Design File Libraries help ensure consistency.

CELL LIBRARIES

The table below lists the cell libraries.

Bridge Cells	DS_2009bridge_e.cel
Bridge Detail Cells	DS_2009bridgedetails_e.cel
Roadway Design Cells	DS_2009design_e.cel
General Cells	DS_2009general_e.cel
Striping Cells	DS_2009Striping.cel
Striping Symbol Cells	DS_2009StripingSymbols.cel
Survey Cells	DS_2009survey_e.cel
Text Symbols	DS_2009TextSymbols.cel

LEVEL LIBRARIES

Each of the base reference files described in the content guideline is also a design file library (dgnlib). There are also five sheet level libraries. The table below contains all of the dgnlib level libraries that MCDOT uses.

Level Library Name	File Name
Structures Base File Levels	BB_BaseStructures.dgnlib
Project Control Base File Levels	BC_BaseProjectControl.dgnlib
Roadway Design Base File Levels	BD_BaseRoadDesign.dgnlib
Existing Topo Base File Levels	BE_BaseExistingTopo.dgnlib
Drainage Base File Levels	BH_BaseDrainage.dgnlib
Design Profile Base File Levels	BP_BaseDesignProfile.dgnlib
ROW Base File Levels	BR_BaseRow.dgnlib
Design Surface Base File Levels	BS_BaseDesignSurface.dgnlib
Traffic Base File Levels	BT_BaseTraffic.dgnlib
Utility Base File Levels	BU_BaseUtilities.dgnlib
Cross Sections Base File Levels	BX_BaseCrossSections.dgnlib
Construction Sheet Levels	SC_ConstructionSheets.dgnlib
Detail Sheet Levels	SD_DetailSheets.dgnlib
Traffic Sheet Levels	ST_TrafficSheets.dgnlib
Sheet Annotation Levels	S_SheetAnnotation.dgnlib
Sheet Borders Levels	S_SheetBorder.dgnlib

TEXT STYLES LIBRARY

MCDOT now uses the Arial and Garamond true type fonts for all CADD files. This was done to improve print quality as well as ensure future compatibility. Most symbols used in the previous versions of the standard are available in the MicroStation V8i word processor.

Font Use	Font
Sheet Text	Arial Italics
Title Text	Arial
County Text	Garamond

Sheet Text Parameters									
Plot Scale	Text Heights & Widths								
	XX-Small	X-Small	Small	Existing	Proposed	Large	X-Large	XX-Large	Largest
Point Size ≈	N/A	N/A	7	9	11	13	14	18	24
1"=1'	N/A	N/A	0.1	0.125	0.15	0.175	0.2	0.25	0.33
1"=2'	N/A	N/A	0.2	0.25	0.3	0.35	0.4	0.5	0.66
1"=5'	N/A	N/A	0.5	0.625	0.75	0.875	1	1.25	1.65
1"=10'	N/A	N/A	1	1.25	1.5	1.75	2	2.5	3.3
1"=20'	N/A	N/A	2	2.5	3	3.5	4	5	6.6
1"=30'	N/A	N/A	3	3.75	4.5	5.25	6	7.5	9.9
1"=40'	N/A	N/A	4	5	6	7	8	10	13.2
1"=50'	N/A	N/A	5	6.25	7.5	8.75	10	12.5	16.5
1"=60'	N/A	N/A	6	7.5	9	10.5	12	15	19.8
1"=100'	N/A	N/A	10	12.5	15	17.5	20	25	33

Title & County Text Parameters									
Plot Scale	Text Heights & Widths								
	XX-Small	X-Small	Small	Existing	Proposed	Large	X-Large	XX-Large	Largest
Point Size ≈	9	11	13	14	18	24	36	43	54
1"=1'	0.125	0.15	0.175	0.2	0.25	0.33	0.5	0.6	0.75
1"=2'	0.25	0.3	0.35	0.4	0.5	0.66	1	1.2	1.5
1"=5'	0.625	0.75	0.875	1	1.25	1.65	2.5	3	3.75
1"=10'	1.25	1.5	1.75	2	2.5	3.3	5	6	7.5
1"=20'	2.5	3	3.5	4	5	6.6	10	12	15
1"=30'	3.75	4.5	5.25	6	7.5	9.9	15	18	22.5
1"=40'	5	6	7	8	10	13.2	20	24	30
1"=50'	6.25	7.5	8.75	10	12.5	16.5	25	30	37.5
1"=60'	7.5	9	10.5	12	15	19.8	30	36	45
1"=100'	12.5	15	17.5	20	25	33	50	60	75

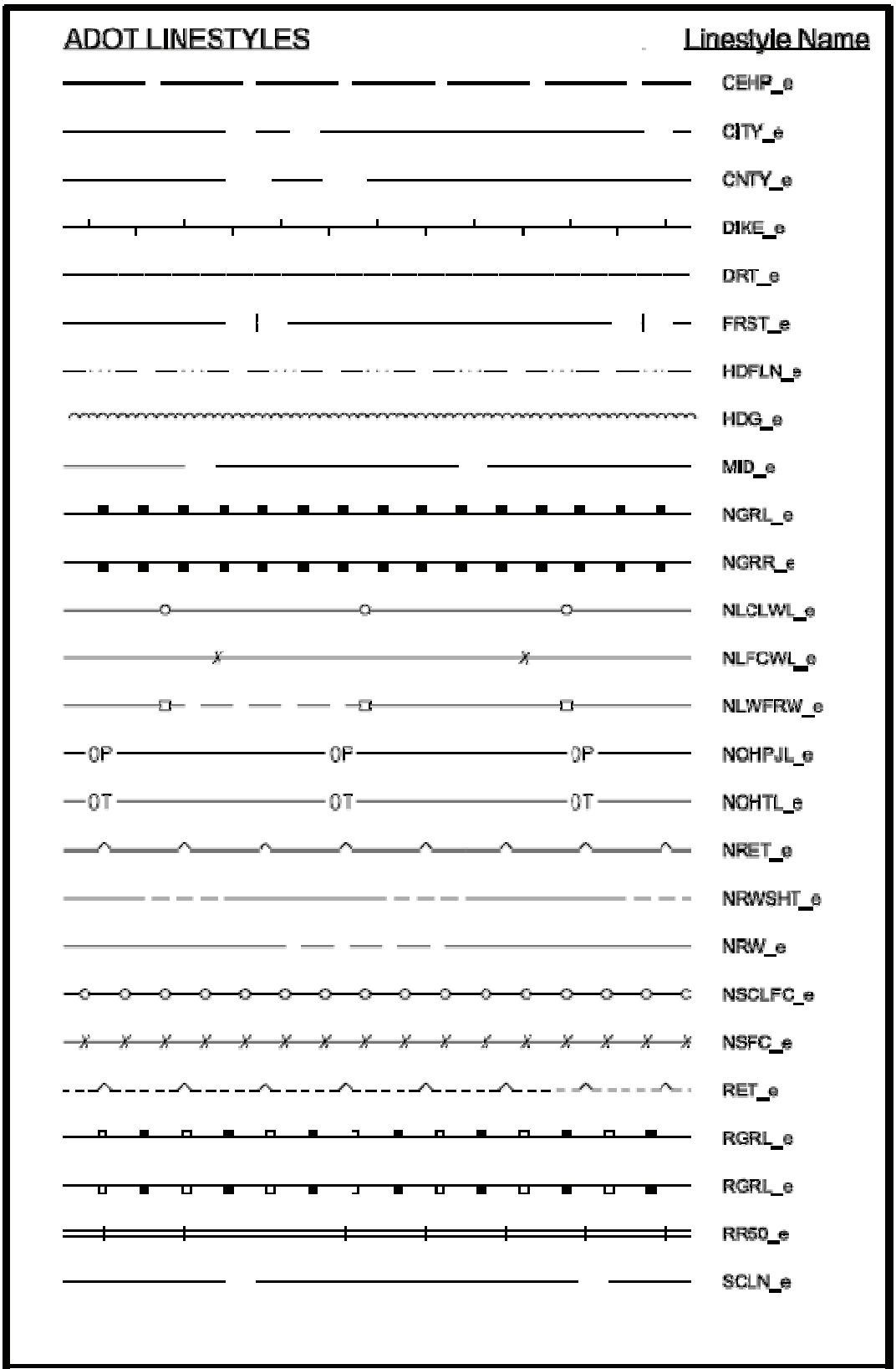
LINESTYLE LIBRARIES

The table below lists the MCDOT Linestyle resource libraries.

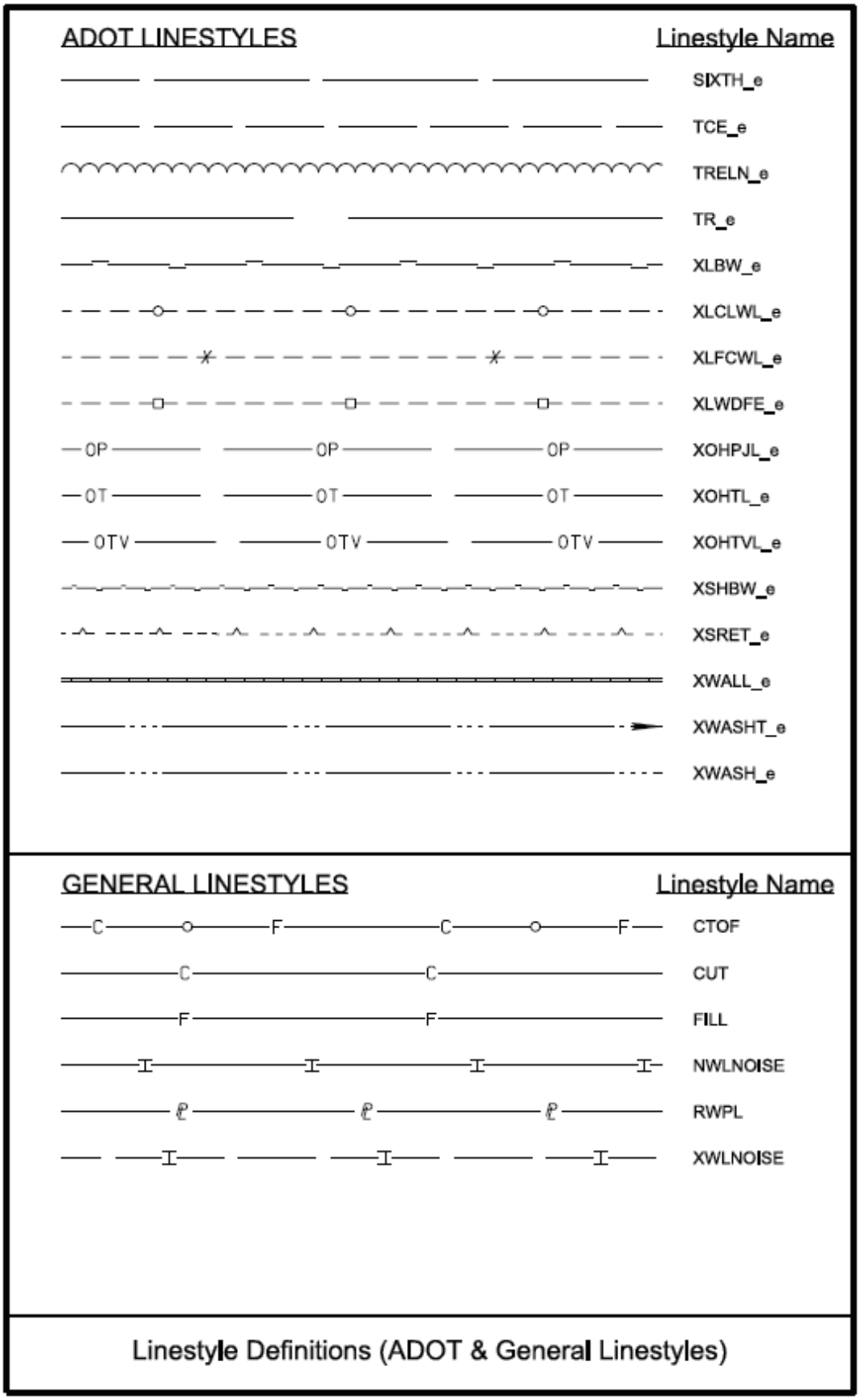
ADOT Linestyles	DS_ADOT_e.rsc
General Linestyles	DS_GeneralLinestyles.rsc
Utility Linestyles	DS_MCDOTUtilityLinestyles.rsc
Traffic Linestyles	DS_TrafficLinestyles.rsc
Utility Multi-line Styles	DS_MCDOTUtilityMulti-lineStyles.rsc

ADOT LINESTYLES

To provide for more consistency throughout the State of Arizona, MCDOT has adopted several of the Arizona Department of Transportation's V8 linestyles into the DS_ADOT_e.rsc linestyle library. The DS_ADOT_e.rsc library contains only ADOT linestyle definitions from the linestyle resource library (adot_e.rsc). The ADOT linestyle definitions were not modified to create the DS_ADOT_e.rsc library.
The User shall only use a linestyle from one of the MCDOT linestyle libraries.



Linestyle Definitions (ADOT Linestyles)



Linestyle Definitions (ADOT & General Linestyles)

TRAFFIC LINESTYLES	Linestyle Name
	TRAF_12SW
	TRAF_12SY
	TRAF_24SW
	TRAF_24SY
	TRAF_4BW
	TRAF_4BW40
	TRAF_4BY
	TRAF_4BY40
	TRAF_4DTW
	TRAF_4DTW12
	TRAF_4DTY
	TRAF_4DTY12
	TRAF_4DY
	TRAF_4DY10
	TRAF_4DY20
	TRAF_4DY40
	TRAF_4SBY
	TRAF_4SBYMD
	TRAF_4SBYMH
	TRAF_4SW
	TRAF_4SW20
	TRAF_4SW40
	TRAF_4SW80
	TRAF_4SY
	TRAF_4SY40
	TRAF_4SY80
	TRAF_4SYH40

Linestyle Definitions (Traffic Linestyles)

TRAFFIC LINESTYLES	Linestyle Name
	TRAF_4SYH80
	TRAF_8BW
	TRAF_8BW24
	TRAF_8DTW
	TRAF_8DTW12
	TRAF_8DTY
	TRAF_8DTY12
	TRAF_8SW
	TRAF_8SW10
	TRAF_8SW20
	TRAF_8SW40

Linestyle Definitions (Traffic Linestyles)

UTILITY LINESTYLES

Underground Power Lines (Graphic)		Linestyle Name
1-½" E (PVC)	1-½" E (PVC)	XEL 1.5PVC
2" E (PVC)	2" E (PVC)	XEL 2PVC
2-½" E (PVC)	2-½" E (PVC)	XEL 2.5PVC
3" E (PVC)	3" E (PVC)	XEL 3PVC
4" E (PVC)	4" E (PVC)	XEL 4PVC
5" E (PVC)	5" E (PVC)	XEL 5PVC
E (CONDUIT)	E (CONDUIT)	XEL COND
E(DUCT BANK)	E(DUCT BANK)	XEL DUCT

Fiber Optic Lines		Linestyle Name
FO (CONDUIT)	FO (CONDUIT)	XFOL COND
FO (DUCT BANK)	FO (DUCT BANK)	XFOL_DUCT

Plotted Linestyle Dimensions (NTS)

0.10" to 0.26" | 0.20" to 0.40" | 0.12" to 0.27" | 0.34" to 0.90" | 0.65" to 0.85" | 0.15" | 0.50" to 0.60"

2.50"

Material Abbreviations

- ACP = Asbestos Cement Pipe
- CIP = Cast Iron Pipe
- CMP = Corrugated Metal Pipe
- CP = Concrete Pipe
- DIP = Ductile Iron Pipe
- HDPE = High Density Polyethylene Pipe
- PE = Polyethylene Pipe
- PVC = Polyvinyl Chloride Pipe
- RCP = Reinforced Concrete Pipe
- RGRCP = Rubber Gasket RCP
- SCCP = Steel Cylinder Concrete Pipe
- STL = Steel Pipe
- VCP = Vitrified Clay Pipe

Utility Abbreviations

- E = Underground Power
- G = Gas Line
- IR = Irrigation Line
- SD = Storm Drain
- SS = Sanitary Sewer
- T = Telephone
- TSC = Traffic Signal Conduit
- W = Water Line

Linestyle Naming

XWL_6PVC

Existing Utility (Water) Line — Size (6") — Material (PVC)

Linestyle Scale

LS Scale		Plot Scale
1.0	≈	1"=100'
0.5	≈	1"=50'
0.2	≈	1"=20'

Gas Lines (Graphic)	Linestyle Name
1-½" G (PE)	XGL 1.5PE
1-½" G (STL)	XGL_1.5STL
2" G (PE)	XGL_2PE
2" G (STL)	XGL_2STL
2-½" G (PE)	XGL_2.5PE
2-½" G (STL)	XGL_2.5STL
3" G (PE)	XGL_3PE
3" G (STL)	XGL_3STL
4" G (PE)	XGL_4PE
4" G (STL)	XGL_4STL
6" G (PE)	XGL_6PE
6" G (STL)	XGL_6STL
8" G (PE)	XGL_8PE
8" G (STL)	XGL_8STL

Plotted Linestyle Dimensions (NTS)

0.10" to 0.26" | 0.20" to 0.40" | 0.12" to 0.27" | 0.34" to 0.90" | 0.65" to 0.85" | 0.15" | 0.50" to 0.60"

2.50"

Material Abbreviations

ACP = Asbestos Cement Pipe
CIP = Cast Iron Pipe
CMP = Corrugated Metal Pipe
CP = Concrete Pipe
DIP = Ductile Iron Pipe
HDPE = High Density Polyethylene Pipe
PE = Polyethylene Pipe
PVC = Polyvinyl Chloride Pipe
RCP = Reinforced Concrete Pipe
RGRCP = Rubber Gasket RCP
SCCP = Steel Cylinder Concrete Pipe
STL = Steel Pipe
VCP = Vitrified Clay Pipe

Utility Abbreviations

E = Underground Power
G = Gas Line
IR = Irrigation Line
SD = Storm Drain
SS = Sanitary Sewer
T = Telephone
TSC = Traffic Signal Conduit
W = Water Line

Linestyle Naming

XWL_6PVC

Existing Utility (Water) Line — Size (6") — Material (PVC)

Linestyle Scale

LS Scale		Plot Scale
1.0	=	1"=100'
0.5	=	1"=50'
0.2	=	1"=20'

Irrigation Lines (Graphic)	Linestyle Name
4" IR (PVC)	XIRL_4PVC
6" IR (PVC)	XIRL_6PVC
8" IR (PVC)	XIRL_8PVC
10" IR (PVC)	XIRL_10PVC
12" IR (CP)	XIRL_12CP
12" IR (PVC)	XIRL_12PVC
12" IR (RCP)	XIRL_12RCP
12" IR (RGRCP)	XIRL_12RGRCP
14" IR (PVC)	XIRL_14PVC
15" IR (CP)	XIRL_15CP
15" IR (RCP)	XIRL_15RCP
15" IR (RGRCP)	XIRL_15RGRCP
16" IR (PVC)	XIRL_16PVC
18" IR (PVC)	XIRL_18PVC
18" IR (RCP)	XIRL_18RCP
18" IR (RGRCP)	XIRL_18RGRCP
21" IR (RCP)	XIRL_21RCP
21" IR (RGRCP)	XIRL_21RGRCP
24" IR (CP)	XIRL_24CP

Plotted Linestyle Dimensions (NTS)

0.10" to 0.26" | 0.20" to 0.40" | 0.12" to 0.27" | 0.34" to 0.90" | 0.65" to 0.85" | 0.15" | 0.50" to 0.60"

2.50"

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STL = Steel Pipe
VCP = Vitrified Clay Pipe

Utility Abbreviations

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G = Gas Line
IR = Irrigation Line
SD = Storm Drain
SS = Sanitary Sewer
T = Telephone
TSC = Traffic Signal Conduit
W = Water Line

Linestyle Naming

XWL_6PVC

Existing Utility (Water) Line — Size (6") — Material (PVC)

Linestyle Scale

LS Scale		Plot Scale
1.0	=	1"=100'
0.5	=	1"=50'
0.2	=	1"=20'

Irrigation Lines Con't (Graphic)

	Linestyle Name
24" IR (RCP)	XIRL_24RCP
24" IR (RGRCP)	XIRL_24RGRCP
30" IR (CP)	XIRL_30CP
30" IR (RCP)	XIRL_30RCP
30" IR (RGRCP)	XIRL_30RGRCP
36" IR (CP)	XIRL_36CP
36" IR (RCP)	XIRL_36RCP
36" IR (RGRCP)	XIRL_RGRCP
42" IR (CP)	XIRL_42CP
42" IR (RCP)	XIRL_42RCP
42" IR (RGRCP)	XIRL_42RGRCP
48" IR (RCP)	XIRL_48RCP
48" IR (RGRCP)	XIRL_48RGRCP
60" IR (RCP)	XIRL_60RCP
60" IR (RGRCP)	XIRL_60RGRCP
72" IR (RCP)	XIRL_72RCP
72" IR (RGRCP)	XIRL_72RGRCP
84" IR (RCP)	XIRL_84RCP
84" IR (RGRCP)	XIRL_84RGRCP

Plotted Linestyle Dimensions (NTS)

0.10" to 0.26" | 0.20" to 0.40" | 0.12" to 0.27" | 0.34" to 0.90" | 0.65" to 0.85" | 0.15" | 0.50" to 0.60"

2.50"

Material Abbreviations

ACP = Asbestos Cement Pipe
CIP = Cast Iron Pipe
CMP = Corrugated Metal Pipe
CP = Concrete Pipe
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PE = Polyethylene Pipe
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RGRCP = Rubber Gasket RCP
SCCP = Steel Cylinder Concrete Pipe
STL = Steel Pipe
VCP = Vitrified Clay Pipe

Utility Abbreviations

E = Underground Power
G = Gas Line
IR = Irrigation Line
SD = Storm Drain
SS = Sanitary Sewer
T = Telephone
TSC = Traffic Signal Conduit
W = Water Line

Linestyle Naming

XWL_6PVC

Existing Utility (Water) Line — Size (6") — Material (PVC)

Linestyle Scale

LS Scale		Plot Scale
1.0	=	1"=100'
0.5	=	1"=50'
0.2	=	1"=20'

Storm Drain Lines (Graphic)		Linestyle Name
12" SD (CMP)	12" SD (CMP)	XSDL_12CMP
12" SD (CP)	12" SD (CP)	XSDL_12CP
12" SD (RCP)	12" SD (RCP)	XSDL_12RCP
12" SD (RGRCP)	12" SD (RGRCP)	XSDL_12RGRCP
15" SD (CP)	15" SD (CP)	XSDL_15CP
15" SD (HDPE)	15" SD (HDPE)	XSDL_15HDPE
15" SD (RCP)	15" SD (RCP)	XSDL_15RCP
15" SD (RGRCP)	15" SD (RGRCP)	XSDL_15RGRCP
16" SD (CP)	16" SD (CP)	XSDL_16CP
16" SD (HDPE)	16" SD (HDPE)	XSDL_16HDPE
18" SD (RCP)	18" SD (RCP)	XSDL_18RCP
18" SD (RGRCP)	18" SD (RGRCP)	XSDL_18RGRCP
21" SD (CP)	21" SD (CP)	XSDL_21CP
21" SD (HDPE)	21" SD (HDPE)	XSDL_21HDPE
21" SD (RCP)	21" SD (RCP)	XSDL_21RCP
21" SD (RGRCP)	21" SD (RGRCP)	XSDL_21RGRCP
24" SD (CMP)	24" SD (CMP)	XSDL_24CMP
24" SD (CP)	24" SD (CP)	XSDL_24CP
24" SD (HDPE)	24" SD (HDPE)	XSDL_24HDPE
30" SD (CMP)	30" SD (CMP)	XSDL_30CMP

Plotted Linestyle Dimensions (NTS)

0.10" to 0.26" | 0.20" to 0.40" | 0.12" to 0.27" | 0.34" to 0.80" | 0.65" to 0.85" | 0.15" | 0.50" to 0.60"

2.50"

Material Abbreviations

- ACP = Asbestos Cement Pipe
- CIP = Cast Iron Pipe
- CMP = Corrugated Metal Pipe
- CP = Concrete Pipe
- DIP = Ductile Iron Pipe
- HDPE = High Density Polyethylene Pipe
- PE = Polyethylene Pipe
- PVC = Polyvinyl Chloride Pipe
- RCP = Reinforced Concrete Pipe
- RGRCP = Rubber Gasket RCP
- SCCP = Steel Cylinder Concrete Pipe
- STL = Steel Pipe
- VCP = Vitrified Clay Pipe

Utility Abbreviations

- E = Underground Power
- G = Gas Line
- IR = Irrigation Line
- SD = Storm Drain
- SS = Sanitary Sewer
- T = Telephone
- TSC = Traffic Signal Conduit
- W = Water Line

Linestyle Naming

XWL_6PVC

- Existing Utility (Water) Line
- Size (6")
- Material (PVC)

Linestyle Scale

LS Scale		Plot Scale
1.0	=	1"=100'
0.5	=	1"=50'
0.2	=	1"=20'

Storm Drain Lines Con't (Graphic)

	Linestyle Name
30" SD (CP)	XSDL_30CP
30" SD (HDPE)	XSDL_30HDPE
30" SD (RCP)	XSDL_30RCP
30" SD (RGRCP)	XSDL_30RGRCP
36" SD (CMP)	XSDL_36CMP
36" SD (CP)	XSDL_36CP
36" SD (HDPE)	XSDL_36HDPE
36" SD (RCP)	XSDL_36RCP
36" SD (RGRCP)	XSDL_36RGRCP
42" SD (CMP)	XSDL_42CMP
42" SD (CP)	XSDL_42CP
42" SD (HDPE)	XSDL_42HDPE
42" SD (RCP)	XSDL_42RCP
42" SD (RGRCP)	XSDL_42RGRCP
48" SD (CMP)	XSDL_48CMP
48" SD (CP)	XSDL_48CP
48" SD (RGRCP)	XSDL_48RGRCP
60" SD (CMP)	XSDL_60CMP
60" SD (RCP)	XSDL_60RCP

Plotted Linestyle Dimensions (NTS)

0.10" to 0.26" | 0.20" to 0.40" | 0.12" to 0.27" | 0.34" to 0.90" | 0.65" to 0.85" | 0.15" | 0.50" to 0.60"

2.50"

Material Abbreviations

ACP = Asbestos Cement Pipe
CIP = Cast Iron Pipe
CMP = Corrugated Metal Pipe
CP = Concrete Pipe
DIP = Ductile Iron Pipe
HDPE = High Density Polyethylene Pipe
PE = Polyethylene Pipe
PVC = Polyvinyl Chloride Pipe
RCP = Reinforced Concrete Pipe
RGRCP = Rubber Gasket RCP
SCCP = Steel Cylinder Concrete Pipe
STL = Steel Pipe
VCP = Vitrified Clay Pipe

Utility Abbreviations

E = Underground Power
G = Gas Line
IR = Irrigation Line
SD = Storm Drain
SS = Sanitary Sewer
T = Telephone
TSC = Traffic Signal Conduit
W = Water Line

Linestyle Naming

XWL_6PVC

Existing Utility (Water) Line — Size (6") — Material (PVC)

Linestyle Scale

LS Scale		Plot Scale
1.0	≈	1"=100'
0.5	≈	1"=50'
0.2	≈	1"=20'

Storm Drain Lines Con't (Graphic)

	Linestyle Name
60" SD (RGRCP)	XSDL_60RGRCP
72" SD (CMP)	XSDL_72CMP
72" SD (RCP)	XSDL_72RCP
72" SD (RGRCP)	XSDL_72RGRCP
84" SD (CMP)	XSDL_84CMP
84" SD (RCP)	XSDL_84RCP
84" SD (RGRCP)	XSDL_84RGRCP

Plotted Linestyle Dimensions (NTS)

0.10" to 0.26" | 0.20" to 0.40" | 0.12" to 0.27" | 0.34" to 0.90" | 0.65" to 0.85" | 0.15" | 0.50" to 0.60"

2.50"

Material Abbreviations

ACP = Asbestos Cement Pipe
CIP = Cast Iron Pipe
CMP = Corrugated Metal Pipe
CP = Concrete Pipe
DIP = Ductile Iron Pipe
HDPE = High Density Polyethylene Pipe
PE = Polyethylene Pipe
PVC = Polyvinyl Chloride Pipe
RCP = Reinforced Concrete Pipe
RGRCP = Rubber Gasket RCP
SCCP = Steel Cylinder Concrete Pipe
STL = Steel Pipe
VCP = Vitrified Clay Pipe

Utility Abbreviations

E = Underground Power
G = Gas Line
IR = Irrigation Line
SD = Storm Drain
SS = Sanitary Sewer
T = Telephone
TSC = Traffic Signal Conduit
W = Water Line

Linestyle Naming

XWL_6PVC

Existing
Utility (Water)
Line
Size (6")
Material (PVC)

Linestyle Scale

LS Scale		Plot Scale
1.0	=	1"=100'
0.5	=	1"=50'
0.2	=	1"=20'

Sanitary Sewer Lines (Graphic)		Linestyle Name
4" SS (CIP)	4" SS (CIP)	XSSL_4CIP
4" SS (PVC)	4" SS (PVC)	XSSL_4PVC
4" SS (VCP)	4" SS (VCP)	XSSL_4VCP
6" SS (CIP)	6" SS (CIP)	XSSL_6CIP
6" SS (DIP)	6" SS (DIP)	XSSL_6DIP
6" SS (PVC)	6" SS (PVC)	XSSL_6PVC
6" SS (VCP)	6" SS (VCP)	XSSL_6VCP
8" SS (CIP)	8" SS (CIP)	XSSL_8CIP
8" SS (DIP)	8" SS (DIP)	XSSL_8DIP
8" SS (PVC)	8" SS (PVC)	XSSL_8PVC
8" SS (VCP)	8" SS (VCP)	XSSL_8VCP
10" SS (DIP)	10" SS (DIP)	XSSL_10DIP
10" SS (PVC)	10" SS (PVC)	XSSL_10PVC
10" SS (VCP)	10" SS (VCP)	XSSL_10VCP
12" SS (DIP)	12" SS (DIP)	XSSL_12CIP
12" SS (PVC)	12" SS (PVC)	XSSL_12PVC
12" SS (VCP)	12" SS (VCP)	XSSL_12VCP
15" SS (PVC)	15" SS (PVC)	XSSL_15PVC
15" SS (VCP)	15" SS (VCP)	XSSL_15VCP
21" SS (PVC)	21" SS (PVC)	XSSL_21PVC
21" SS (VCP)	21" SS (VCP)	XSSL_21VCP

Plotted Linestyle Dimensions (NTS)

0.10" to 0.26" | 0.20" to 0.40" | 0.12" to 0.27" | 0.34" to 0.90" | 0.65" to 0.85" | 0.15" | 0.50" to 0.60"

2.50"

Material Abbreviations

- ACP = Asbestos Cement Pipe
- CIP = Cast Iron Pipe
- CMP = Corrugated Metal Pipe
- CP = Concrete Pipe
- DIP = Ductile Iron Pipe
- HDPE = High Density Polyethylene Pipe
- PE = Polyethylene Pipe
- PVC = Polyvinyl Chloride Pipe
- RCP = Reinforced Concrete Pipe
- RGRCP = Rubber Gasket RCP
- SCCP = Steel Cylinder Concrete Pipe
- STL = Steel Pipe
- VCP = Vitrified Clay Pipe

Utility Abbreviations

- E = Underground Power
- G = Gas Line
- IR = Irrigation Line
- SD = Storm Drain
- SS = Sanitary Sewer
- T = Telephone
- TSC = Traffic Signal Conduit
- W = Water Line

Linestyle Naming

XWL_6PVC

Existing Utility (Water) Line — Material (PVC) — Size (6")

Linestyle Scale

LS Scale		Plot Scale
1.0	≈	1"=100'
0.5	≈	1"=50'
0.2	≈	1"=20'

Telephone Lines (Graphic)	Linestyle Name
—T (CONDUIT)———— ————T (CONDUIT)——	XTL_COND
—T (DUCT BANK)———— ————T (DUCT BANK)——	XTL_DUCT

Traffic Signal Conduit Lines (Graphic)	Linestyle Name
— 1-½" TSC (PVC)———— ————1-½" TSC (PVC)——	XTSCL_1.5PVC
—— 2" TSC (PVC)———— ————2" TSC (PVC)——	XTSCL_2PVC
— 2-½" TSC (PVC)———— ————2-½" TSC (PVC)——	XTSCL_2.5PVC
—— 3" TSC (PVC)———— ————3" TSC (PVC)——	XTSCL_3PVC
—— 4" TSC (PVC)———— ————4" TSC (PVC)——	XTSCL_4PVC
—— 5" TSC (PVC)———— ————5" TSC (PVC)——	XTSCL_5PVC

Plotted Linestyle Dimensions (NTS)

0.10" to 0.26" | 0.20" to 0.40" | 0.12" to 0.27" | 0.34" to 0.90" | 0.65" to 0.85" | 0.15" | 0.50" to 0.60"

2.50"

Material Abbreviations

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- E = Underground Power
- G = Gas Line
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- SD = Storm Drain
- SS = Sanitary Sewer
- T = Telephone
- TSC = Traffic Signal Conduit
- W = Water Line

Linestyle Naming

XWL_6PVC

Existing Utility (Water) Line — Size (6") — Material (PVC)

Linestyle Scale

LS Scale		Plot Scale
1.0	≈	1"=100'
0.5	≈	1"=50'
0.2	≈	1"=20'

Water Lines (Graphic)		Linestyle Name
4" W (PVC)	4" W (PVC)	XWL_4PVC
6" W (ACP)	6" W (ACP)	XWL_6ACP
6" W (DIP)	6" W (DIP)	XWL_6DIP
6" W (PVC)	6" W (PVC)	XWL_6PVC
8" W (ACP)	8" W (ACP)	XWL_8ACP
8" W (DIP)	8" W (DIP)	XWL_8DIP
8" W (PVC)	8" W (PVC)	XWL_8PVC
10" W (ACP)	10" W (ACP)	XWL_10ACP
10" W (DIP)	10" W (DIP)	XWL_10DIP
10" W (PVC)	10" W (PVC)	XWL_10PVC
12" W (ACP)	12" W (ACP)	XWL_12ACP
12" W (DIP)	12" W (DIP)	XWL_12DIP
12" W (PVC)	12" W (PVC)	XWL_12PVC
14" W (PVC)	14" W (PVC)	XWL_14PVC
16" W (PVC)	16" W (PVC)	XWL_16PVC
18" W (PVC)	18" W (PVC)	XWL_18PVC
24" W (SCCP)	24" W (SCCP)	XWL_24SCCP
30" W (SCCP)	30" W (SCCP)	XWL_30SCCP

Plotted Linestyle Dimensions (NTS)

0.10" to 0.26" | 0.20" to 0.40" | 0.12" to 0.27" | 0.34" to 0.90" | 0.65" to 0.85" | 0.15" | 0.50" to 0.60"

2.50"

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IR = Irrigation Line
SD = Storm Drain
SS = Sanitary Sewer
T = Telephone
TSC = Traffic Signal Conduit
W = Water Line

Linestyle Naming

XWL_6PVC

Existing Utility (Water) Line — Material (PVC) — Size (6")

Linestyle Scale

LS Scale		Plot Scale
1.0	≈	1"=100'
0.5	≈	1"=50'
0.2	≈	1"=20'

MULTILINE STYLES

Multi-line styles are useful for pipelines that are 18” or greater in diameter that must be printed at scales other than 1” = 100’. There is a multi-line style library for pipes that are to be plotted at 10, 20, 30, 40, 50, 60 scales.

PLOTTING

The MCDOT workspace includes three plot configuration files (pltcfg). The files have a pltcfg extension and take advantage of the new XML-based plot configuration format released with the V8i version.

MCDOT XM CAD GUIDELINES (MXM)

Default Lineweights using
MXM bw printer.pltcfg

Graphic Definition	Weight	Thickness (mm)	Thickness (inch)
	0	0.18	0.007
	1	0.25	0.010
	2	0.35	0.014
	3	0.50	0.020
	4	0.70	0.028
	5	1.00	0.040
	6	1.20	0.047
	7	1.40	0.055
	8	1.60	0.063
	9	1.80	0.071
	10	2.00	0.079

GRAYSCALE PLOTTING COLOR MAPS

The standard MCDOT black and white plot configuration files will print black for colors 0-100 and 50% screened for colors 101 and above.

COLORS

The picture below is the standard color table.