Design CADD Standards & Consultant Deliverables

June 2018

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Software Versions

AutoCAD Civil 3D 2018

Author

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1: Overview

This manual was created for the New Mexico Department of Transportation to assist in standardizing Computer Aided Drafting and Design (CADD) deliverables produced within, and for, the department. Items in this section:

- Purpose
- CADD Platforms
- Glossary of Terms
- Paradigms

Purpose

The purpose of this manual is to establish and document design CADD standards to be utilized for all civil engineering projects developed for NMDOT. This manual also documents the files to be submitted and the use of the files within NMDOT.

The creation of electronic files is merely the initial process of their life span. Project files are shared and referenced by many individuals. Establishing standards allows individuals to reliably utilize project files with predictable results and behaviors.

This manual presents these standards in a format that is easily understood by any individual with basic CADD knowledge. The contract between NMDOT and its consultants, or contractors define the exact terms and conditions regarding procedures and standards to be followed.

CADD Platforms

NMDOT has committed to the implementation and support of AutoCAD Civil 3D on future projects. As of July 01, 2018, NMDOT's currently supported versions of software are:

- AutoCAD Civil 3D 2018

Glossary of Terms

.dwg – Default file extension for files created by AutoCAD.

.stb – An AutoCAD plot style that allows the properties of the element to determine the printed results. Each element has properties that determine color, line weight (thickness), and linetype.

AutoCAD - CAD platform designed by Autodesk, Inc.

Base File –AutoCAD file created with design elements to be used as a reference file only.

Block– A group of elements created for use as a single element repeatedly. Blocks are stored within the AutoCAD drawing file.

CAD – Acronym for **C**omputer **A**ided **D**rafting.

CADD – Acronym for **C**omputer **A**ided **D**rafting & **D**esign.

Color Table – Used to assign specific colors to elements using numeric values.

Extended Characters – Special symbol characters located within an AutoCAD or TrueType font resource file.

Layers – An element in a CAD file in which CAD programs segregate information for the user to aid in the display of the design. For example, the prposed centerline of a roadway may be placed on a level named "VF-ROAD-CNTR-P". The existing striped centerline may be placed on another level named "VF-ROAD-CNTR-E". The user would then have the ability to show one of these centerlines by merely turning off the other level.

Linear Elements – Made up of either lines or various types of arcs, linear elements account for a majority of a design file.

Macros – A simple "program" used in applications that assist in automating repetitive commands. An example of a macro would be to change the "case" of text from lower to upper throughout a design file.

PCN – Acronym for **P**roject **C**ontrol **N**umber. A PCN is a numeric value assigned to every civil engineering project to aid the DOT in tracking the design.

Raster Images – An image used in a design file to display either the project area, or a specific item within the project (i.e. a scanned New Mexico map to show location of project on the vicinity map). "Raster image" is typically used in reference to an Aerial photograph.

Reference File – A term used to describe a source file when the information is viewed from another file. A reference file is typically a base file used for information for the sheet file (i.e. plan and profile sheet).

Share – Folders located on a server with user and/or group permissions.

Servername – Example name of a server on the NMDOT Domain or a corporate domain.

Sharename – Example name of folder "shared" on the NMDOT servers or a corporate server.

Sheet File – Design files that reference base files in order to display information in a manageable fashion. Sheet files are the files that are printed to create the plan set for any given civil engineering project.

Symbology – This term refers to the weight, color, and style of vector elements in a design file.

UNC – **U**niversal **N**aming **C**onvention; designated by \\servername\sharename.

Vector Elements – Any element created within a CAD application is a vector element. The most common elements are lines and arcs. These elements are often the output of the engineering software.

Working Units – Working units are merely units of measurement used in a CAD file to determine distance.

Paradigms

Several typefaces and symbols are used throughout this document to assist the reader in understanding the document.

Typefaces:

Normal:

- This typeface is used to relay general information to the reader

Bold/Italic/Underlined:

- This typeface is used as an indicator of a hyperlink. Hyperlinks are used throughout this document to allow for quicker navigation within this document when viewed in an electronic format.

Notable:
This typeface is used in conjunction with the alert symbols to relay important information.

Symbols:

- This symbol is used to call attention to a body of text that is to be considered important

→

- This symbol is used in conjunction with the bold typeface to relay a specific process or selection.

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2: Data Separation

With technology available today in civil applications, it is entirely possible to create an entire civil project within a single file. This is especially true with Civil 3D. NMDOT has determined that all data should not reside in a single file, and all data will be separated. Items discussed in this section:

- Survey Data Separation
- Survey File Content
- Proposed Data Separation

Survey Data Separation

All consultants are expected to follow the following guidelines for data separation of survey deliverables. No exceptions are to be made without express, written consent from the NMDOT Survey management.

File Name	PCN_XSURV01.dwg (Main Survey File)	PCN_Surface01.dwg (Surface Only File)	PCN_XSCN01.dwg (Survey Notes Sheet)
Data Included in File	• Vector Graphics • Alignments • Pipe Networks	• Existing Surface	• Points Tables • Alignment Tables

Survey Files Content

The following information is provided to allow survey consulting companies to provide the correct data using correct naming conventions.

PCN_XSURV01.dwg

The XSURV (Survey) file is the main survey file delivered by survey personnel, be it within the NMDOT or a contracted company. This file contains vector graphics often created using photogrammetric methods, and/or using standard survey methods. This file will also contain all existing alignments pertaining to the project along with pipe networks that make up the drainage culverts. This file will also have data shortcut into it.

Use of File

This file will be referenced into the project plan set via the xref commands as well as having the alignments and pipe networks shortcut into design files for use in development of the project.

For an example of the contents of this file, please contact NMDOT CAD-mapping unit management.

- Vector Graphics
- All Existing Alignments pertaining to project

PCN_Surface01.dwg

The Surface file only contains the existing surface created by either a photogrammetric method, traditional survey method, or a combination of both. This file should not have any vector graphics displayed, including contours, or triangles, of the surface.

Use of File

This file will be used only to shortcut the existing surface into design files for use in development of the project.

For an example of the contents of this file, please contact NMDOT CAD-mapping unit management.

 Existing Surface

PCN_XSCN01.dwg

The XSCN (Existing Survey Notes) file contains dynamic alignment tables as well as dynamic point tables. This file will contain vector graphics as well as alignments shortcut into it.

Use of File

This file will be used in verifying survey location and setout of project. It will not be referenced into any design file, nor is it shortcut in any way.

Proposed Data Separation

Segregating data used during the project development process becomes more important the larger the project is. The engineering data included in a file adds to loading times and processing times. The dynamic nature of Civil3D such as section views, dynamic tables, etc., add a significant load to hardware and operating systems.

The breakdown of sheets that make up a plan set can be found in the NMDOT_CADD_Stds_2015 document available on the NMDOT website. This document will only address the project files as they pertain to hosting engineering data.

Alignments

It is highly recommended that all alignments be housed in a file that is separate from any vector data or other engineering data, with the sole exception of pipe networks. Depending on the size of project, it may be necessary to separate alignments into several files. This will be dependent on work sharing and size of project.

Alignments should be shared between drawings using the data shortcut feature available in Civil3D. Alignments should not be promoted at any time, thus creating duplicate alignments in the project.

Surfaces

Any surface created during the project development process should be segregated from and vector data, this includes contours. Corridor surfaces should be housed in the same file as the corridor. Any grading surfaces (e.g. detention ponds) should be housed in a separate file from the corridor file, or any other file containing alignments or vector data.

Surfaces should be shared between drawings using the data shortcut feature available in Civil3D. Surfaces should not be promoted at any time, thus creating duplicates in the project.

Corridors

Corridors should be kept separate from any other engineering data generated during the project development process. This includes alignments and surfaces (except corridor surfaces).

Corridors cannot be shared using data shortcuts, but can be sampled for section views by referencing the drawing that hosts the corridor.

Sample Lines & Section Views

Sample lines, and the resulting section views should be kept separate from any other engineering data generated during the project development process. This includes alignments and surfaces. It is possible to sample corridors by referencing the CAD file they are housed in. This is the preferred method for creation section views that include the corridor for construction purposes.

Pipe Networks

Pipe Networks can be kept in a separate file or in the same file as any alignments.

Pipe networks should be shared between drawings using the data shortcut feature available in Civil3D. Pipe networks should not be promoted at any time, thus creating duplicates in the project.

View Frame Groups

View frame groups should be kept in a separate file mainly due to their nature and use in a project.

View frame groups should be shared between drawings using the data shortcut feature available in Civil3D. View frame groups should not be promoted at any time, thus creating duplicates in the project.

Sites

Sites should not be used in an NMDOT project.

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3: Survey Standards

NMDOT has developed a file naming convention that is to be applied in every project delivered to the department. This section also addresses workflow issues within the CADD application and the separation of sheet files and base files. Items discussed in this section:

- State Plane Coordinates
- Standard Points List
- NMDOT Point Attributes
- CAD Standards

State Plane Coordinates

The New Mexico Department of Transportation designs all projects using local ground coordinates directly derived from GPS observations of found or set control monuments on the project site. These control monuments have both local ground and New Mexico State Plane 1983 Coordinates.

Standard Point List

The segregation of point numbers is necessary to allow for easy identification and setting of points by survey crews within NMDOT and its contractors. The point numbers to be used for survey purposes range from 1-49,999. Points ranging from 50,000-100,000 are used for project development. The following table is the breakdown of survey point numbers and their use.

Point Numbers	Description
1-99	GPS and supplemental control for site
100-299	Calculated photo control (preliminary position from photogrammetry)
300-499	Set photo control
500-999	Found ROW Monuments, Section Corners, adjacent property
1,000-49,999	Topo shots.

Table 3.1

Along with the grouping of point ranges, NMDOT has developed a point code list that standardizes the information gathered in the field. NMDOT does not accept additional points beyond what is listed. Should the surveyor have any additions, or recommendations, please contact NMDOT Survey Section Head. The following table contains all the points used by NMDOT during field surveys. Please note the Layer column as it represents the layer in which the resulting point graphic should reside.

Code	Format	Description	Layer
3D	NGS3D ROD	NGS VCM 3D ROD	VF-NODE-MONU
ABUT **	ABUT	ABUTMENT	VF-NODE-BRDG
AC	AC	ALUM. CAP	VF-NODE-MONU
ACB **	ASPHALT CURB	ASPHALT CURB	VF-NODE-CURB-ASPH-BACK
ACSET	AC SET	ALUM. CAP SET	VF-NODE-MONU-N
AX	AXLE	AXLE	VF-NODE-MONU
BL **	BRKLN	BREAKLINE	VF-NODE-BRKL
BLDG **	BLDG. CRNR.	BUILDING CORNER	VF-NODE-BLDG-OTLN
BLDL **	BLDG. OTLN.	BUILDING LINE	VF-NODE-BLDG-OTLN
BLDO **	BLDG. OVHD.	BUILDING OVERHANG	VF-NODE-BLDG-OVHD
BM	BM	BENCH MARK	VF-NODE-MONU
BOL	BOLLAR	STRUCTURE - BOLLARD	VF-NODE-BARR-BOLL
BR **	BRDG. DECK	BRIDGE	VF-NODE-BRDG
BRAS **	BRDG. APP. SLAB	BRIDGE APPROACH SLAB	VF-NODE-BRDG-APPR-SLAB
BRC	BC	BRASS CAP	VF-NODE-MONU
BRCSET	BC SET	BRASS CAP SET	VF-NODE-MONU-N
CALC	CALC. PNT.	CALCULATED POINT	VF-NODE-MONU-CALC
CAN	CANOPY	CANOPY	VF-NODE-BLDG-OVHD
CAST	CAST	CAST IRON PIPE CULVERT	VF-NODE-STRM-PIPE
CB **	CURB BK. TOP	TOP BACK OF CURB	VF-NODE-ROAD-CURB
CBC	CBC	CONCRETE BOX CULVERT	VF-NODE-STRM-PIPE
CG	CTTL. GRD.	CATTLE GUARD	VF-NODE-FENC-CTTLGRD
CHK	CHK	CHECK SHOT	VF-NODE-CHK
CL **	CL	CENTERLINE OF GENERIC	VF-NODE-ROAD-CNTR
CLM **	CL MAT	CENTERLINE OF MAT	VF-NODE-ROAD-CNTR-MATT
CLNOUT	CLNOUT	CLEANOUT	VF-NODE-STRM
CMC	CMC	CORRUGATED METAL CULVERT	VF-NODE-STRM
CON **	CONC.	CONCRETE	VF-NODE-ROAD-CONC
CONS	CONS	CONCRETE SPOT	VF-NODE-ROAD-CONC
CP	CNTROL. PNT.	CONTROL POINT	VF-NODE-MONU
CPC	CPC	CONCRETE PIPE CULVERT	VF-NODE-STRM
CPSET	CNTRL. PNT. SET	CONTROL POINT SET	VF-NODE-MONU-N

*** = Appending a counter after code is allowed to facilitate multiple object entries*

Code	Format	Description	Layer
CVG **	CVG	CONCRETE VALLEY GUTTER	VF-NODE-ROAD-CURB-VGUT
CWB	CWB	CONCRETE WALL BARRIER	VF-NODE-BARR-CONC-WALL
DH	DH	DDRILL/BORE HOLE	VF-NODE-UTIL-DRIL-HOLE
DI	DI	DROP INLET	VF-NODE-STRM
DM	ANCHOR	DEAD MAN ANCHOR	VF-NODE-UTIL-ELEC-STRC
EBOX	BOX ELEC.	ELECTRIC BOX	VF-NODE-UTIL-ELEC-STRC
EMH	MH ELEC.	ELECTRICAL MANHOLE	VF-NODE-UTIL-ELEC-MHOL
EOM **	EOM	EDGE OF MAT	VF-NODE-ROAD-EDGE-MATT
EOP **	EOP	EDGE OF PAVEMENT	VF-NODE-ROAD-EDGE-PVMT
EOR **	EOR	EDGE OF ROAD	VF-NODE-ROAD-EDGE
EPB	ELEC. PULLBOX	ELECTIC PULLBOX	VF-NODE-UTIL-ELECT-STRC
ET	ELEC. TRNSF.	ELECTRIC TRANSFORMER	VF-NODE-UTIL-ELEC-STRC
FBW	FENCE	FENCE	VF-NODE-FENC
FCL	FENCE	FENCE	VF-NODE-FENCE
FEN **	FENCE	FENCE	VF-NODE-FENC
FF	FF	Finished Floor	VF-NODE-BLDG-FFLOR
FH	FIRE HYDR.	FIRE HYDRANT	VF-NODE-WATR-HYDR
FIR	FENCE	FENCE	VF-NODE-FENC
FL **	FL	FLOW LINE	VF-NODE-STRM-FLOW
FLC **	FLC	FLOW LINE of CURB	VF-NODE-ROAD-CURB-FLOW
FOPB	FIBR. OPTC. PULLBOX	FIBER OPTIC PULLBOX	VF-NODE-UTIL-FIBR-STRC
FPIPE	FENCE	FENCE	VF-NODE-FENC
FRR	FENCE	FENCE	VF-NODE-FENC
FSILT	FENCE	FENCE	VF-NODE-FENC
FSM	MONU. FRST. SRVC.	FORREST SERVICE MONUMENT	VF-NODE-MONU
FWD	FENCE	FENCE	VF-NODE-FENC
FWW	FENCE	FENCE	VF-NODE-FENC
GASREG	GAS RGLTR.	GAS REGULATOR	VF-NODE-NGAS-EQPM
GASTANK	GAS TANK	GAS TANK	VF-NODE-NGAS-TANK
GASWELL	GAS WELL	GAS WELL MONITOR	VF-NODE-NGAS-WELL
GATE	GATE	GATE	VF-NODE-FENC-GATE
GLIP **	G. LIP	GUTTER LIP	VF-NODE-STRM-GLIP
GND	GRND.	GROUND	VF-NODE-GRND
GR **	GRD. RAIL	GUARD RAIL	VF-NODE-BARR-GRAL

*** = Appending a counter after code is allowed to facilitate multiple object entries*

Code	Format	Description	Layer
GRA	GRATE	GRATE	VF-NODE-STRM
GRDR	$*	GIRDER	VF-NODE-BRDG-GRDR
HG	HEADGATE	HEAD GATE ON IRRIGATION DITCH	VF-NODE-IRRG-EQPM
HR	HANDRAIL	HANDRAIL	VF-NODE-HR
HWALL **	HEADWALL	HEAD WALL	VF-NODE-STRM-STRC-HWAL
ID **	IRR. DITCH	IRRIGATION DITCH	VF-NODE-STRM-DITC
INV	INV.	INVERT OF STRUCTURE	VF-NODE-STRM-FLOW
IP	IRON PIPE	FOUND IRON PIPE	VF-NODE-MONU
JCTB	JNCT. BOX	JUNCTION BOX	VF-NODE-UTIL-ELEC-STRC
LP	POLE LIGHT	LIGHT POLE	VF-NODE-UTIL-ELEC-STRC
MB	MAILBOX	MAILBOX	VF-NODE-ROAD-EQPM
MEM	MEMORIAL	MEMORIAL/DESCANSO	VF-NODE-MISC
METERE	METER ELEC.	ELECTRIC METER	VF-NODE-ELEC-METR
METERG	METER GAS	GAS METER	VF-NODE-NGAS-METR
METERW	METER WATER	WATER METER	VF-NODE-WATR-METR
MON	MONU. UNDEF.	MONUMENT NOT DEFINED	VF-NODE-MONU
MP	MILEPOST	MILE POST	VF-NODE-ROAD-MILE
MU	MOVE UP	MOVE UP	VF-NODE-MONU
NAIL	NAIL	NAIL	VF-NODE-MONU
OHE **	ELEC. OVHD.	ELECTRICAL LINE OVERHEAD	VF-NODE-ELEC-OVHD
OHT **	TELE. OVHD.	TELEPHONE LINE OVERHEAD	VF-NODE-TELE-OVHD
OHTV **	CATV OVHD.	OVERHEAD CABLE TV LINE	VF-NODE-UTIL-CATV-OVHD
OHU **	UTIL. OVHD.	UTILIY LINE OVERHEAD	VF-NODE-UTIL-OVHD
PA	PIPE ARCH	PIPE ARCH	VF-NODE-STRM
PAV	PVMNT.	PAVEMENT	VF-NODE-ROAD-PVMT
PCB	P&C BAR.	P&C BARR.	VF-NODE-BARR-POST-CBL
PCON	PHOTO CNTRL.	PHOTO CONTROL	VF-NODE-MONU
PEDT	PED. TELE.	PEDESTAL TELEPHONE	VF-NODE-TELE-EQPM
PEDTV	PED. CATV	PEDESTAL TV	VF-NODE-TELE-EQPM
PIER **	PIER	PIER	VF-NODE-BRDG-PIER
PIPE	PIPE	PIPE	VF-NODE-MONU
PK	PK NAIL	PK NAIL	VF-NODE-MONU
PKSET	PK NAIL SET	PK NAIL SET	VF-NODE-MONU-N
PLCAP	CAP PLAST.	PLASTIC CAP	VF-NODE-MONU

*** = Appending a counter after code is allowed to facilitate multiple object entries*

Code	Format	Description	Layer
PM	METER PARK.	PARKING METER	VF-NODE-ROAD-EQPM
PP	POLE PWR.	POWER POLE	VF-NODE-UTIL-ELEC-POLE
RBR	REBAR	REBAR	VF-NODE-MONU
RBRSET	REBAR SET	REBAR SET	VF-NODE-MONU-N
RIVR **	RIVER EDGE	RIVER/STREAM EDGE	VF-NODE-STRM-RIVR
RR **	RR TRAK	RAIL ROAD RAIL	VF-NODE-RAIL-TRAK
RRAP **	RIPRAP	RIPRAP	VF-NODE-STRM-RRAP
RRARM	RR ARM	RAIL ROAD ARM	VF-NODE-RAIL-EQPM
RRCL **	CL RR TRAK	RAIL ROAD CENTER LINE OF RAILS	VF-NODE-RAIL-CNTR
RRLT	RR LIGHT	RAIL ROAD LIGHT	VF-NODE-RAIL-EQPM
RRSPIKE	MONU. RR SPIKE	RAIL ROAD SPIKE	VF-NODE-MONU
RRSW	RR SWITCH	RAIL ROAD SWITCH	VF-NODE-RAIL-EQPM
RWBC	ROW BC	R/W BRASS CAP	VF-NODE-MONU
RWBCSET	ROW BC SET	R/W BRASS CAP SET	VF-NODE-MONU-N
SC	SRCH. CORD.	CALC. POINT; SEARCH COORD.	VF-NODE-MONU-CALC
SFB	SEE FIELD BOOK	SEE FIELD BOOK	VF-NODE-UNKN
SH **	SHORE	SHORE	VF-NODE-STRM-SHOR
SIGNMULTI	SIGN MULTI	SIGN MULTIPLE POST	VF-NODE-SIGN
SIGNONE	SIGN	SIGN ONE POST	VF-NODE-SIGN
SILT	SILT	SILT	VF-NODE-STRM-GRND
SL **	SSWR	SANITARY SEWER LINE	VF-NODE-SSWR
SP	POLE SRVC.	SERVICE POLE	VF-NODE-UTIL-ELEC-STRC
SPINDLE	SPINDLE	SPINDLE	VF-NODE-MONU
SPNKLR	SPRINKLER	SPRINKLER	VF-NODE-IRRG-EQPM
SSMH	MH SSWR	SANITARY SEWER MANHOLE	VF-NODE-SSWR-MHOL
STDL **	STORM DRAIN	STORM DRAIN LINE	VF-NODE-STRM
STMH	MH STORM	STORM DRAIN MANHOLE	VF-NODE-STRM-MHOL
STONE	MONU. STONE	STONE	VF-NODE-MONU
STRMG	GAUGE STRM.	STREAM GUAGE	VF-NODE-RIVR-EQPM
STRMR	RECORDER STRM.	STREAM RECORDER	VF-NODE-RIVR-EQPM
SW **	SIDEWALK	SIDE WALK	VF-NODE-SWLK
TANKPRO	TANK LQPG	PROPANE TANK	VF-NODE-NGAS-TANK
TANKSEPT	TANK SEPTIC	SEPTIC TANK	VF-NODE-SSWR-TANK

*** = Appending a counter after code is allowed to facilitate multiple object entries*

Code	Format	Description	Layer
TB **	BANK TOP	TOP OF BANK	VF-NODE-BRKL-TOPB
TBS	CALCD. PNT. TO BE SET	CALC. POINT; TO BE SET	VF-NODE-MONU-CALC
TL **	TREE LINE	TREE LINE	VF-NODE-VEGE-TREE
TMH	MH TELE.	TELEPHONE MANHOLE	VF-NODE-UTIL-TELE-MHOL
TOE **	TOE SLOPE	TOE/DOWNHILL SIDE	VF-NODE-BRKL-BOTB
TP	POLE TELE.	TELEPHONE POLE	VF-NODE-UTIL-TELE-POLE
TR	T-RAIL	T-RAIL	VF-NODE-MONU
TREE	TREE	TREE	VF-NODE-VEGE-TREE
TRPB	PULLBOX TRAF.	TRAFFIC PULLBOX	VF-NODE-ROAD-EQPM
TRS	SIGNAL TRAF.	TRAFFIC SIGNAL	VF-NODE-ROAD-EQPM
UGE **	ELEC. UGND.	UNDERGROUND ELECTRIC	VF-UTIL-ELEC-UNGD
UGF **	FIBR. OPTC. UGND.	FIBER OPTIC LINE	VF-NODE-UTIL-LOCA-FIBR
UGG **	NGAS UGND.	GAS LINE	VF-NODE-UTIL-LOCA-NGAS
UGP **	LQPG UGND.	PETROLEUM LINE	VF-NODE-UTIL-LOCA-LQPG
UGT **	TELCOM UGND.	UNDERGROUND COMMUNICATION	VF-NODE-UTIL-LOCA-TELE
UGTV **	CATV UGND.	UNDERGROUND CABLE TV	VF-NODE-UTIL-LOCA-CATV
UGW **	WATER UGND.	WATERLINE	VF-NODE-LOCA-WATR
UMH	MH UNKN.	UNKNOWN MANHOLE	VF-NODE-UNKN-MANL
UNV	VALV. UNKNO.	UNKNOWN VALVE	VF-NODE-UNKN-VALV
VALVG	VALV. GAS	GAS VALVE	VF-NODE-NGAS-EQPM
VALVW	VALV. WATR.	WATER VALVE	VF-NODE-WATR-VALV
VP	VENT PIPE	VENT PIPE	VF-NODE-SSWR-VENT
WALL **	WALL	WALL	VF-NODE-WALL
WATFCT	FAUCET WATR.	WATER FAUCET	VF-NODE-WATR-FAUC
WATWELL	WELL WATR.	WATER WELL	VF-NODE-WATR-WELL
WC	WITNESS CRNR.	WITNESS CORNER	VF-NODE-MONU
WCSET	WITNESS CRNR. SET	WITNESS CORNER SET	VF-NODE-MONU-N
WMH	MH WATER	WATER MANHOLE	VF-NODE-WATR-MHOL
WS **	STRIPE WHT.	WHITE PAINT STRIPE	VF-NODE-STRP-WHTE
WWALL **	WINGWALL	WING WALL	VF-NODE-STRM-WWAL
WX	WIRE X-ING	WIRE CROSSING	VF-NODE-UTIL-OVHD
X	CHISLED "X"	CHISLED "X"	VF-NODE-MONU
YS **	STRIPE YLLW	YELLOW PAINT STRIPE	VF-NODE-STRP-YLLW

Table 3.2

*** = Appending a counter after code is allowed to facilitate multiple object entries*

NMDOT Point Attributes

NMDOT had long ago begun the process of collecting meta-data in the field during survey collection. This meta-data, or attribute, allows information to be accessible to office personnel without the need to reference survey field books. Examples of these attributes are: tree diameter, tree type, point description, etc. With Civil 3D, this information is not mandatory, but the import process is very specific as to the order of import. The following table is a listing of attributes in the order of import.

Attribute Name	Value	Description	CSV Column
Feature_Name	Text	Feature Name	F
Bridge_No	Text	Bridge Number	G
C_Stab_ft	Numeric	(feet)	H
Desc	Text	Description	I
DiaHt_in	Numeric	Diameter Height (inches)	J
Dia_in	Numeric	Diameter (inches)	K
DiaWid_in	Numeric	Diameter Width (inches)	L
Dim_ft	Numeric	Dimension (feet)	M
E_Stab_ft	Numeric		N
GrateDimFt	Text	Storm Grate Dimension (feet)	O
HDWL_Ht_ft	Numeric	Headwall Height (feet)	P
Height_ft	Numeric	Height (feet)	Q
LegLn_ft	Numeric	Leg Length (feet)	R
LegWid_ft	Numeric	Leg Width (feet)	S
Length_ft	Numeric	Length (feet)	T
MilePostNo	Text	Mile Post Number	U
N_Stab_ft	Numeric	North Measurement to Rim (feet)	V
NoBoxes	Text	Number of Boxes	W
Number	Text	Number	X
OpenHt_ft	Numeric	Open Height (feet)	Y
OpenWid_ft	Numeric	Open Width (feet)	Z
PaintPanel	List		AA
S_Stab_ft	Numeric	South Measurement to Rim (feet)	AB
SigDirectn	Text	Sign Direction facing	AC
Spread_ft	Numeric		AD
Stamping	Text		AE
Stand_Mast	List		AF
Type	Text	Type of element	AG
TypeDesc	Text	Type & Description	AH
W_Stab_ft	Numeric	West Measurement to Rim (feet)	AI
Photo	Photo	Photograph number	AJ

Linear Features

The workflow that has been developed for NMDOT projects includes the ability to automate linear feature creation while importing the surveyed points into Civil 3D. When using the NMDOT feature code list along with the NMDOT template, the following linear features will be automatically created. Given is the code, if the resultant feature is a breakline or not, and finally, the layer the feature will be placed.

Name	Breakline	Layer		Name	Breakline	Layer
ABUT	No	VF-BRDG-ABUT		OHE	No	VF-UTIL-ELEC-OVHD
BL	Yes	VF-BRKL		OHT	No	VF-UTIL-TELE-OVHD
BLDG	No	VF-BLDG-OTLN		OHU	No	VF-UTIL-OVHD
BLDL	No	VF-BLDG-OTLN		PIER	No	VF-BRDG-PIER
BLDO	No	VF-BLDG-OTLN		RIVR	Yes	VF-STRM-RIVR
BR	No	VF-BRDG		RR	RR	RR
BRAS	NO	VF-BRDG-APPR-SLAB		RRAP	RIPRAP	RIPRAP
CAN	No	VF-BLDG-OTLN		RRCL	No	VF-RAIL-CNTR
CB	Yes	VF-ROAD-CURB		SH	Yes	VF-STRM-SHOR
CL	Yes	VF-ROAD-CNTR		SL	No	VF-SSWR
CLM	Yes	VF-ROAD-CNTR-MATT		STDL	No	VF-STRM
CMC	No	VF-STRM-STRC		SW	Yes	VF-SWLK
CON	Yes	VF-ROAD-CONC		TB	Yes	VF-BRKL-TOPB
CPC	No	VF-STRM-STRC		TL	No	VF-VEGE
CVG	Yes	VF-ROAD-CURB-VGUT		TOE	Yes	VF-BRKL-BOTB
EOM	Yes	VF-ROAD-EDGE-MAT~		UGE	No	VF-UTIL-ELEC-UNGD
EOP	Yes	VF-ROAD-EDGE-PVMT		UGG	No	VF-UTIL-NGAS-UNGD
EOR	Yes	VF-ROAD-EDGE		UGP	No	VF-UTIL-LQPG-UNGD
FEN	No	VF-FENC		UGT	No	VF-UTIL-TELE-UGND
FL	Yes	VF-STRM-FLOW		UGW	Yes	VF-UTIL-WATR-UNGD
FLC	Yes	VF-ROAD-CURB-FLOW		UNKN	No	VF-UNKN
GLIP	Yes	VF-ROAD-CURB-GLIP		WALL	Yes	VF-WALL
GR	No	VF-ROAD-BARR		WS	No	VF-ROAD-STRP-WHIT
HWALL	Yes	VF-STRM-STRC-HWAL		WWALL	Yes	VF-STRM-STRC-WWAL
ID	Yes	VF-STRM-DITC		YS	No	VF-ROAD-STRP-YELO

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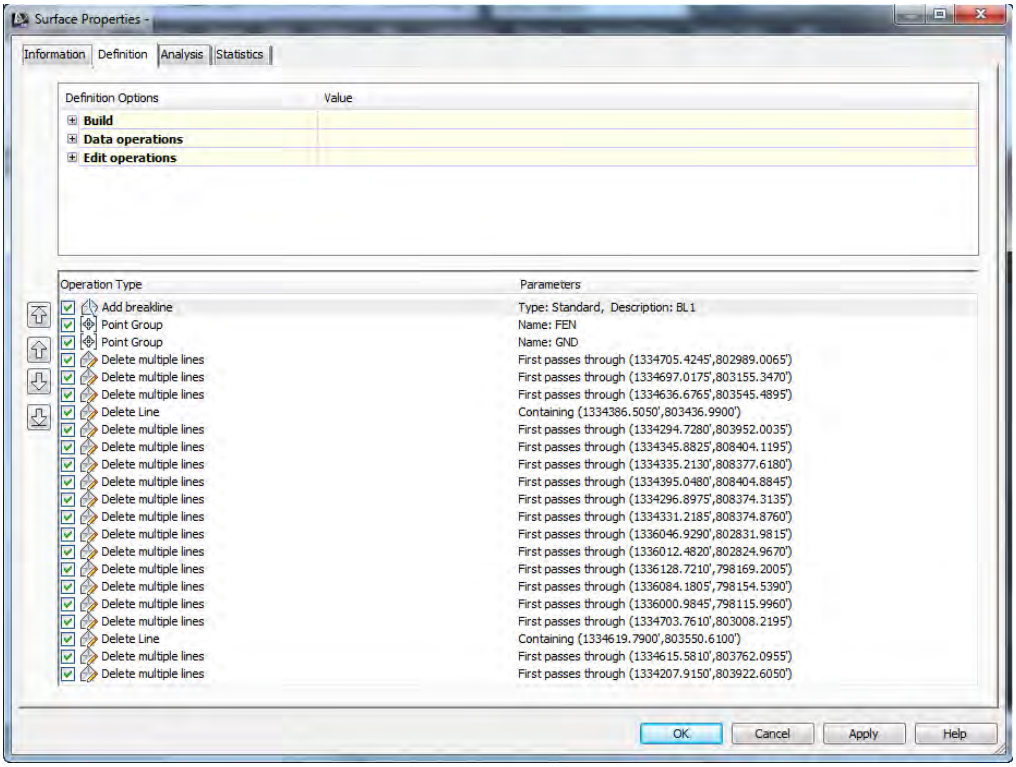
4: Surfaces

Surfaces are used to represent both existing and design conditions. Surfaces can be created using many different methods, or a combination of methods. NMDOT has developed standards for the creation, and use, of surfaces. Items discussed in this section:

- Definitions
- Naming Conventions
- Symbology

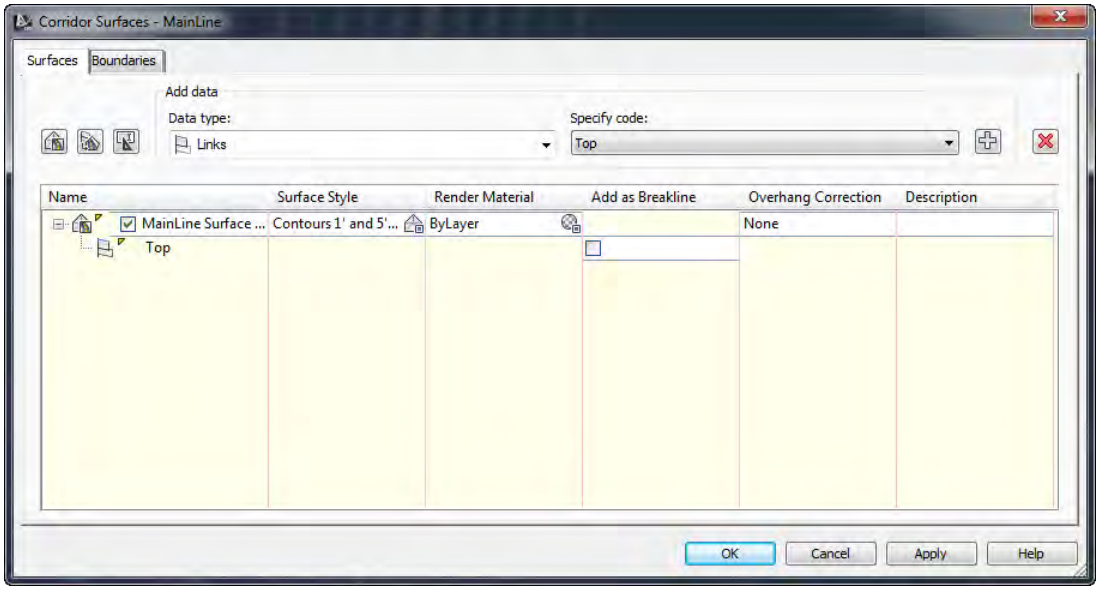
Definitions

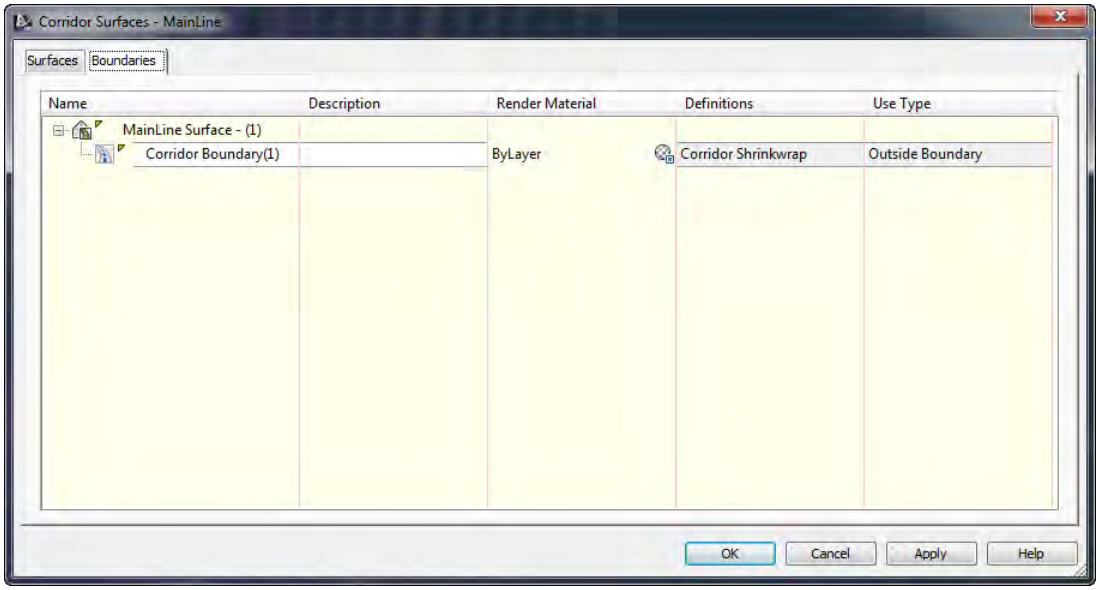
Surfaces are three dimensional representations of an area of land. Surfaces are defined by including points and breaklines. Any and all modifications to a surface are permanently part of the surface, and the order of operations effects the final surface definition. In a civil engineering project, an existing surface is typically defined by the photogrammetric process and enhanced by terrestrial surveying.



When this process is used to create an existing surface, the points from the terrestrial survey are imported as points. It is not recommended the points to be imported into the drawing using the survey database method, but using the Create Points command. This enables the points to be used by a surface without the need to keep a database attached to the drawing.

Another method for creating surfaces is from a corridor. When using this method, it is important to only include the Top Links and the corridor boundary as the exterior boundary.





Naming Conventions

For survey surfaces, the surface shall contain the Status of surface, Project Control Number (PCN), and a counter. The counter is necessary to help differentiate multiple surfaces when additional survey is requested and delivered, or the length of the project exceeds 2 ½ miles.

Example: EX-PCN-## (e.g. EX-134795-01)

For design surfaces, the name must include the road being modeled along with the links used. Should the project be separated for any reason, a counter will be necessary.

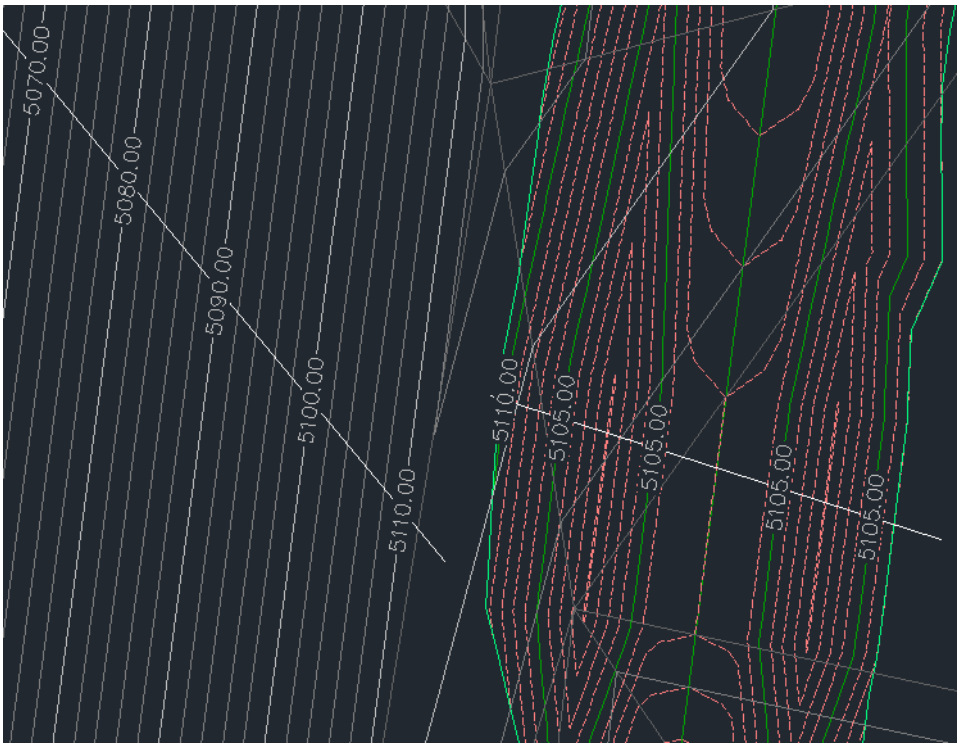
Examples: I25-NM-Corridor-Top01, NM138-Corridor-Datum

Symbology

NMDOT has provided several styles to allow the display of surfaces to signify the various stages. All surfaces should be displayed on the proper layer.

	Major	Minor
Existing	VF-TINN-CONT-MAJR	VF-TINN-CONT-MINR
Proposed	C-ROAD-TINN-MAJR	C-ROAD-TINN-MINR

While colors and linetypes may change, major contours should be displayed using either ten foot (10'), or five foot (5') increments. Minor contours should be displayed five minors for every major contour.



5: Geometry

NMDOT has developed a standard for geometry elements such as horizontal and vertical alignments. It is important for all NMDOT projects to follow the standard naming conventions for geometry elements due to the interactivity of the NMDOT and its consultants during the design process. Adherence to these standards allows for reviews of data to be completed in a more efficient manner. In many instances, multiple consultants will be involved in a NMDOT project, thus making a standard necessary. Items discussed in this section:

- Horizontal Alignments
- Station Equations
- Profiles
- Symbology

Horizontal Alignments

Horizontal alignments are a series of curves and tangents which can represent roadways, intersections, ditch lines, right of way, retaining walls, breaklines, or any other linear feature found in a civil design. There are several methods for creating horizontal alignments. Some of the popular methods are the use of graphic elements, importing an .xml file, use of points (AutoCAD or Civil 3D), and the use of the geometry tools available in Civil 3D.

NMDOT utilizes descriptive naming for horizontal alignments and profiles. Alignments shall be named based on the road name they represent. Individual user names, temporary names, or version names are not acceptable for submission to NMDOT for review.

NMDOT reserves the right to reject any file containing non-acceptable naming conventions.
At no point are any horizontal alignments to be a member of a Site.

Examples: I25-NB, NM126, EX-Louisiana, EX-NM126

Horizontal alignments that represent items other than roadways shall utilize the following alignment abbreviations along with the alignment they are offset from:

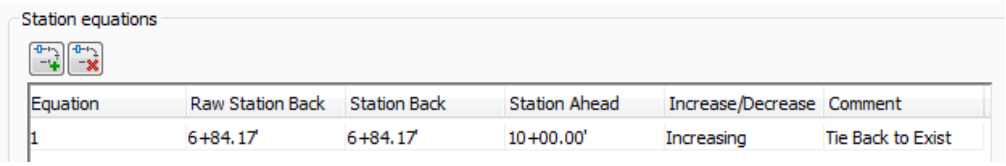
Abbreviation	Description
SC	Saw Cut Line
LG	Lip of Gutter
FL	Flow Line
TC	Top of Curb
FW	Front of Walk
BW	Back of Walk
HP	Hinge Point
LW	Lane Widening

Example:LW-I25NB (Lane Widening-I25 North Bound, FL-NM126 (Flow Line-NM126)

Station Equations

In some instances, a station equation is necessary. Station equations are often used to tie proposed alignments to existing stationing, or for detour alignments (see the Civil 3D Help for instructions on creating, editing, or deleting station equations). Civil 3D does not allow the use of Alpha characters when creating station equations. All station equations are to be labeled using the correct sets defined in the NMDOT template.

Example:



Profiles

Layout profiles are children to horizontal alignments in Civil 3D. Layout profiles are normally created using the Civil 3D profile tools, although there are other methods including importing from an asci file, or allowing Civil 3D to generate an automatic profile.

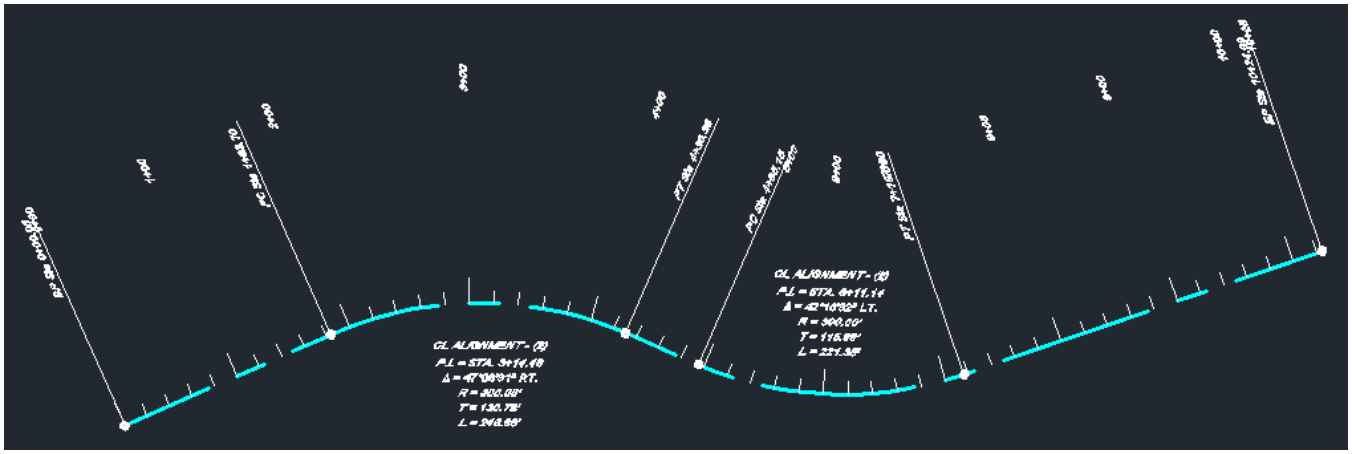
Naming of profiles may include a counter should there be a reason to have multiple profiles for one horizontal alignment.

Examples: LayoutProfile-01, DesignProfile-03

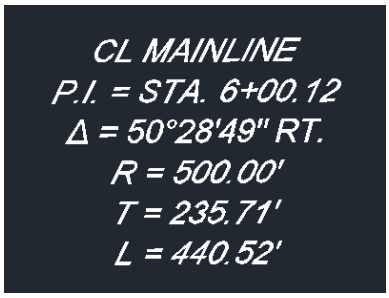
Symbology

The symbology of alignments is determined by the state of the alignment: existing or proposed. The most important factor in the display of alignments is the placement on the correct layers.

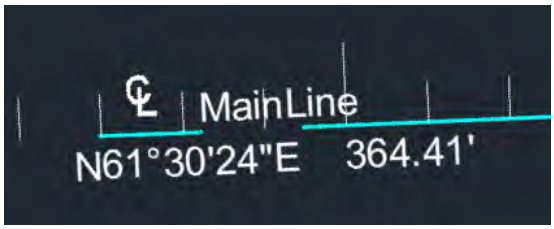
	Existing	Proposed
Elements	VF-ALGN	C-ROAD-ALGN
Stationing	VF-ALGN-STA~-LBLS	C-ROAD-ALGN-STA~-LBLS
Point Information (PI's, PC's, PT's, etc.)	VF-ALGN-GEOM-PNTS	C-ROAD-ALGN-GEOM-PNTS



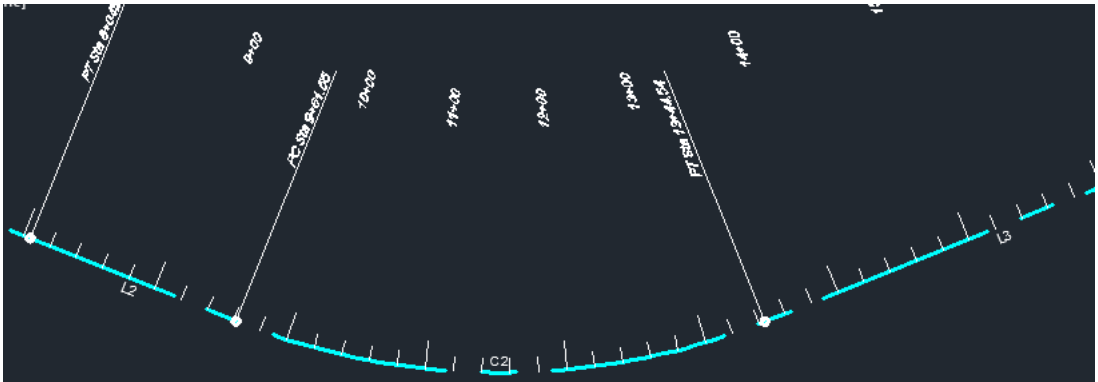
Curves are annotated with the data centered in the curve and must contain the following information: name of alignment, PI Station, Delta, Radius, Tangent length, and length of curve.



Tangents are annotated with the data along the alignment. The tangent information displayed must contain the name of the alignment along with the bearing and the distance of the tangent. Each tangent must be individually annotated.



Another option for annotating alignments is to display the information in a table. Using the appropriate tools, this is a simple task. The information displayed in the table must be equivalent to the information normally displayed in plan view.



MainLine						
Number	PI Station	Delta	Radius	Tangent	Length	Line/Chord Direction
L1					364.408	N61° 30' 24.29"E
C1	Sta: 6+00.12	050°	500.000	235.71	440.523	N86° 44' 48.60"E
L2					156.616	S68° 00' 47.09"E
C2	Sta: 11+62.99	044°	500.000	201.44	382.992	S89° 57' 24.82"E
L3					359.111	N68° 05' 57.46"E

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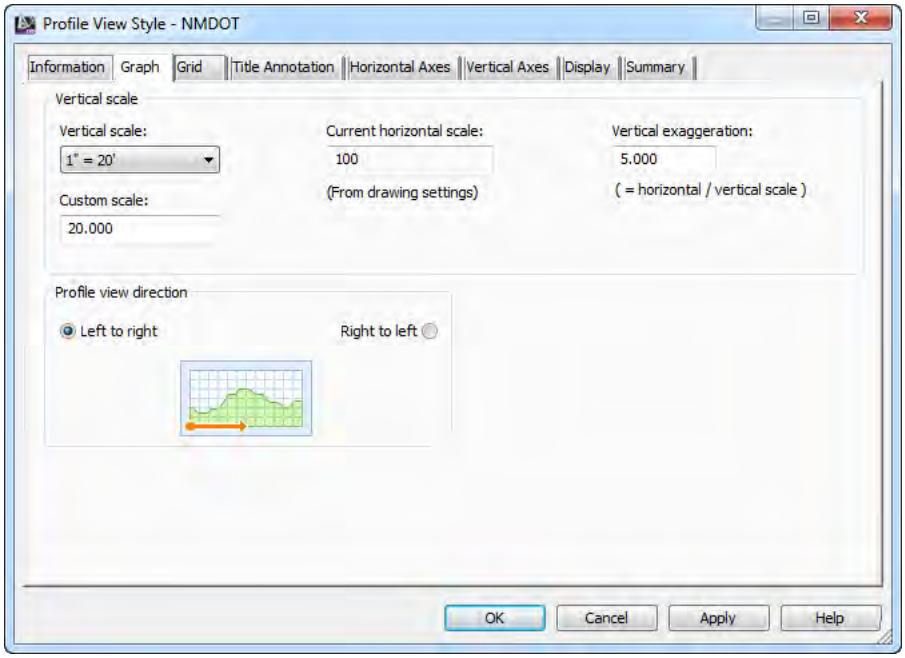
6: Profile & Section Views

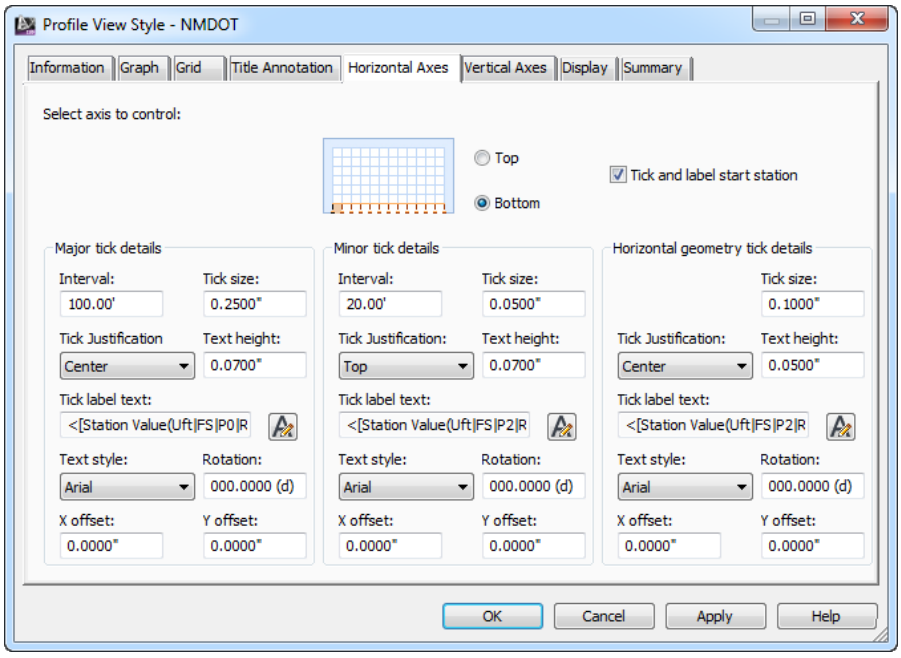
NMDOT has developed specific standards for the display of profile and section views. Both views allow for a three dimensional view of the project on a basic level. Along with displaying the existing and proposed geometry elements, profile and section views are used with ROW location in regard to slope treatments, structure placements, and depths of material of the design. Items discussed in this section:

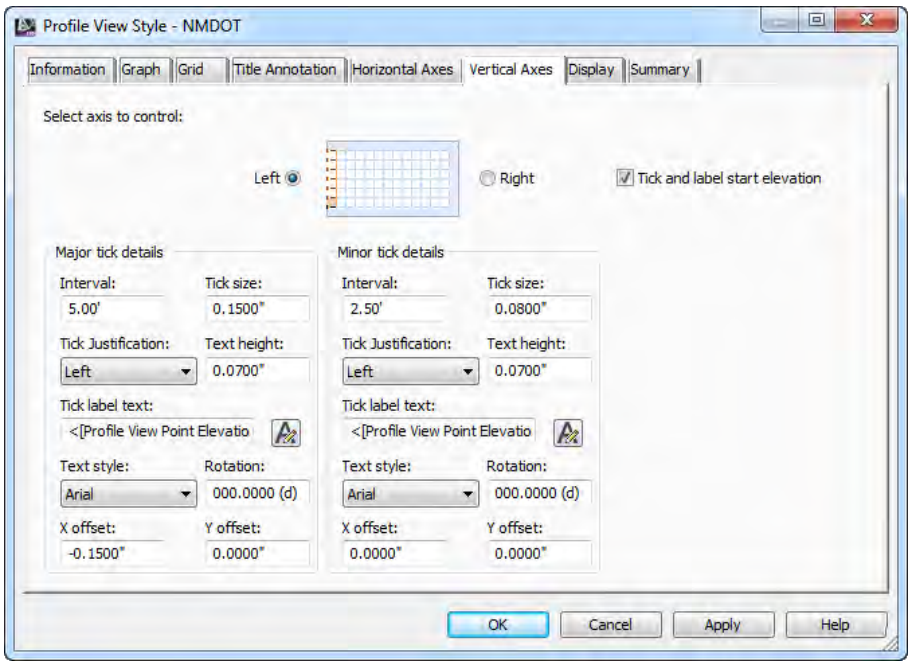
- Profile Views
- Section Views

Profile Views

A profile view provides a longitudinal view of the existing ground and provides the engineering team an avenue to present the geometry for the new alignment. All profile views for NMDOT projects must be based on a horizontal alignment and not CAD graphics. NMDOT has provided styles for use with the NMDOT template for use when creating profile views.



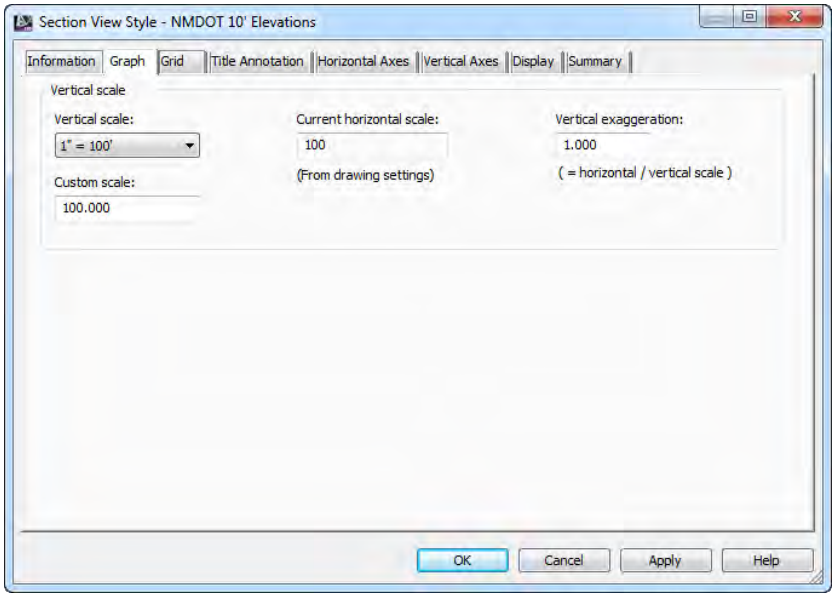


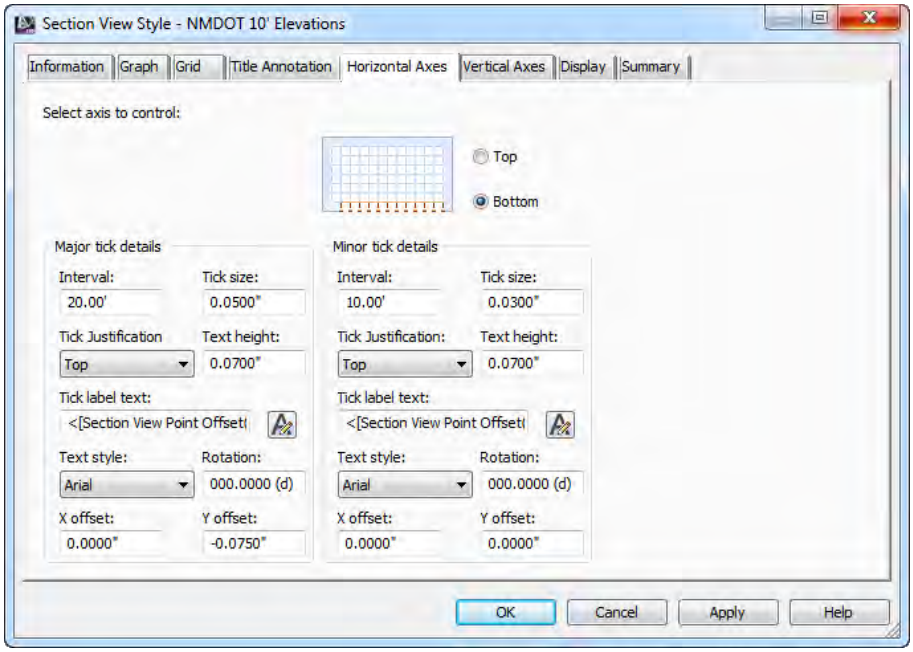


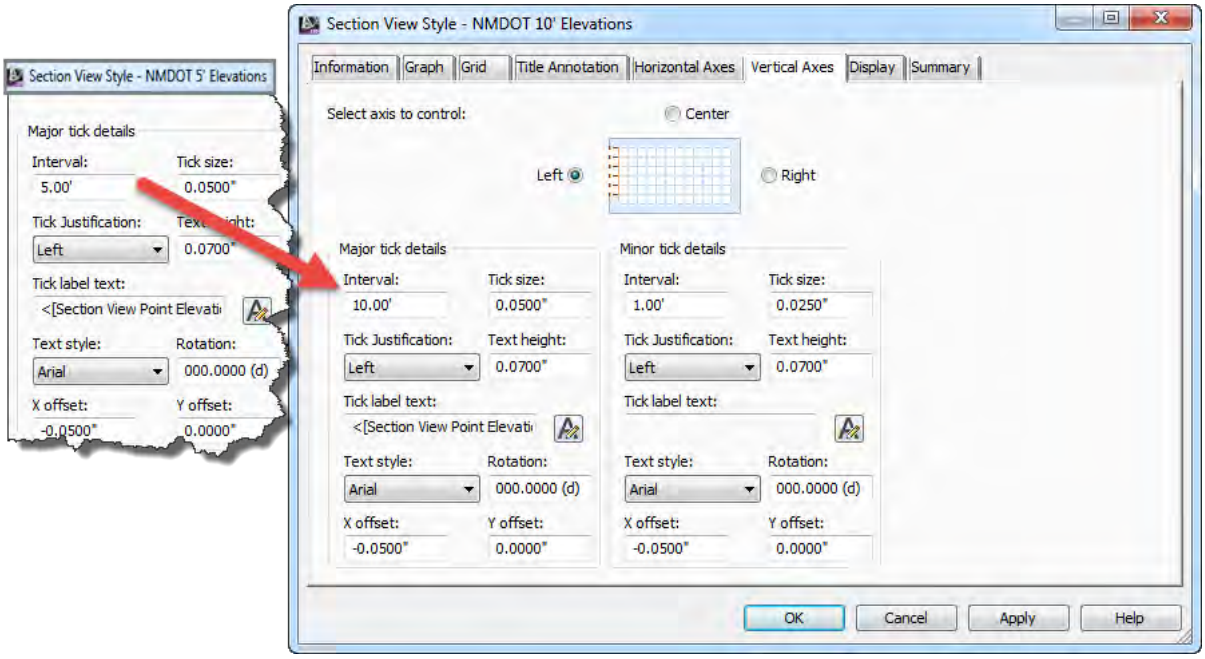
Section Views

Section views are planar views of the roadway at a specific station. Section views are typically displayed in sets at specified intervals along the alignment. Both existing and proposed surfaces can be displayed in a section view with the ROW lines, centerlines, and drainage structures.

NMDOT provides two styles for use in creating section views: **5' Elevations** and **10' Elevations**. The difference between the two styles is the interval for elevations on the left and right axes.




Section View Style - NMDOT 10' Elevations
Information
Graph
Grid
Title Annotation
Horizontal Axes
Vertical Axes
Display
Summary
Select axis to control:
Top
Bottom
Major tick details
Interval:
20.00'
Tick size:
0.0500"
Tick Justification
Top
Text height:
0.0700"
Tick label text:
<[Section View Point Offset(
Text style:
Arial
Rotation:
000.0000 (d)
X offset:
0.0000"
Y offset:
-0.0750"
Minor tick details
Interval:
10.00'
Tick size:
0.0300"
Tick Justification:
Top
Text height:
0.0700"
Tick label text:
<[Section View Point Offset(
Text style:
Arial
Rotation:
000.0000 (d)
X offset:
0.0000"
Y offset:
0.0000"
OK
Cancel
Apply
Help


Section View Style - NMDOT 5' Elevations
Major tick details
Interval:
5.00'
Tick size:
0.0500"
Tick Justification:
Left
0.0700"
Tick label text:
<[Section View Point Elevati
Text style:
Arial
Rotation:
000.0000 (d)
X offset:
-0.0500"
Y offset:
0.0000"
Section View Style - NMDOT 10' Elevations
Information
Graph
Grid
Title Annotation
Horizontal Axes
Vertical Axes
Display
Summary
Select axis to control:
Center
Left
Right
Major tick details
Interval:
10.00'
Tick size:
0.0500"
Tick Justification:
Left
Text height:
0.0700"
Tick label text:
<[Section View Point Elevati
Text style:
Arial
Rotation:
000.0000 (d)
X offset:
-0.0500"
Y offset:
0.0000"
Minor tick details
Interval:
1.00'
Tick size:
0.0250"
Tick Justification:
Left
Text height:
0.0700"
Tick label text:
Text style:
Arial
Rotation:
000.0000 (d)
X offset:
-0.0500"
Y offset:
0.0000"
OK
Cancel
Apply
Help

7: Corridors

Corridors in Civil 3D are a dynamic method to acquiring final grades and creating the proposed model. NMDOT has developed methods and styles for creating corridors for all projects engineered for its use.

- Assemblies
- Corridors
- Corridor Surfaces

Assemblies

Assemblies are cross-sectional components that represent the road to be modeled. Assemblies are built by combining sub-assemblies. Sub-assemblies represent sections of roadway (e.g. lane pavement, sidewalk, clear zones). Assemblies must be assembled in the same drawing the corridor will be modeled. They cannot be referenced in any way to be utilized in differing corridors outside of the host drawing.

Naming Conventions

The naming of assemblies is important and the NMDOT convention for naming assemblies includes the road name and the insertion station.

Example: I25-NM-Sta13520.00

Corridors

Corridors are the main element in a modern civil design that is utilized by NMDOT for each of its projects. The corridor allows the user to determine if certain aspects of the design are feasible and if they are desirable (e.g. purchasing of Right of Way). Corridors utilize the horizontal and vertical alignments as well as the existing surface to calculate what the final grades will be for the road to be constructed. Corridors should be created in their own drawing (see ***page*** 16 of this document)

Naming Conventions

All corridors shall be named according to the horizontal alignment they are utilizing for horizontal and vertical control. Should there be several iterations of the same corridor reflecting varying designs, each shall include a counter following the name.

Examples: I25-NB-01, NM138-01

Corridor Surfaces

Following the development of the corridor to the final design, a surface should be generated to reflect the final grade. This surface will be used for the calculations of earthwork as well as the displaying of proposed contours and other proposes.

The creation of the corridor surface should only include the top links from the corridor as well as using the corridor extents for the outer boundary.

It is possible to create a surface representing the base of the corridor. This may be desirable for quantities or section views. If the surface created is for these proposes, it is important to name the surface accordingly.

Naming Conventions

All corridor surfaces should be named using the road being modeled along with the links used. Should the project be separated for any reason, a counter will be necessary.

Examples: I25-NM-Corridor-Top01, NM138-Corridor-Datum

8: Submission of Files

NMDOT has developed guidelines for its contractors on the preparation of file and the submission process.

- Preparing files
- Submission Process

Preparing Files

The preparation of files for submittal is absolutely necessary when working in a Civil 3D environment. Preparing files for submittal is required due to file size and the integration of data and references within each project.

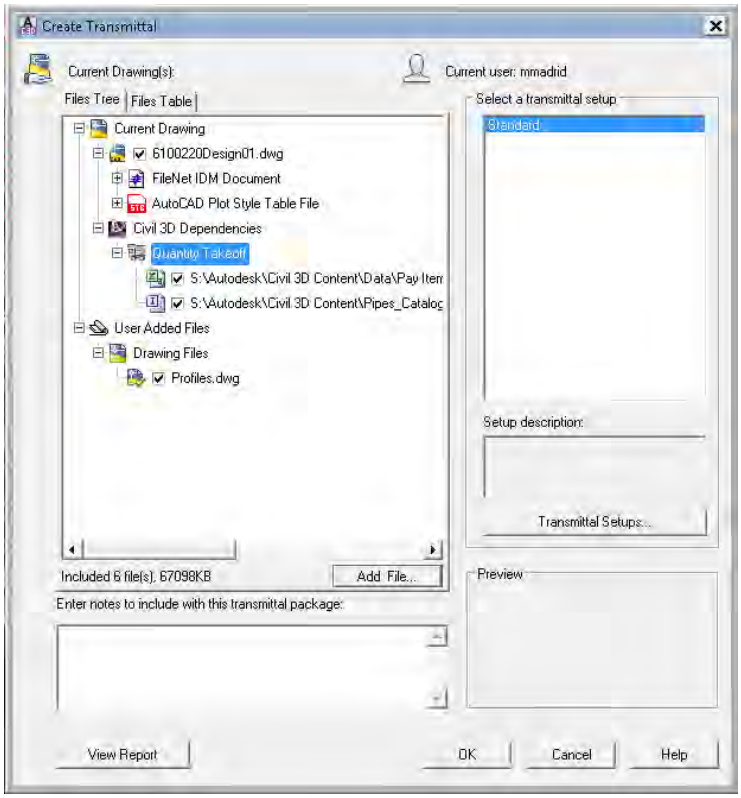
Prior to submittal all files should have the following commands applied:

- AUDIT
    - FIX ALL ERRORS FOUND
- -WBLOCK
    - INCLUDE ALL ELEMENTS

When running the –WBLOCK command, the resulting file will replace the file being processed. The Civil 3D data (surfaces, alignments, etc.) and data shortcuts will have to be re-established once the files are replaced.

eTransmit

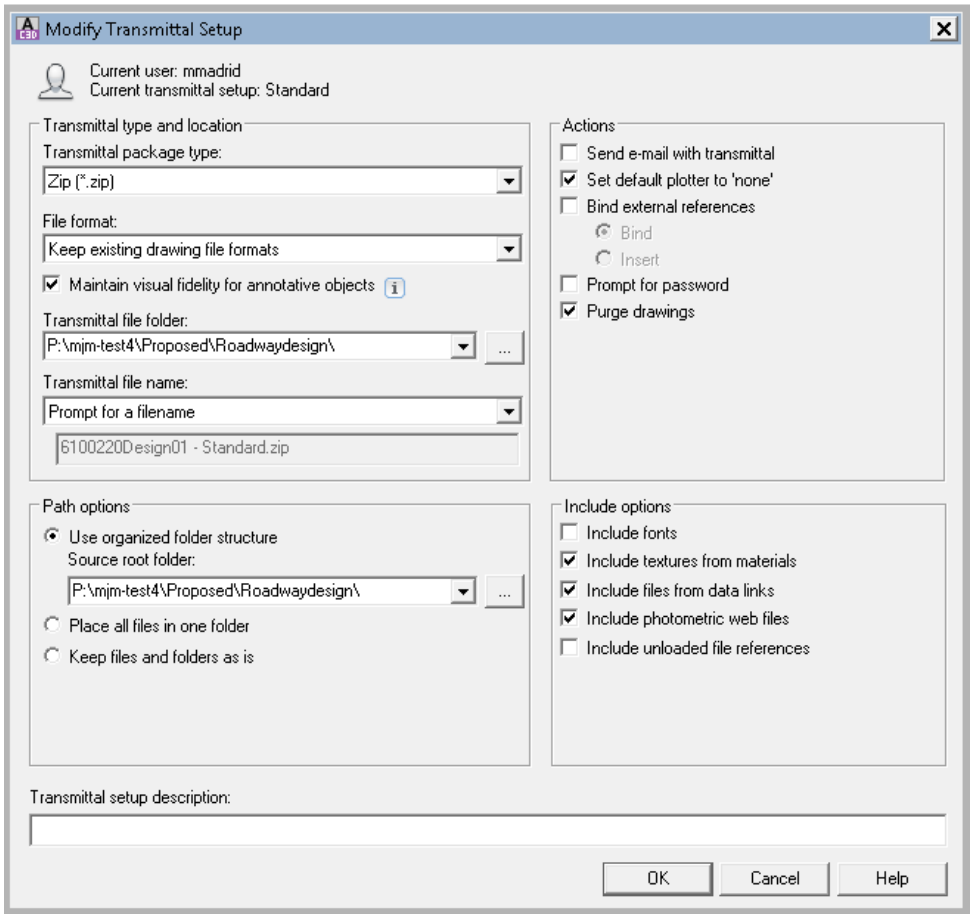
When submitting files to NMDOT for review, or further development or review, it is highly recommended that the eTransmit tool be utilized to create the submission package. The eTransmit tool allows for all project design files to be packaged including all external references, images, blocks, and plotting files. The result of using this tool is a single zip file that can be delivered to NMDOT.



Options

It is advisable to verify the settings of the eTransmit tool. See the image below for all desired settings. Notable changes from the delivered product is:

- Set default plotter to 'none'
- Purge drawings



Naming Conventions

The naming of the resulting zip file should include the PCN (Project Control Number) along with the submission state.

Example: 6100220-60percent.zip, 6100220-final.zip

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