CADD Standards

March 2021

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Software Versions

AutoCAD Civil 3D 2021

Author

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Table of Contents

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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:

- What's New

- Purpose

- CADD Platforms

- Glossary of Terms

- Paradigms

What's New

The following changes have been made to this document:

- 2021 is the NMDOT standard version of AutoCAD Civil 3D
- Design Standards and CAD Standards combined into one document
- Interactive material included throughout the document

Purpose

The purpose of this manual is to establish and document general CADD standards to be utilized for all civil engineering projects developed for NMDOT, regardless of the entity creating the plans.

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.

This manual is a living document. NMDOT will update this manual when necessary and make it available to consultants and internal staff.

CADD Platforms

NMDOT has committed to the implementation and support of AutoCAD Civil 3D on all projects. NMDOT's currently supported versions of software are:

- AutoCAD Civil 3D 2021 (new and future projects)
- AutoCAD Civil 3D 2018 (ongoing projects)

Glossary of Terms

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

.dst – Extension for Sheet Set Manager files.

.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.

Data Shortcuts – A series of files written in XML format that allow AutoCAD Civil 3D to share civil objects and metadata information between files.

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 centerline of a roadway may be placed on a level named "VF-ROAD-CNTR-P". The 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.

Plan Set or NMDOT Plan Set – A series of documents assembled to relay pertinent information to enable the building of the design. A NMDOT plan set can either be an electronic or a hard-copy version.

PCN – Acronym for **P**roject **C**ontrol **N**umber. A **PCN** is a numeric value assigned to every NMDOT 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 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.

Sheet Set – A number of sheet files that are created to represent an engineering design for NMDOT that enables a contract to build the design.

Sheet Set Manager – An AutoCAD utility that enables the organization of a project's sheet set. The Sheet Set Manager is also used to print and deliver a project plan set.

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 polylines, lines and arcs. These elements are often the output of the engineering software.

Drawing Units – Drawing 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 to relay important information.

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2: Directory Structure

This section discusses the basis of the CADD environment: the directory structures. The two structures of utmost importance are the project directories. The project directories consist of the project directory structure and the standards directory structure. NMDOT has created downloadable project template folders, which create a similar directory structure on any local area network. In addition to the folders, the CADD Support Section has developed downloadable consultant workspaces, which should be utilized by all consultants doing work for the NMDOT (See **_Section 15_** for additional information). The NMDOT requires all projects created for the State of New Mexico to follow certain criterion and has created these files and workspace for this purpose. Items discussed in this section:

- Project Directory Structure

- CADD Standards Directory Structure

Project Directory Structure

The New Mexico Department of Transportation has developed a standard project directory structure to be utilized for all projects within the NMDOT. This includes deliverables submitted to the NMDOT by consulting firms performing work for the NMDOT. This project directory structure organizes the entire project within one main folder and departmentalizes the project by design disciplines. In addition to departmental directories, each project folder allocates directory locations for construction as-built drawings, completed Plans, and a **Project_Resources** directory for output files created for use in the current project.

This project workflow consists of existing and proposed design information, including a "**Construction**" folder for as-built data. Additionally, each project directory structure will include a "**Plans**" directory to store completed project design files for archival and if necessary, submission outside of the agency. This includes the project title sheets and vicinity map. The fifth and final primary folder, "**Project_Resources**", is intended to store project files which may be generated, such as a project-specific block libraries.

The NMDOT project directory structure is to be adhered to unless given explicit, written permission from NMDOT to deviate. Any un-approved deviations from the project directory structure will be denied and the consultant will be responsible for the modifications necessary to meet the NMDOT standards.

Detailed Summary of Project Directory Structure

--Each 📁 folder icon contains a link.

📁	**PCN** – Project Control Number used as root folder
📁	**_data -** _data folder is used for Civil 3D shortcut information and related files.
📁	**Construction** – Construction As-Built folder used to store As-Built drawings usually stored as scanned .TIFF images or .pdf file formats.
📁	**Existing** – Existing folder utilized for existing design information such as existing survey, aerial photos, existing surfaces, existing horizontal alignments, etc.
📁	**PDE –** PDE folder will contain vital project information and will be maintained regularly. Items such as certifications, environmental documents, ROW, Utilities, correspondence, estimates per milestone, schedule, design diary, etc.
📁	**Plans** – Plans folder used for storage of completed project plan sheets, Project Title and Vicinity Map sheets. Staging folder for project archival and external project submission.
📁	**Preliminary** – Preliminary folder is used for storage of preliminary design-related files that will be utilized in the planning stages of a project such as as-builts, ROW information and project imagery.
📁	**Project_Resources** – This directory is to be used to store any project-specific files such as block libraries, custom linetypes, etc.
📁	**Proposed** – Proposed folder used for all proposed project design files. Included in each proposed discipline is a folder for documentation and work. The Work folder is to be utilized for temporary or scratch drafting/design files and is NOT to be used for final design files. A documentation directory structure to be used for discipline specific documentation is also included.

Table 2.1: Project Directory Root Structure

```
NMDOT_Standard_Project_Structure
    _data
    Construction
        Addenda
        As-let plans
        Change orders
        Design_Revisions
        RFI
        Submittals
    Existing
        Aerial_Photography
        LIDAR
        New folder
        Photogrammetry
        ROW
        Survey
            Documents
            Photos
            Preliminary
    PDE
        Agreements
        Bidding
        Certifications
        Consultant
        Estimates
        Funds
        Maps
        Meetings
        Project Requests
        Reports
        ROW
    Plans
        01_Sheets
        02_Sheets
        03_Sheets
        04_Sheets
        05_Sheets
        06_Sheets
        07_Sheets
        08_Sheets
        09_Sheets
        10_Sheets
        11_Sheets
        12_Sheets
        13_Sheets
        14_Sheets
        30%_Plans
        60%_Plans
        90%_Plans
        Current PDF
        Production
        PS&E_Plans
    Preliminary
        As-built
        GIS
        Images
            Aerial
            Photos
            Videos
        ROW
    Project_Resources
    Proposed
        Aviation
            Data
            Documentation
                Docs
                Images
                Mics
                Spreadsheets
            Working
        Basefiles
            Vframes
        Bridge
        Drainage
            Documentation
        Enviromental
        Geotechnical
        HazMat
        ITS
            Data
            Documentation
                Docs
                Images
                Mics
                Spreadsheets
            Working
        Pavement Design
        Roadway Design
            Data
                BIM360_Files
                IMX_Files
                KML_Files
                LAS_Files
                Shapefiles
            Documentation
                Docs
                Spreedsheets
            Working
        ROW
            Data
            Documentation
                Docs
                Images
                Mics
                Spreadsheets
            Working
                From Engineers
                Property Descriptions
                Reference
                ROW Maps
                Title Reports
        Traffic
            Construction_Signing
            Lighting
            Perm_Signing_Striping
            Signalization
        Utilities
```
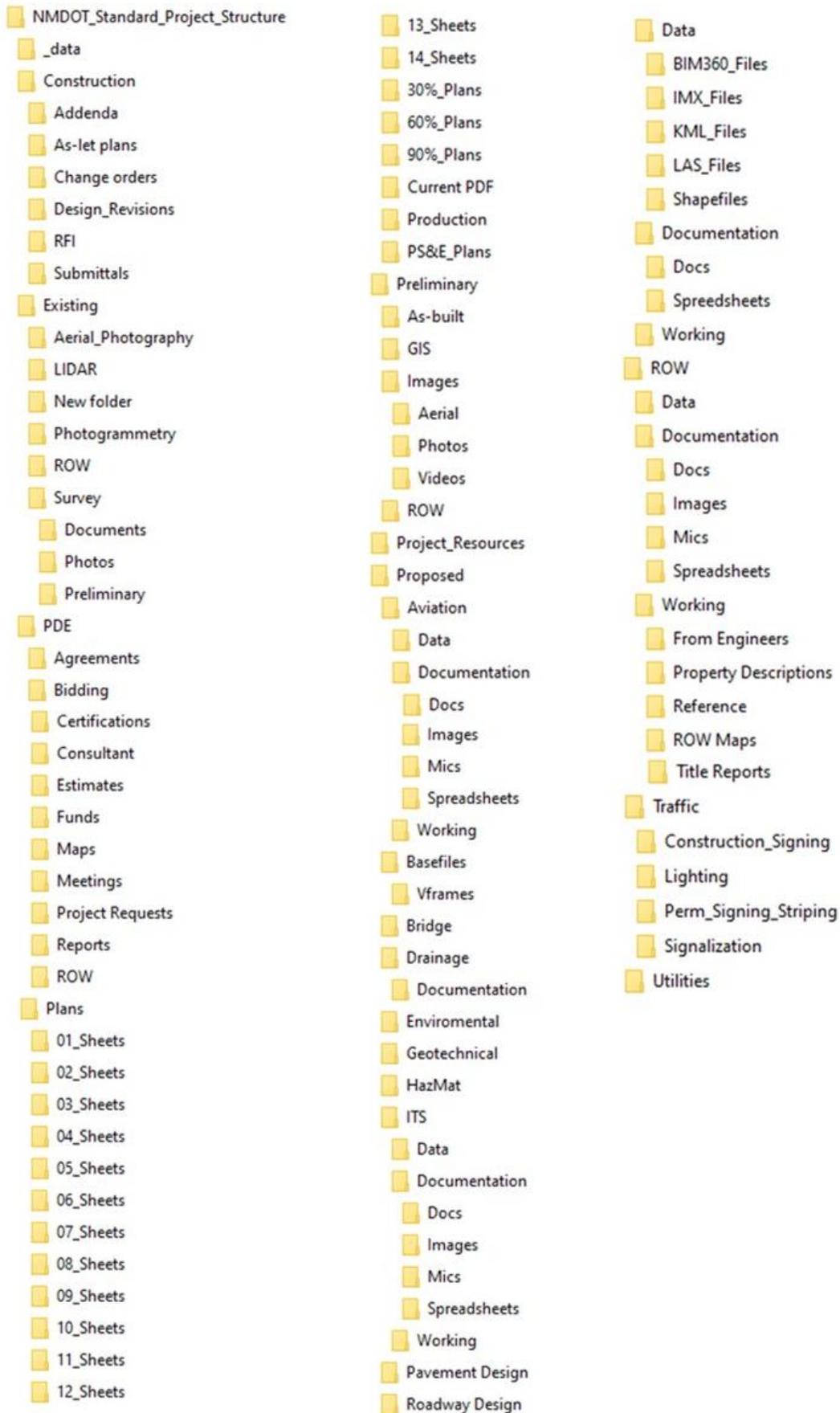
Figure 2.1: Project Directory Expanded

PCN Explained

The NMDOT Project Control Number (PCN) designates the root project folder name as assigned by the NMDOT planning department and is primarily designated as an alpha-numeric value containing up to eight characters. This number is used throughout the project and will be used in conjunction with each project file naming convention. (See **_Section 4_** for additional information).

Primary Sub Directories

Eight primary subdirectories (**_data**, **Construction, Existing, PDE, Plans, Preliminary, Project Resources**, and **Proposed**) are intended to house all project information in a segregated manner, focusing on all phases of a project. These phases designate a "start to finish" progression, thus, each primary folder represents a phase in the project. The **Project_Resources** sub directory is intended to serve as the directory housing any created project files such as block libraries.
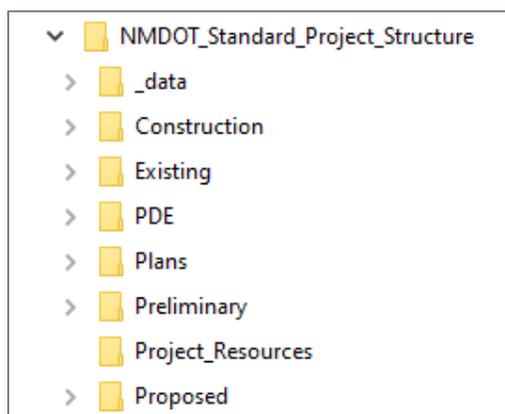

Figure 2.2: Project Root Directory Structure

_data

The **_data** subfolder is used exclusively to house the Civil 3D data shortcut and survey files. Files stored in these folders are created automatically by Civil 3D and consist of XML, log files, and database files.
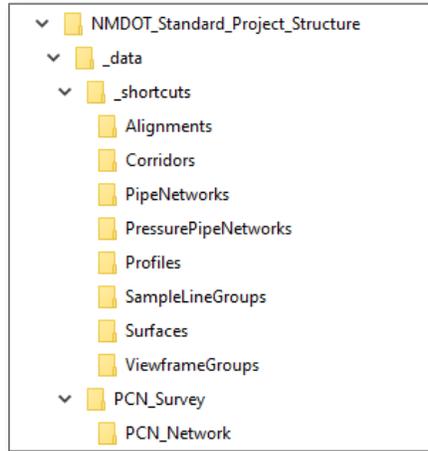

Figure 2.3: _data Folder

Construction

The **Construction** subfolder is home to all design data reflecting construction, and all related activities, of the project.
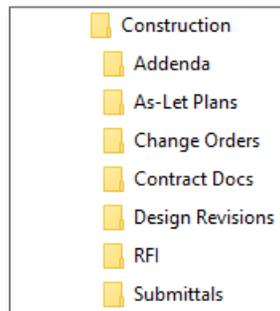

Figure 2.4: Construction Folder

Existing

The **Existing** subfolder includes survey, right of way (ROW), and photogrammetry related project information. Additionally, a folder for Preliminary Survey exists to store work in progress data. As referenced in the ***File Naming Convention*** section, relative information is to be stored in these sub-folders as seen in ***Table 3.1***. A detailed example of all existing sub directories can be seen in ***Table 2.2***.

File Type	Folder Name	Description
Existing Base Files: Contain graphic display of the existing conditions of the project.	\Aerial_Photography	Scanned images from aerial perspective
	\LIDAR	LIDAR points files
	\Photogrammetry	Topography data & Image files
	\ROW	Right of Way data
	\Survey	Ground Survey & Utility data
	\Survey\Documents	Documents related to survey deliverables
	\Survey\Photos	Photos taken by survey crew
	\Survey\Preliminary	Preliminary Survey data

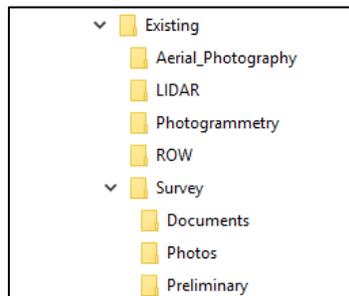**Table 2.2: Existing Project Directory and File Types**

Figure 2.5: Existing Folder

Project_Resources

The **Project_Resources** directory is to be utilized for any project files such as new project specific block libraries.
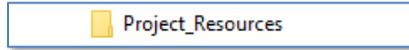
Figure 2.6: Project_Resources Folder

PDE

The **PDE** folder will contain vital project information and will be maintained regularly. Items such as certifications, correspondence, estimates per milestone, etc.
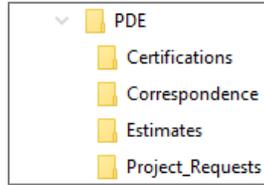
Figure 2.7: PDE Folder

Preliminary

The Preliminary folder is used for the storage of documents showing the existing conditions that were not collected by survey. This location is also to be used for preliminary design of the project.
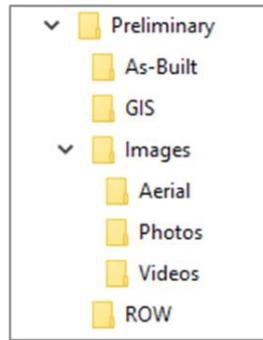
Plans

The **Plans** folder is used for storage of all completed project sheet files used to compile deliverable plan set, and the staging folder for external plan submission and project archival. Any file that is directly printed to create the final plan set belongs in this directory, within the appropriate subdirectory. The project sheet set manager file (**PCN-SheetSet.dst**) should be located at the root of this directory.
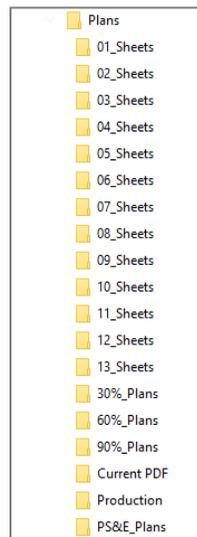
Figure 2.8: Plans Folder

For the segregation and placement of the sheet files in a NMDOT project, refer to ***Section 3***.

Proposed

The **Proposed** subdirectory designates departmental specific "proposed" design data and includes documentation, data, and working subfolders. A detailed explanation of all proposed subdirectories is outlined in ***Table 2.3***.

File Type	Folder Name	Description
Proposed Base Files: Contain proposed planimetric design graphics of the roadway design.	Aviation	Aviation design related data
	Basefiles	Location of all DWG files that are utilized in the creation of sheet files
	Bridge	Bridge and major culvert structure data
	Drainage	Drainage, Storm Sewers, and Grading data
	Environmental	Environmental drawings and reports
	Geotechnical	Geologic field data
	HazMat	Location of all Hazard Materials documents
	ITS	Intelligent Transport System related data.
	Pavement_Design	Reports and files used to determine pavement design
	Roadway_Design	Roadway Design data & Profiles and Profile Grids & Cross Sections
	ROW	Proposed Right of Way data
	Traffic	Construction Signing, Permanent Signing and Striping, Lighting and Signalization data
	Utilities	Utility data

Table 2.3: Proposed subdirectories

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3: Project Plan Sets

The standard medium of a civil design project is the printed hard copies. These hard copies relay the information from survey, to design, to construction. It is vitally important that this information be standardized to simplify the exchange of information. In addition, standardization of this information has a positive impact on the many individuals who create these plan sets. This section discusses the project plan set as an entity and the elements these plan sets consist of. Items discussed in this section:

- Planimetric vs. Informational

- Basic Numbering Scheme

Planimetric vs. Informational

The standard civil design plan set is comprised of two general sheet types: planimetric and informational.

Planimetric sheets containing a plan (overhead) view of the design which is based on the NM State Plane Coordinate system 1983 or a NMDOT approved coordinate system. Examples of a planimetric sheet are: plan and profile sheet, a permanent striping sheet, or a lighting sheet.

Informational sheets can be graphical or non-graphical and are not coordinate correct. A non-graphical sheet does not contain a view of the project, but merely contains project specific information, such as a summary of quantities. A graphical sheet does contain at least one view of the project, but does not have to be coordinate correct, such as a vicinity map of the project. Examples of an informational sheet would be a typical section sheet, or a general notes sheet.

Basic Numbering Scheme

In addition to the types of sheets, the plan set has been organized into fourteen categories. Regardless of the project and the criteria of the project, the categories remain constant. Each category contains either planimetric or informational sheets. The terms "One Sheets" and "Two Sheets" are often used to describe the information within that category. "Nine Sheets" would contain the signalization sheets for a project. If the project is a rural road with no intersections, the "Nine Sheets" would be omitted, and the next category would remain the "Ten Sheets" being the structure placements. Please refer to ***Table 3.1*** for the entire listing of sheets and numbering scheme.

Table 3.1: Project plan set numbering convention

	Informational	Sheet Number
One	Cover Sheet	1-1
	Vicinity Map	1-2
	Index of Sheets	1-3
	Summary of Quantities	1-4
	General Notes	1-5 to 1-#
	Special Provisions	
	Environmental Requirements	
Two	Typical Sections	2-1 to 2-#
	Surfacing Schedule	
	Structure Quantities	
	Miscellaneous Quantities	
	SWPPP Informational Plan	
	TESCP	
	Miscellaneous and Special Drawings	

Planimetric		Examples
	Survey Notes	3-0A
Three	GPS Control	3-0B
	Horizontal Layout	3-0C
	Plan and Profile Sheet	3-1 to 3-#
	Grading Plans	
Four	Turnout Profiles	4-1 to 4-#
Five	General Notes	5-1 to 5-#
	Estimated Quantities	
	Structure Location Plan	
	Structure Elevation	
	Transverse Section	
	Structure Foundation Plan	
	Drilled Shaft Details	
	Abutment Cap Plan & Elevation	
	Pier Cap Plan & Elevation	
	Abutment & pier Cap Details	
	Abutment Diaphragm Plan & Elevation	
	Pier Diaphragm Plan & Elevation	
	Abutment Diaphragm Details	
	Pier Diaphragm Details	
	Girder Seat Elevations	
	Bearing Details	
	Framing Plan	
	Precast Girder Details (Type --)	
	Deck Slab Reinforcement Top & Bottom	
	Approach Slab	
	Transition Slab	
	Miscellaneous Compaction Details	
	Wingwall Details	
	Intermediate Steel Diaphragms	
	Top of Deck Elevations	
	Approach Slab & Transition Slab Details	
	Bridge Railing Plan & Details	
	Reinforcing Schedule	
	Bore Hole Data Sheet	
	Bat Box	
	Bat Box Details	

Table 3.1: Project plan set numbering convention (cont.)

	Planimetric	Examples
Six	Traffic Control and Temporary Construction Quantities and Summary Schedules	6-1 to 6-#
	Sequence of Construction	
	Standard Drawings	
	Traffic Control, Detour and Temporary Drainage Plans	
Seven	Signing and Striping Quantities and Summary Schedule	7-1 to 7-#
	Sign Face Details	
	Permanent Signing and Striping Plans	
Eight	Lighting	8-1 to 8-#
Nine	Signalization	8-1 to 9-#
Ten	Structure Placement, Permanent Drainage	10-1 to 10-#
Eleven	Utilities Cover and Vicinity Map (for consultant projects)	11-0
	Utilities Plans	11-1 to 11-#
Twelve	ITS	12-1 to 12-#
Thirteen	Landscaping	13-1 to 13-#
Fourteen	Cross Sections Main Line	14-1 to 14-#
	Cross Sections Connectors/Ramps	
	Cross Sections Side Streets	

Table 3.1(cont.): Project plan set numbering convention

4: File Naming Conventions

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:

- Base files vs. Sheet Files

- Standard Base files

- Standard Sheet files

Base Files vs. Sheet Files

The term "base file" best describes a graphic design file containing project information such as planimetrics, profiles, and cross sections. The base file is referenced to multiple "sheet files" to display the project information in its entirety. Every element within a base file is created at a 1:1 scale. Text created in a base file must reflect the sheet file plotting scale (See **_Section 10_** for additional information).

A "sheet file" is a design file containing a border, project information text, north arrows, and has base files referenced to display project information within a specific area. A sheet file is used to scale the project information to a specific plotting unit. Sheet file is the digital version of the hardcopy paper output. Sheet files are to be created regardless of CAD platform used in project development.

NMDOT requires the use of AutoCAD layouts. Annotation scaling must be used in all sheet files used to create an NMDOT plan set.

Standard Base Files

All base files are created with a naming convention allowing the individual to easily identify the project, contents of the file, and the design group responsible for the data.

PCNXXXX_dddddd.DWG

Project Control Number: Assigned by the Department of Transportation

Description of Data:

Four character description of data within the file, see below

File Extension:

Base files are to be saved with a .dwg extension for a NMDOT project

Counter:

Optional six character description that is only used if multiple base files containing similar information are needed

ROAD – Roadway

CORR – Corridor

ALGN – Alignment

PROF – Profile

TINN – Surface

PIPE – Pipe Network

VF## - View Frame Section Numbers

PLAN – Planimetrics

BRDG – Bridge/Structures

DRAN – Drainage

TRAF – Traffic

TTCP – Traffic Control

Figure 4.1: Base Reference File Naming Convention

Standard Sheet Files

File Type	File Name	Description
One	PCN1Cover.dwg	Cover Sheet
	PCN1VMnn.dwg	Vicinity Map
	PCN1HLnn.dwg	Horizontal Layout
	PCN1ISnn.dwg	Index of Sheets
	PCN1SQnn.dwg	Summary of Quantities
	PCN1GNnn.dwg	General Notes
	PCN1SPnn.dwg	Special Provisions
	PCN1ERnn.dwg	Environmental Requirements
Two	PCN2TSnn.dwg	Typical Sections
	PCN2SSnn.dwg	Surfacing Schedule
	PCN2STRQnn.dwg	Structure Quantities
	PCN2MQnn.dwg	Miscellaneous Quantities
	PCN2ECnn.dwg	Re-Vegetation and Erosion Control Plan
	PCN2TPnn.dwg	TESCM Plan
	PCN2MSDnn.dwg	Miscellaneous and Special Drawings
Three	PCN3SCNnn.dwg	Survey Notes
	PCN3GCSnn.dwg	GPS Control Sheet
	PCN3HLnn.dwg	Horizontal Layout Sheet
	PCN3PPnn.dwg	Plan and Profile Sheets
	PCN3GPnn.dwg	Grading Plans
Four	PCN4MTnn.dwg	Turnout Profiles
Five	PCN5GNnn.dwg	General Notes
	PCN5EQnn.dwg	Estimated Quantities
	PCN5SLPnn.dwg	Structure Location Plan
	PCN5SEnn.dwg	Structure Elevation
	PCN5TSnn.dwg	Transverse Section
	PCN5SFPnn.dwg	Structure Foundation Plan
	PCN5DSDnn.dwg	Drilled Shaft Details
	PCN5ACPnn.dwg	Abutment Cap Plan & Elevation
	PCN5PCEnn.dwg	Pier Cap Plan & Elevation
	PCN5APDnn.dwg	Abutment & pier Cap Details
	PCN5ADPnn.dwg	Abutment Diaphragm Plan & Elevation

	PCN5PDPnn.dwg	Pier Diaphragm Plan & Elevation
Five (cont.)	PCN5ADDnn.dwg	Abutment Diaphragm Details
	PCN5PDDnn.dwg	Pier Diaphragm Details
	PCN5GEnn.dwg	Girder Seat Elevations
	PCN5BDnn.dwg	Bearing Details
	PCN5FPnn.dwg	Framing Plan
	PCN5GDnn.dwg	Precast Girder Details (Type --)
	PCN5DSnn.dwg	Deck Slab Reinforcement Top & Bottom
	PCN5ASnn.dwg	Approach Slab
	PCN5TSnn.dwg	Transition Slab
	PCN5MDnn.dwg	Miscellaneous Compaction Details
	PCN5WDnn.dwg	Wingwall Details
	PCN5ISDnn.dwg	Intermediate Steel Diaphragms
	PCN5DPnn.dwg	Top of Deck Elevations
	PCN5SDnn.dwg	Approach Slab & Transition Slab Details
	PCN5RDnn.dwg	Bridge Railing Plan & Details
	PCN5RSnn.dwg	Reinforcing Schedule
	PCN5BHnn.dwg	Bore Hole Data Sheet
	PCN5BBnn.dwg	Bat Box
	PCN5BBDnn.dwg	Bat Box Details
Six	PCN6CSnn.dwg	Construction Signing
Seven	PCN7PSnn.dwg	Permanent Signing
Eight	PCN8LTnn.dwg	Lighting
Nine	PCN9SGnn.dwg	Signalization
Ten	PCN10SPnn.dwg	Structure Placement
	PCN10PDnn.dwg	Permanent Drainage
Eleven	PCN11UTnn.dwg	Utilities
Twelve	PCN12ITSnn.dwg	ITS Layout Sheets
Thirteen	PCN13LDSnn.dwg	Landscaping Layout Sheets
Fourteen	PCN14SCMLnn.dwg	Cross Sections Main Line
	PCN14SCSSnn.dwg	Cross Sections Connectors/Ramps
	PCN14CSSSnn.dwg	Cross Sections Side Streets

To create consistency within the project electronic files, the base file naming convention mirrors the base files. All files must be managed using the **Sheet Set Manager** (See <u>***Section 5***</u> for more information).

Table 4.1: Standard Base File Naming

Sheet Naming Convention
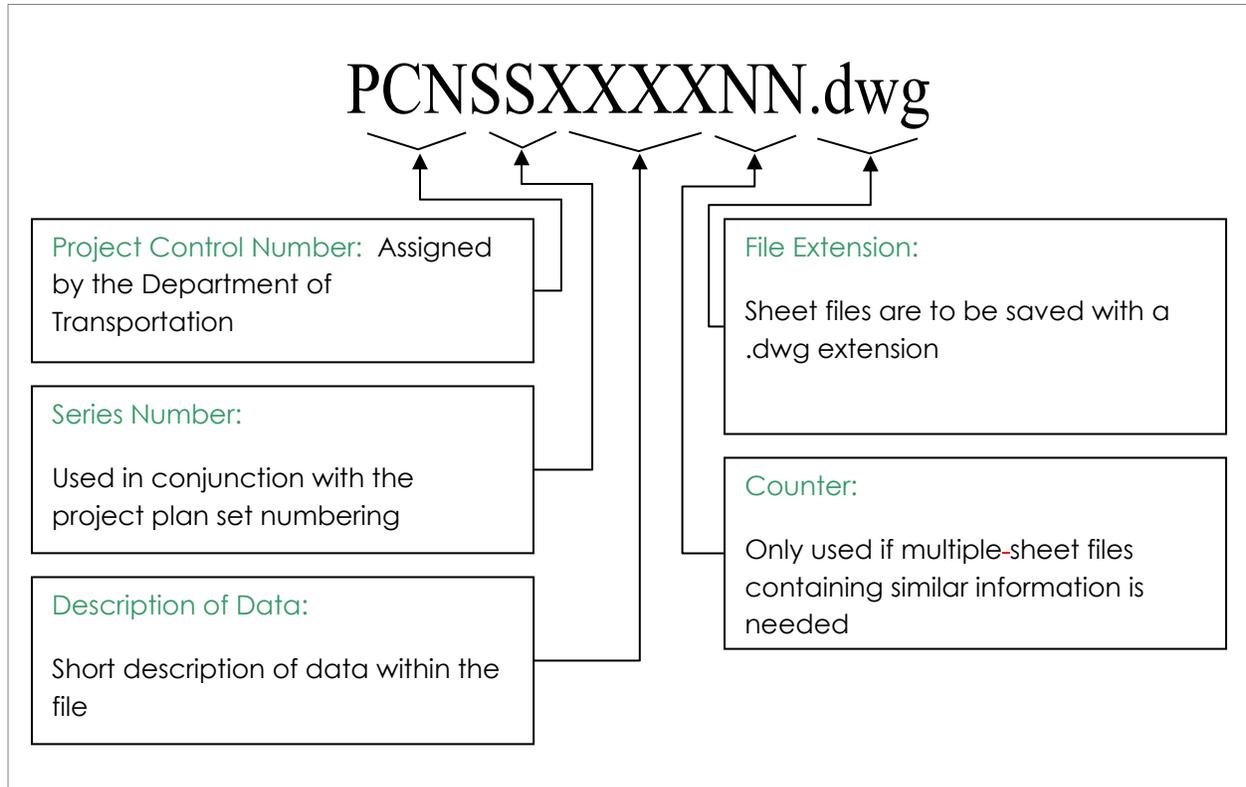
Figure 4.2: Sheet File Naming Convention

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5: 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	CN_XSURV.dwg (Main Survey File)	CN_XDTM.dwg (Survey Surface File)	CN_XSCN.dwg (Survey Notes Sheet)	CN_XPLAN.dwg (2D Survey File)
Data Included in File	Vector Graphics Alignments Pipe Networks	Existing Surface	Points Tables Alignment Tables	2D Linework 0 Elevation Feature Blocks

Survey Files Content

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

PCN_XSURV.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 method, LiDAR methods, and/or using standard survey methods. This file will also contain all existing alignments pertaining to the project. This file will also have data shortcut into it for the Survey Centerlines. This file will contain all surveyed points and features collected.

Use of File

This file will be used to data shortcut the existing survey alignments 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.

$\boxed{A}$ Vector Graphics

$\boxed{A}$ All Existing Alignments pertaining to project

PCN_XDTM.dwg

The Surface file only contains the existing surface created by either a photogrammetric method, LiDAR methods, traditional survey method, or a combination thereof. 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 data shortcut the existing surface(s) 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.

$\boxed{A}$ Existing Surface

PCN_XSCN.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 stakeout of project. It will not be referenced into any design file, nor is it shortcut in any way. This drawing file is the working file for the Construction Plan set, sheet 3-0, Survey Notes Sheet deliverable to be submitted to NMDOT PDE or contracted design engineer.

PCN_XPLAN.dwg

The XPLAN (Existing Planimetrics) file contains all surveyed features including but not limited to edge of pavement, fences, walls, structures, utilities, roadway striping, and signs. The linework of these features should be flattened to elevation zero(0) and demoted to 2D polylines.

Use of File

This file will be referenced into the project plan set via the xref command into design files for use in development of the project.

PCN_XSTRUC.dwg

The XSTRUC (Existing Structure Sections) file contains all cross-section views of existing structures found within the project limits. Each structure section must be labeled for invert elevation, structure size, and a description of the entrance and exits of structure. This file is for reference only.

Use of File

This file will be used to determine any changes to be made to the existing structure. This file may also be used to document changes to the existing structure in the project plan set.

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 **_Chapter 4_**. This section will only address the project files as they pertain to hosting engineering data.

Planimetrics

Planimetrics are vector data used to label and supplement the civil objects using Civil 3D. Planimetrics are created using simple lines, arcs, blocks, text, and dimensions. Examples of planimetrics are: showing where paint is used in the project for lane striping to annotating size of structures.

Sample Name: 1234567_PLAN_DESC.DWG

Location: \Proposed\ BaseFiles\

Description: Proposed Basefiles

Alignments

It is highly recommended that all alignments be housed in a file that is separate from any vector data or other engineering data. 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.

Sample Name: 1234567_ALGN_DESC.DWG

Location: \Proposed\ BaseFiles\

Description: Construction centerline alignments

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.

Sample Name: 1234567_TINN_DESC.DWG

Location: \Proposed\ BaseFiles\

Description: Finished grade surfaces

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 can be shared using data shortcuts and can also be sampled for section views by referencing the drawing that hosts the corridor.

Sample Name: 1234567_CORR_DESC

Location: \Proposed\ BaseFiles

Description: Proposed corridor models

Sample Lines & Structure Section

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.

Sample Name: 1234567_DRAN_DESC

Location: \Proposed\ BaseFiles

Description: Proposed and existing drainage structure sections

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.

Sample Name: 1234567_PIPE_DESC

Location: \Proposed\ BaseFiles

Description: Proposed pipe network

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.

Sample Name: 1234567_VF##_DESC

Location: \Proposed\ BaseFiles\VFrames

Description: View frames used for plan sheets

Bridge

Bridge files are numerous and vary according to the size of the project. Detailed file names can be found in ***Chapter 4***.

Sample Name: 1234567_BRDG_DESC

Location: \Proposed\ BaseFiles

Description: Contains proposed bridge basefiles

Traffic

Traffic files are numerous and vary according to the size of the project. Detailed file names can be found in ***Chapter 4***.

Sample Name: 1234567_TRAF_DESC

Location: \Proposed\ BaseFiles

Description: Contains proposed signing and striping basefiles

Traffic Control

Traffic control files are numerous and vary according to the size of the project. Detailed file names can be found in ***Chapter 4***.

Sample Name: 1234567_TTCP_DESC

Location: \Proposed\ BaseFiles

Description: Contains proposed construction phasing basefiles

Earthwork

Earthwork files are numerous and vary according to the size of the project. Detailed file names can be found in ***Chapter 4***.

Sample Name: 1234567_EWRK_DESC

Location: \Proposed\ BaseFiles

Description: Contains proposed cross sections and surfaces for calculating earthwork quantities

Sites

Sites should not be used in an NMDOT project.

The page intentionally left blank.

6: Borders and Covers

Standard borders have been developed by the New Mexico Department of Transportation for internal and external use. These borders are available on the internal Engineering Automation Bureau website and the external NMDOT website. This section discusses the NMDOT borders and their design. Items discussed in this section:

- Border Use

- Border Dimensions

- Plan and Profile Generation

- Consultant Logos

- Covers

- Sheet Set Manager

Border Use

The NMDOT border was created using the standard NMDOT template and is intended for use on all sheet files in an NMDOT project plan sets. The border is placed as vector elements and the standard template has a layout with the border already placed.

Border Dimensions

The NMDOT border is typically plotted on 11" x 17" paper for submittals and for the contractors to be used in the field. NMDOT supplies all borders scaled 1:1 based on the 11"x17" final print.
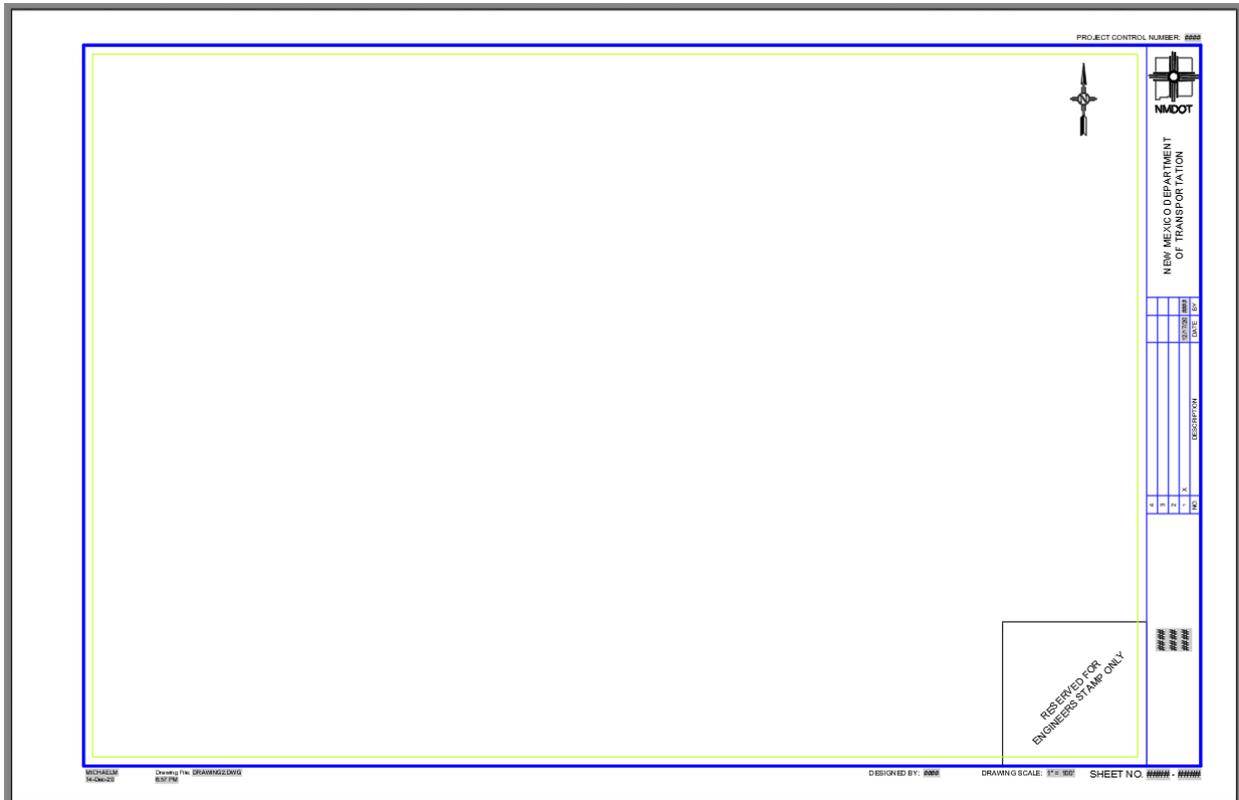
Figure 6.1: AutoCAD Plan Border

Plan and Profile Generation

NMDOT supports the use of the Civil 3D plan production tools. This tool allows for the easy creation of plan and profile sheets, plan sheets, and double plan/profile sheets.

$\boxed{\text{A}}$ The sheet creation process for Civil 3D requires the **NMDOT_Sheets2021.dwt** to be used when creating the view frames. The use of the sheets template allows the tool to create the sheets using the NMDOT standard borders at standard scales.
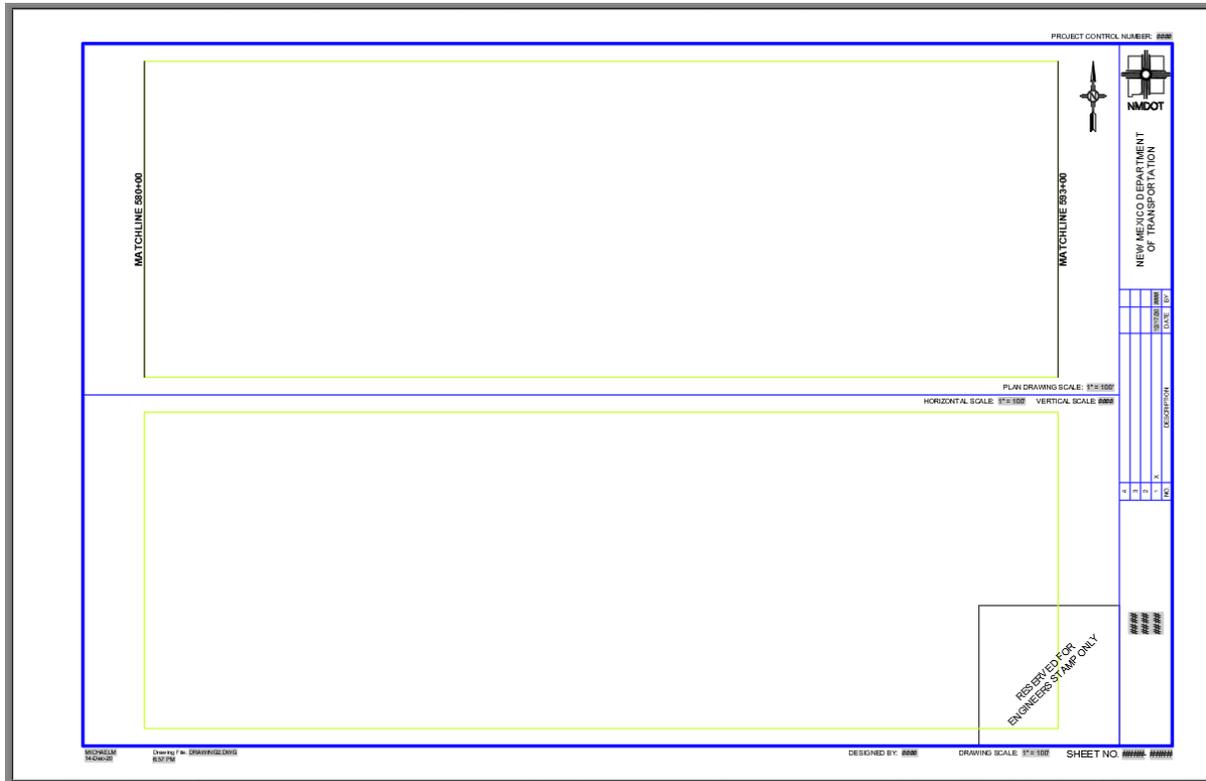

Figure 6.2: AutoCAD Plan and Profile Border

Consultant Logos

To help ensure standards are met on consultant deliverables, NMDOT has included an area in the cover sheets that may be used for consultant logos. An image, or vector elements, may be used in this area to create the consultant logo. The logo must plot correctly using the NMDOT standard plotting methods (see **_Section 13_**).

Covers

NMDOT utilizes several different covers depending on many factors regarding the project. The NMDOT project manager will communicate which cover is to be used for the given project. The NMDOT covers are designed for final 11" x 17" printing. As with all CAD files delivered by the NMDOT, the covers are designed to print correctly using the NMDOT standard plotting methods.
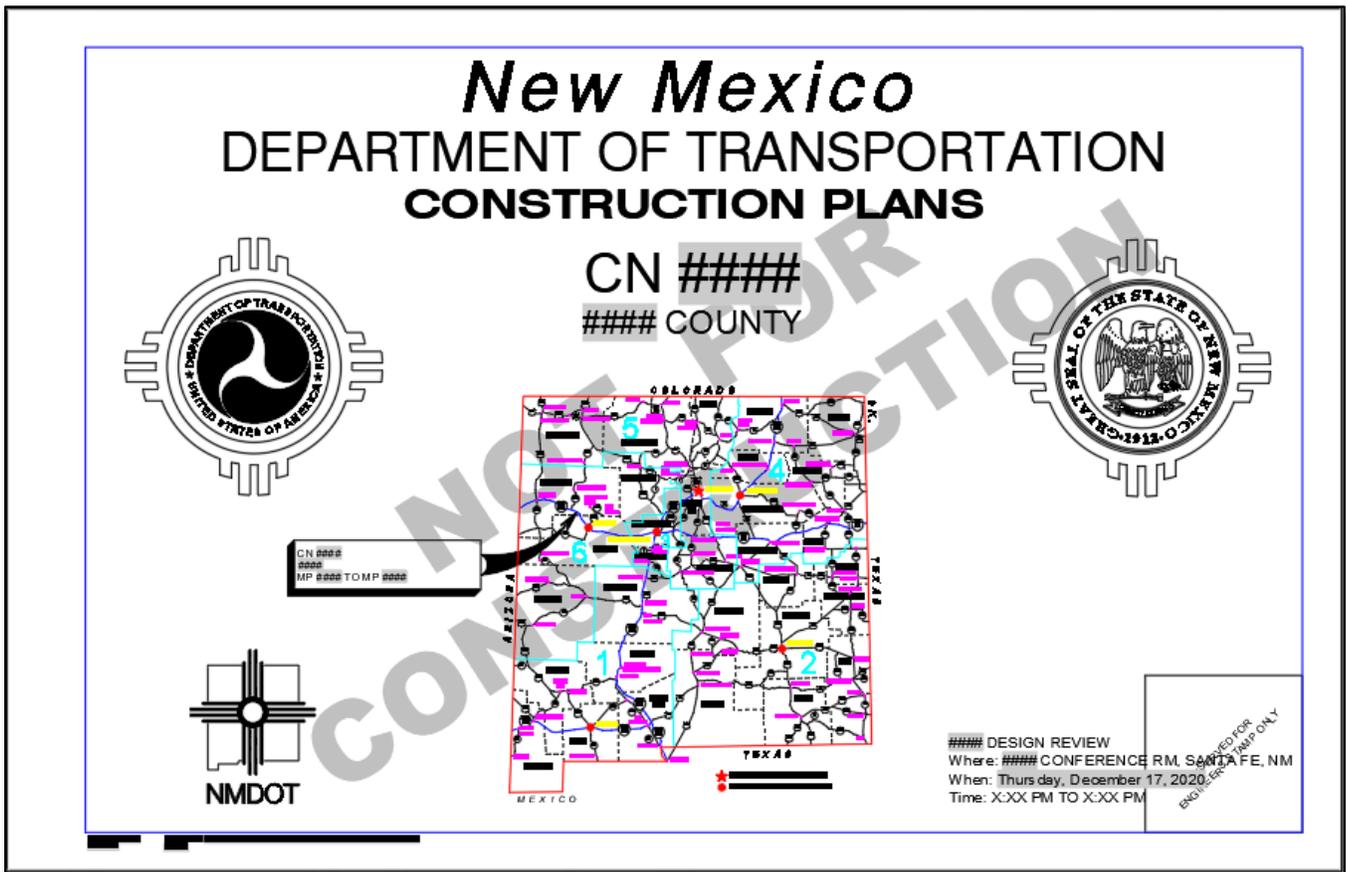

Figure 6.3: AutoCAD Plan Cover

Sheet Set Manager

The **Sheet Set Manager** is an important tool in a civil engineering project. It allows the automation of content in a sheet file in a project. NMDOT has developed a custom **Sheet Set Manager** file, .dst, that is integrated into all covers and standard border sheets. This is completed using fields within AutoCAD.

It is not advisable to modify the fields in the covers, or standard borders sheets, manually. The .dst file should be kept at the root of the **\Plans** directory. This file should be named **{PCN}-SheetSet.dst**. The custom settings in the .dst file can be accessed by right-clicking on a file shown in the .dst file and selecting the **Properties…** command. The .dst file must be delivered with the project.

Sheet Set Properties - PCN-SheetSet	
Sheet Set	
Name	PCN-SheetSet
Sheet set data file	M:\Template Files\PCN-SheetSet.dst (v1.1)
Description	Sheet Set Description
Model view	
Label block for views	
Callout blocks	
Page setup overrides file	Z:\NMDOT-CAD Committee\2021TemplateWork\Civil3D\NMDOT_20...
Project Control	
Project number	PCN
Project name	PROJECT NAME
Project phase	Project Phase - Not Used
Project milestone	Project Milestone - Not Used
Sheet Custom Properties	
Bridge Approved By	%%U
Bridge Approved Date	XX/XX/XXXX
Bridge Checked By	%%U
Bridge Designed By	%%U
Bridge Drawn By	%%U
Cross Section Alignment	XSec Alignment Name
Cross Section Station Range	1+00 thru 2+00
Misc. Profile Vertical Scale	1" = XX'
Revised By	%%U
Road Name	%%U
Sheet Creation	
Sheet storage location	P:\
Sheet creation template	NMDOT PLAN 100(Z:\NMDOT-CAD Committee\2021TemplateWork\...
Prompt for template	Yes
Sheet Set Custom Properties	
AEC Design Engineer	%%U
AEC Firm Designed By	%%U
Bridge Milepost	XXX.XX
Bridge Number	XXXX
Bridge Station	XXXX+XX.XX
Construction Milepost (BEGIN)	XXX.XX
Construction Milepost (END)	XXX.XX
Construction Station (BEGIN)	XXXX+XX.XX
Construction Station (END)	XXXX+XX.XX
County	County
Cross Section Horizontal Scale	1" = XX'
Cross Section Vertical Scale	1" = XX'
District Engineer	%%U
District Number	D#
District Traffic Engineer	%%U
Engineering Technician #1	%%U
Engineering Technician #2	%%U
Engineering Technician (LEAD)	%%U
Latitude of Project	XX.XXXX° N
Longitude of Project	XXX.XXXX° N
NMDOT MP	Maintenance Patrol Foreman or Yard
NMDOT PDE	Project Development Engineer
NMDOT PM	Const. Project Manager
PnP Profile Vertical Scale	1" = XX'
Project Design Review	30%
Project Developed By	%%U
Project Length	X.XXX
Project Limits Milepost (BOP)	XXX.XX
Project Limits Milepost (EOP)	XXX.XX
Project Limits Station (BOP)	XXXX+XX.XX
Project Limits Station (EOP)	XXXX+XX.XX
STIP Limits Milepost (BEGIN)	XXX.XX
STIP Limits Milepost (END)	XXX.XX
Total Cross Section Sheets	%%U
Total Plan Sheets	%%U
Total Sheets	%%U

Figure 6.4

B.O.P. CN ####
BEGIN WEST CROSSOVER
STA. ####, M.P. ####

BEGIN I-40 CONSTRUCTION
STA. ####, M.P. ####

MAJOR STRUCTURE
(2) - 10' x 10' C.B.C.
BRIDGE NO. ####
STA. ####, M.P. ####

PROJECT CONTACT INFORMATION
NMDOT PROJECT DEVELOPMENT ENGINEER
####
Cell. (505) XXX-XXXX

NMDOT CONSTRUCTION PROJECT MANAGER
####
Office. (505) XXX-XXXX

NMDOT MAINTENANCE PATROL FOREMAN
####
Office. (505) XXX-XXXX

NMDOT DESIGN TEAM
####, ENGINEERING TECHNICIAN V
Cell. (505) XXX-XXXX
####, ENGINEERING TECHNICIAN III
Cell. (505) XXX-XXXX
or
DESIGN CONSULTANT
####
Cell. (505) XXX-XXXX

THE 2019 EDITION OF NEW MEXICO DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS AND STANDARD DRAWINGS FOR HIGHWAY AND BRIDGE CONSTRUCTION SHALL GOVERN CONSTRUCTION OF THIS PROJECT.

MICHAEL BRANDT
17-Mar-21
Drawing File: Z:\NMDOT-CAD COMMITTEE\2021\TEMPLATE\WORK\PRESENTATION\DST_NMDOT VICINITY MAP.DWG
3:53 PM

Sheet Set Properties - PCN-SheetSet   X

Project Control		
Project number	PCN	
Project name	PROJECT NAME	
Sheet Set Custom Properties		
Sheet Custom Properties		
Revised By	%%U	
AEC Design Engineer	%%U	
AEC Firm Designed By	%%U	
Bridge Milepost	XXX.XX	
Bridge Number	XXXX	
Bridge Station	XXXX+XX.XX	
Construction Milepost (BEGIN)	XXX.XX	
Construction Milepost (END)	XXX.XX	
Construction Station (BEGIN)	XXXX+XX.XX	
Construction Station (END)	XXXX+XX.XX	
District Engineer	%%U	
District Number	D#	
Engineering Technician #1	%%U	
Engineering Technician #2	%%U	
Engineering Technician (LEAD)	%%U	
Latitude of Project	XX.XXXX° N	
Longitude of Project	XXX.XXXX° N	
NMDOT MP	Maintenance Patrol Foreman or Yard	
NMDOT PDE	Project Development Engineer	
NMDOT PM	Const. Project Manager	
PnP Profile Vertical Scale	1" = XX'	
Project Design Review	30%	
Project Developed By	%%U	
Project Length	X.XXXX	
Project Limits Milepost (BOP)	XXX.XX	
Project Limits Milepost (EOP)	XXX.XX	
Project Limits Station (BOP)	XXXX+XX.XX	
Project Limits Station (EOP)	XXXX+XX.XX	

BEGIN I-40 CONSTRUCTION
STA. ####, M.P. ####

LENGTH OF PROJECT #.### miles
THIS PROJECT BEGINS IN SECTION XX, T.XXN, R.XXW, N.M.P.M.
THIS PROJECT ENDS IN SECTION XX, T.XXN, R.XXW, N.M.P.M.

SEC. 2

T.14N
T.13N

R.13W
R.12W

~1.4 miles
To Prewitt, NM

PROJECT DEVELOPED BY: ####

DRAWING SCALE: NONE

E.O.P. CN ####
END EAST CROSSOVER
STA. ####, M.P. ####

END I-40 CONSTRUCTION
STA. ####, M.P. ####

Section &
Sheet # from
Sheet Set
Manager

RESERVED FOR ENGINEER

####
####
VICINITY MAP

SHEET NO. ####-####

PROJECT CONTROL NUMBER ####

NO.	DESCRIPTION	DATE	BY
4			
3			
2			
1	X	X	####

NEW MEXICO DEPARTMENT
OF TRANSPORTATION

NMDOT

NOI INPUTS

PERMIT NUMBER:
NMDOT PROJECTS REQUIRE ELECTRONIC NOI SUBMISSION - PAPER SUBMISSION REQUIRES PRIOR APPROVAL.
NMR100000 STATE OF NEW MEXICO, EXCEPT INDIAN COUNTRY
NMR101000 INDIAN COUNTRY WITHIN THE STATE OF NEW MEXICO, EXCEPT NAVAJO RESERVATION LANDS THAT ARE COVERED UNDER ARIZONA
PERMIT AZ100001 AND UTE MOUNTAIN RESERVATION LANDS THAT ARE COVERED UNDER COLORADO PERMIT COR100001.

OPERATOR NAME: NMDOT, DISTRICT #

POINT OF CONTACT: DISTRICT # PROJECT MANAGER

NOI PREPARED BY: DISTRICT # PROJECT MANAGER

PROJECT / SITE NAME: NMDOT CONTROL NUMBER (CN) XXXXXXXX

PROJECT / SITE ADDRESS: ENTER PROJECT NAME MP XX.XX - M.P. XX.XX

LATITUDE:	XX.XXXX° N
LONGITUDE:	XXX.XXXX° W
ESTIMATED PROJECT START DATE:	TO BE DETERMINED BY # PROJECT MANAGER
ESTIMATED PROJECT COMPLETION DATE:	TO BE DETERMINED BY # PROJECT MANAGER
ESTIMATED AREA TO BE DISTURBED (NEAREST ¼ ACRE):	XX.XX acres
TYPE OF CONSTRUCTION:	HIGHWAY OR ROAD
DEMOLITION OF ANY STRUCTURES, 10,000 SQUARE FEET OR GREATER, BUILT OR RENOVATED BEFORE JANUARY 1, 1980? (YES/NO):	??
WAS THE PREDEVELOPMENT LAND USE FOR AGRICULTURE? (YES/NO):	??
COMMENCED EARTH-DISTURBING ACTIVITIES?:	NO
PREVIOUS NPDES PERMIT? IF YES, PERMIT NO:	NO
MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4): NAME	??
SURFACE WATERS WITHIN 50 FT.? (YES/NO):	??
RECEIVING WATER:	X
IMPAIRED WATERS:	??

IMPAIRED WATERS METHOD: ONLINE CONSULTATION OF NEW MEXICO ENVIRONMENT DEPARTMENT LISTING OF STATEWIDE 303D AND TMDL IMPAIRMENTS.

TIER 2, TIER 2.5, TIER 3, WATERS: (CONSULT 2017 CGP APPENDIX "F"): ?

CHEMICAL TREATMENT INFORMATION: TYPICAL NMDOT PROJECT WILL NOT UTILIZE THESE CHEMICALS

SWPPP CONTACT INFORMATION: DISTRICT X PROJECT MANAGER

ENDANGERED SPECIES CRITERIA (A, B, C, D, E, or F) X

HISTORIC PRESERVATION: HISTORIC PROPERTIES WILL NOT BE IMPACTED.
THE ENVIRONMENTAL COMMITMENTS WILL INDICATE EXISTENCE OF HISTORIC PROPERTIES. IF HISTORIC PROPERTIES EXIST, THE TESCP
SHEETS CAN SHOW NO EFFECT ON HISTORIC PROPERTIES IN STORMWATER CONTROL SPECIFIC AREAS OF DISTURBANCE.

CERTIFICATION: NOI MUST BE CERTIFIED BY "A..."

GENERAL NOTES:

1. THE 2020 EDITION OF NMDOT NATIONAL PO... EROSION AND SEDIMENT CONTROL OF THE... AND BRIDGE CONSTRUCTION SHALL BE USE... PREVENTION PLAN (SWPPP).

2. THE NPDES PERMIT NUMBER FOR THE PROJE... ASSIGNED, SHALL BE POSTED AT THE PROJE...

3. THE STORM WATER POLLUTION PREVENTIO... QUALIFIED INSPECTOR ASSIGNED BY THE C... REPRESENTATIVES AT ALL TIMES DURING CO...

4. INFORMATION NEEDED TO COMPLETE THE N...

5. THE CONTRACTOR SHALL SPECIFICALLY DEFINE ALL REQUIRED CONTROL MEASURES FOR EACH CONSTRUCTION PHASE, AND SHALL COMPLY WITH THE PROVISIONS OF THE NPDES MANUAL AND THE 2017 CONSTRUCTION GENERAL PERMIT

6. THE FINAL SEEDING AND REVEGETATION PLAN, ALONG WITH THE MEASURES SHOWN ON THE FINAL STABILIZATION TESCP SHEETS (IF INCLUDED) SERVE AS THE FINAL SOIL STABILIZATION MANAGEMENT PRACTICE.

7. CLASS 'A' AND CLASS 'C' SEEDING SHOULD USE QUANTITIES SHOWN IN THE 2019 NMDOT STANDARD SPECIFICATIONS FOR HIGHWAY AND BRIDGE CONSTRUCTION. QUANTITIES SHOWN IN THE RUSLE2 CALCULATIONS ARE FOR PERMIT COMPLIANCE ONLY.

STORM WATER POLLUTION PREVENTION PLAN INFORMATION

SOIL LOSS MODEL

For sites greater than 5 acres in size, BMP selection must be made based on the use of appropriate soil loss prediction models (2017 CGP)

Add RUSLE or RUSLE2 (SOIL LOSS MODEL) calculations, comparing pre-construction to post-construction conditions here.

Results should include:
Existing Undisturbed Vegetative Cover
Worst Case Class 'A' seeding, all four seasons
Worst Case Class 'C' seeding, all four seasons.

MS4 RETENTION

PRE-PROJECT IMPERVIOUS AREA	XX.XX ACRES
POST-PROJECT IMPERVIOUS AREA	XX.XX ACRES
NET INCREASE IN IMPERVIOUS AREA	XX.XX ACRES
REQUIRED RETAINED RAINFALL DEPTH **(A)**	X.XX INCHES
REQUIRED RETENTION VOLUME	XXX CUBIC FEET
RETENTION VOLUME PROVIDED	XXX CUBIC FEET

(A) SEE EPA PUBLICATION 832-R-15-009
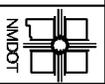

A Sheet Set Properties - PCN-SheetSet ✕

Project Control

Project number	PCN
Project name	PROJECT NAME

Sheet Custom Properties

Revised By	%%U

Sheet Set Custom Properties

Project Developed By	%%U

Section &
Sheet # from
Sheet Set
Manager

RESERVED FOR ENGINEER

PROJECT DEVELOPED BY: ####

DRAWING SCALE: NONE

PROJECT CONTROL NUMBER: ####

NEW MEXICO DEPARTMENT OF TRANSPORTATION

NMDOT

NO.	DESCRIPTION	DATE	BY
4			
3			
2			
1	X	X	####

####
####
SWPPP INFORMATION SHEET

SHEET NO. #### - ####

MICHAEL BRANDT
17-Mar-21
3:17 PM

Drawing File: Z:\NMDOT-CAD COMMITTEE\2021\TEMPLATEWORK\PRESENTATION\051_SWPPP.DWG

DESIGNED BY: ####
MICHAEL BRANDT
17-Mar-21

DRAWN BY: ####
Drawing File: Z:\NMDOT-CAD COMMITTEE\2021\TEMPLATEWORK\PRESENTATIONS\ST_BRIDGE\EXHIBIT.DWG
4:36 PM

CHECKED BY: ####

PLOT DATE: 3/17/2021

Field

APPROVED FOR CONSTRUCTION

PROJECT DEVELOPED BY: #### DATE: 3/17/2021

Field

Section & Sheet # from Sheet Set Manager

SHEET NO. #### - ####

RESERVED FOR ENGINEER

NOT FOR CONSTRUCTION

STA. ####

Sheet Title from Sheet Set Manager

####
####
####

BRIDGE NO. XXXX

4				
3				
2				
1		X		x	####
NO.	DESCRIPTION		DATE	BY

NEW MEXICO DEPARTMENT OF TRANSPORTATION

NMDOT

PROJECT CONTROL NUMBER ####

Sheet Set Properties - PCN-SheetSet

Project Control

Project number	PCN
Project name	PROJECT NAME
Bridge Approved By	%%U
Bridge Approved Date	XX/XX/XXXX
Bridge Checked By	%%U
Bridge Designed By	%%U
Bridge Drawn By	%%U

Sheet Custom Properties

| Bridge Station | XXXX+XX.XX |
| Revised By | %%U |

Sheet Set Custom Properties

| Project Developed By | %%U |
| Project Design Review | 30% |

A Sheet Set Properties - PCN-SheetSet ✕

Project Control

Project number		PCN
Project name		PROJECT NAME

Sheet Custom Properties

Cross Section Alignment		XSec Alignment Name
Cross Section Station Range		1+00 thru 2+00
Revised By		%%U

Sheet Set Custom Properties

Cross Section Vertical Scale		1" = XX'
Project Developed By		%%U
Project Design Review		30%

ALIGNMENT: ####   STATION RANGE: ####

PROJECT DEVELOPED BY: ####

RESERVED FOR ENGINEER

HORIZONTAL SCALE: 1" =
VERTICAL SCALE

SHEET NO. ####

Horizontal Scale set by Viewport Scale or by DST

Section & Sheet # from Sheet Set Manager

####
####
CROSS SECTIONS
FOR INFORMATION ONLY

4			
3			
2			
1	X	X	####
NO.	DESCRIPTION	DATE	BY

NEW MEXICO DEPARTMENT
OF TRANSPORTATION

NMDOT

PROJECT CONTROL NUMBER: ####

MICHAEL BRANDT
17-Mar-21

Drawing File: Z:\NMDOT-CAD COMMITTEE\2021\TEMPLATE\WORK\PRESENTATION\DST_EXHIBITS.DWG
1:24 PM

7: Template Files

The standard NMDOT template files have been developed with careful consideration given to the design specifics of New Mexico projects. These files are the basis of all NMDOT design files and should be used throughout the project. It is paramount that the standards and settings discussed in this section be considered prior to, and during, the development of the project.

It should be noted that all template files are living documents, subject to periodic updates. Please check the NMDOT website for updates.

Items discussed in this section:

- Template Files

- Units

- Coordinates ~~Systems~~

- Angles

- Layouts

- View Ports

Template Files

NMDOT has separated its templates into four templates:

- NMDOT_Survey2021.dwt
- NMDOT_Bridge2021.dwt
- NMDOT_2021.dwt
- NMDOT_Sheets2021.dwt

The reason for this separation is to minimize the amount of data used in one file. Autodesk files have the potential to grow large in file size during a civil engineering project. By separating the template, the resulting project files are smaller in size. Another reason for the separation is to minimize the potential of the wrong styles being utilized.

Units

NMDOT provides Civil 3D template files for use on all projects designed for the department. All projects are required to use the standard template files.

[A] NMDOT provides an AutoCAD template which are defined in **Feet**. No coordinate systems or projections are applied to the template.
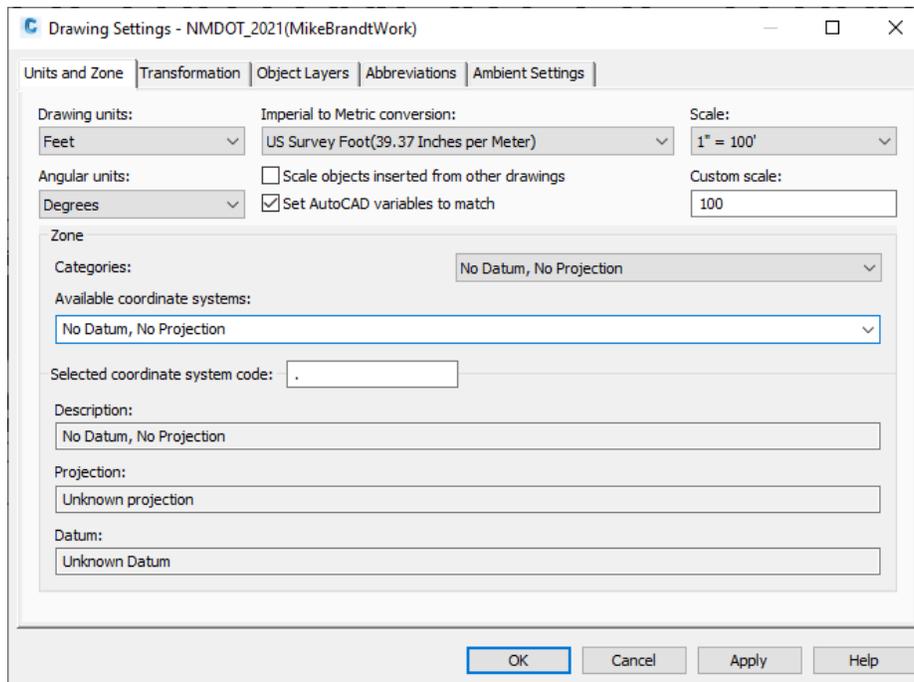
Figure 7.1: AutoCAD Template Units

A⃞ The structural template is defined in **Architectural units**. No coordinate systems or projections are applied to the template.

Figure 7.2: AutoCAD Structural Template Units

Coordinates

Coordinate readouts determine the accuracy and format of the overall readout returned by the CAD application. Readouts focus on two specific settings: coordinates and angles. Coordinates set the format and accuracy of the design file, based on the units specified and the degree of accuracy based on decimal or fraction.

$\boxed{A}$ The NMDOT template has the coordinates settings established using the foot unit and a precision setting of three decimal places (***Figure 6.3***).
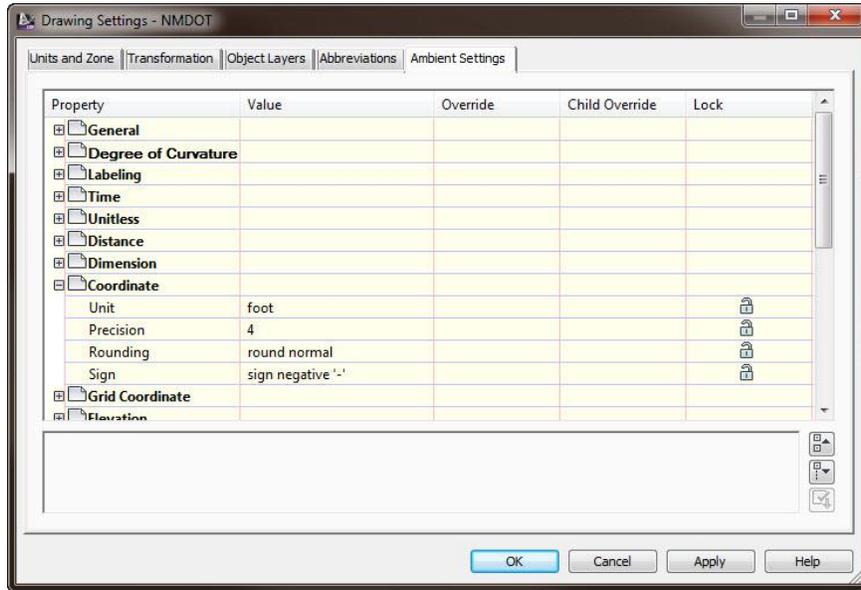
Figure 7.3: AutoCAD Coordinate Settings

Direction

Direction settings control the format, mode, and accuracy of the design files angular settings. These settings will determine the readout of the angle determined.
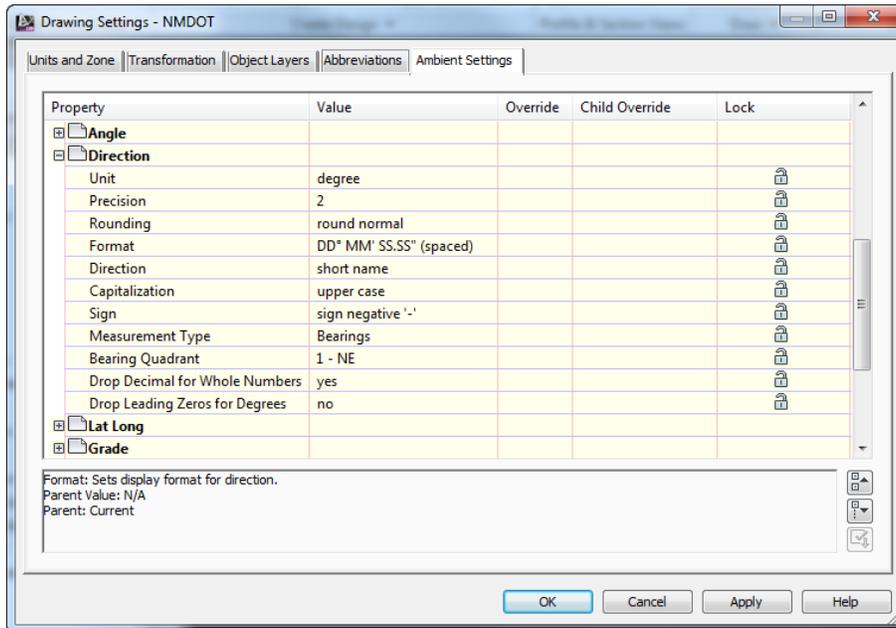
Figure 7.4: AutoCAD Direction settings

Layouts

Layouts are the AutoCAD version of a digital sheet that is printed to create the individual page to be included in the project plan set. AutoCAD files can have multiple layouts within each drawing. The NMDOT template contains one layout with the NMDOT plan border placed as vector elements for use by the CAD user. The **NMDOT_SHEETS2021.dwt** template file has many different layouts (plan and profile, plan, cross sections, etc.) to be used when creating sheets for a NMDOT project.

NMDOT engineering consultants are welcome to create as many layouts as necessary to effectively create a project plan set. The number of layouts is limited to a maximum of 10 per drawing file (see **Sheet Naming** below.)

Template Update Process

Any changes, or additions, to the NMDOT Template will be made by the CADD Committee. A request must made by email and include detailed information on the changes/additions to be made. A drawing with an example of requested changes can be included. The request by email with drawings, or documents, attached must be sent to ***NMDOT.CADDCOM@state.nm.us***

Sheet Naming

The names of all new layouts created in a design file should be self-explanatory and the use of the **Description** field is required. At no point should a model name contain the term "temp" or any deviation thereof. If a temporary model/layout is created during the project development, it must be deleted prior to submission to NMDOT.

If it is determined that a CAD file is to have multiple sheets contributing to the final plan set, the design file name should contain the sheet range.

Design file name	Description	Sheet Models/Layouts
PCN3PP01.dwg	Plan and Profile sheets 1 thru 5	PP01
		PP02
		PP03 PP04 PP05
PCN2TS01.dwg	Typical Section sheets 1 and 2	TS01
		TS02

Table 7.1: File Naming with Multiple Layouts

View Ports

The use of view ports in AutoCAD is essential in the creation of sheets. There are no limitations to the number of viewports in a single layout. Each viewport must have a standard plotting scale associated with it. The standard layouts within the NMDOT template files have a custom north arrow associated with the initial view port. This north arrow is designed to rotate to reflect true north should the view within the view port be rotated. If any other viewports are created and show a plan view, the NMDOT north arrow must be inserted into, and associated with, the viewport.
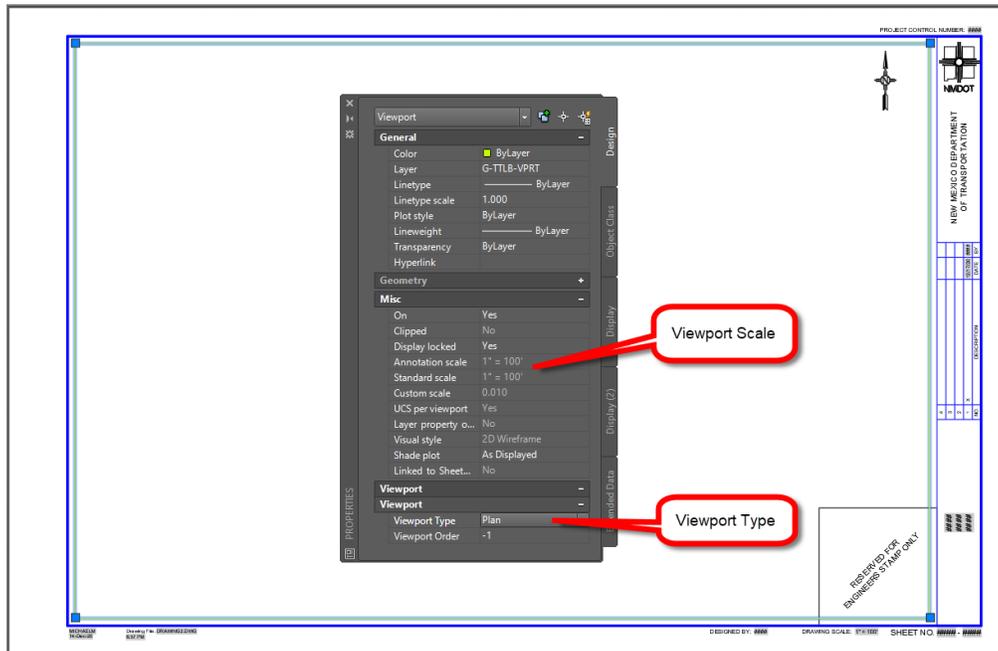
Figure 7.5: View Port Creation

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8: 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

- Point Description Key Set

- 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 Points for search points, photo control, stakeout, etc.
300-499	Set photo control
500-999	Found ROW Monuments, Section Corners, adjacent property
1,000-49,999	Topo shots.

Table 8.1

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.

A breakdown of all points and their properties can be found here.

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.

A breakdown of linear features, codes, and more details are available here.

9: Reference Files

Reference files are necessary for any creation of drawings and are used extensively throughout the NMDOT design process. The standard workflow of the NMDOT is to utilize references of design base files in lieu of copying all design information into a single design sheet. This method allows for segregation of design criteria while enabling "real time" updating of design changes.   In addition, this method allows for separate layer controls enabling the user to control the display of layers within each reference file while not affecting the active design file. Items discussed in this section:

Reference File Usage

Reference Pathing

Data Shortcuts

Reference File Usage

The NMDOT's use of reference files is critical to all aspects of project design and brings together multiple design disciplines into a "real time" viewing and editing process. This process becomes important when multiple design aspects, like drainage and roadway design interact on a project. In the case of a roadway widening project, the design team will need to reference the proposed drainage design (i.e. culvert design and locations) including existing contours to determine any potential issues with curb and gutter locations. This communication of information can be made available in "real time" between all departments simultaneously by utilizing reference files.

Reference File Pathing

Reference file pathing in AutoCAD can be accomplished using three methods: Relative, No Path or Full Path. The Full pathing method saves the entire path to the reference file. This includes the mapped drive and directory structure (e.g. K:\OurProjects\NMDOT\PCN\....). Because NMDOT may not utilize the same drive mapping as any consultant, the use of Full Pathing is not recommended.

The No Path option utilizes the project values set in the user's options. Because each user's options may vary, the use of No Path is not recommended.

The Relative Path option stores the location of the reference based on the current file's directory. From the current directory, AutoCAD stores the location as having to navigate up/down folder(s) and stores the names of the remaining folders to navigate. No drive mapping is utilized and only the folders that are pertinent to the location of the reference file is stored (e.g. ...\...\Existing\Survey\file.dwg).

A When referencing in AutoCAD, it is required that the **Path type** be set to **Relative path** and the attachment type is set to **Overlay**.
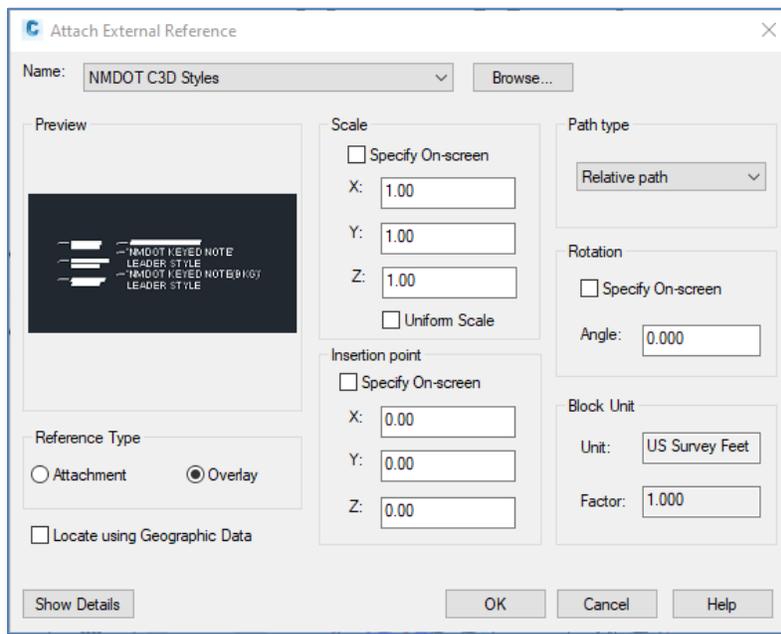
Figure 9.1: AutoCAD Reference dialog box

Data Shortcuts

Data shortcuts are XML-based files that allow Civil 3D to share civil objects, such as surfaces and alignments, between drawings. Data shortcuts allow project teams to avoid creating duplicate civil objects in drawing files.

Data shortcuts require a specific directory structure which resides in the projects working folder. ***See page*** 22 for a breakdown of the data shortcut structure.

NMDOT has integrated the data shortcuts structure into the standard NMDOT project structure. When the NMDOT standard structure is utilized, the working folder is set to the project root folder. Civil 3D will automatically search the project structure for the standard data shortcut folders.

NMDOT will not accept any projects that do not utilize the data shortcut method delivered by a consultant.

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10: Layers

The AutoCAD drawing layer structure used by the NMDOT is based on the National CAD Standards (NCS). While the NCS does not allow for major deviations for a government agency such as a department of transportation, the NMDOT has taken some liberties when developing the layering structure. These liberties allow the layering structure to represent the different design sections within the NMDOT and the various types of projects the NMDOT develops and contracts to consultant engineering firms. Items discussed in this section:

- Layering Schema

- Layer Filters

- ByLayer Attributes

AutoCAD Layers

AutoCAD assigns symbologies to layers and by assigning placed vector elements to specific layers, the elements automatically adopt the symbologies. The layering schema found within the NMDOT templates were developed to enable the use of layers for each design section within NMDOT.

ByLayer Attributes

The ability to assign symbologies to a layer is known as a "ByLayer" setting (see ***Section 9*** for additional information on symbology). Layer symbologies such as the color, linetype, and lineweight of vector elements can be assigned to a drawing layer. When a drawing layer is made active, the lineweight, linetype and color will automatically be changed if the active symbologies are set Bylayer.

The **Layers Properties Manager** can be accessed two ways: the Layer Properties button (see ***Figure 8.1***), or by typing "**Layer**" into the command line. The NMDOT has decided to assign lineweights to all AutoCAD elements. This layer property has already been assigned in the template, but the **Show/Hide Lineweight** toggle must be on-to view properly in the CAD file (see ***Figure 8.2***).
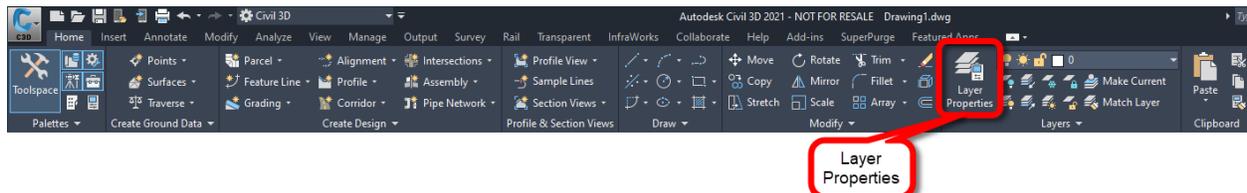
Figure 10.1: Layer Properties button

Figure 10.2: Show/Hide Lineweight button

Layering Schema

The NMDOT used the National CAD Standards (NCS) as the basis for its layer naming convention. While the NCS does not encompass a single, large entity such as a department of transportation, the NMDOT had to deviate slightly. This deviation is mainly found in the major groups and discipline designator. Below is a breakdown of the discipline designators and major groups unique to the NMDOT layering structure.

Discipline Designator	NMDOT Definition	Description
C-	Civil	Roadway Design, Drainage, Traffic, etc
G-	General	Any layer not unique to any design section
L-	Landscaping	Any vegetation or irrigation related objects
S-	Structural	Bridge or any structure requiring structural engineering (e.g. large CBC's, bridges, large drainage structures)
U-	Utilities	Any utilities, or utility-related objects or annotation
VF-	Survey – Field shots	Any figures, annotation or survey points
VA-	Survey – Aerial mapping	Any figures, annotation, or points that are placed during the mapping phase of a project.

Major Group	NMDOT Definition
DRAN	Drainage
ENVR	Environmental
RAIL	Railroad/light rail
ROAD	Roadway Design
RWAY	Right-of-way
TRAF	Traffic
BRDG	Bridge/structures

NMDOT has adhered to the NCS standard of four characters for any major or minor groups. Should the standard acronym for any given object not contain four characters, The acronym for material is generally accepted as "mat", therefore any layer containing this acronym should have a tilde (e.g. C-ROAD-MAT~).

Layer Filters

Due to the large number of layers within the template, the NMDOT has developed layer filters to enable users the ability to work with a smaller number of layers. Selecting one of the layer filters in the left pane of the Layer Properties Manager palette will display only the layers related to the filter in the main pane. The Invert filter toggle located at the bottom of the Filters area will remove the layers associated with the filter and display all remaining filters. The image on the right shows the new filtering tree that excludes all layers from reference files. This allows the user to isolate local layers.
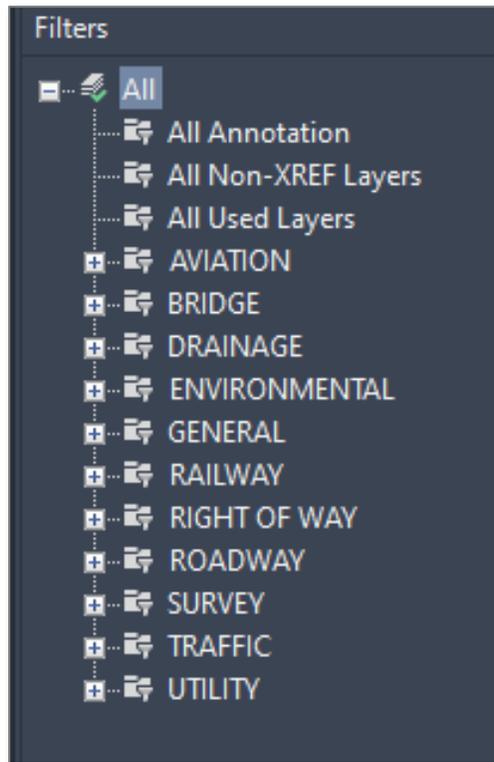
Figure 10.3: Layer filtering

11: Symbology

A CAD application's settings of color, linetype, and lineweight are referred to as symbologies or layer attributes. It is possible to assign symbologies to layers or to vector elements. The ByLayer setting is the standard for NMDOT. This section discusses the different symbologies associated with each. Items discussed in this section:

- Lineweights

- Linetypes

- Colors

Lineweights

Lineweights refer to the plotted line thicknesses of each element within a drawing file. The standardization of lineweights extends to the final plotting of a sheet file. These standards created for lineweights are based on the idea that all elements representing the proposed design will be prominently represented in the plan set. This has a large impact on contractors in the field and designers completing As-Builts in the office. The NMDOT template prints by lineweight and layer, not by color.

Linetypes

Custom linetypes are used to aid the user and contractors in easily distinguishing elements representing design features such as daylight points, electric overhead lines, storm lines, etc. The NMDOT has created custom linetypes for use in a NMDOT civil design project (NMDOT_Linetypes.lin).

$\boxed{A}$ All NMDOT supported linetypes are contained in the NMDOT template. The source .LIN file can be downloaded from the NMDOT website or can be found in the NMDOT workspace installer.

Colors

Every element in a CAD file has a color that is either assigned to the element or assigned to the layer the element is placed on. Colors are important in a CAD file as they allow for easy identification of elements, and types of elements. The ability to plot by lineweight, the NMDOT can assign colors to layers/elements that are somewhat logical (e.g. blue for water, red for electrical).

Gray Scaling and RGB values

Gray scaling is a method used in a CAD file to "gray out", or dither, a specified portion of the design to visually depress the boldness of the features. For example, this method is used to reference existing survey features, to "dull" their appearance visually on the screen, and to additionally invoke the plotting output to be "shaded". This proves beneficial in diminishing the focus on the existing survey while enhancing the proposed design, allowing the designer to see existing and proposed features together on the same design plan sheet.

All gray scaling should be done in the CAD file by modifying the ByLayer symbologies and/or overrides. Several different gray scaling options are available for NMDOT projects (see **_Table 9.1_**).

% Shading	RGB Value
50%	140,140,140
40%	153,153,153
30%	178,178,178
20%	254,254,254

Table 11.1: Gray scaling values

A̲ For AutoCAD deliverables, the standard color index is to be used (see **_Figure 9.2_**). All layers should only be assigned colors based on index numbers and not RGB values.
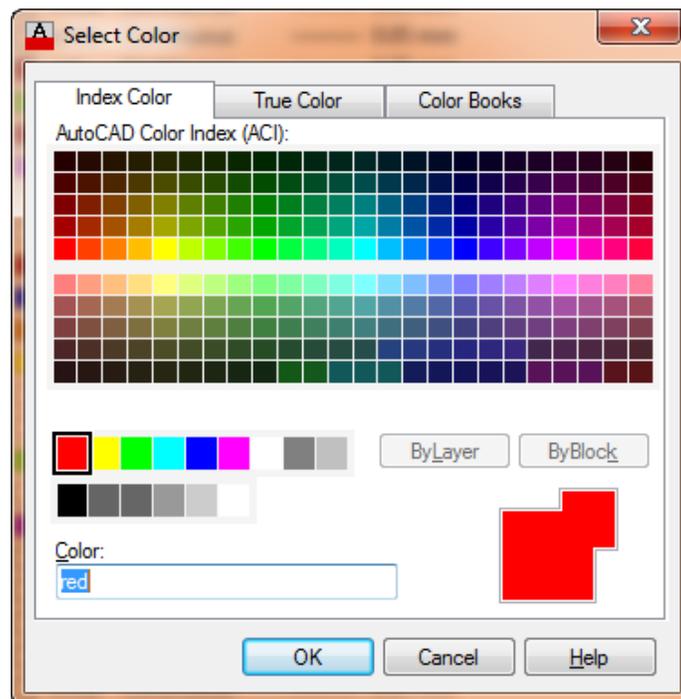
Figure 11.2: AutoCAD color table

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12: 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, breaklines, and/or feature lines. Any 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. A proposed surface is often created from the corridor of the project, or by 3 dimensional feature lines.

Naming Conventions

For survey surfaces, the name must indicate that it is the existing or original surveyed ground. The surface name is used to create a new layer. Using dashes in lieu of spaces is recommended to ensure the layer naming convention is preserved.

Example: EG-125, OR-NM12, EXIS-GRND, EG-125-NB

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.

For an example of style use, click here.

	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.

Surface utilizing NMDOT-Existing Contours style
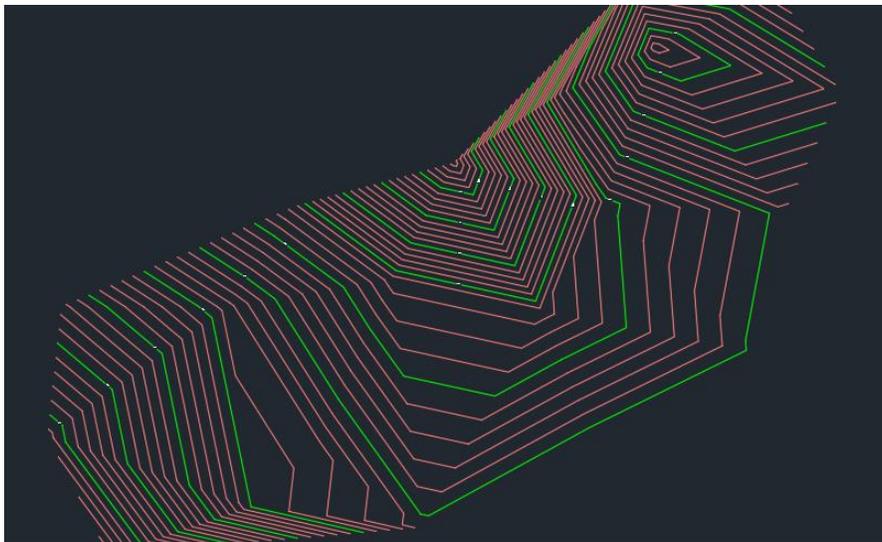
Surface utilizing NMDOT-Proposed Contours style

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13: 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:

- Definitions

- Naming Conventions

- Symbology

Definitions

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.

Centerlines

Centerlines are graphical representations of the center of mat, but can also be representative of left, or right, pavement edges. The type of roadway determines the location of the centerline. For example, an off-ramp/on-ramp will have the "centerline" located at the inside edge of the travel way.

Survey centerlines are often the center of the right-of-way for the roadway involved.

Offset

Offset alignments are typically used for the control of corridors. Offset alignments are also used to represent saw/cut lines where the assembly/corridor will be run using the offset alignment.

Curb Return

Curb return alignments are often created using the intersection tool in Civil 3D. The curb return alignment is geometry that represents the radius curb and gutter between two edges of pavement in an intersection.

Miscellaneous

Miscellaneous alignments do not represent any given entity for every project. Not every project will utilize miscellaneous alignments. Miscellaneous alignments can represent any linear/circular entity and are normally used to control corridors. Examples of miscellaneous alignments are ditch alignments, raised medians, lane tapers, and right-of-way.

NMDOT utilizes descriptive naming for horizontal alignments and profiles. Alignments shall be named based on the road name they represent. Individual usernames, 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)

Naming Conventions

NMDOT does not enforce a strict naming convention for alignments in Civil 3D. It is important that each alignment have a descriptive name to easily identify what the alignment represents. Examples of valid alignment names include: NM-64-CL, SR528-EOP-NBND, I40-WB-CL

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.

For an example of style use, click here.

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

Alignment utilizing NMDOT-Exist style

Alignment utilizing NMDOT-Prop style

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.

CL MAINLINE
P.I. = STA. 6+00.12
Δ = 50°28'49" RT.
R = 500.00'
T = 235.71'
L = 440.52'

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.

CL MainLine
N61°30'24"E   364.41'

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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14: 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:

- Definitions

- Naming Conventions

- Symbology

Definitions

Profile & 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.

Structure Sections: A structure section is a cross section view of the roadway showing a profile view of a drainage structure. Not all structure sections are perpendicular to the roadway, as some structures are at a skewed angle.

Cross Sections: A cross section is a view of the existing and proposed roadway cut perpendicular to the roadway geometry. A cross section will display the existing ground as well as any depths of pavement, concrete, or base aggregate.

Sample Lines: Samples lines are civil objects created by Civil 3D to sample civil objects to be viewed in a cross section, or structure section. Cross sections and structure sections cannot be created without the existence of sample lines.

Naming Conventions

Profile & Profile Views: Each profile view and associated profile shall be named using the horizontal geometry name and shall be descriptive of what the object represents.

Structure Sections: Each structure section shall be named using the horizontal geometry name and shall be descriptive of what the object represents.

Cross Sections: Each cross section shall be named using the horizontal geometry name and shall be descriptive of what the object represents.

Sample Lines: Each sample line group shall be named using the horizontal geometry name and shall be descriptive of what the object represents.

Symbology

For an example of style use, click here.
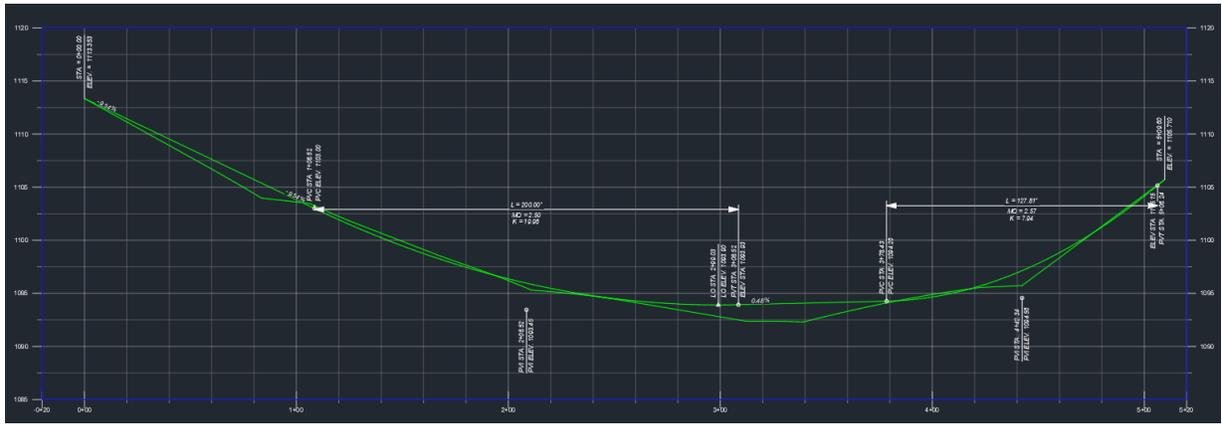
Profile utilizing NMDOT-Exist style
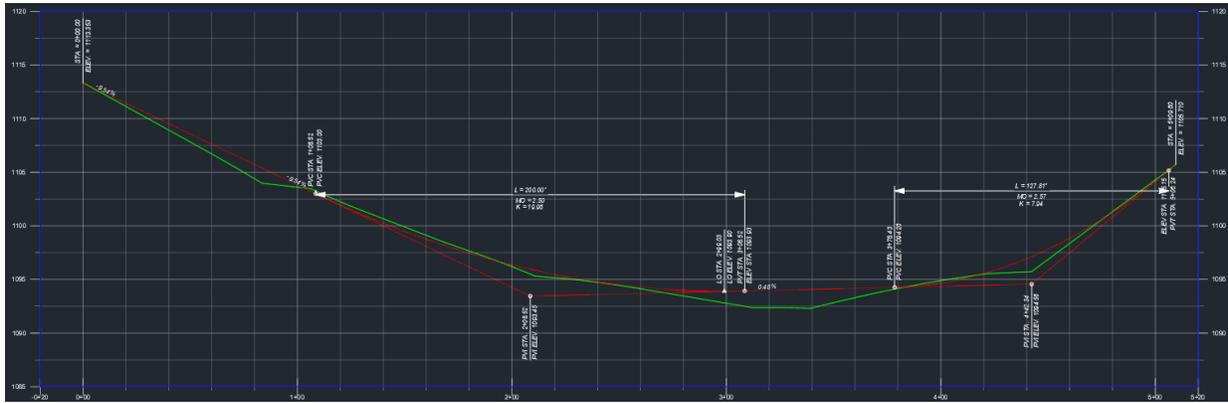
Profile utilizing NMDOT-Prop. Turnoff style
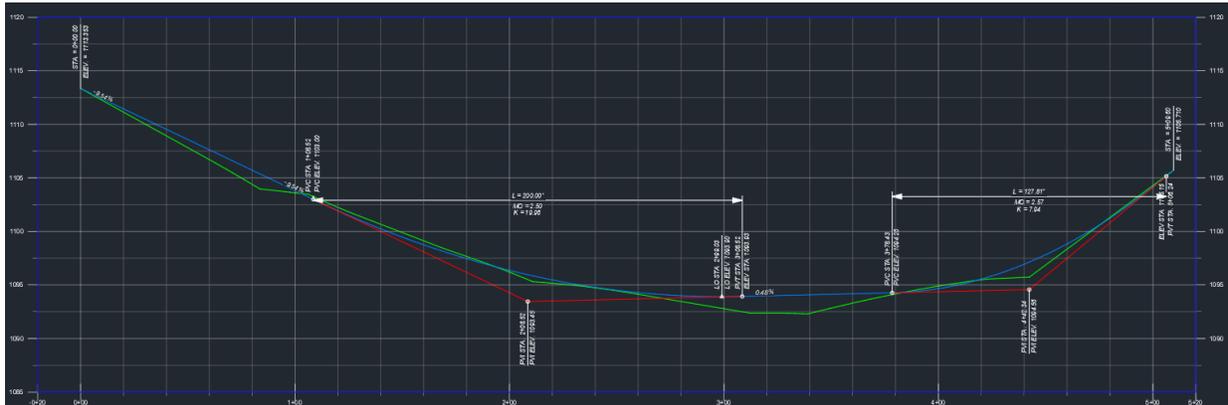
Profile utilizing NMDOT-Prop. style
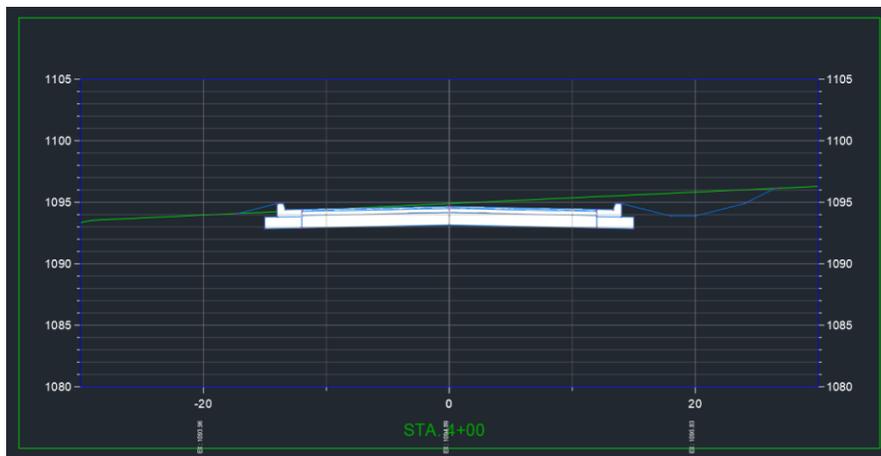
Cross Section utilizing NMDOT-Section View style

15: 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.

Definitions

Naming Conventions

Symbology

Definitions

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** 41 of this document)

Assemblies

Assemblies are cross-sectional components that represent the road to be modeled. Assemblies are built by combining sub-assemblies.

Sub-assemblies

Sub-assemblies represent sections of roadway (e.g., lane pavement, sidewalk, daylight). 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.

Corridor Surfaces

Corridor surfaces are the triangulated points calculated from the corridor processing. Corridor surfaces often represent the finish (top) grade and the bottom (datum) of the proposed design

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

Naming Conventions

Corridors

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, NM138

Corridor Surfaces

All corridors surfaces shall be named according to the surface they represent. The surface name should also include a reference to the corridor they were derived from. Should there be several iterations of the same corridor reflecting varying designs, each shall include a counter following the name.
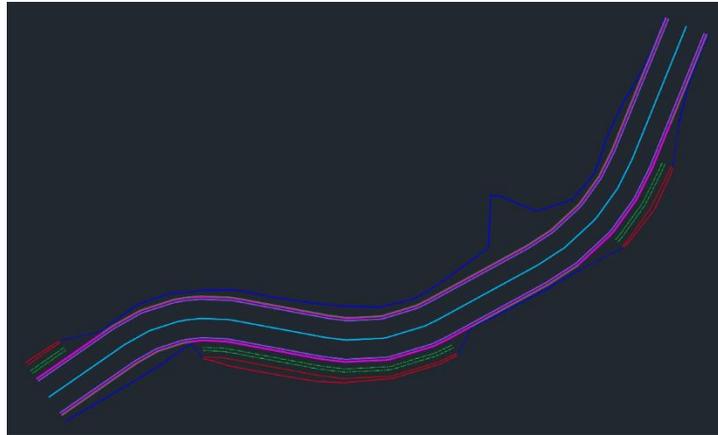
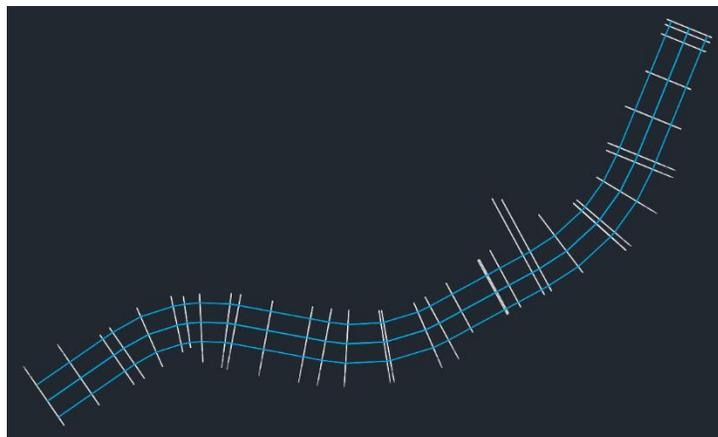**Examples: I25-NB-Top01, NM138-Datum01**

Symbology

For an example of style use, click here.
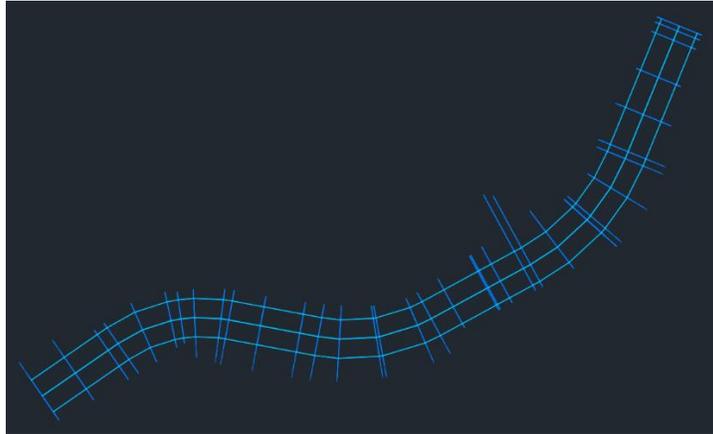
Corridor utilizing NMDOT-Assembly Creation code set style

Corridor utilizing NMDOT-Corridor Creation code set style

Corridor utilizing NMDOT-Cross Section Display code set style

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16: Pipe Networks

Pipe networks in Civil 3D are a true-scale representation of all drainage structures and pipes for any given project. The pipe network is designed in Civil 3D with all standard pipe, and structure, sizes detailed by NMDOT.

Definitions

Naming Conventions

Symbology

Definitions

A pipe network is a civil object within Civil 3D that is defined by a collections of pipe object and structure objects that are associated with each other to represent a pipe system. The purpose of a pipe network in a civil design to ensure the drainage design for the project is sufficient and meets all project expectations and safety protocols, along with client requirements.

Naming Conventions

The naming of pipe networks should be descriptive and contain a reference to the mainline of the project the network is associated with

Example: I25-Pipe01, NM550-Pipe01

Symbology

For an example of style use, click here.

Section

XVII

17: Annotation

Annotation within AutoCAD has brought a greater flexibility and integration than previous versions. This added flexibility allows for AutoCAD shape files and Windows systems fonts to be fully integrated within the design environment. The NMDOT has chosen to utilize Windows system fonts to be fully compatible between applications. Items discussed in this section:

- NMDOT Standard Fonts

- Text Styles

- Text Sizes

- Text Justification

- Special Characters

NMDOT Standard Fonts

The NMDOT has standardized three primary fonts: **Arial** for survey, design, and title text. These font types are accessed from Windows System fonts and are represented below.

Existing Text Style = **Arial**

Proposed Text Style = **Arial (with 20˚ slant) or Arial Bold (with 20˚ slant)**

Arial or Arial Bold with a 20˚ slant will not be used for general notes or tables.

Bold text label styles

Label type	Text height
Match lines	0.10
Station Labels	0.07
Geometry Labels (PI, PC, PT etc…)	0.07
Curve labels	0.07
Bearing and distance tangent labels	0.07

All Autodesk Civil 3D labels will have text mask

Text Styles

NMDOT has established text styles in order to simply standard adherence. It is not recommended to create deviations from the NMDOT Standard Text Sizes

The **Annotation Scale** tool allows for dynamic text sizing with minimal effort. This method allows for the development of sheets with multiple detail scales. The use of the **Annotation Scale** tool makes all text height calculations unnecessary.

The **Annotation Scale** tool determines the multiplication factor to be applied to all text and dimensions. The scale is applied by selecting the desired scale for each view port (see ***Section 6: Layouts***).

	Structural	Civil
General Text	1/16"	.07
Title Text	3/32"	.10

THIS IS 'NMDOT- EXISTING TITLE' TEXT STYLE

THIS IS 'NMDOT-EXISTING' TEXT STYLE
THIS IS 'NMDOT-EXISTING' TEXT STYLE
THIS IS 'NMDOT-PROPOSED' TEXT STYLE
THIS IS 'NMDOT-PROPOSED' TEXT STYLE

An image showing NMDOT-Existing title, NMDOT-Existing, and NMDOT-Proposed text styles

Text Justification

Text justification is described as the "anchor point" for a single text element or multi line text node. This justification is important to set for text placement and alignment. The NMDOT's standard text justification is defined for single text strings to be **Left-Center** and for Multi Line text nodes to be **Top-Left**. This allows all single line text to align from the left and multi-line text such as general notes to align left and start from a Top start point.

The NMDOT's standard title block text justification should be set within a data file as **Center-Center** justification. (See ***Text Fields*** within this section for additional information).

Special Characters

Special characters are symbols used for specific design annotation not found in standard font libraries. These symbols represent annotation such as Centerline, Flow Line, etc.

Symbols can be accessed by right-clicking in the text entry window and selecting the Symbol flyout. From this flyout, any number of symbols can be selected.
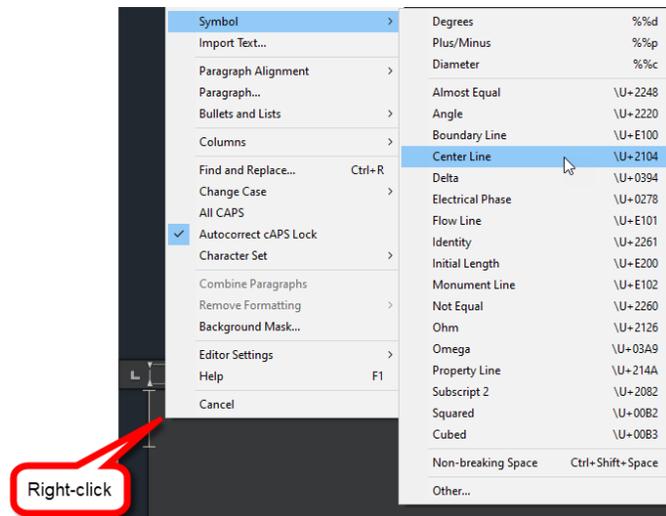
Additional Default Symbols

AutoCAD Civil 3D allows special characters to be accessed and placed with the following AutoCAD %% method. These symbols are placed utilizing the **Arial** font.

%% Method:

%%d = degree symbol

%%p = plus minus

%%c = diameter symbol
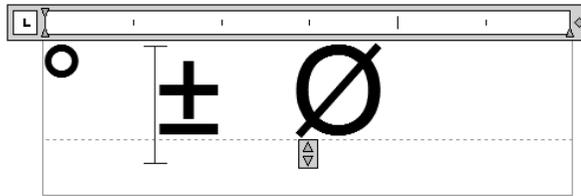
Figure 16.2: Placing symbols in AutoCAD using %% method

Text Fields

Text fields are used within the NMDOT standard title block. These fields are text "place holders" for text to be automatically populated by the desired information from the project .DST file. Fields are used to determine last saved date of a file, as well as the username of the person who printed the file. The NMDOT will continue to expand the use of fields in subsequent CAD standard releases. All defined fields should not be modified for any file being submitted to the NMDOT.

Structural Build Notes

Structural build notes will have 2 columns one for standard drawing and the other for the build note. Standard drawing references will be shown per build note/line.


```
                          <DS - 01>
                          REMOVE EXISTING 1 - 30"X65.07' RCP LT.
                          REMOVE EXISTING 1 - 30"X68.92' RCP RT.
        206-03, 206-07    BUILD 1 - 30"X78' CULVERT PIPE LT. NORMAL
570-02, 511-11, SEE SHEET 2-20   WITH END SECTION, CLASS "A" TYPE I RIP RAP AT OUTSIDE END,  AND 4:1 SLOPE BLANKET
        206-03, 206-07    BUILD 1 - 30"X90' CULVERT PIPE RT. NORMAL
        511-11, 570-02    WITH 4:1 SLOPE BLANKET AT MEDIAN AND END SECTION AT OUTSIDE END
```

Typical Section Labels

Existing Typical sections will be labeled with letters

Proposed Typical Section will be labeled with numbers

Quantities and Schedules Tables

Tables will be created using Microsoft Excel, text height for titles will be 14 and text heights for general text will be 10. Once the spreadsheet have been created it is to be copied, paste special link and scaled by 0.7. all text within the spread sheet will be Arial or Arial Bold, no slant is to be used in table information.

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18: Blocks

The NMDOT provides block libraries for use in all its civil projects. Blocks are utilized in lieu of repeatedly drafting the same elements multiple times. The use of blocks also aids in standardizing elements/details of NMDOT projects. Items discussed in this section:

- Block Libraries

- Block Attributes

NMDOT Block Libraries

Most blocks are drawn at a 1:1 scale, based on the NMDOT drawing units. Some blocks are not to scale to allow for easy identification and plotting. These blocks are mainly utilized for survey mapping.

⒜ Block libraries are AutoCAD drawing files with a .dwg extension. They can be opened in AutoCAD as a standard file and the blocks edited using the block editor tool.

The insertion point of each block is the coordinate 0,0. Every element used to create the block is drawn on the **Default**, or **0**, level, with symbologies set to **ByLayer** except for **Linetype**. The linetype is manually set to Continuous to ensure the cell maintains its appearance regardless of the layer the block is placed.

NMDOT has developed the following libraries to be used in its civil designs whether created internally or by a consultant:

AutoCAD Block Library	Description
BridgeBlocks.dwg	Schedules, details, and symbols used in bridge plan sheets
Coming Soon	Blocks used in the creation of NPDES sheets
Coming Soon	Roadway features, details, and cross section and profile blocks
Coming Soon	Used for CAD mapping with the NMDOT feature table
Coming Soon	Includes North arrow, information block for border, bar scales, and utilities legend
Coming Soon	Signing and traffic control blocks. Used to supplement GuidSIGN cell libraries

Table 18.1: Block libraries

Block Attributes

Any custom blocks are to be drafted using ByLayer symbologies for color and thickness. Linetypes must remain either continuous or 0.

19: Dimensioning

The NMDOT has developed dimensioning standards for all internal design departments and consultants to follow. These dimensioning standards follow a simple methodology of settings as referenced in the following section. Items discussed in this section:

- Geometry & Symbology

- Units

- Text

Geometry & Symbology

NMDOT has two distinct dimension styles: Existing and Proposed. The main difference between the two styles is the text used. The Proposed style utilizes Arial Italic and the Existing style utilizes Arial.

For an example of style use, click here.
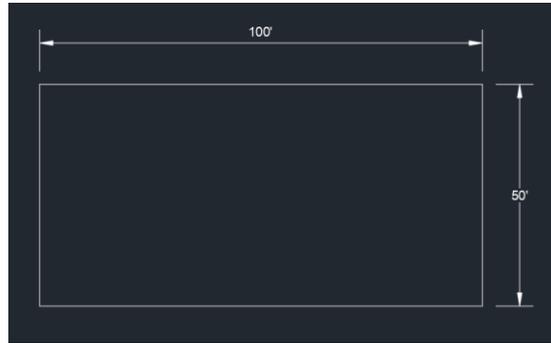
Dimensions utilizing NMDOT-Existing dimension style

Dimensions utilizing NMDOT-Proposed dimension style

An image showing all NMDOT multileader styles

20: Plotting

New Mexico Department of Transportation has provided plotting resource files for use in all NMDOT projects. These files allow the plotting from AutoCAD to the standard PDF format. NMDOT has provided plotting resource files to enable its consultants and employees to provide standardized hard copies of the project plan sets. Items discussed in this section:

        NMDOT Plotting Standards

        AutoCAD STB Files

NMDOT Plotting Standards

All plotting resource files can be obtained by visiting the NMDOT website or calling the Engineering Automation Bureau. These files include print drivers which control the printing of color, gray-scale, and .pdf prints; and pen tables which control gray-scaling of existing features, priority, and text substitutions. Unless specifically stated in consultant contracts or requested by Internal Design, NMDOT standard print size is based on "11x17" paper. All borders are drawn to scale (see **Section 5**) based on "11x17."

AutoCAD STB files

NMDOT has determined AutoCAD plotting will use a named plot style table. Named plot style tables are files with an extension of .stb. STB files allow for lineweights to be determined either by layer or element, and not the color of the item. The NMDOT STB file has several values entered based on gray scaling (see **Section 9**) printing.
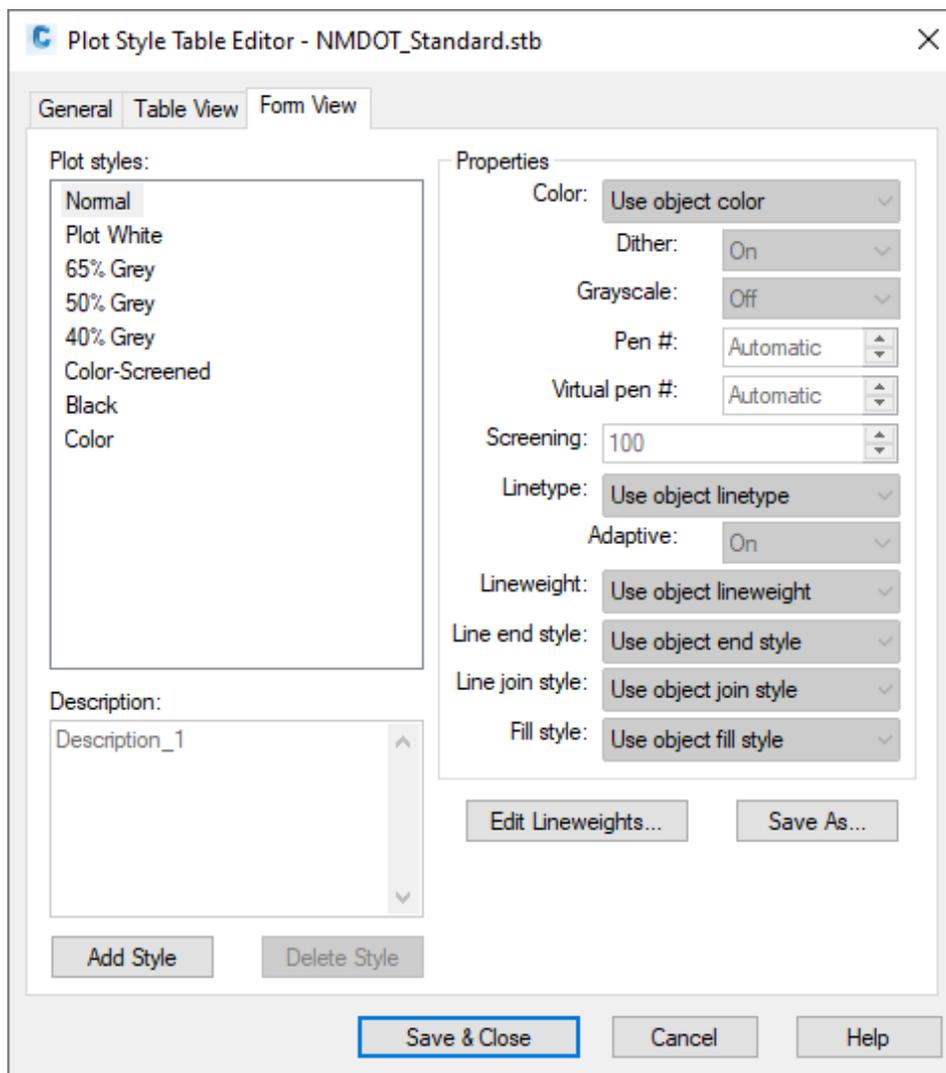
Figure 20.1: NMDOT_Standard STB settings

The selection of the STB is done in the print dialog or in the page setup manager.
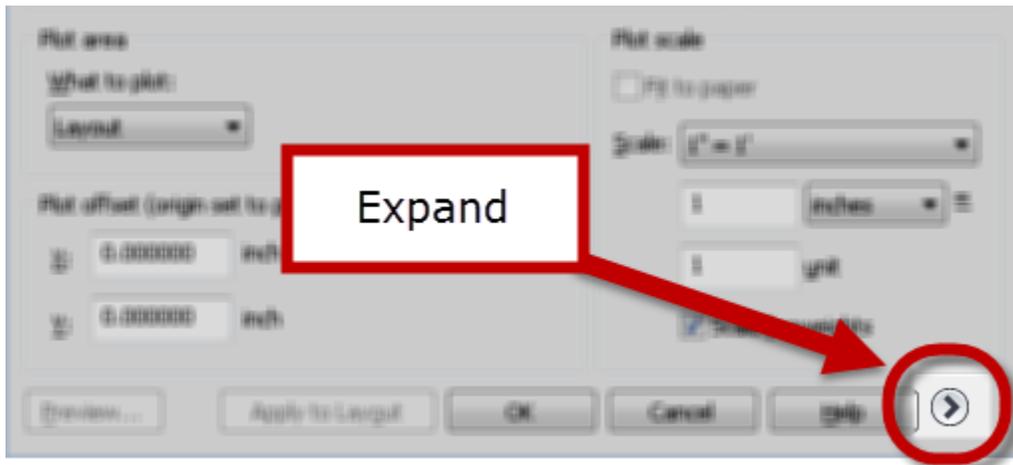
Figure 20.2: Select STB via print dialog
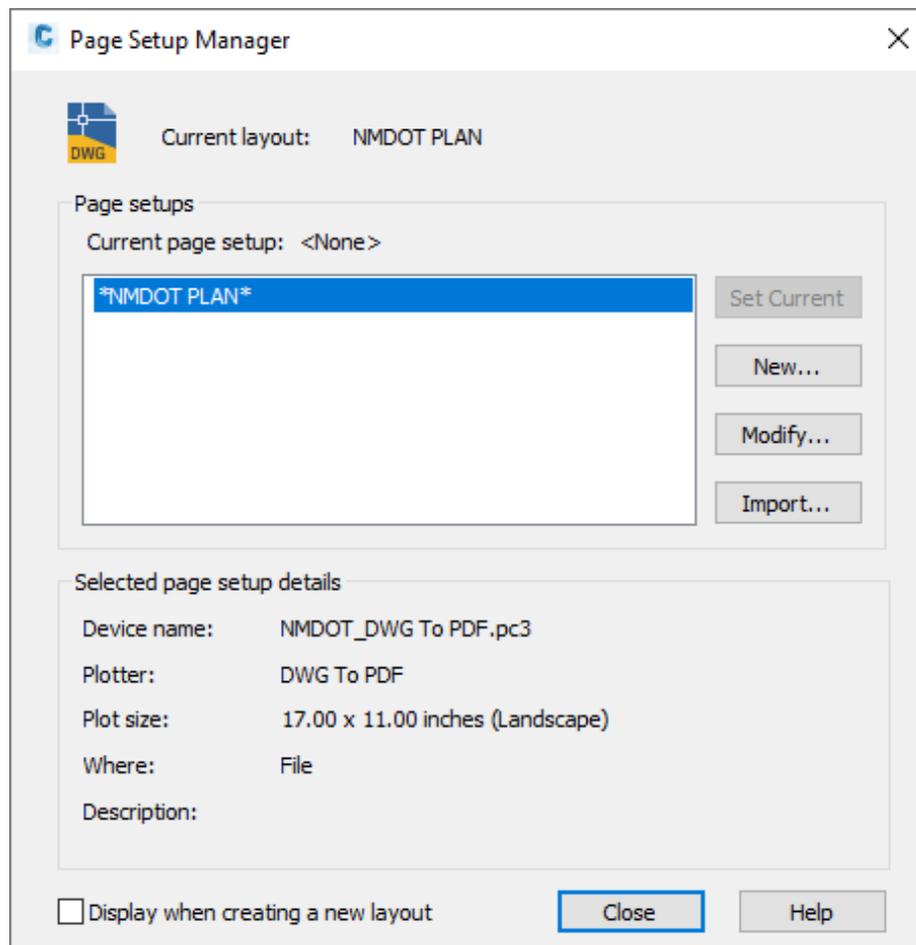
Figure 20.3: Page Setup Manager

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21: Acceptable Delivery Formats

The NMDOT has developed CADD Standards files for internal and consultant use. For the NMDOT design departments to complete projects initiated by the consultant community, it is necessary to specify the required deliverable expected by the NMDOT. Given the impact that the design environment brings to both internal and consultant design projects, this specification is critical to the accuracy and digital compatibility between parties. This section will briefly outline the requirements of the NMDOT for all CADD deliverables. Items discussed in this section:

- .DWG formats

- Packaging

.DWG formats

NMDOT will only accept project deliveries in native DWG format. Translations are not acceptable, and the project data will be returned to the submitting consultant for correction. NMDOT will accept the following versions of files from consultants:

	AutoCAD/Civil 3D
Version	2021
File Extension	.DWG

Table 20.1: Acceptable file formats

Packaging

NMDOT will accept CD/DVD's containing project data in an uncompressed format. All submitted project data should be delivered to the Engineering Automation Bureau for analysis and should not be submitted to project engineers or design technicians.

All project data should be in the standard NMDOT project directory structure. All blank folders can be deleted prior to placing data on the CD/DVD. All non-CAD files should not be moved from the original directory to avoid breaking any dynamic linking with other files, including CAD files.

The use of the Autodesk AutoCAD Civil 3D electronic submittal is preferred. This tool is in the **application pulldown>Publish>eTransmit**.
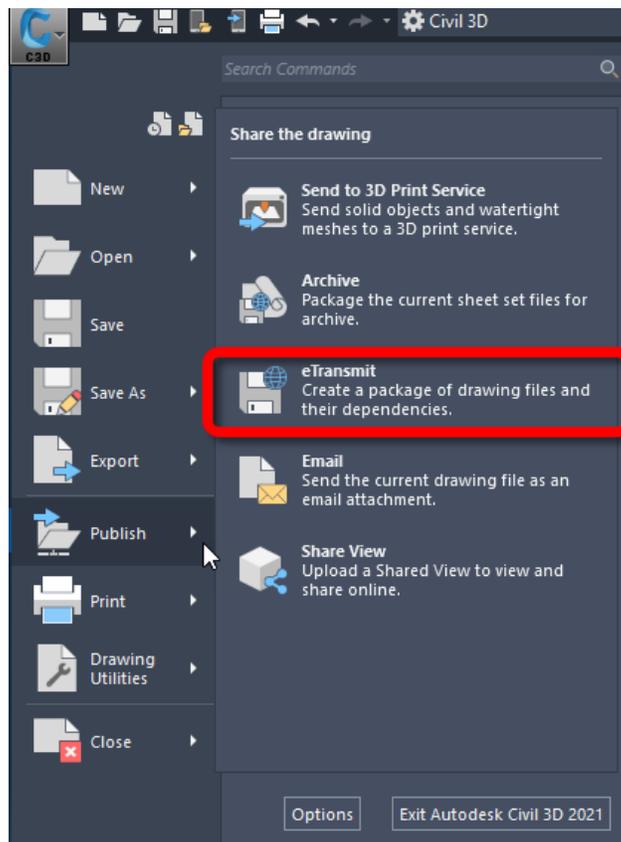
Preparing Files

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:

A AUDIT

- o FIX ALL ERRORS FOUND

A -WBLOCK

- o 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.
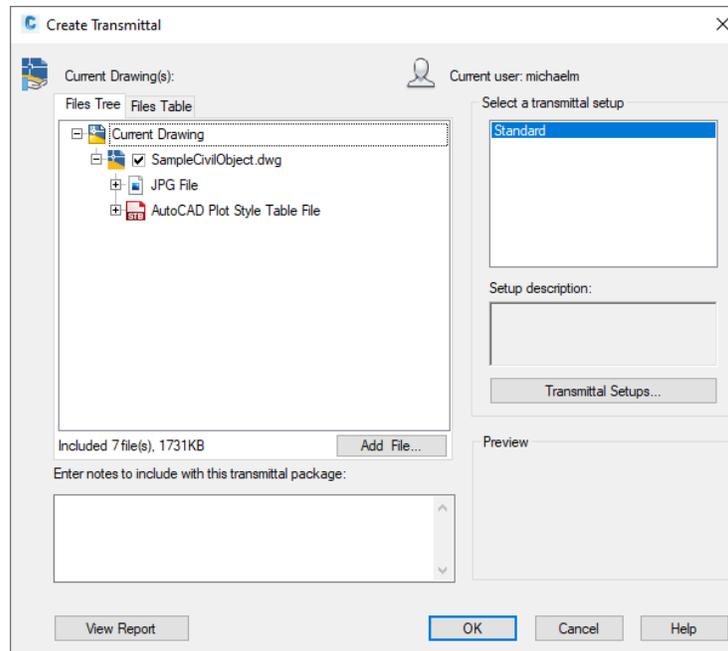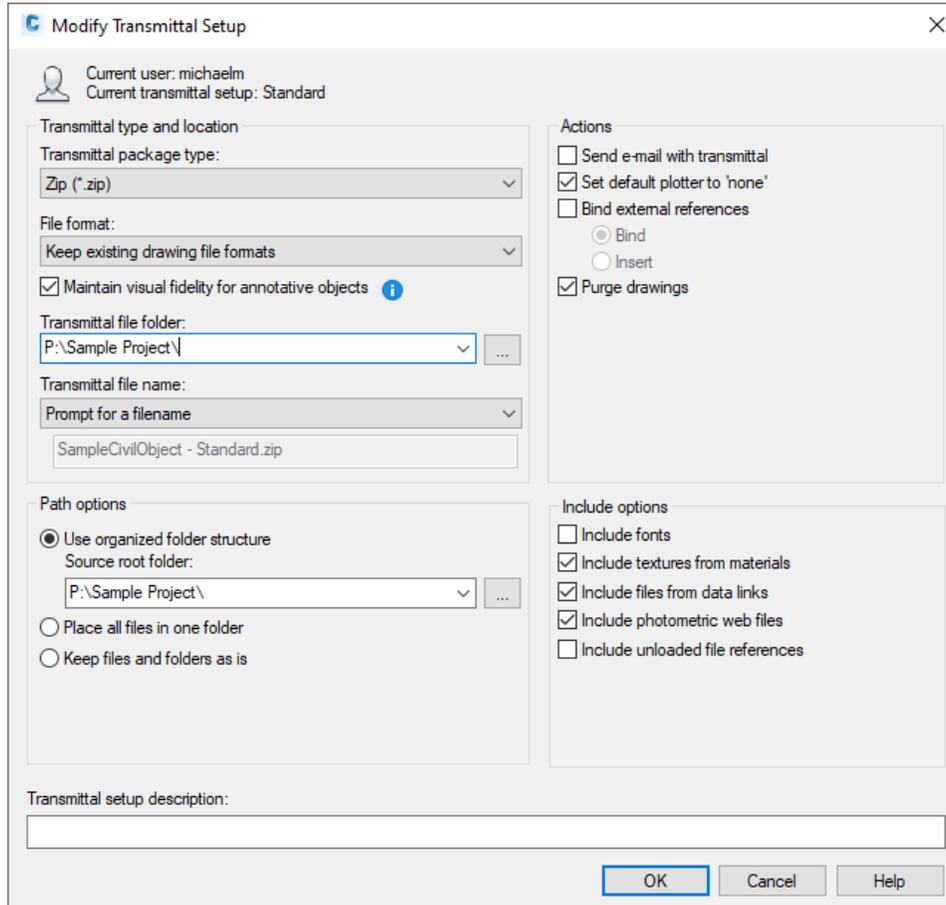
Options

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:

A Set default plotter to 'none'

A 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

22: NMDOT Consultant Workspace

The New Mexico Department of Transportation's (NMDOT) corporate workspace offers NMDOT the opportunity to globally control the CAD environment while retaining necessary levels of personalized, departmental, and project specific settings. This environment gives management the tools to assist NMDOT's designers and draftsmen by developing an easy to use environment which also controls accurate project settings within the CAD interface. Items discussed in this section.

Consultant Deliverable Workspace

Consultant Deliverable Workspace

The NMDOT has developed consultant workspaces for AutoCAD Civil 3D to be used by consulting firms producing design projects for the NMDOT. These workspaces are self-contained and "invokes" all necessary NMDOT CADD Standard Files for respective projects. These workspaces are "fully contained," having the same functionality as the internal NMDOT CADD environment and is similar in operability. The NMDOT workspaces can be downloaded from the NMDOT CADD Standards website. A readme.txt file is included within each download to aid consulting firms in the use of NMDOT workspaces.

23: Georeferenced Imaging

New Mexico Department of Transportation has utilized raster images for several years. All images were geo-referenced with the information in a header embedded in the image itself. Raster imaging has undergone tremendous amounts of advances in recent years. Along with these advances, several image formats have become widely accepted in the civil engineering field. The NMDOT standard for raster imagery is the focus of this section. Items discussed in this section:

Imaging Standard

Compression

Imaging Standard

The NMDOT has begun to integrate Geographic Information Systems (GIS) technology in the design process. This has led to many changes to the method in which projects are created and delivered. The workflow for the creation of Geo-referenced images remains consistent with only the delivered file format changing.

The NMDOT has set the standard for raster images as a Georeferenced Tiff (GeoTiff) file. The GeoTiff file has become the new standard for raster imaging due to the compatibility with ARC GIS software. All GeoTiffs will be delivered with the accompanying world file, projected in the New Mexico State Plane Coordinate System and NAD 83.

NMDOT will also accept GeoTiffs including .JPG compression with all GeoReferencing in the header of the image. The basis for .JPG files must be a GeoTiff with a world file to be accepted as a final deliverable for any photogrammetric contracts.

Compression

The NMDOT has determined a critical need for image compression on all aerial photos submitted to the NMDOT. The .jpg compression is an industry standard for compressing orthos and has been adopted by the NMDOT. Any other types of compression will be rejected at the consultant's expense.

Index

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