CONNECTICUT DEPARTMENT OF TRANSPORTATION

DIGITAL DESIGN ENVIRONMENT GUIDE

CONNECT EDITION

Volume 16 - Appendix

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VOLUME 16 - Appendix

Appendix 1 - Configuration and WorkSets

The Digital Design Environment is maintained by CTDOT's AEC Applications office and consists of two major entities:

- **Configuration** (Agency standards/WorkSpace folders)
- **Projects** (WorkSet folders)

These two entities and their constituent files, along with the required CONNECT Edition software, provide the resources required to develop designs and contract plans in compliance with CTDOT standards.

In MicroStation V8i and previous versions, the term "WorkSpace" referred to the usage of configuration files and variables. In OpenRoads Designer, OpenBridge Modeler and OpenBuildings Designer CONNECT Edition products, they are now referred to as the **configuration**. At CTDOT we refer to the combination of the **WorkSpace** (design standards) and the **WorkSet** (project folders) as the **Digital Design Environment (DDE)**. The DDE uses configuration files (*.cfg) to combine resources like DGNLibs, Cell Libraries, *.rsc files and *.dgn files, providing a WorkSet-based CAD environment.

CTDOT uses Bentley OpenX products alongside the COMPASS SharePoint project management platform for our consultants and internal users. Syncing is required to be able to access the CAD Configuration and Projects in SharePoint. Volume 1 of the DDE outlines the syncing procedures.

Consultants can also download the DDE and manually install it by following the directions in Volume 1. ProjectWise Explorer and Managed Workspaces are not supported by the CTDOT DDE.

The main purpose of this section is to describe the function of the **configuration** in the CTDOT's DDE. This the CT_Configuration folder is in a shared location, in the CTDOT DDE, there are several levels of configurations for each product.

1.1 Configurations

The main purpose of this section is to describe the function of the **configuration** in the CTDOT's DDE. This the CT_Configuration folder is in a shared location, in the CTDOT DDE, there are several levels of configurations for each product.

Within \CT_Configuration\, there are several levels of configurations for each Bentley product.

Levels of Configurations

OpenRoads Designer Uses: Organization Organization-BIM_CT_Civil Standards WorkSpaces\CT_WorkSpace Roles	**OpenBuldings Designer Uses:** Organization Organization-BIM_CT_Building Standards CT_OpenBuildingsDesigner_Dataset WorkSpaces\CT_WorkSpace Roles
OpenBridge Modeler Uses: Organization Organization-BIM_CT_Civil Standards Organization-BIM_CT_Bridge Standards WorkSpaces\ CT_WorkSpace Roles	**OpenRail Designer Uses:** Organization Organization-BIM_CT_Civil Standards Organization-BIM_CT_Rail Standards WorkSpaces\CT_WorkSpace Roles

1.1.1 Organization

Organization houses files needed by all products.

Cell Libraries Sheet Borders 2D Cells	**Seed Files** Discipline Seeds Title Sheet Cover Sheets User Preference Seeds	**DGNLIBs** CTDOT Custom Ribbon Tools Element Templates Levels Text Styles Dimension Styles Print Styles Dimension Styles Item Types Text Favorites Reports
Scales Definitions Unit Scale Sheet Sizes	**Resource Files** Line Styles Font Color Tables	**Misc.** Pen Tables Marcos VBAs Plot Configuration files Master Pay item Database

1.1.2 Organization-BIM

Organization-BIM_CT_Civil Standards
folders house files needed to run OpenRoads, OpenRail and OpenBridge.

Cell Libraries	**Misc.**	**DGNLIBs**	
2D	Superelevation	Civil Cells	Sheet Seeds
3D Cells	Sight Visibility	Color Books	Civil Labeler
Template Libraries	Widening	Design Standards	Element Templates
Roadway	Macros	Display Styles	Levels
Site	Materials	Feature Definitions	Text Styles
Rail		Graphical Filters	Dimension Styles
			Text Favorites

Organization-BIM_CT_Bridge Standards folders house files needed to run OpenBridge.

Misc.	**DGNLIBs**
Bridge Templates	Feature Definitions
Prostructures	Sheet Seeds
Dynamic View Settings.	Element Templates
Cells	Levels
	Text Styles
	Dimension Styles

Organization-BIM_CT_Building Standards folders house files needed to run OpenBuildings.

Misc.	**DGNLIBs**
Auto Fitting Options xml	Managers
WorkSet Shapes xml	Display Styles
Prostructures	

1.1.3 OpenBuildings Designer Dataset

CT_OpenBuildingsDesigner_Dataset is only used by OpenBuildings Designer, it's a modified version of the delivered Dataset "C:\ProgramData\Bentley\OpenBuildings CONNECT Edition\Configuration\Datasets".

One Workspace "**CT_WorkSpace**" is used for all products. There is nothing stored in this location as it is just needed because of how the CONNECT Products are configured by Bentley.

1.1.4 Roles

Roles are used to enable each discipline to have their specific Seed files configured and active when creating new files. Roles are also used to set the OpenRoads Template Library location for each discipline.

Discipline	Seed File Directory	Template Library Project_Typicals.itl
Bridge.cfg	…\OrganizationSeed\Bridge\	…\Design\Bridge\Eng_Data\
Environmental.cfg	…\OrganizationSeed\Road\	…\Design\Envir\Eng_Data\
Facilities_Arch.cfg	…\OrganizationSeed\Buildings\	N/A
Facilities_Civil.cfg	…\OrganizationSeed\Road\	…\Design\F_Civil\Eng_Data\
Facilities_Electrical.cfg	…\OrganizationSeed\Buildings\	N/A
Facilities_Mechanical.cfg	…\OrganizationSeed\Buildings\	N/A
Facilities_Structures.cfg	…\OrganizationSeed\Buildings\	N/A
Geotech.cfg	…\OrganizationSeed\Road\	…\Design\Geotech\Eng_Data\
Highways.cfg	…\OrganizationSeed\Road\	…\Design\Highways\Eng_Data\
Hwy_Management.cfg	…\OrganizationSeed\Road\	…\Design\Hwy_Man\Eng_Data\
Hwy_Opperations.cfg	…\OrganizationSeed\Road\	…\Design\Hwy_Ops\Eng_Data\
Hydraulics.cfg	…\OrganizationSeed\Road\	…\Design\Hydro\Eng_Data\
Illumination.cfg	…\OrganizationSeed\Road\	…\Design\Illumination\Eng_Data\
Landscape.cfg	…\OrganizationSeed\Road\	…\Design\Landscape\Eng_Data\
Pavement.cfg	…\OrganizationSeed\Road\	…\Design\Pavement\
Property_Maps.cfg	…\OrganizationSeed\PMap\	N/A
Public_Transportation.cfg	…\OrganizationSeed\Road\	…\Design\Public_Trans\Eng_Data\
Railroad_Catenary.cfg	…\OrganizationSeed\Rail\	…\Design\R_Catenary\Eng_Data\
Railroad_Signals.cfg	…\OrganizationSeed\Rail\	…\Design\R_Signals\Eng_Data\
Railroad_Track.cfg	…\OrganizationSeed\Rail\	…\Design\R_Track\Eng_Data\
Survey.cfg	…\OrganizationSeed\Survey\	…\Design\SVY_Central\
Survey_Central.cfg	…\OrganizationSeed\Survey\	…\Design\SVY_Central\
Survey_Consultant.cfg	…\OrganizationSeed\Survey\	…\Design\SVY_Consultant\
Survey_District.cfg	…\OrganizationSeed\Survey\	…\Design\SVY_District\
Traffic.cfg	…\OrganizationSeed\Road\	…\Design\Traffic\Eng_Data\

1.2 WorkSets

Much like the configuration folders, WorkSet (project) folders will be set up in a shared directory. A standard WorkSet template will be used for any new projects created.

When a project is created, the engineering discipline subfolders in the project directory are initially empty. As project data develops, the folders are populated with DGN files, spreadsheets, databases, email correspondence and other documents. Each engineering discipline has a file naming convention for project work in their respective subfolder. The discipline-specific naming conventions will be discussed in Appendix C: File Naming Conventions.

1.2.1 WorkSet Locations

Worksets (project container/folders) are located in the following locations:

- Internal CTDOT staff and consultants syncing SharePoint/COMPASS - WorkSets are configured to a SharePoint/COMPASS Project Site under the Design folder
- Consultant Engineers with a manual install - Each consultant will maintain the location of their own WorkSets, starting from a project template delivered with the DDE for Consultant engineers. Consultants will copy this template to create CTDOT WorkSets (projects)

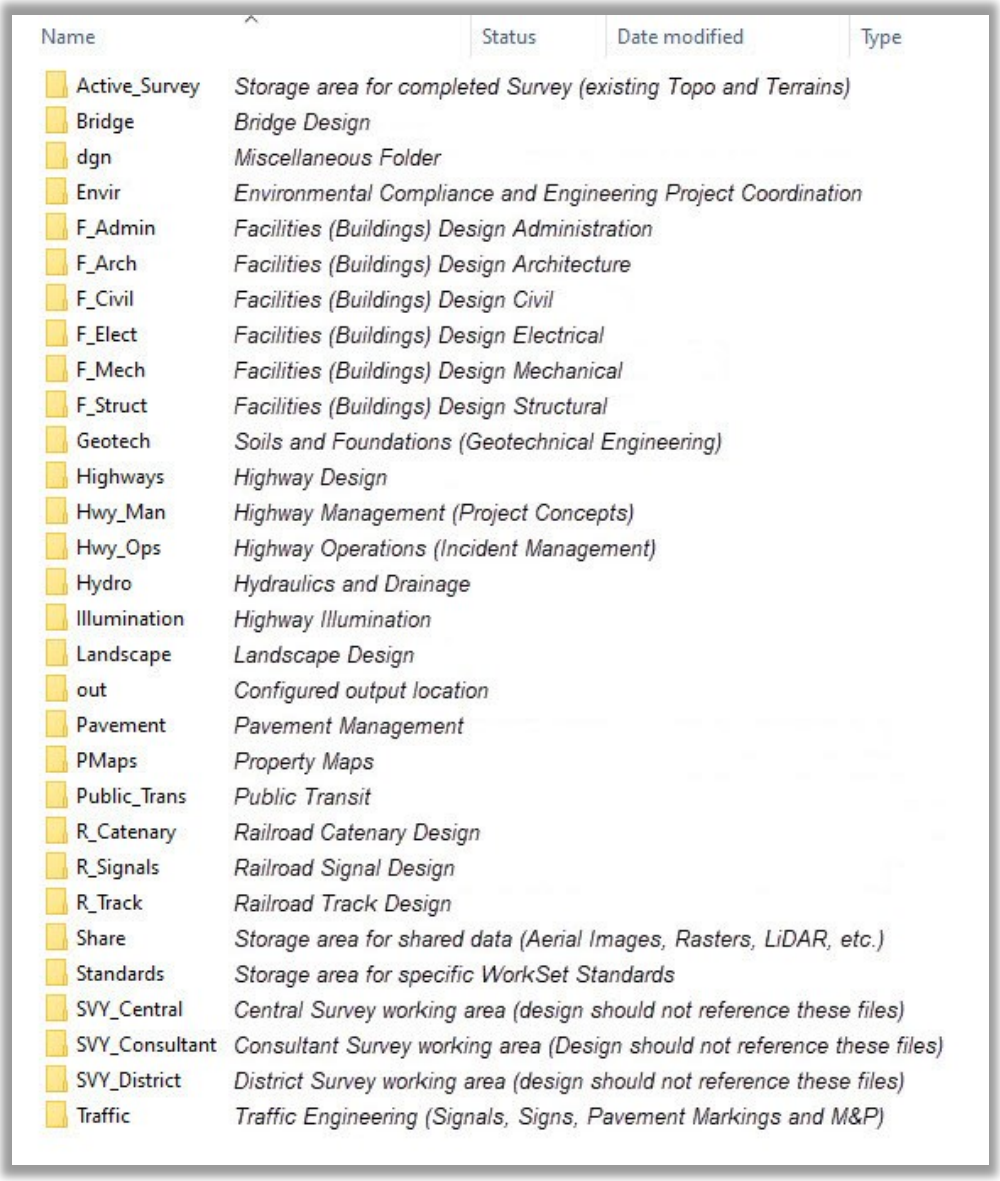
1.2.2 WorkSet Purposes

A WorkSet is used to house the files for each individual CTDOT design project, serving the following purposes:

- Project CAD file storage
- Project documentation storage
- Project-specific CAD standards and design data

1.2.3 WorkSet Folders

- All CTDOT projects use a standard folder structure for the WorkSet.
- Designers will reference the Survey information in the **\Active Survey\ folder**. Please coordinate with the Survey unit if changes need to be made to these files.
- New folders can only be created at the bottom level under each discipline folder.
- The following folders reside at the top level of CTDOT's Project Container/WorkSet and are available for use:



Name	Status	Date modified	Type
Active_Survey	*Storage area for completed Survey (existing Topo and Terrains)*		
Bridge	*Bridge Design*		
dgn	*Miscellaneous Folder*		
Envir	*Environmental Compliance and Engineering Project Coordination*		
F_Admin	*Facilities (Buildings) Design Administration*		
F_Arch	*Facilities (Buildings) Design Architecture*		
F_Civil	*Facilities (Buildings) Design Civil*		
F_Elect	*Facilities (Buildings) Design Electrical*		
F_Mech	*Facilities (Buildings) Design Mechanical*		
F_Struct	*Facilities (Buildings) Design Structural*		
Geotech	*Soils and Foundations (Geotechnical Engineering)*		
Highways	*Highway Design*		
Hwy_Man	*Highway Management (Project Concepts)*		
Hwy_Ops	*Highway Operations (Incident Management)*		
Hydro	*Hydraulics and Drainage*		
Illumination	*Highway Illumination*		
Landscape	*Landscape Design*		
out	*Configured output location*		
Pavement	*Pavement Management*		
PMaps	*Property Maps*		
Public_Trans	*Public Transit*		
R_Catenary	*Railroad Catenary Design*		
R_Signals	*Railroad Signal Design*		
R_Track	*Railroad Track Design*		
Share	*Storage area for shared data (Aerial Images, Rasters, LiDAR, etc.)*		
Standards	*Storage area for specific WorkSet Standards*		
SVY_Central	*Central Survey working area (design should not reference these files)*		
SVY_Consultant	*Consultant Survey working area (Design should not reference these files)*		
SVY_District	*District Survey working area (design should not reference these files)*		
Traffic	*Traffic Engineering (Signals, Signs, Pavement Markings and M&P)*		

Figure 1 Project (WorkSet) Folders

1.2.4 Best Practices for Folder and File Naming

To avoid down time and minimize support requests please note the following:

- Windows file systems have a max character limit of 255 for path, including folder names, file name and the extension. While users are not locked from creating additional folders, excessive folder nesting and long names should be avoided. A given file or folder should not exceed 128 characters. Users will run into a multitude of issues if this is not adhered to. If the character limit is exceeded, CAD will not function properly.
- All design and contract production data should be placed in the discipline subfolders. **File Naming Conventions** for *.dgn CAD files can be found in APPENDIX 4.

1.2.5 WokrSet Creation

SharePoint/COMPASS

WorkSet Creation for CTDOT Employees and Consultants syncing SharePoint/COMPASS
Will use this form to request a SharePoint/COMPASS project site CAD WorkSet configuration.

New CAD WorkSet Request

AEC Applications will:

Set the configurations on the SharePoint/COMPASS project site
Integrate the project's contract sheet title block

Manual installs

Consultant Engineers with a manual install will maintain the location of their own WorkSets; a project template is delivered with the DDE for Consultant engineers. Consultants will copy this template to create CTDOT WorkSets.

Appendix 2 - Seed Files

A seed file is a template *.dgn file that comes preconfigured with CAD standards ahead of time. When a user creates a new file, the application makes a copy of the seed file, puts it in the desired folder and renames the file.

2.1 Settings

Seed files are used to standardize all new designs so every newly created *.dgn will have the same working units, color table, views, etc. as the seed file.

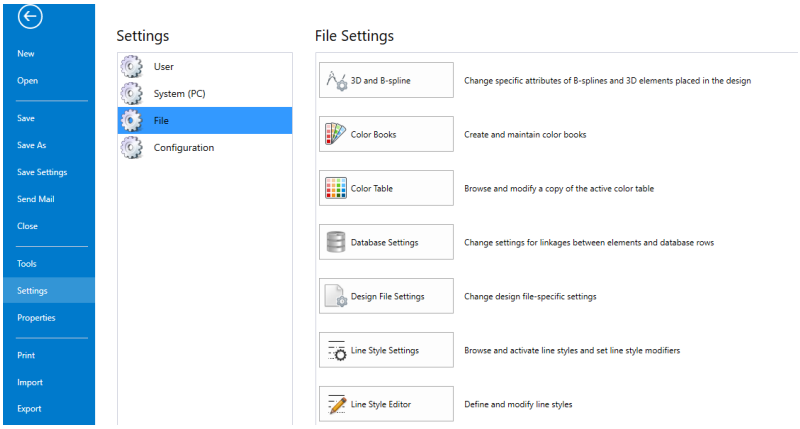


Figure 2 File Settings

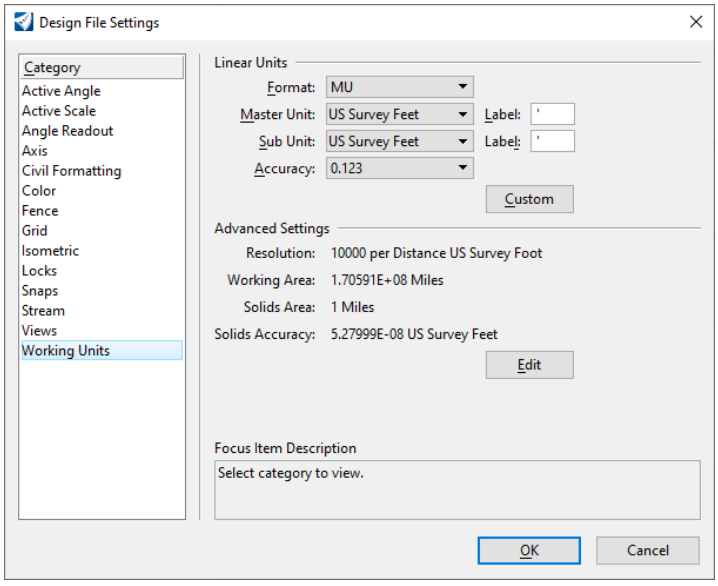


Figure 3 Design File Settings

Each application (OpenRoads, OpenBridge, OpenRail, and OpenBridge) has its own set of seed files used for creating *.dgn files. More information on types of models and usage can be found in subsequent volumes.

2.2 Seed File Locations

All seed files are located in this directory: ***...CT_Configuration|Organization|Seed|***

Discipline Seed files are located in the Subfolders and are assigned by your selected role (Discipline Name)

OpenRoads Designer:

...CT_Configuration|Organization|Seed|Road

...CT_Configuration|Organization|Seed|Rail

...CT_Configuration|Organization|Seed|Survey

There are seed files in both 2D and 3D, and each has its own purpose. While Highway Design should start from a 2D seed file, Survey will use a 3D one to create the existing terrain. For designers, the work that is done on the 2D model will create a 3D view automatically. Designers will create a proposed design in 2D, with the added capability to view their work in a 3D space for model checking and visualization.

–OpenBridge Modeler:

...CT_Configuration|Organization|Seed|Bridge

–OpenBuildings Designer:

...CT_Configuration|Organization|Seed|Buildings

-Additional Seed Files

Title Sheet Seed file

...CT_Configuration|Organization|Seed|CTDOT_Title_Sheet_Seed.dgn

Cover Sheet Seed files

...CT_Configuration|Organization|Seed|CTDOT_State_Cover_Sheet_Seed.dgn

...CT_Configuration|Organization|Seed|CTDOT_Consultant_Cover_Sheet_Seed.dgn

Geographic Coordinate System from file seeds

...CT_Configuration|Organization|Seed|GCS

2.3 Geographic Coordinate System

OpenRoads Designer OpenRail Designer, and OpenBridge Modeler seed files have been assigned a default Geographic Coordinate System (GCS) of NAD 1983 State Plane Connecticut with a North American Vertical Datum of 1988 to allow interaction with geospatial applications. For more on GSC, please see Volume 2. This GCS has been applied to each view as an Auxiliary Coordinate System (ACS):

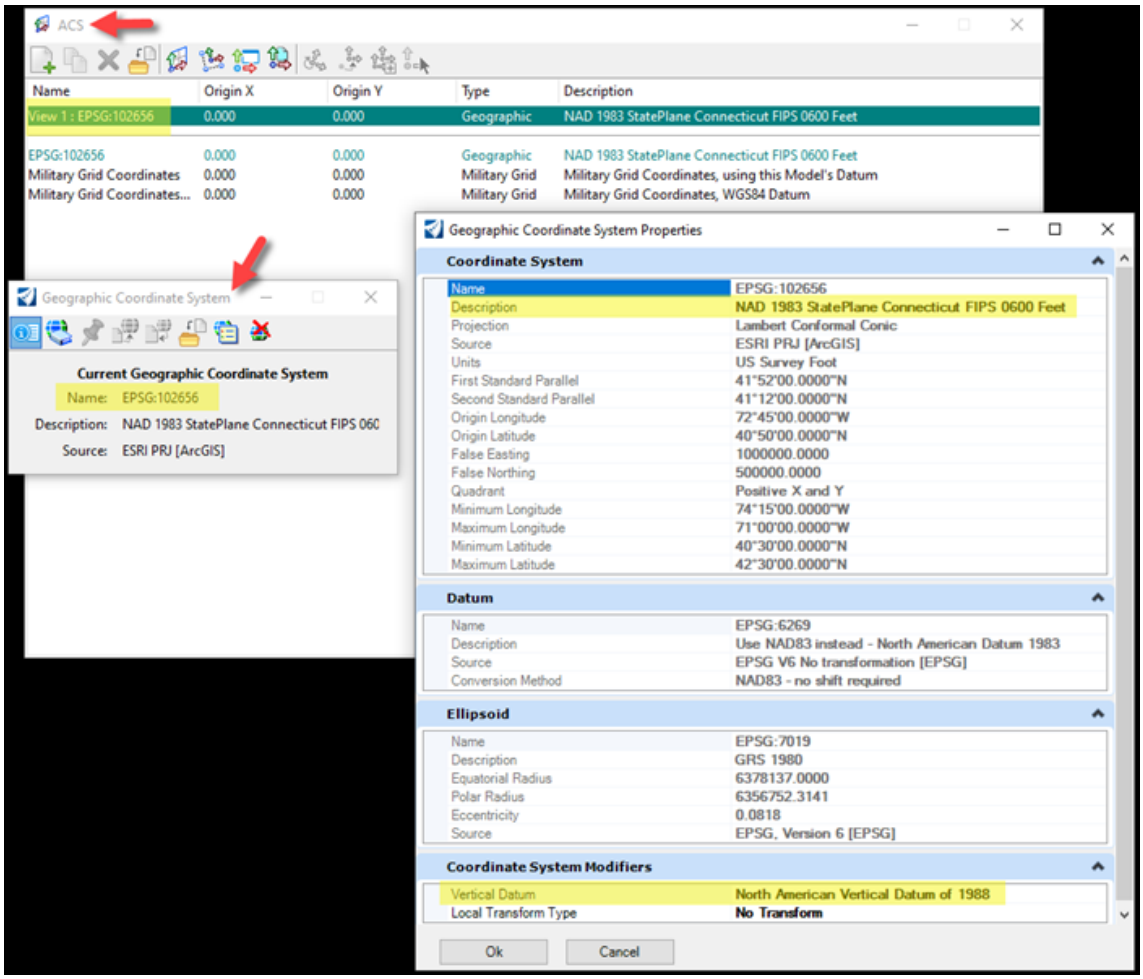


Figure 4 Geographic Coordinate System (GCS)

Appendix 3 - CAD Standards

3.1 DGN Libraries

3.1.1 Levels

Standard levels have been created in the CTDOT CONNECT DDE. To create a consistent and professional set of dgn files it is imperative that users create all dgn elements on their proper level. If a level or Element Template is needed that is not currently available, please contact the AEC Applications CAD Support Staff with your recommendation to have it added.

Over the years level naming has changed as the software has advanced. In older versions, levels were Numbers and users were limited to 63. With the release of V8 users were given the opportunity to have as many levels as we wanted and could name them at our own discretion. In the V8 DDE CTDOT came up with a naming convention using Discipline Designators, many proposed levels such as Pipes, Pavement Striping, Sidewalks, Right of way line etc… were found in multiple disciplines. With the CONNECT release we have decided to simplify the level structure and make them more user friendly. For example, the discipline designators are gone, and the level is either Existing or Proposed. The level **Name** is short but descriptive enough to know what it is while the level **Description** is longer and gives the full name. The Description is what CTDOT has set to come through to the PDFs.

 Old V8 Pavement Striping Levels**:**

	Level "NAME"	**Level "DESCRIPTION"**
Existing Levels	*Survey* SV_TRAF_PVMTL	Traffic: pavement line work (solid lines and broken lines, xwalk, stop bar)
Proposed Levels	*Traffic* TR_PVMT_MKGS_WEIGHT_0 TR_PVMT_MKGS_WEIGHT_2 TR_PVMT_MKGS_WEIGHT_4 TR_PVMT_MKGS_WEIGHT_5 *Highway Traffic* HT-TRAF-PAVT 1 HT-TRAF-PAVT 2 HT-TRAF-PAVT 3	 Pavement Marking: Weight 0 Pavement Marking: Weight 2 - shoulder lines, skips Pavement Marking: Weight 4 Doublel wide Pavement Marking: Weight 5 - Stop bars Traffic: pavement markings 1 Traffic: pavement markings 2 Traffic: pavement markings 3

OpenRoads Designer CONNECT Edition Pavement Striping Levels:

	Level "NAME"	***Level "DESCRIPTION"***
Existing Level	E_PAVM_Striping	Existing Pavement Marking: Line Striping
Proposed Level	PAVM_Striping	Pavement Marking: Line striping

3.1.2 Element Templates

It is important to know that not all elements get placed using "by level" attributes as Colors, Lines Styles and Weights can also be set in the Element Template. The Pavement Striping Level has all striping on one level regardless of the required attributes. The Element Template determines the weight, color and line style that will be used. Other examples of Element Templates setting the attributes include but are not limited to Right of Way lines, Cut and Fill Lines, and Fencing.

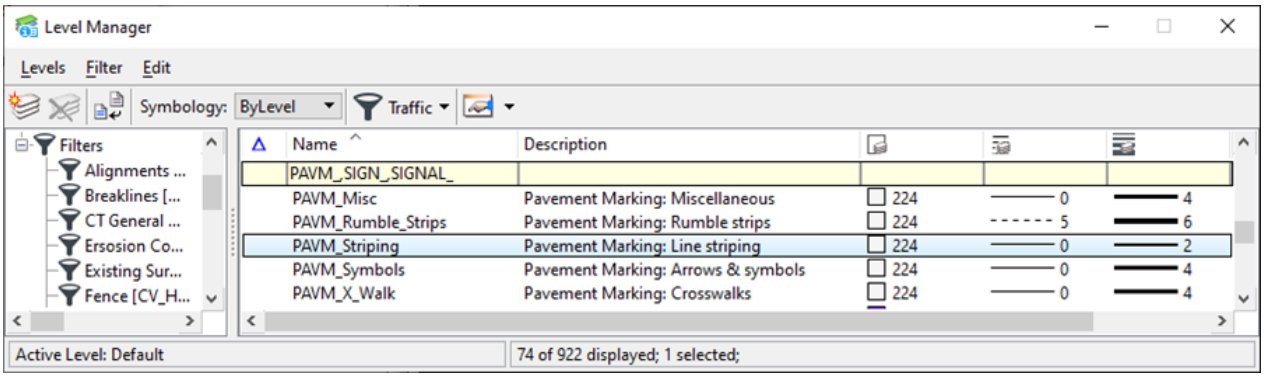


Figure 5 Level Manager

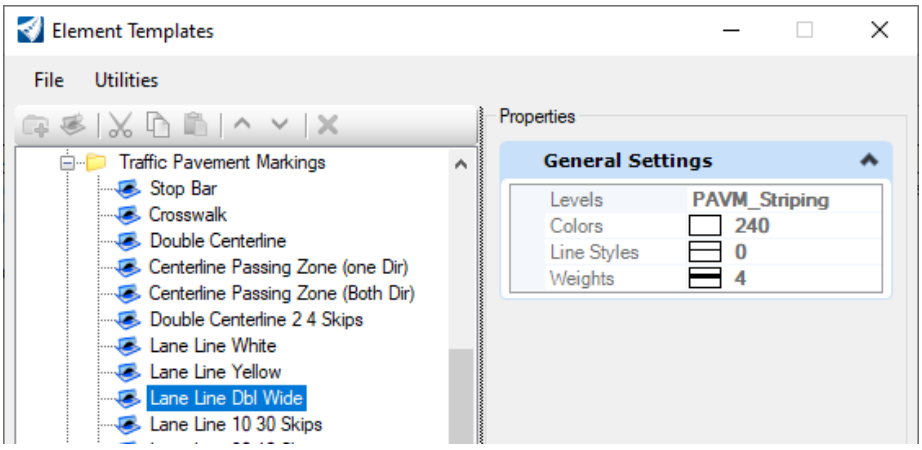


Figure 6 Lan line Element Templates

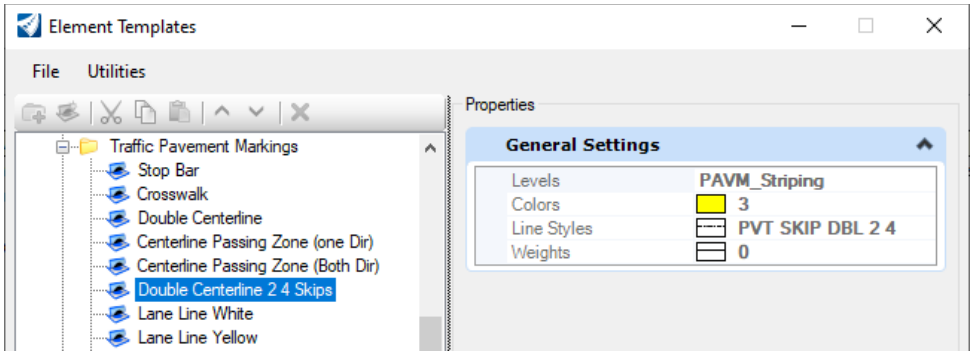


Figure 7 Centerline Element Template

Referencing other discipline dgn files is a standard practice, and many times referenced elements need to be turned on or off, and its level symbology attributes need to be changed. However, if the elements are not placed on the correct levels, using the standard element template attributes, these simple operations may become extremely difficult and time consuming.

Appendix 4 - File Naming

4.1 Civil Design File Naming Conventions

Discipline Designator (DD)

- HW = Highway Design
- HO - Highway Operations
- IL = Illumination
- LS = Landscape Design
- SB = Structure Bridge
- TR = Traffic

Data Category (DC)

- CB = Contract Base Model
- CP = Contract Plans (Drawing and Sheet Models)
- NC = Non-Contract (Presentation Material, Location plan, etc..)

Project Number (PROJ_NUMB)

8-digit project number – includes 4-digit town number or district Number followed by 4-digit project sequenced Number.

Addendum/Change Order # (AC#)

- A1= Addendum 1, A2 = Addendum 2, A3 = Addendum 3 etc…
- CA = Construction Order A, CB = Construction Order B, CC = Construction Order C etc…

DD_DC_PROJ_NUMB_Description_AC#

4.1.1 Highway Design

DD	DC	File Naming Standard Examples	Proper Storage Location
HW	CB	HW_CB_1234_1234_Alignments.dgn HW_CB_1234_1234_Stage1.dgn HW_CB_1234_1234_Stage2.dgn HW_CB_1234_1234_RoadwayModel.dgn HW_CB_1234_1234_Master.dgn	\Highways\Base_Models
HW	CP	HW_CP_1234_1234_GeneralSubset.dgn HW_CP_1234_1234_Details.dgn HW_CP_1234_1234_Stage1.dgn HW_CP_1234_1234_Stage2.dgn HW_CP_1234_1234_PlanPro_Route1.dgn HW_CP_1234_1234_PlanPro_SchoolRd.dgn HW_CP_1234_1234_XSC_Route1.dgn HW_CP_1234_1234_XSC_SchoolRoad.dgn	\Highways\Contract_Plans

HW	NC	HW_NC_1234_1234_AccidentData.dgn	\Highways\Misc
HW	NC	HW_NC_1234_1234_PublicInfoMeeting.dgn	\Highways\Presentation

4.1.2 Highway Operations

DD	DC	File Naming Standard Examples	Proper Storage Location
HO	CB	HO_CB_1234_1234_Master.dgn	\Highway_Ops\Base_Models
HO	CP	HO_CP_1234_1234_Details.dgn HO_CP_1234_1234_Plans.dgn	\Highway_Ops\Contract_Plans
HO	NC	HO_NC_1234_1234_Study1.dgn	\Highway_Ops\Misc
HO	NC	HO_NC_1234_1234_PublicInfoMeeting.dgn	\Highway_Ops\Presentation

4.1.3 Illumination

DD	DC	File Naming Standard Examples	Proper Storage Location
IL	CB	IL_CB_1234_1234_Master.dgn	\Illumination\Base_Models
IL	CP	IL_CP_1234_1234_Details.dgn IL_CP_1234_1234_Plans.dgn	\Illumination\Contract_Plans
IL	NC	IL_NC_1234_1234_Study1.dgn	\Illumination\Misc
IL	NC	IL_NC_1234_1234_PublicInfoMeeting.dgn	\Illumination\Presentation

4.1.4 Landscape

DD	DC	File Naming Standard Examples	Proper Storage Location
LS	CB	LS_CB_1234_1234_Master.dgn	\Landscape\Base_Models
LS	CP	LS_CP_1234_1234_Details.dgn LS_CP_1234_1234_Plans.dgn	\Landscape\Contract_Plans
LS	NC	LS_NC_1234_1234_Misc.dgn	\Landscape\Misc
LS	NC	LS_NC_1234_1234_PublicInfoMeeting.dgn	\Landscape\Presentation

4.1.5 Structure Bridge

DD	DC	File Naming Standard Examples	Proper Storage Location
SB	CB	SB _CB_1234_1234_Bridge123.dgn SB_CB_1234_1234_RetainingWall123.dgn SB_CB_1234_1234_Master.dgn	\Struct_Bridge\Base_Models
SB	CP	SB_CP_1234_1234_Details.dgn SB_CP_1234_1234_General.dgn	\Struct_Bridge\Contract_Plans
SB	NC	SB_NC_1234_1234_Misc.dgn	\Struct_Bridge\Misc
SB	NC	SB_NC_1234_1234_PublicInfoMeeting.dgn	\Struct_Bridge\Presentation

4.1.6 Traffic

DD	DC	File Naming Standard Examples	Proper Storage Location
TR	CB	TR _CB_1234_1234_PavMarking.dgn	\Traffic\Base_Models

		TR _CB_1234_1234_Signal_123_123.dgn TR _CB_1234_1234_Signing.dgn TR_CB_1234_1234_Detour.dgn TR _CB_1234_1234_Master.dgn	
TR	CP	TR_CP_1234_1234_Details.dgn TR_CP_1234_1234_Detour.dgn TR_CP_1234_1234_SignsPavMarking.dgn TR_CP_1234_1234_Signal_123_123.dgn	\Traffic\Contract_Plans
TR	NC	TR_NC_1234_1234_CollisionDiagram.dgn	\Traffic\Misc
TR	NC	TR_NC_1234_1234_PublicInfoMeeting.dgn	\Traffic\Presentation

4.2 Facilities File Naming Conventions

4.3 Survey File Naming Conventions

4.4 Property Maps File Naming Conventions

Discipline Designator (DD)

- SV = Survey

Office Location (OL)

- CS = Central Survey
- D1 = District 1
- D2 = District 2
- D3 = District 3
- D4 = District 4
- D5 = District 5

Project Number (PROJ_NUMB)

- 8-digit project number – includes 4-digit town number or district Number followed by 4-digit project sequenced Number.

Map Number (000)

- Property Map Number 001, 002, 003, …

TYPE (TY)

- PM = Property Map
- SHP = DGN for Shape for Export

CAD Version (CV)

- ORD = OpenRoads

DD_OL_PROJ_NUMB_000_TY_CV

Property Map Example

SV_CS_0012_0123_004_PM_ORD.dgn

DGN for Shape for Export Example

SV_CS_0012_0123_004_SHP_ORD.dgn

Appendix 5 - Drawing Number

The **drawing number** is used primarily for sheet to sheet linking, typically in, but not limited to, section details, section cuts, and detail callouts. Drawing Numbers are placed in CAD files, they consist of the discipline/sheet type designator followed by a hyphen and a number. Examples of drawing number prefixes can be found in in the table below.

Sheet numbers are applied to the discipline subset after the contract plans are published to PDF.

Figure 8 – Drawing Number vs Sheet Number

DRAWING NUMBER PREFIX TABLE

Various drawings are encouraged to be combined at the discretion of the project engineer. Drawings shall be limited to the list below.

GENERAL SUBSET

ABBREVIATION	DESCRIPTION
G	Title Sheet
G	Detail Estimate Sheets

HIGHWAY SUBSET

ABBREVIATION	DESCRIPTION
INX	Index of Drawings
INP	Index of Plans
SVY	Survey Control Data
ALN	Alignment Plans
ROW	Right of Way Plans
TYP	Typical Sections
PLN	Highway Plans
DRN	Drainage Plans
SED	Sedimentation and Erosion Control Plans
PRO	Profile
XSC	Cross Sections
SGP	Site Grading Plans
IGP	Intersection Grading Plans
MDS	Miscellaneous Detail Sheets

SUP	Superelevation Diagrams
BOR	Boring Logs
PIT	Test Pit Data
STG	Staging Plans (includes plans, profiles, and cross sections)

STRUCTURE BRIDGE SUBSET

ABBREVIATION	DESCRIPTION
S	All Sheets - Index, Plans, Details, Logs, Staging, etc…

TRAFFIC SUBSET

ABBREVIATION	DESCRIPTION
INX	Cover Sheet/Subset Index of Drawings
TRA	Used when sheet count is small, All Sheets - Index, Plans, Details, Staging, etc…
MPT	Maintenance and Protection of Traffic
INT	Interconnect Plan
TCS	Traffic Control Signal
FLA	Flashing Beacon
COL	Collision Diagram
SGN	Signing
DET	Detail Sheet
SPM	Signing and Pavement Markings
PVT	Pavement Markings
XSC	Cross-Section
DTR	Detour Plan
TGS	Traffic Guide Sheets

ROADWAY ILLUMINATION SUBSET

ABBREVIATION	DESCRIPTION
ILL	All Sheets - Index, Plans, Details, Logs, Staging, etc…

LANDSCAPE SUBSET

ABBREVIATION	DESCRIPTION
LSD	All Sheets - Index, Plans, Details, Logs, Staging, etc…

Facilities

DEMOLITION SUBSET	
D	All Sheets - Index, Plans, Details, Logs, Staging, etc…
CIVIL/SITE SUBSET	

C	All Sheets - Index, Plans, Details, Logs, Staging, etc...
ELECTRICAL SUBSET	
E	All Sheets - Index, Plans, Details, Logs, Staging, etc...
ARCHITECTURAL SUBSET	
A	All Sheets - Index, Plans, Details, Logs, Staging, etc...
STRUCTURES SUBSET	
S	All Sheets - Index, Plans, Details, Logs, Staging, etc...
MECHANICAL SUBSET	
M	All Sheets - Index, Plans, Details, Logs, Staging, etc...

UTILITIY SUBSETS

UTILITIY SUBSET	
"Util A"	All Sheets - Index, Plans, Details, Logs, Staging, etc...
UTILITIY SUBSET	
"Util B"	All Sheets - Index, Plans, Details, Logs, Staging, etc...

Appendix 6 - Design Submissions

Consultant and State Employees responsible for working on Capital Projects are required to follow Connecticut Department of Transportation (CTDOT) submission and delivery guidelines. These requirements are documented in the Digital Project Development Manual. This manual covers the preparation, review, and delivery of capital project documents across the whole project timeline from project initiation to project completion.

6.1 Project Polygons

Additional Information can be found in Section 13 Project Location (Geo-Spatial Boundary or Route ID and Mileage) Digital Project Development Manual

A Project Polygon (geo-spatial boundary) shall be submitted to COMPASS at project milestones of DA (Design Approval) and DCD (Design Completion Date) by the lead designer. The Project Polygons will be used in the Department's Project Web-GIS feature layer to identify spatial location, each section of State and Local Roads contained within the boundary for FHWA FMIS reporting, and future CIM (Civil Integrated Management) of roadway assets. The Project Polygon will also aid in the ROW (Right of Way) Web-GIS mapping process. The Project Polygons are created in a CAD file and converted to a KML.

Creating a Project Polygon

The following steps explain how to create and submit the Project Polygon file(s). If the project consists of multiple "sites," a separate file shall be created for each polygon. The datum and units will be NAD 83 in Survey Feet.

Before attempting to open or create DGN files users should make sure the following is in place:

1. CTDOT users should have the CTDOT CONNECT DDE synced through SharePoint with the COMPASS Project Synced along with the CAD Configuration.
2. Consultants should have CTDOT DDE properly installed or be syncing to the CTDOT DDE SharePoint/COMPASS system.
3. Log on to the CONNECTION Client. Bentley CONNECT licensing requires users to log into their Bentley account to secure a software license. CTDOT users should log in using your CTDOT email address and Bentley password. If you do not see the dialog box, select the ^ icon on the bottom Windows Screen. Click on the Connection Client Icon and select Open.
4. Access OpenRoads through Accounting or the Customized Icon following
5. On the OpenRoads open screen select **Custom Configuration**, using the small drop-down arrows select the Workspace **CT_Workspace**, the needed **WorkSet** and **Role**.
6. Create a file using the following Seed File:

...State of Connecticut|DOT CTDOT_DDE - CONNECT|CT_Configuration|Organization|Seed|GCS|NAD83FT_NAVD88.dgn

7. The new file will now be created and opened for editing. On the View window icon click on **Select Background Map**, select the **Map Type *Hybrid***.
8. Reference the Survey and Highway Design files into the newly created file, If the file does not match up to the Background map the project is probably and old V8i file or NAD 27 FT. If there are no Survey or Design Files available skip this step.
   - For old V8i files - In the References dialog box select the un-aligned reference file, turn **True Scale** off and set the Scale to ***1:1***.
   - For NAD 27 files –In the References dialog box select the un-aligned reference file. In the **Offset X** key in ***400124.900*** and **Offset Y** key in ***500038.900***.

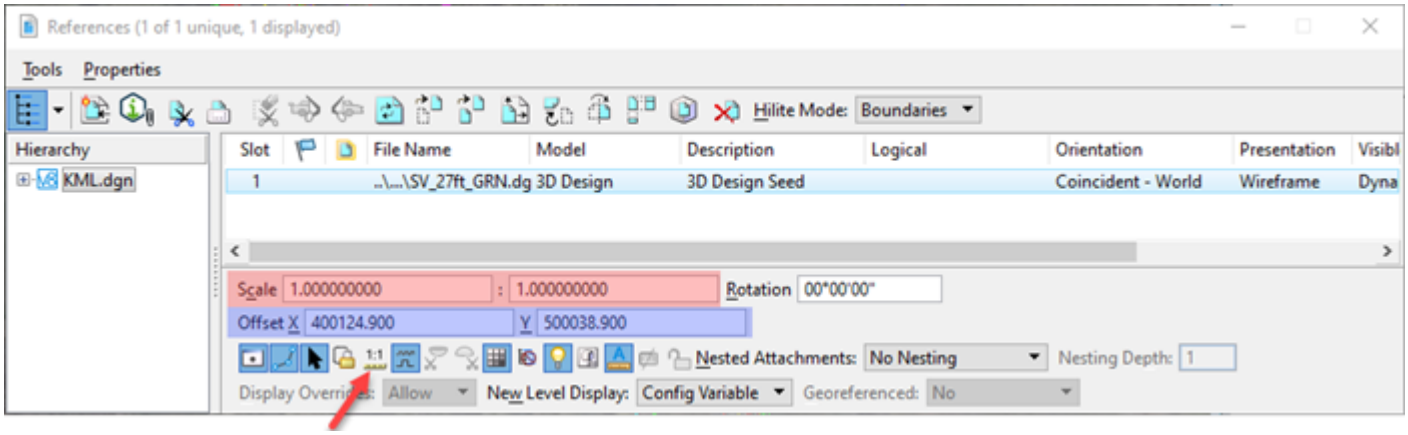


Figure 9 References

9. Set the active level to ***TOOL_Prelim_Proj_Polygon*** for the Project Polygon. Then create a closed polygon around the Project Limits using **Place Shape** or **Create Complex Shape**. Select the polygon and turn on the fill to verify the polygon is a closed shape.
   - DA (Design Approval): The Project Polygon shall include the entire project extents per site and include all existing and proposed ROW boundaries and portions of local affected roads. The polygon shall be drawn up to and following the ROW lines, then it shall cross the roads at the project limits. Note: The Polygon does not include slope limits. For projects with no survey use the Arial Image as a rough guide.
   - DCD (Design Completion Date): The Project Polygon shall include the entire project extents per site and include all ROW boundaries and portions of local affected roads. The polygon shall be drawn up to and following the right of way lines. When Rights and/or Defined Easements extend beyond the ROW, these lines shall be followed. The polygon shall cross the roads at the project limits. For projects with no survey use the Arial Image as a rough guide

10. After the polygon has been placed, **turn off all reference displays** and **fit** the polygon to the view.
11. In the tool search type in ***Export Google Earth File.*** In the Create Google Earth (KML) File dialog box set the following:
    - Save as type: ***KML***
    - Browse tothe **Share** folder (PROJ-NUMB - Design\Share)
    - Name the file ***Project Polygon.kml***
    - Click the **Save** button

    Google Earth should then automatically open and zoom to the Project Polygon vicinity, this will verify that the polygon is spatially correct. ***Note:*** *If a project has multiple sites, a project polygon file shall be created for each site and the file names should be numbered (Project Polygon 01.kml, Project Polygon 02.kml).*
12. After the KML file(s) are saved to the Share Folder email Mathew.Calkins@ct.gov.

6.2 PDF Packages

Additional Information can be found in Section 4 Document Preparation and Format Digital Project Development Manual

Contract plans shall be grouped, by discipline into individual multiple page PDF files called discipline subsets. The project manager is tasked with determining the discipline subset numbering and grouping and whether to use a single volume or multiple volumes for the project.

6.3 Electronic Engineering Data (EED)

Additional Information can be found in Section 14 Electronic Engineering Data (EED) Digital Project Development Manual

EED is produced during the survey and design phase of a project and usually consists of various types of electronic design information that can be displayed graphically in a computer aided design file (CAD). Examples of EED include but are not limited to: 3D terrain DGN models, Horizontal and vertical Coordinate Geometry DGN files and Proposed 3D Design DGN Models.

CTDOT sees the advantage and the need to move into a 3D model-centric environment. This will allow CTDOT to increase productivity, reduce design errors, and adhere to industry trends of AMG (Automated Machine Guidance), eConstruction and Asset Management. As the transportation industry worldwide adapts to new technology, Transportation Agencies must ascertain their readiness to adapt to these industry trends. FHWA has elevated 3D modeling through its Every Day Counts initiative and has encouraged Transportation Agencies to adopt

policy for delivering a digital product in lieu of a set of plans (paper, mylar or PDF). When a project is designed using current civil design software, it is created within a 3D model. Contractors across the world are utilizing 3D models for Automated Machine Guidance to perform activities such as grading, paving and drainage installation. In between these steps, projects are often flattened to convey design intent in a 2D medium such as a PDF or paper plan set. During this conversion, data is lost, precision is reduced and design intent is nullified. Looking forward, CONNECT Edition products will allow designers to produce a product that retains the civil data and design intent through construction. This data, also known as Electronic Engineering Data (EED), can be consumed further downstream in Asset Management and Maintenance. However, for now, CTDOT recognizes that the contract document shall remain a PDF set of plans.

What are the benefits of creating a 3D engineered model from designers' perspective?

- *To be able to see the whole model as one (communicates design intent)*
- *To ensure all parts tie together (clash detection)*
- *Valuable tool to represent data to others.*
- *Validates constructability of staging/final product.*
- *Better understanding of staging plans.*

Appendix 7 - Converting from V8i

7.1 Using Existing V8i Surveys

A converted survey will consist of two *.dgn files.

1. The original existing ground *.dgn file - to be used as is and properly referenced into the design.

   When referencing the existing ground *.dgn, turn true scale **off** and set the scale to **1:1**. Attachment properties for global line style scale may differ from project to project for various existing ground *.dgn files. Users should visually determine the required setting and set it either to **Master** or **Reference**. See image below.

   The Scale Line Style By Reference Scale button should be toggled on.

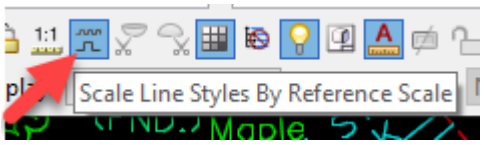


Figure 10 Line Style Scale

2. An OpenRoads CONNECT Edition terrain file - converted from an InRoads *.dtm. The Design unit must request that the Survey unit convert the preexisting *.dtm to a *.dgn terrain.

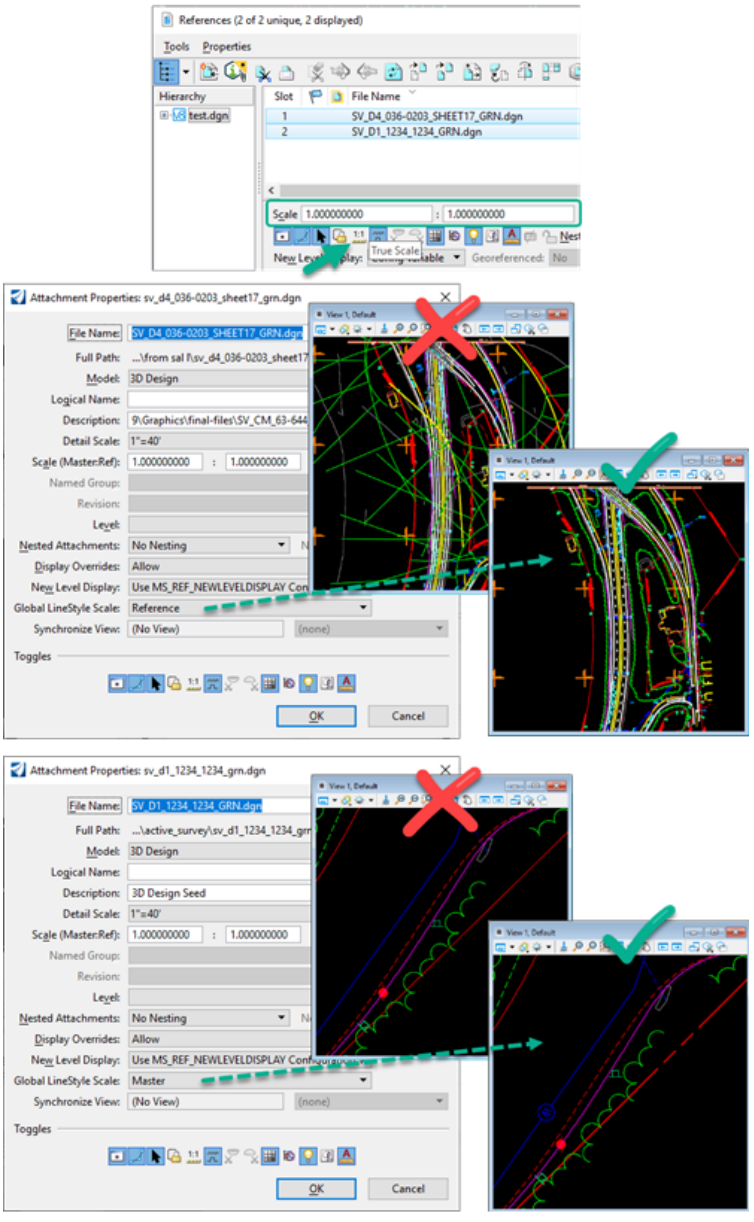


Figure 11 Reference Settings

7.2 Roadway Projects DGN Files

- **DO NOT** copy *.dgn files created with the V8i to the new WorkSet (project) folders.
- **DO** create all new *.dgn files using seeds from the CTDOT CONNECT DDE.
- Temporarily reference SELECTseries *.dgn files, align them geospatially, copy in needed line work, and modify line work to use the new element templates and levels.
- There are geometry import tools available in ORD to bring in old InRoads *.alg geometry. Be sure to set the horizontal and vertical feature definitions to **centerline**.

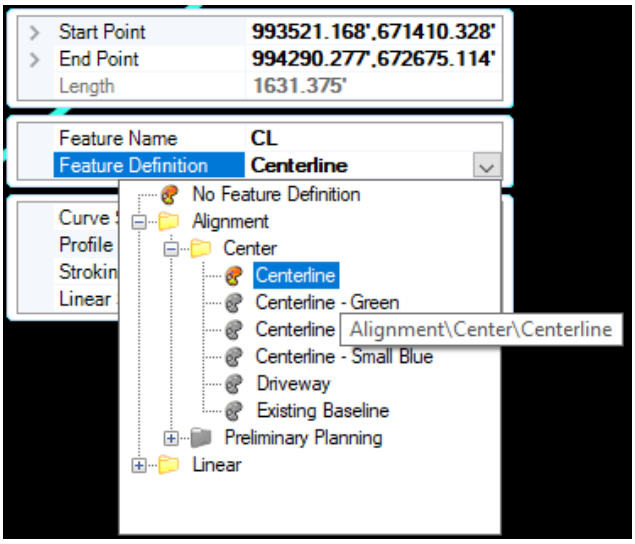


Figure 12 Feature Definition Name

Base Models

All civil design disciplines should create base models for their proposed design, as design elements drawn in a sheet model and drawing model will not be accepted. All design elements need to be in their proper geospatial location using the Geographic Coordinate System that matches the project's survey files. For more information go to Volume 2. SELECTSeries *.dgn files with plan view graphics should be temporarily referenced into the new OpenX CAD files, properly scaled and aligned geospatially. Users will need to copy in the needed graphics and modify them to use the new levels, element templates and/or feature definitions. The SELECTSeries *.dgn reference files will need to be detached after the graphics are properly copied.

Contract Sheets

OpenX applications all come with plans production tools to automate sheet production. For an overview of the OpenRoads tools go to Volume 13. All Plans, Profiles and Cross Section should be re-cut using OpenRoads.

Basic steps to reuse typical sections and detail sheets:

1. Create a new file using the sheet seed ***…\|CT_Configuration\|Organization\|Seed\|Road\|Seed2D - CT RoadSheet.dgn***
2. Change the **Annotation Scale** to **full size 1 = 1**. Place the **Contract Border** cell, snapping to the bottom left corner of the transient shape.
3. In the *.dgn file, copy this sheet model to create as many typical sections and detail sheets as needed. Reference in, scale, move and copy the needed SELECTSeries typical sections

and details into each model. Do not import the old border. Detach the old cut sheet when complete.

7.3 Roadway Template Library Files

Template libraries can either be batch or manually converted from old feature *styles* in the InRoads XIN to feature *definitions* in OpenRoads.

7.3.1 Batch Conversion

Migration utilities are available for download on the Bentley Communities website. If you encounter issues with these tools, please contact Bentley directly. After the download is complete, launch the Template Library ITL Converter executable **itl_importexport_excel.exe**. This standalone executable will convert a roadway template library (*.itl) file to an Excel spreadsheet for bulk editing. Additionally, it can also convert the Excel spreadsheet back to the *.itl format.

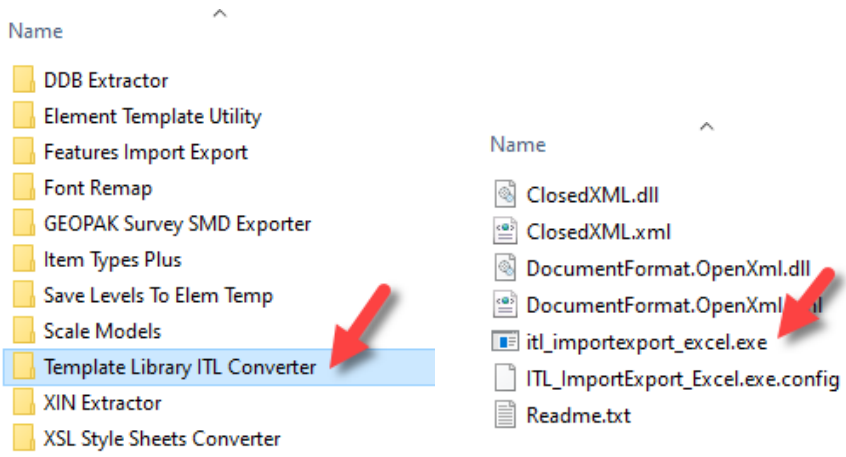


Figure 13

Warning: *This can make an *.itl file unusable (corrupt). Always start with a backup copy and work on the backup, then make sure the updated backup copy is functioning properly. Never work on the original file! Additionally, there are columns marked DO NOT EDIT in the Excel spreadsheet. Editing entries in these columns is NOT supported and will very likely cause corruption.*

Steps:

1. Make a backup of the *.itl file you wish to edit.
2. Run the provided executable and follow the prompts to select the backup *.itl file.
3. This will create an Excel spreadsheet.

4. Make changes in Excel, then save the file and close the program. See below tables for the ORD feature definition paths.
5. Run the executable a second time, this time selecting the Excel file to overwrite the original backup *.itl file.
6. Test the backup *.itl file in OpenRoads Designer CONNECT Edition.

Known Limitations: Some special characters are not supported. There is no list available for unsupported characters. In the event of an error, check for the use of special characters.

7.3.2 Manual Conversion

Use the Template Library organizer to copy in old Roadway Templates and update the feature definitions.

Points

1. Open the **roadway template library** that was copied from the CTDOT CONNECT DDE to your project. Use the **template library organizer** to bring over old roadway templates from InRoads SS2.

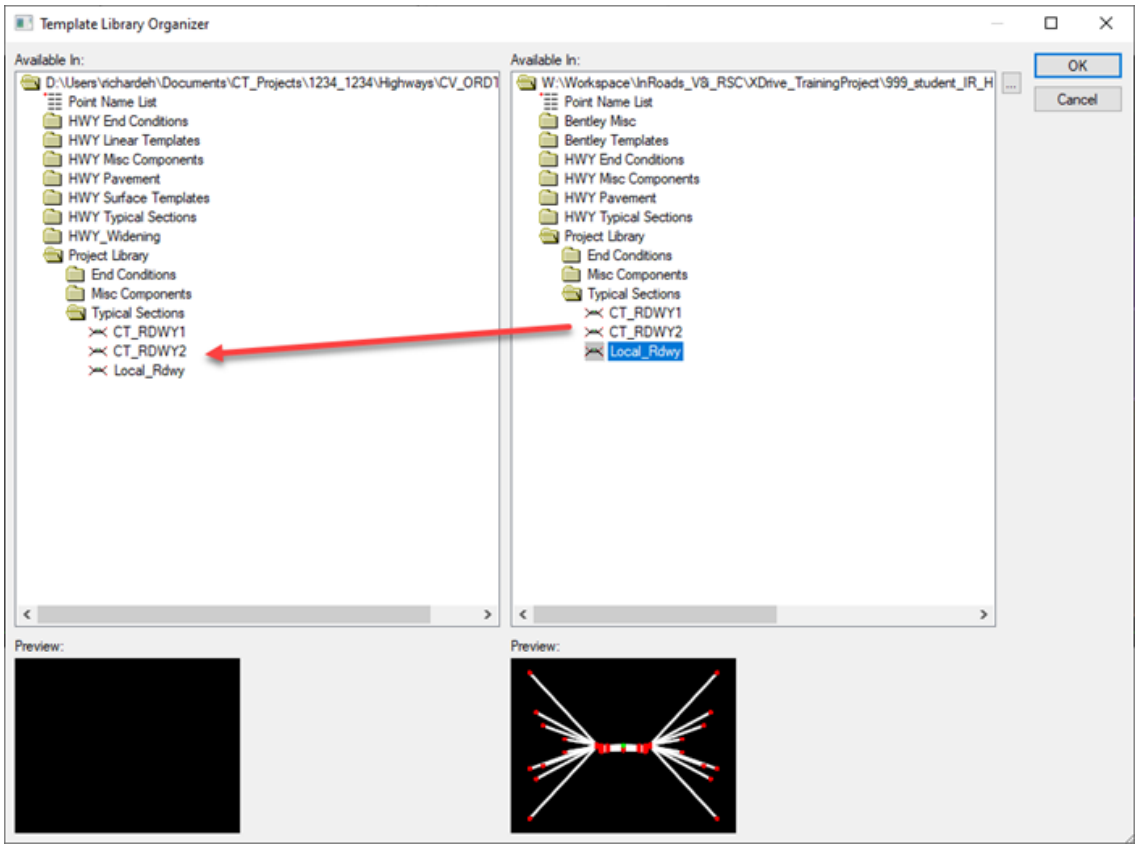


Figure 14

2. Select the roadway template you need to convert and redirect all points and components to the new feature definitions using the tools **Apply Feature Definition to Points** and **Apply Feature Definition to Components.**

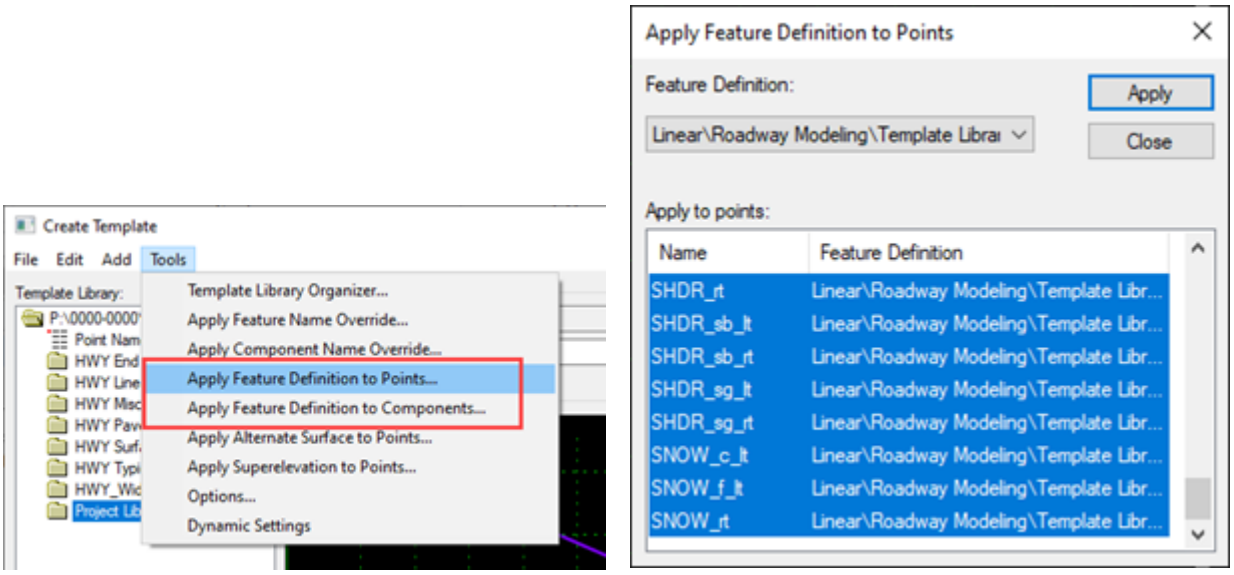


Figure 15

3. Choose **Tools > Apply Feature Definition to Points**.
4. Select all points.
5. Select the feature definition pull-down and change all points to **miscellaneous**. Browse to ***Linear|Roadway Modeling|Template Library|Misc*** and click **apply** to accept. Switch to the appropriate definition on each individual item.

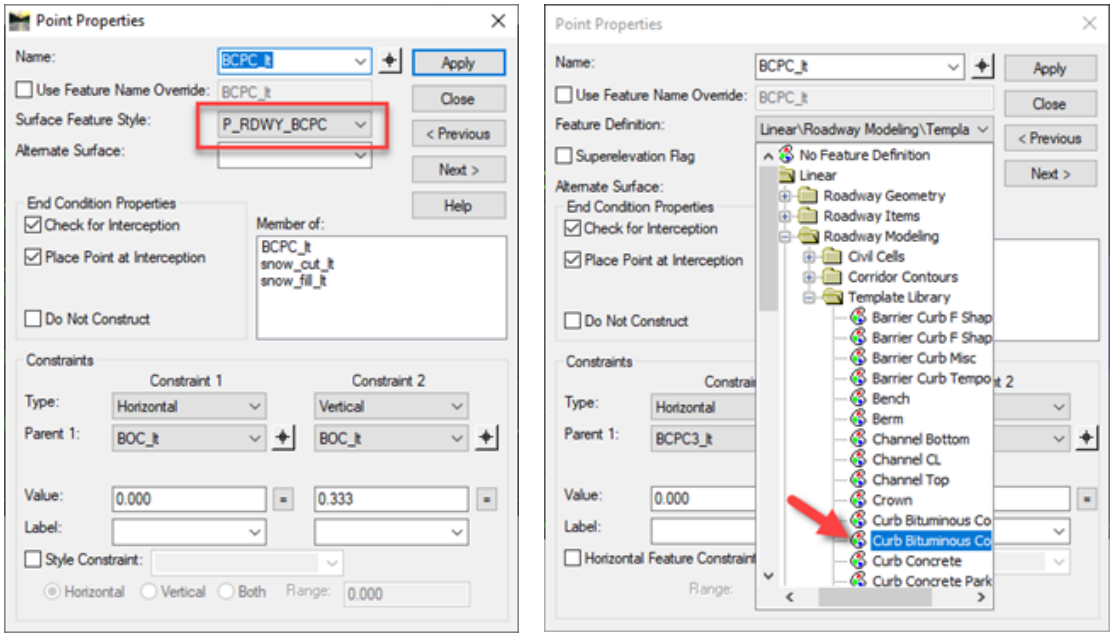


Figure 16

InRoads – OpenRoads Linear Feature Name Relation Table		
Point Name	**InRoads Feature Style**	**OpenRoads Feature Definition Path**
Centerline		
CL	P_RDWY_CL	Linear\Roadway Modeling\Template Library\Road CL
CL_b	P_SUB_CL	Linear\Roadway Modeling\Template Library\Sublayer HMA S1
CL_sb	P_SUB_CL	Linear\Roadway Modeling\Template Library\Sublayer Subbase
CL_sg	P_SUB_CL	Linear\Roadway Modeling\Template Library\Sublayer Subgrade
Travelway		
TRWY1	P_RDWY_TW1	Linear\Roadway Modeling\Template Library\Travelway
TRWY1_b	P_SUB_TW	Linear\Roadway Modeling\Template Library\Sublayer HMA S1
TRWY1_sb	P_SUB_TW	Linear\Roadway Modeling\Template Library\Sublayer Subbase
TRWY1_sg	P_SUB_TW	Linear\Roadway Modeling\Template Library\Sublayer Subgrade
TRWY2	P_RDWY_TW2	Linear\Roadway Modeling\Template Library\Travelway
TRWY2_b	P_SUB_TW	Linear\Roadway Modeling\Template Library\Sublayer HMA S1
TRWY2_sb	P_SUB_TW	Linear\Roadway Modeling\Template Library\Sublayer Subbase
TRWY2_sg	P_SUB_TW	Linear\Roadway Modeling\Template Library\Sublayer Subgrade
Shoulder		
SHDR	P_RDWY_SHDR	Linear\Roadway Modeling\Template Library\Shoulder
SHDR_b	P_SUB_SHDR	Linear\Roadway Modeling\Template Library\Sublayer HMA S1
SHDR_sb	P_SUB_SHDR	Linear\Roadway Modeling\Template Library\Sublayer Subbase
SHDR_sg	P_SUB_SHDR	Linear\Roadway Modeling\Template Library\Sublayer Subgrade
Edge or Road		
EOR	P_RDWY_EOR	Linear\Roadway Modeling\Template Library\Edge of Road
EOR_b	P_SUB_EOR	Linear\Roadway Modeling\Template Library\Sublayer HMA S1
EOR_sb	P_SUB_EOR	Linear\Roadway Modeling\Template Library\Sublayer Subbase
EOR_sg	P_SUB_EOR	Linear\Roadway Modeling\Template Library\Sublayer Subgrade
Curbing		
BCLC	P_RDWY_BCLC	Linear\Roadway Modeling\Template Library\Curb Bituminous Concrete Lip
BCPC	P_RDWY_BCPC	Linear\Roadway Modeling\Template Library\Curb Bituminous Concrete Park
CC	P_RDWY_CC	Linear\Roadway Modeling\Template Library\Curb Concrete
CPC	P_RDWY_CPC	Linear\Roadway Modeling\Template Library\Curb Concrete Park
GC	P_RDWY_GC	Linear\Roadway Modeling\Template Library\Curb Granite
GSC	P_RDWY_GSC	Linear\Roadway Modeling\Template Library\Curb Granite Transition
Misc Curbing		
BCLC1	P_RDWY_CURB TOP	Linear\Roadway Modeling\Template Library\Curb Misc

BCLC2	P_RDWY_CURB TOP	Linear\Roadway Modeling\Template Library\Curb Misc
BCPC1	P_RDWY_CURB TOP	Linear\Roadway Modeling\Template Library\Curb Misc
BCPC2	P_RDWY_CURB TOP	Linear\Roadway Modeling\Template Library\Curb Misc
CC1	P_RDWY_CURB TOP	Linear\Roadway Modeling\Template Library\Curb Misc
CPC1	P_RDWY_CURB TOP	Linear\Roadway Modeling\Template Library\Curb Misc
CPC2	P_RDWY_CURB TOP	Linear\Roadway Modeling\Template Library\Curb Misc
GC1	P_RDWY_CURB TOP	Linear\Roadway Modeling\Template Library\Curb Misc
BOC	P_SUB_BOC	Linear\Roadway Modeling\Template Library\Sublayer Curb
BOC_b	P_SUB_BOC	Linear\Roadway Modeling\Template Library\Sublayer HMA S1
BOC_sb	P_SUB_BOC	Linear\Roadway Modeling\Template Library\Sublayer HMA S1
BOC_sg	P_SUB_BOC	Linear\Roadway Modeling\Template Library\Sublayer Subgrade
GSC1	P_SUB_MISC	Linear\Roadway Modeling\Template Library\Sublayer Curb
Side Slopes		
SNOW	P_RDWY_SNOW	Linear\Roadway Modeling\Template Library\Snow Shelf
Ditch Backslope	P_RDWY_SDITCH	Linear\Roadway Modeling\Template Library\Channel Top
Ditch Bottom	P_RDWY_BDITCH	Linear\Roadway Modeling\Template Library\Channel Bottom
Ditch Foreslope	P_RDWY_SDITCH	Linear\Roadway Modeling\Template Library\Channel Top
CUT	P_RDWY_CUT	Linear\Roadway Modeling\Template Library\Slope Cut Limit
FILL	P_RDWY_FILL	Linear\Roadway Modeling\Template Library\Slope Fill Limit
Sawcut		
BITCUT	P_RDWY_CUTBIT	Linear\Roadway Modeling\Template Library\Sawcut Bituminous
BITCUT1	P_SUB_MISC	Linear\Roadway Modeling\Template Library\Sublayer HMA S1
BITCUT2	P_SUB_MISC	Linear\Roadway Modeling\Template Library\Sublayer HMA S1
BITCUT3	P_SUB_MISC	Linear\Roadway Modeling\Template Library\Sublayer Subgrade
Sidewalk		
WLKC	P_RDWY_WLKC	Linear\Roadway Modeling\Template Library\Walk Concrete
WLKC_gr	P_SUB_WLK	Linear\Roadway Modeling\Template Library\Sublayer Granular
WLKC_sg	P_SUB_WLK	Linear\Roadway Modeling\Template Library\Sublayer Subgrade

Components

1. Select **Tool > Apply Feature Definition to Components**.
2. Click on each component name and browse to the needed component. Then select the appropriate component to mesh feature definition, click **apply** to accept. Finally, switch to the appropriate definition on each individual item.

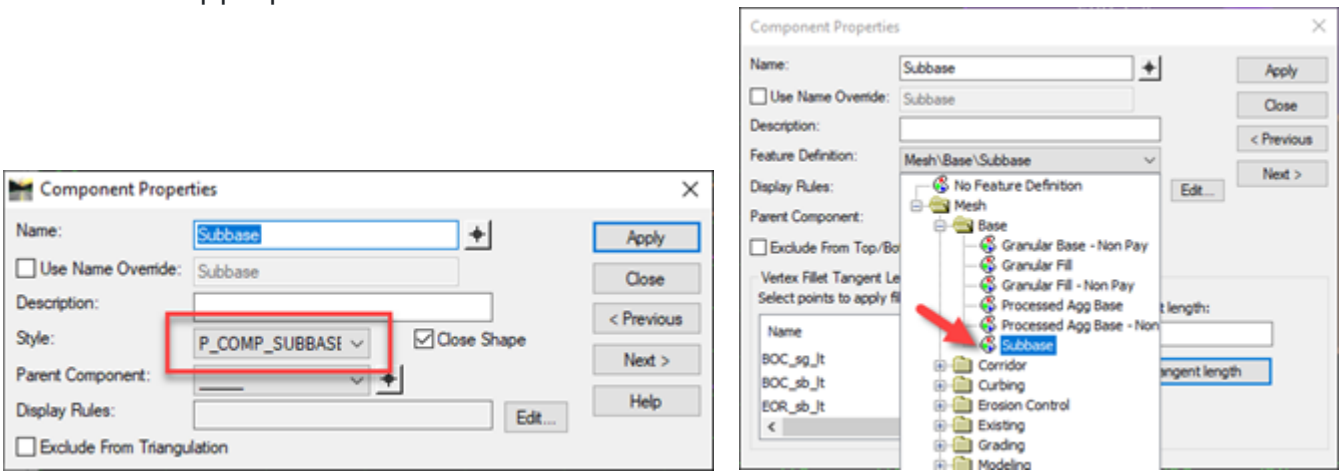


Figure 17

InRoads – OpenRoads Component Feature Name Relation Table		
Component Name	**InRoads Feature Style**	**OpenRoads Feature Definition Path**
BCLC	P_COMP_CURB	Mesh\Curbing\Bituminous Curb
BCPC	P_COMP_CURB	Mesh\Curbing\Bituminous Curb
CC	P_COMP_CURB	Mesh\Curbing\Concrete Curb
CPC	P_COMP_CURB	Mesh\Curbing\Concrete Curb
Cut	P_COMP_GRASS	Mesh\Grading\Grass
Ditch	P_COMP_GRASS	Mesh\Grading\Grass
Fill	P_COMP_GRASS	Mesh\Grading\Grass
GC	P_COMP_CURB	Mesh\Curbing\Granite Curb
Granular_Base	P_COMP_CURB	Mesh\Base\Granular Base - Non Pay
Grass_Buffer	P_COMP_GRASS	Mesh\Grading\Grass
GRAVEL_BASE	P_COMP_SDWK	Mesh\Base\Granular Fill - Non Pay
GSC	P_COMP_CURB	Mesh\Curbing\Granite Curb
Sidewalk	P_COMP_SDWK	Mesh\Sidewalk\Concrete
snow	P_COMP_GRASS	Mesh\Grading\Grass
Subbase	P_COMP_SUBBASE	Mesh\Base\Subbase
Superpave_Sub	P_COMP_SUPERPAVE1.5	Mesh\Pavement\HMA S1 Pavement
Superpave_Top	P_COMP_SUPERPAVE.5	Mesh\Pavement\HMA S.5 Pavement

7.4 Traffic Signal Modification

There are three options for working in CONNECT on traffic signal modification projects. These types of projects reuse the *.dgn files stored in the **traffic signal asset** area in ProjectWise. These are projects where no other disciplines such as Survey, Highway, Bridge, Landscaping, Illumination etc. will be submitting contract sheets or *.dgn files.

Consultants working on these types of projects should discuss these options with the CTDOT consultant liaison. CTDOT employees should consult with their supervisors.

7.4.1 Option 1 – Limited Conversion

Re-use Stored Asset Plan Sheet

1. Copy the signal asset *.dgn to the CONNECT project storage area ***…Traffic/Contract_Plans***.
2. Using OpenRoads, open the copied asset *.dgn file. Verify that the model is a **sheet model type**. If it is not, modify the model type to sheet model and change the view background to black.
3. Edit the sheet boundary.
4. Work in the sheet model to edit design features, tables, movement diagram, call outs and construction notes. Do not attempt to use the new CONNECT Edition cells and line styles as they will come in at the wrong size.

   Option 1 is for files needing limited adjustments, major changes should use either Option 2 or 3 below.

7.4.2 Option 2 – Partial Conversion

Create a Geospatial Base Model – Reuse Asset Signal Plan Sheet

Base Model

1. Copy the signal asset *.dgn to the CONNECT project storage area ***…Traffic/Base_Models***.
2. Using OpenRoads, open the copied asset *.dgn file. Delete tables, movement diagram, call outs and construction notes leaving only the design features.
3. Move match marked areas to line up with the main corridor.
4. Create a base model using a CONNECT seed file and reference in the copied asset *.dgn file.
5. Move the reference file(s) to the **correct geospatial location**.
6. In the reference dialog box use the **merge to master** tool.

7. Edit the features as needed.
8. After all the new design features are in place in the new **base model** *.dgn, delete the old signal asset *.dgn from the project folder.

Sheet Model

1. Copy the signal asset *.dgn to the CONNECT project storage area ***…Traffic/Contract_Plans***.
2. Using OpenRoads, open the copied asset *.dgn file. Delete all design features.
3. Verify that the model is a **sheet model type**. If it is not, modify the model type to **sheet model** and change the view background to black.
4. Edit the sheet boundary.
5. Reference in the new base model, align and scale it within the sheet. Clip the reference as necessary.
6. Repeat for match marks.
7. Edit tables, movement diagram, call outs and construction notes as needed.

7.4.3 Option 3 – Full Conversion

Create Base and Sheet Models

Base Model

1. Copy signal asset *.dgn to the CONNECT project storage area ***...Traffic/Base_Models***.
2. Create a base model using a CONNECT seed file and reference in the *.dgn file.
3. Move the reference file(s) to be in the **correct geospatial location**. This sample video should work for most *.dgns but some files may have been created incorrectly in the old versions, in which case the user will have to align and scale the reference file manually.
4. Use the asset *.dgn file as a tracing board and replace all new features using the cells and tools in CONNECT. **DO NOT COPY ANYTHING IN FROM THE ASSET *.dgn**
5. After all the new design features are in place in the new base model *.dgn delete the old signal asset *.dgn from the project folder.

Sheet Model

Follow the steps in Volume 13 for Signal Sheets

Appendix 8 Revisions

10/28/2024

Volume	Appendix #	Description
16	1, 2, & 7	Added Configurations, Seed Files and Converting Appendices.
16	4	Updated Highway Drawing Number Abbreviation