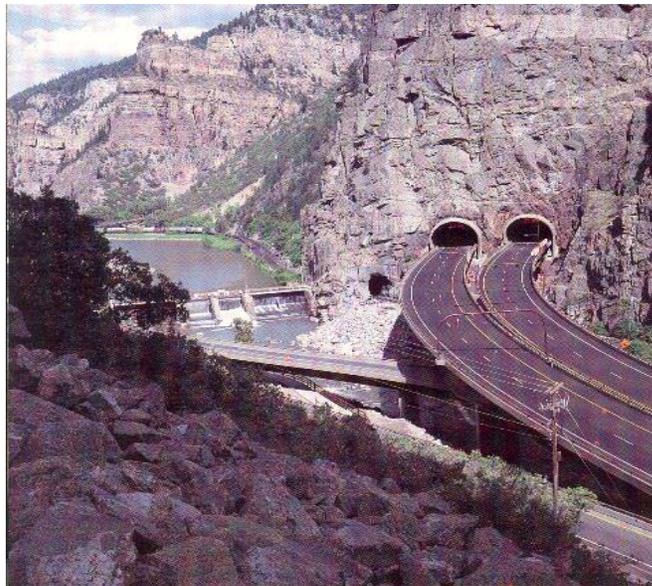


CDOT WORKFLOWS

Colorado Department of Transportation

- General MicroStation Workflows
- MicroStation Printing
- Workflows Using Microsoft Office Products
- MicroStation Information and Administration
- InRoads Related Workflows



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<http://www.dot.state.co.us/DesignSupport/>

MS - General MicroStation Workflows

MP - MicroStation Printing

MA - MicroStation Information and Administration

OP - Workflows Using Microsoft Office Products

IR - InRoads Related Workflows

General MicroStation Workflows

Workflow MS 1 - Explaining File Types

This document describes the various file types used in plan production at CDOT.

CADD Files	
File Extention	Description
dgn	MicroStation CADD file format. Files of this format are called <i>Drawings</i> or <i>Design Files</i> .
cel	MicroStation Cell Library. A cell library contains small drawings tha ca be used over and over. The “Cell” is treated as a group so that it can be placed, moved, copied, manipulated, or deleted as one element.
dgnlib	MicroStation Design Library. Design Libraries store standard settings for MicroStation. Items like Text Styles, Level Names and Symbology, Dimension Styles, and Line Styles. These files are stored within the workspace and should not be modified by the users.
pcf	Project Configurition File. This file is used by MicroStation to set the directory path to refererence file locations for a specific project. The pcf file is used for projects stored locally, and is only accessed when MicroStation is launched from the Start Menu or desktop icon.
dwg/dxf	AutoCAD CADD file format. This is similar to the dgn file. MicroStation can read dgn and dxf file formats, but they need to be converted to dgn format so that CDOT standards can be applied to them.

Image Files	
File Extention	Description
jpg	An image file format use for aerial photos that can be attached to plan sheets. It may come with a sister file.
tif	An image file format use for aerial photos that can be attached to plan sheets. It may come with a sister file.
tfw	A sister file (or world file) is an ASCII text file that contains special formatted coordinate information about where the image is in relation to the surface of the earth.
tif	GeoTiff files (also with a tif extension) but these do not have a sister file. They have the coordinate (and sometimes GeoCoordinate system) embedded within the file

InRoads Files	
File Extention	Description
dtm	Digital Terrain Model, sometimes called a surface file. This file contains triangulated and untriangulated data that describes the topography of the site. An existing ground dtm describes the current state of the site. A design dtm describes what is to be constructed.
alg	Geometry Project or alignment file. This file contains the horizontal and vertical geometry (alignments) for a design project. It is used by ROW/Survey to store Right of way, property, and easement lines.
itl	Template Library. This file contains the templates (an InRoads version of the typical sections) used for a design project. It also contains various parts of templates (called sections and components) that are use to create finished templates.
ird	Roadway Design file. This file is used to combine and compare the data from the dtm, alg, and itl files to create the design model of the proposed roadway. The alg file is used to define the Corridor of the proposed road, the itl file provides the cross section of the road prism, and the dtm is used as a target for the end conditions of the template to tie the design to the existing terrain.
rwk	InRoads Project File. This is an ASCII text file that contains the name and directory path to the InRoads data file used for a specific project. It is used to load and save all of the data files at one time.
fwd	Fieldbook file. This file contains survey information translated from the data collector to the InRoads format.
sup	Superelevation Rate Tables. These are ASCII text files that contain superelevation transition rate information based off of the ASSHTO Greenbook. sup files are used with in Roadway Designer to calculate superelevation for a corridor's horizontal alignment. The calculated data is stored in the ird file.
xin	Preference file. This file contains all of the style settings that control how elements displayed from InRoads will look in MicroStation. It also contains dialog box Preferences (predefined settings for dialox boxes).
xsl	Style Sheets. These files are used to format xml reports generated by InRoads
dft	Drafting Notes file. This file contains formats for commonly used notes, like station and offset notes, that can be extracted from InRoads data.
vdf	View Definition File. This file works with Plan and Profile Generator. It contains the data for plan view and profile view settings.
xsc	Cross Section File. This file contains the data used to define a custom cross section set.

Workflow MS 2 - Useful MicroStation and InRoads Key-ins

This document describes and provides syntax for commonly used MicroStation and InRoads key-ins. Where ‘x’, ‘y’, and ‘z’ characters are entered in the Key-in Syntax column, the user will replace those characters with the desired numbers. Items in italics require the user to provide the desired cell name or view name.

MicroStation / InRoads Key-ins		
Angle Key-ins and Precision Inputs		
Key-In Command	Key-In Syntax	Description
Set Active Angle	aa=xx^xx'xx.xx"	This sets the Active Angle.
Set Active Angle by 2 Points	Active angle pt2	Required input – two <D> clicks. This sets the Active Angle based on the angle defined by the two data clicks and the zero axis.
Coordinate Key-in	xy=xx.xx,yy.yy,zz.zz	This command inputs a <D> at the specified x, y, and z coordinate. The z (elevation) entry is not used in 2D drawings and is optional in 3D drawings
Relative Coordinate Key-in	dl=xx.xx,yy.yy,zz.zz	This command inputs a <D> at the specified x, y, and z distance from the last <D> or <T>. The z (elevation) entry is not used in 2D drawings and is optional in 3D drawings. The distances are measured along the design axes (x is left and right in the top view, y is up and down in the top view, z is into and out of the screen in the top view.)
View Coordinate Key-in	dx=xx.xx,yy.yy,zz.zz	This command inputs a <D> at the specified x, y, and z distance from the last <D> or <T>. The distances are measured along the view axes so that x is left and right on the screen, y is up and down on the screen, z is into and out of the screen.
Distance / Angle Key-in	di=xx.xx,xx^xx'xx"	This command inputs a <D> at the specified distance and angle from the last <D> or <T>.
Station / Offset Key-in	so=xxx+xx.xx,xx.xx	This is an InRoads key-in and a geometry project must be loaded for it to work. The command inputs a <D> at the station and offset from the active alignment. The “+” is not required in the key-in
Station / Elevation Key-in	se=xxx+xx.xx,xx.xx	This is an InRoads key-in and a geometry project must be loaded for it to work. An InRoads profile is also required. This command inputs a <D> at the station and elevation within the profile. The “+” is not required in the key-in.

MicroStation / InRoads Key-ins		
Angle Key-ins and Precision Inputs		
Key-In Command	Key-In Syntax	Description
Distance / Grade Key-in	dg=xx.xx,x.xx%	This is an InRoads key-in and a geometry project must be loaded for it to work. An InRoads profile is also required. This command inputs a <D> at the distance and grade from the last point entered in the profile. This command is primarily used with the Add Vertical PI command.

MicroStation / InRoads Key-ins		
MicroStation Settings		
Key-In Command	Key-In Syntax	Description
Set Key Point Divisor	ky=x	This command sets the key point divisor to the number indicated. The key point divisor divides an element in to the indicated number of equal parts and makes a snap point at each division
Set Active Scale	as=xx.xx	This command sets the X, Y, and Z scales to the specified value.
Set X Scale	xs=xx.xx	This command sets only the X axis scale to the specified value.
Set Y Scale	ys=xx.xx	This command sets only the Y axis scale to the specified value.
Set Z Scale	zs=xx.xx	This command sets only the Z axis scale to the specified value.
Set Active Line Terminator	lt= <i>cell name</i>	This command sets the line terminator to the specified cell.
Set Terminator Scale	ts=xx.xx	This command sets the line terminator scale factor to the specified cell.

MicroStation / InRoads Key-ins		
View Controls		
Key-In Command	Key-In Syntax	Description
Open Saved View	<i>vi=saved view</i>	After executing the key-in, <D> in the view to be updated. In addition to user created saved views, the following default views can be used: top, bottom, left, right, front, and back.
Create a Saved View	<i>sv=saved view</i>	After executing the key-in, <D> in the view to be saved. This command is used to create a saved view without using the Saved Views dialog box.
Rotate View	<i>rv= xx^xx'xx", xx^xx'xx",xx^xx'xx"</i>	This command rotates the view around the design axes. The angles are for the x, y, and z axis. For example to rotate a Top view 90 degrees, the key-in would be <i>rv=0,0,90</i> . This rotates the view about the z axis (the one that goes in and out of the monitor.) The carat symbol is not required if the rotation is in whole degrees.
Set Active Z	<i>az=xx.xx</i>	After executing the key-in, <D> in the view. This sets the elevation at which elements are placed. Snapping to an element overrides the active depth and uses the elevation of the item snapped to unless the ACS Plane Snap lock is toggled on.
Find Active Z	<i>az=?</i>	After executing the key-in, <D> in the view. This displays the current active depth (elevation) in the MicroStation Message Center.
Set Delta Z	<i>dd=xx.xx</i>	After executing the key-in, <D> in the view. This changes the active depth (elevation) by the amount specified in the key-in.
Set Display Depth	<i>dp=-xx.xx,xx.xx</i>	After executing the key-in, <D> in the view. This sets the viewable elevation range. The first number in the key-in is the low elevation and the second is the high elevation. Elements outside of this range cannot be seen. If you cannot see some elements or only partial elements are displayed, try setting the display depth to -100,000,100,000 (<i>dp=-100000,100000</i>)
Find Display Depth	<i>dp=?</i>	After executing the key-in, <D> in the view. This displays the current display depth (elevation range) in the MicroStation Message Center.

MicroStation / InRoads Key-ins		
View Controls		
Key-In Command	Key-In Syntax	Description
Set Relative Display Depth	dd=?	After executing the key-in, <D> in the view. This adjusts the current display depth (elevation range) by the amount specified. The first number in the key-in is the low elevation and the second is the high elevation.
Set Active Level	lv= <i>level name or number</i>	This command sets the active level to the specified level
Level On	on= <i>level name or number</i>	This command turns the specified levels on. Key-in on=all to turn all levels on.
Level Off	of= <i>level name or number</i>	This command turns the specified levels off. Key-in of=all to turn all levels (except the active level) off.

AccuDraw Key-ins

There are a number of key-ins that make working with AccuDraw easier. The table below lists some of the most commonly used key-ins and describes what they do.

MicroStation / InRoads Key-ins		
AccuDraw Key-ins		
Key-In Command	Key-In Syntax	Description
Compass Type	<i>Space Bar</i>	This command toggles the AccuDraw compass between the distance/direction (round) compass to the X, Y, Z (square) compass
View Rotation	v	This command rotates the AccuDraw compass so that it is orthogonal to the view.
Base Rotation	b	This command rotates the AccuDraw compass so that it is orthogonal to the element that was drawn last.
Top Rotation	t	This command rotates the AccuDraw compass so that it is orthogonal to the Top view. If you are in a Front, Back, or side view you will only see the edge of the AccuDraw compass.

MicroStation / InRoads Key-ins		
AccuDraw Key-ins		
Key-In Command	Key-In Syntax	Description
Front Rotation	f	This command rotates the AccuDraw compass so that it is orthogonal to the Front view. If you are in a Top, Bottom, or side view you will only see the edge of the AccuDraw compass.
Side Rotation	s	This command rotates the AccuDraw compass so that it is orthogonal to the Side view. If you are in a Top, Bottom, Front, or Back view you will only see the edge of the AccuDraw compass.
X axis Lock	x	This command works when the AccuDraw compass is in the XYZ mode. This command locks the X axis to the distance that the cursor is from the starting point measured along the X axis.
Y axis Lock	y	This command works when the AccuDraw compass is in the XYZ mode. This command locks the Y axis to the distance that the cursor is from the starting point measured along the Y axis.
Z axis Lock	z	This command works when the AccuDraw compass is in the XYZ mode. This command locks the Z axis to the distance that the cursor is from the starting point measured along the Z axis. Note: the cursor cannot move along the Z axis in a Top view.
Distance Lock	d	This command works when the AccuDraw compass is in the distance/angle mode. This command locks the distance that the cursor is from the starting point of the element.
Angle Lock	a	This command works when the AccuDraw compass is in the distance/angle mode. This command locks the angle that the cursor is from the starting point of the element based on the rotation of the AccuDraw compass.
Set Origin	o	This command allows you to place the next element a specific distance from the last entered point using the AccuDraw toolbox.

Workflow MS 3 - Setting a Project Geographic Coordinate System

This document guides you through the steps required to create a project or local datum MicroStation Geographic Coordinate System (GCS). This will facilitate the integration of images, GIS data, and design files that use different coordinate systems.

These instructions are intended to be used by the Survey department at the beginning of a project, allowing other divisions, like Design, to coordinately attach imagery and shape files later in the project. Without this information, it is unlikely that imagery which is typically in a different coordinate system (like State Plane Coordinates or UTM) will line up with the MicroStation design files created by ROW Survey.

The following steps describe how to create a project specific datum in MicroStation followed with an example of how to attach imagery and GIS information from different coordinate systems.

It is very important that the projection information for all files is known!

CDOT Survey Project Files

MicroStation design files created by CDOT Survey are created in a project specific, local datum plane (project coordinate system). This coordinate system is typically defined by multiplying known coordinates by a scale factor or conversion factor. This factor is project specific and published in the Project Control Diagram created by Survey. Once created, the project GCS can be assigned to the individual models within the MicroStation design file. This means files with different GCS assignments can be reprojected to fit the project GCS.

Creating a Project Geographic Coordinate System in MicroStation

In order to create a project specific GCS the coordinate datum instructions must be obtained. These can be found on the **Project Control Diagram** sheet included in CDOT plan sets.

COORDINATE DATUM: Project coordinates are modified Colorado State Plane North Zone NAD 83(2007) coordinates. The CHARN is based on NAD 83(2007) datum. The project seed point coordinates are: Northing = 377204.827m, Easting = 937274.019m, and Elevation = 1618.990m. The ground scale factor used to modify the coordinates is 1.00028596071914. Project Coordinates are truncated by 300,000m in the Northing and 900,000m in the Easting.

To get from Project to State Plane coordinates: add the truncation, subtract the seed point northing and easting, divide by the ground scale factor, then add the seed point northing and easting.

Factor Computation Worksheet

A worksheet has been created to assist the user in computing the necessary information for the custom project coordinate system. This file is called **Factor Computation Worksheet.xlsx** and can be found in the CDOT workspace under **Standards-Global\MicroStation\Data**. The worksheet is intended to help automate the process of creating a project specific Geographic Coordinate system in MicroStation. Information entered into this worksheet should be obtained from the Project Control Diagram or the Surveyor when a PCD sheet is not available. The worksheet computes parameter information used in MicroStation to create a Geographic Project Coordinate System. Instruction on how to use the worksheet can be found on the first tab.

FACTOR COMPUTATION WORKSHEET

Compiled by: Patrick Williams

Using Project Seed Points

Date:	2-Nov-11
Project Number:	BR 157A-011
Project Location:	SH 157 at US 36 Bridge Deck Replacement
Description:	

Colorado State Plane Grid Zone:	North
Datum:	NAD83(2007)
Scale Factor:	1.00028596071914
Meters to Feet:	3.280833333

Project Seed Point	Meters
Northing:	377204.827
Easting:	937274.019

Truncation	Meters	Truncation Adjusted to	Seed Coordinates
Northing:	300000	300022.071236	900010.655858
Easting:	900000		

Geographic Coordinate System Parameters	
Affine A0 Parameter	-2953629.340605
Affine B0 Parameter	-984603.889593
Affine A1 Parameter	1.00028596071914
Affine B2 Parameter	1.00028596071914

- Using the information from ROW Survey on the Project Control Diagram, the first step will be to complete the Factor Computation Worksheet.
- Next, the appropriate information from the yellow highlighted area will be used to create a Project Coordinate System in MicroStation using the Geographic Coordinate System tools.
- First the program Bentley Map must be activated from within InRoads.

Activating Bentley Map

In order to create and save a Geographic Project Coordinate system that can be assigned to a MicroStation design file, the program Bentley Map must be activated. Once Bentley Map has been activated, a customized GCS can be created. Otherwise the files are read only.

- Begin by opening **InRoads**. Within InRoads, there is an application that needs to be activated called **Bentley Map**.
- From the MicroStation menu bar, select **Applications > Map > Activate Map**.



- A dialog box requesting a connection to a database will appear. **Click** the **Cancel** button to **close**. Map is now activated.

Once **Bentley Map** is activated, a customized geographic coordinate system can be created.

Project Geographic Coordinate File Creation

Geographic Coordinate Projections are created within MicroStation. A file located in the CDOT Data folder called CDOT-Projects.dty is used to store custom systems and a variable has been set in the CDOT configuration to access this file. Once this file has been created, it can be copied to other computers. The CDOT-Projects.dty file is found in the following location:

C:\Workspace\Workspace-CDOT_V8i\Standards-Global\MicroStation\Data.

When creating a project file, a copy of an existing coordinate system is used to create the Project Coordinate System. The following example lab takes you through the steps.

Example - Setting Project Geographic Coordinate System

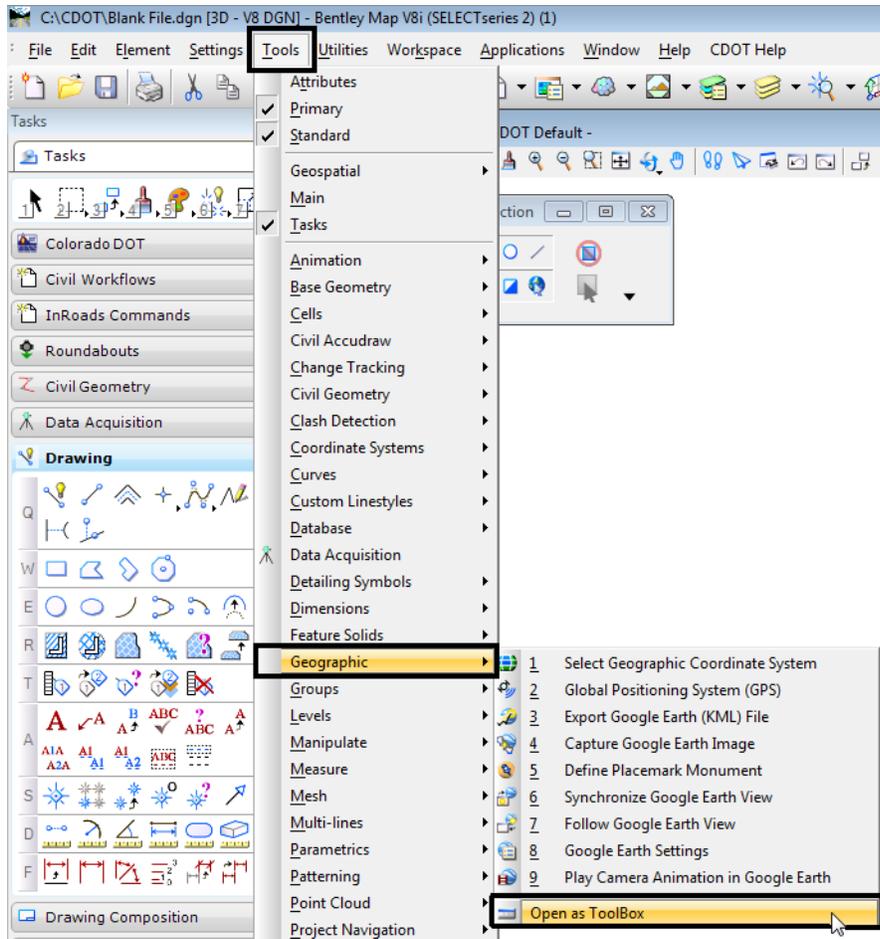
The following is an example of setting up and using a Project Geographic Coordinate System. In this example a project coordinate system is setup using information from ROW Survey. The project coordinate system is then assigned to a MicroStation design file.

Once the project coordinate system has been assigned to the design file, a survey file is referenced, a project point control file is referenced which is in UTM coordinates, an image file is referenced which is UTM coordinates, and lastly GIS data is referenced into the design file.

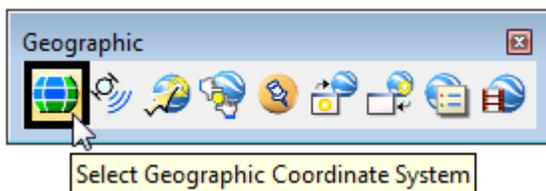
Create Project Geographic Coordinate System

1. Open InRoads and create a new MicroStation design file. In this example the file will be called 12345Des_Model.dgn.
2. From the Applications pulldown, activate Map and then cancel the window.
3. Create a Project Geographic Coordinates System using the information from this workflow. This data can also be found in the **Factor Computation Worksheet** using the **Sample -Seed Points** tab calculations.

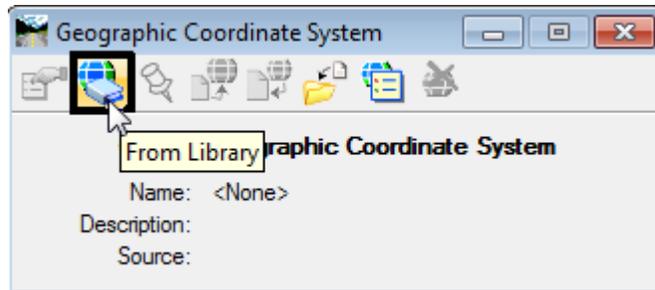
- Open the **Geographic Toolbox** from the **Tools** pulldown menu. Select **Tools > Geographic** and then the **Open as Toolbox**.



- This will open up the **Geographic** toolbox. <D> the **Select Geographic Coordinate System** icon from the toolbox.

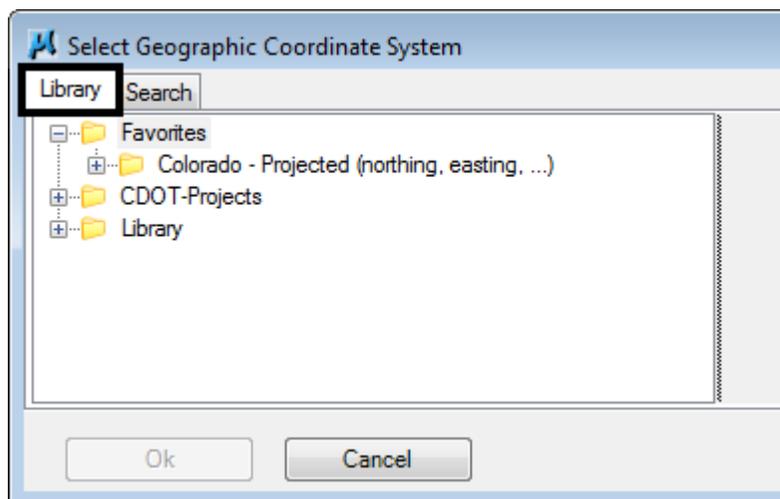


- This opens up the **Geographic Coordinate System** dialog box. <D> the **From Library** icon (the second icon from the left) to open the **Select Geographic Coordinate System** dialog box (this contains the library of geographic coordinate systems).

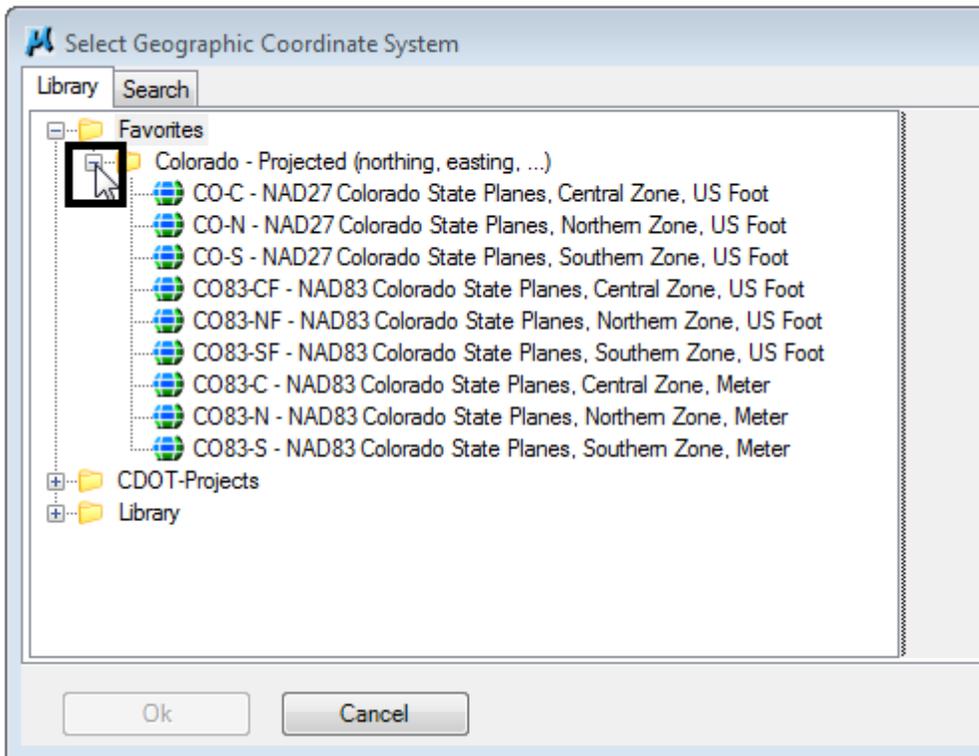


Note: If the model you are in does not have a GCS assigned to it, the first icon is displayed diluted and will be unusable.

- Select the **Library** tab to see all the available systems.



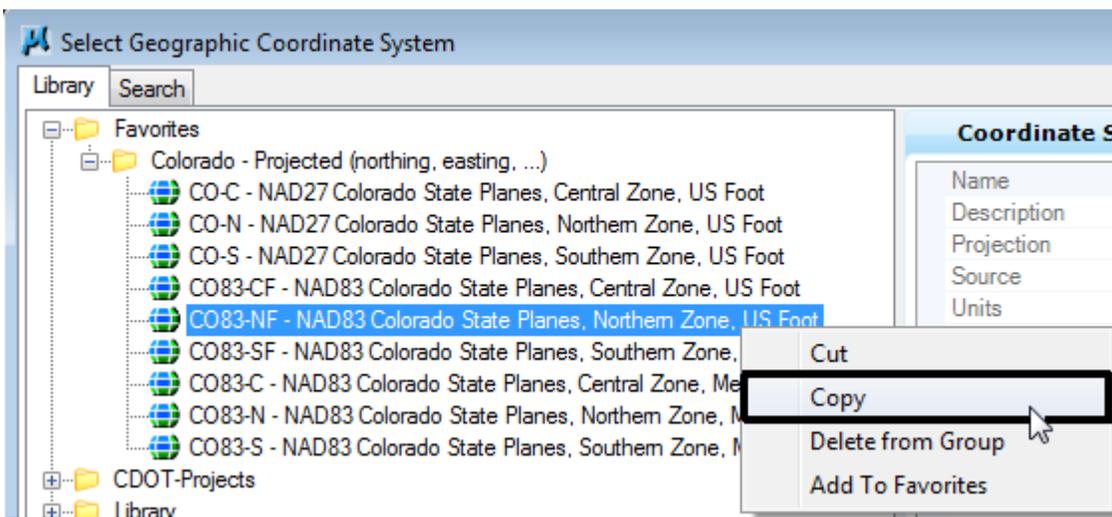
8. Expand the **Favorites** folder by clicking on the plus box and then expand the Colorado folder the same way. Default Colorado geographic coordinate systems can be accessed from this folder.



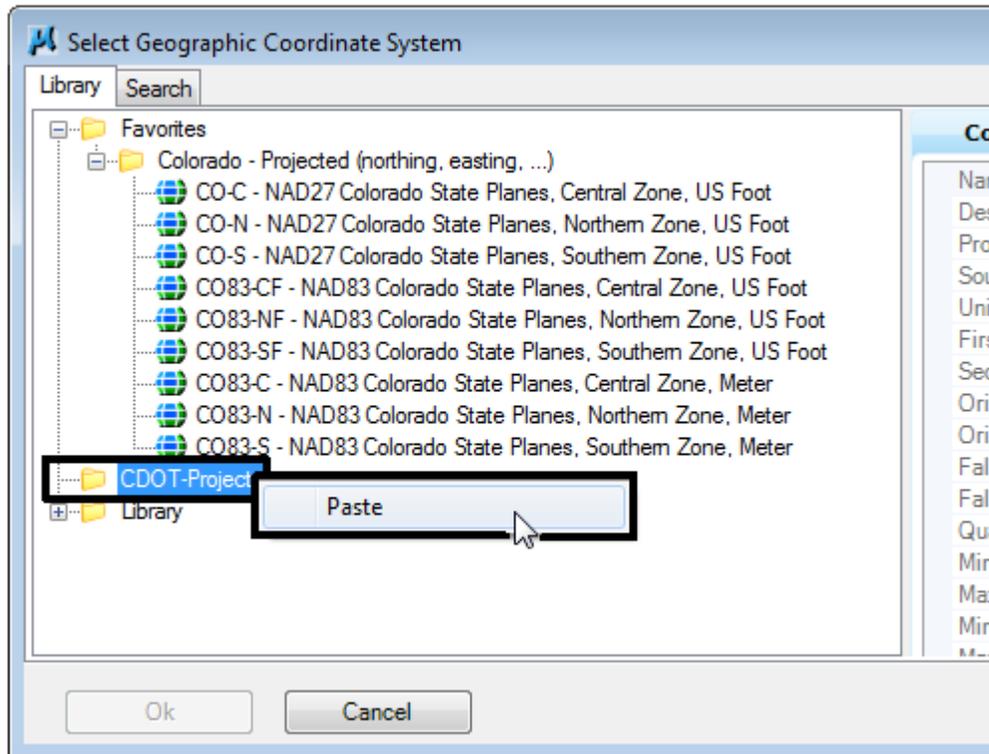
9. A copy of a base coordinate system is used to create the project coordinate system.

Note: CDOT Project coordinates created by ROW Survey are generally modified Colorado State Plane NAD 83 coordinate systems in one of three zones (Northern, Central, and Southern).

10. Select the coordinate system to be copied and right click over it.

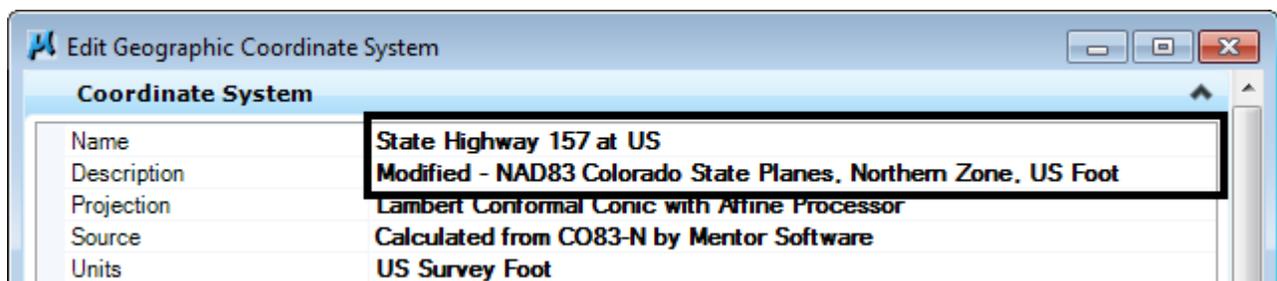


11. <D> on the **CDOT-Projects** folder and **Paste** the copy into the folder.



After pasting the file in the **CDOT-Project** folder it should be edited with project specific information.

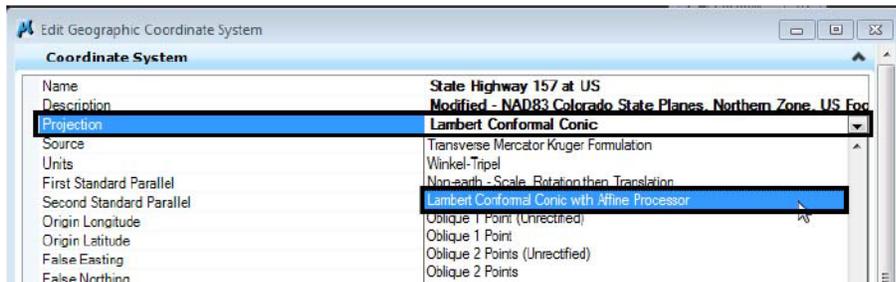
12. <R> on the copied file and select **Edit Coordinate System Properties**.
13. Edit the **Name** and **Description** to represent the project. <D> in the right hand column to edit.



Do not close the **Edit Geographic Coordinate System** dialog box. Additional information is required for the project coordinate system before it can be saved. This information is obtained from the **Factor Computation Worksheet**.

14. The base system for the copied NAD83 Colorado State Plane system has a Projection of Lambert Conformal Conic. It is important to select a system similar to the original when modifying the project system. For example: **Lambert Conformal Conic with Affine Processor** is used to modify a **Lambert Conformal Conic** projection.

15. **<D>** in the right hand column over the projection. Using the down arrow, navigate to the appropriate *Affine Processor*.



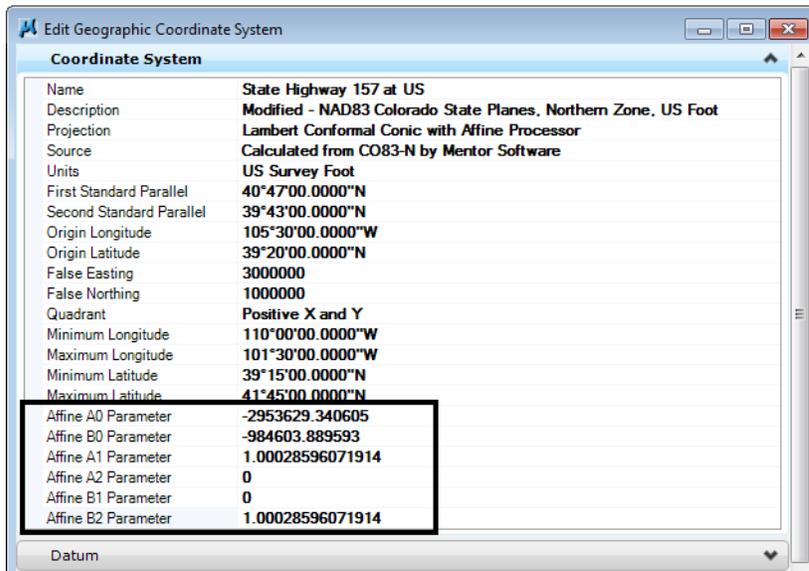
16. Next the information from the worksheet tab for Seed Point's should be entered. The information from the yellow highlighted area into the *Edit Geographic Coordinate System* dialog box.
17. *Affine A0 Parameter* is the *Easting* adjustment and the *Affine B0 Parameter* is the *Northing* adjustment.
18. *Affine A1 Parameter* and *Affine B2 Parameter* are the *Scale* parameters.

NAD83 Colorado State Planes, Northern Zone, US Foot
Lambert Conformal Conic with Affine Processor

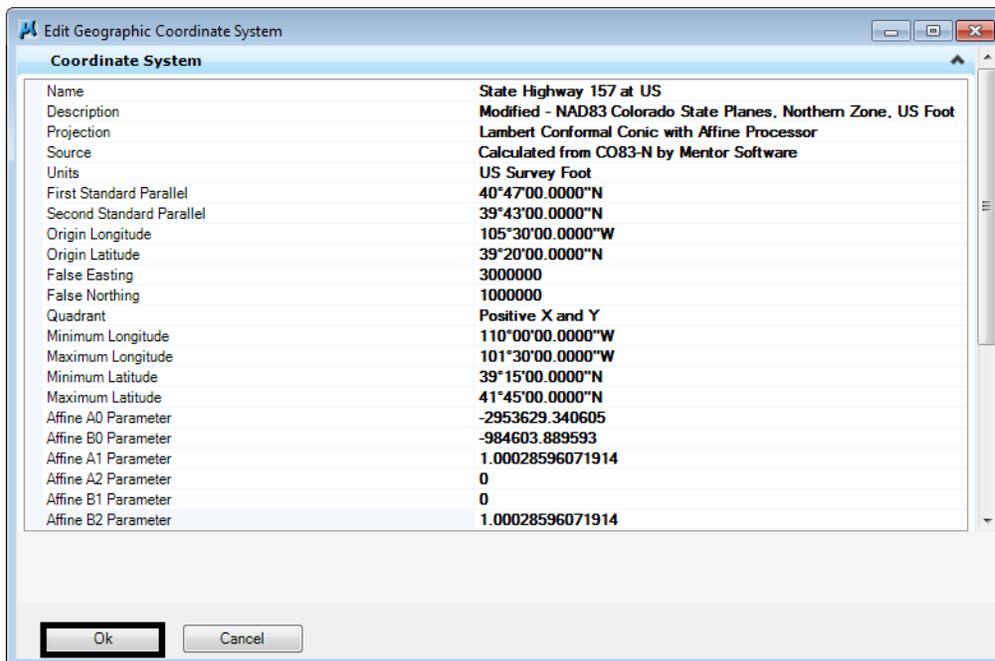
Truncation Adjusted to	300022.071236
Seed Coordinates	900010.655858

Geographic Coordinate System Parameters	
Affine A0 Parameter	-2953629.340605
Affine B0 Parameter	-984603.889593
Affine A1 Parameter	1.00028596071914
Affine B2 Parameter	1.00028596071914

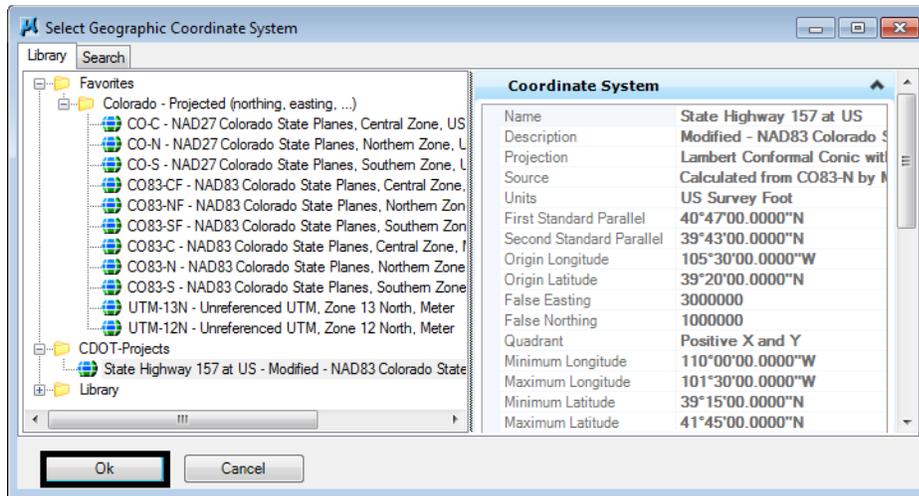
- In those cases when there is a rotation value, this would be entered in the **Affine A2** and **Affine B1** parameter area.



- Once the values have been entered they can be saved by selectin **Ok** to accept the changes and dismiss the **Edit Geographic Coordinate System** dialog box.



21. Select **Ok** in the *Select Geographic Coordinate System* dialog box to apply the custom project system. This project coordinate system can now be assigned to any design file within the project.

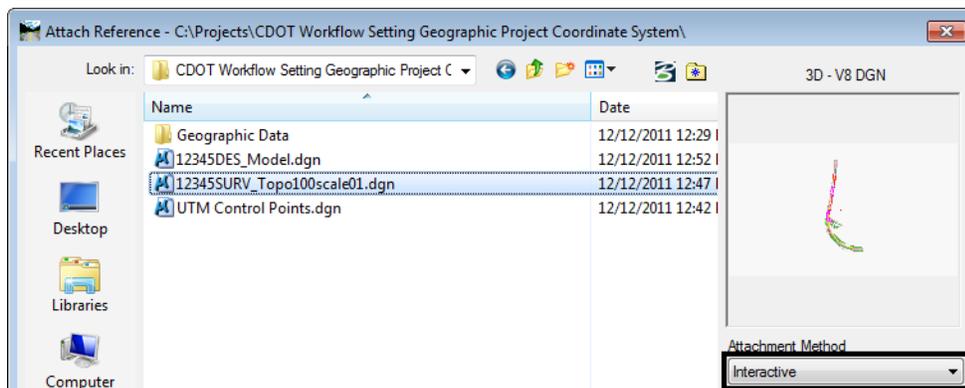


Attach Survey Topo File

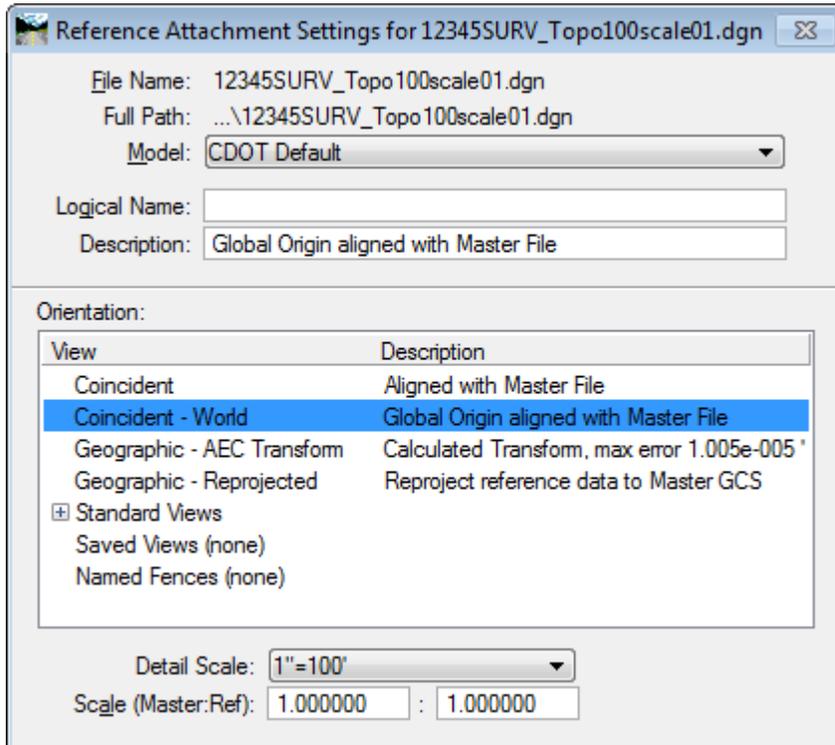
Once the Project Coordinate System has been defined and assigned to the new design file, it is time to reference files.

Note: For more information on attaching imagery, review the workflow Using Geographic Images in Raster Manager.

1. Begin by referencing the survey existing data. This file is called **12345SURV_Topo100scale01.dgn**.
2. Set the **Attachment Method** to **Interactive**.



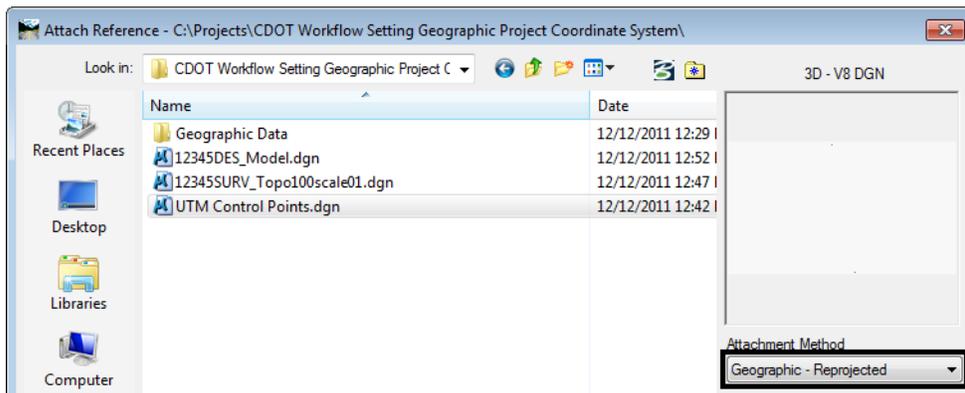
3. Select **Coincident - World** for the **Orientation**.



Reference UTM Control Points

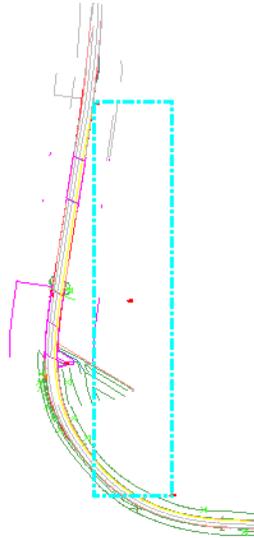
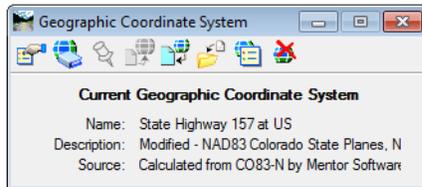
Reference the file containing control points which are in UTM coordinates. This file has a UTM-13N Geographic Coordinate System assigned to it.

1. Attach reference the file **UTM Control Points.dgn** and set the **Attachment Method** to **Geographic - Reprojected**.

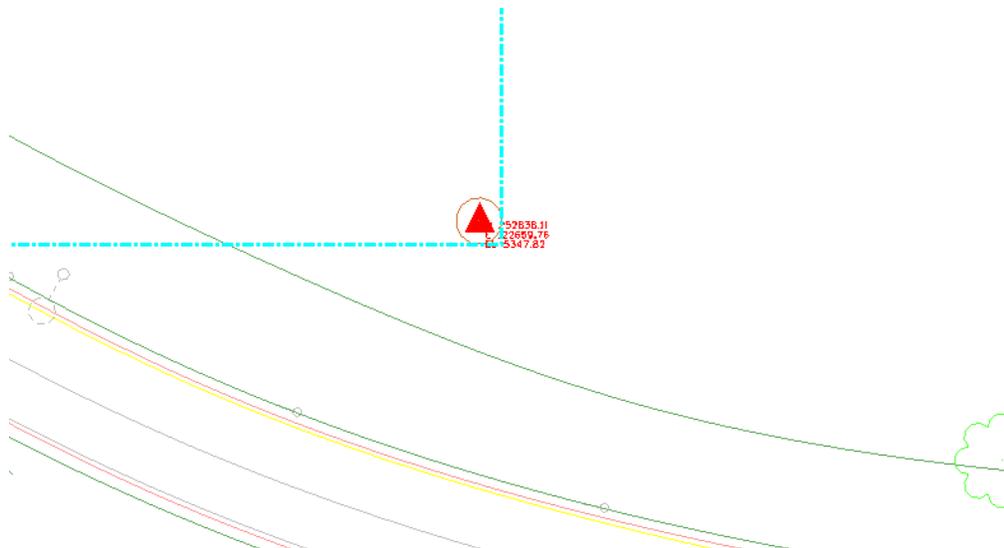


The UTM Control Points.dgn file appears as shown below represented by the blue dashed box.

Note: If the box does not appear, <D> the **Fit** view command (**Files** set to **All** and **Expand Clipping Planes** toggled on).



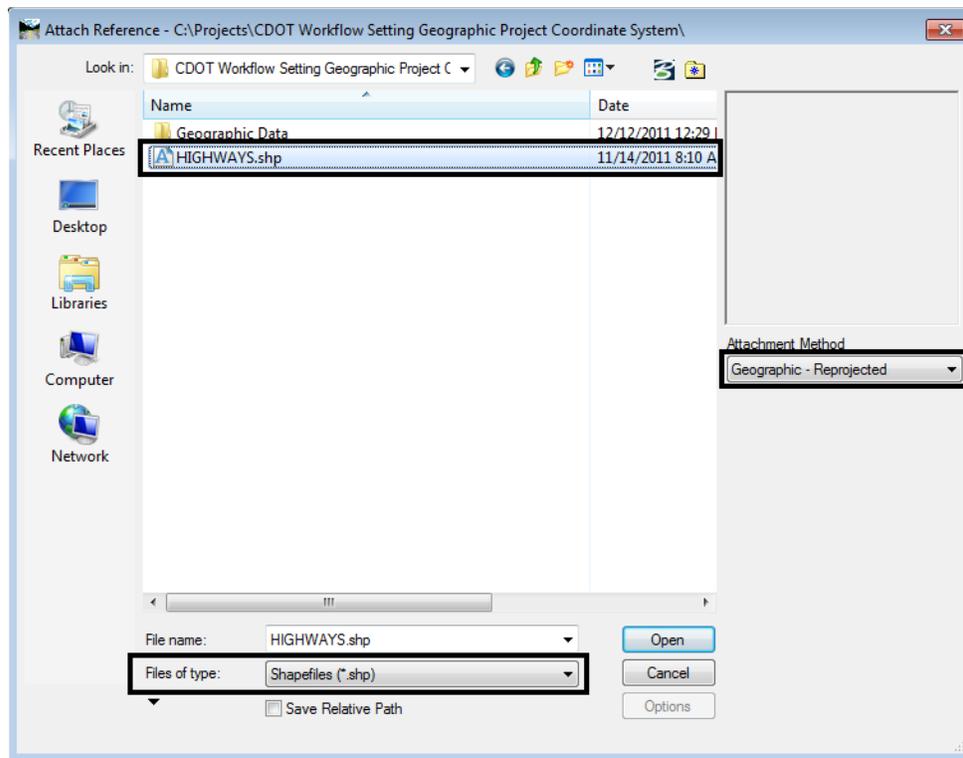
- The control points in the referenced files should line up. The triangle is a control point in the Survey file and the circle is the same control point in the UTM control point file.



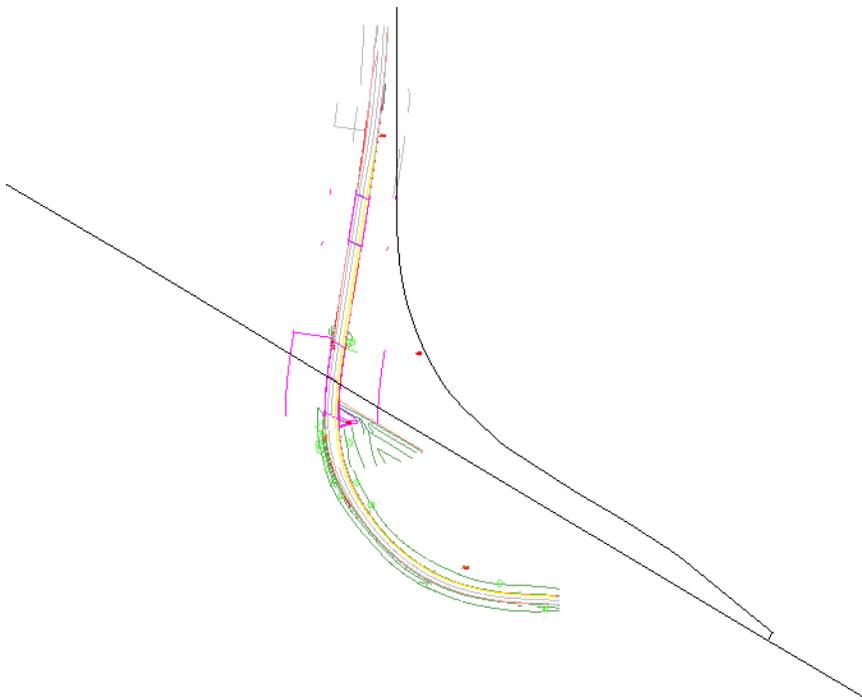
Reference GIS Shapefiles

Shape (shp) files created from GIS can be referenced in. In this example, highway linework in UTM coordinates will be referenced.

1. Attach reference the **HIGHWAYS.shp** being sure to change the **Files of type:** to **Shapefiles (*.shp)** and setting the **Attachment Method** to **Geographic - Reprojected**.



2. Notice that after attaching the files, they all be line up even though there are two separate coordinate systems being used.

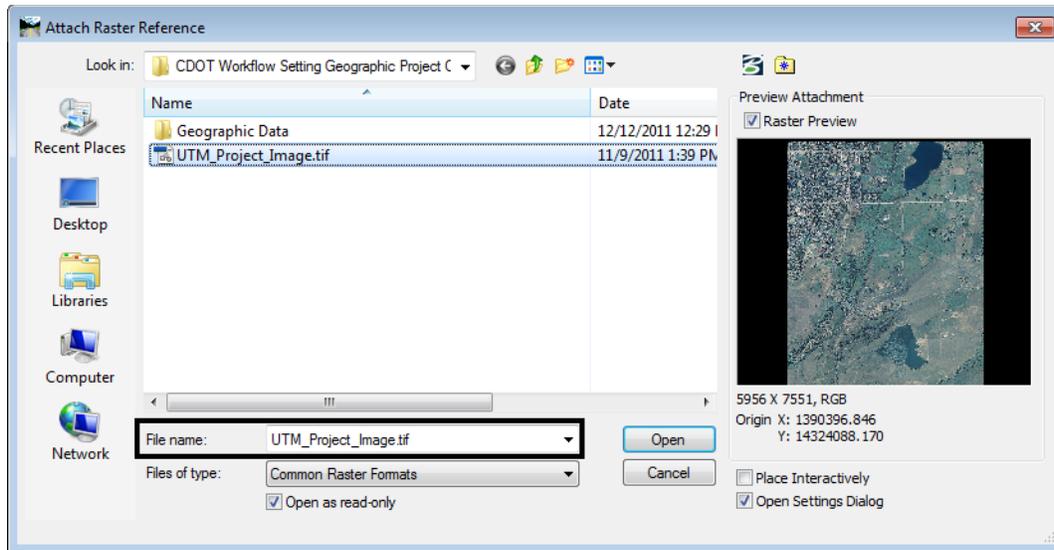


Reference Image Files

CDOT has imagery covering the state of Colorado. This imagery is in two different coordinate systems. The greater Denver area is in NAD83Colorado State Plane coordinates and the rest of Colorado is in UTM coordinates. Either system can be referenced into a design file and reprojected to the project coordinate system.

Refer to the workflow *CDOT Workflow Accessing Imagery Files* to learn more on how to find images within the state of Colorado.

1. Using *Raster Manger*, attach the file *UTM_Project_Image.tif*.

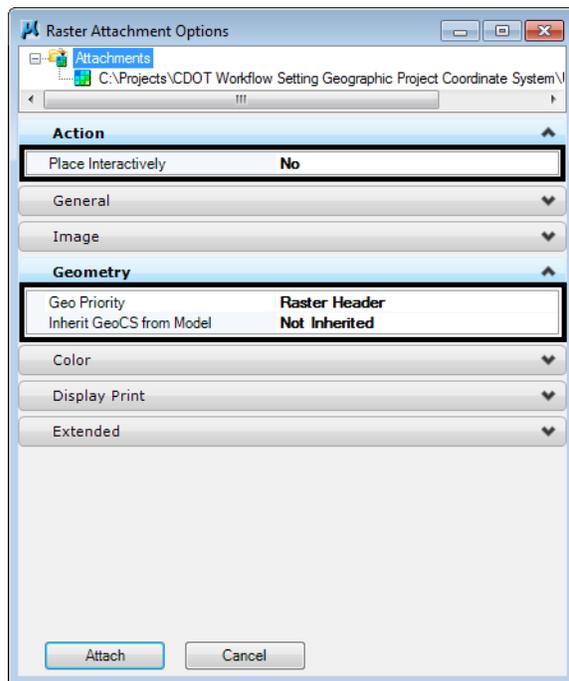


In this example, the image is from a portion of Colorado where the coordinate system is UTM. These files are GeoTIFF files with the coordinate system written into the header of the file. There is no sister file accompanying the image.

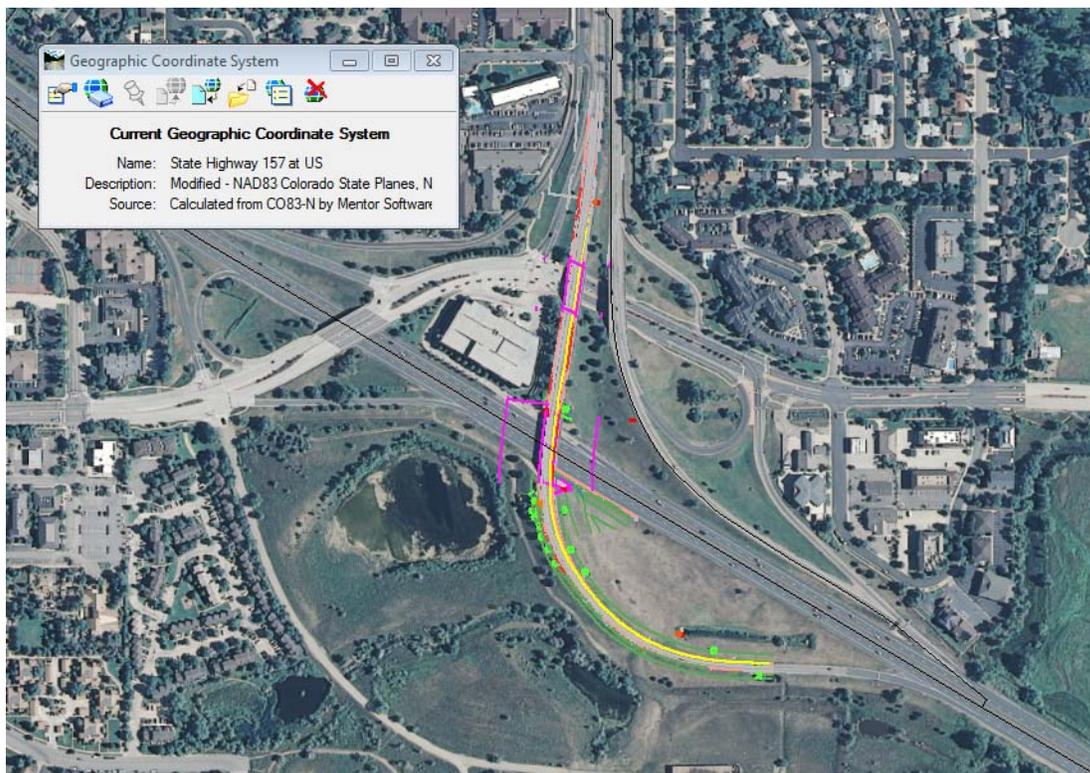
Note: The same setting used below are also used for images that have a sister file.

2. In the *Raster Attachment Options* dialog box, set the **Action** tab setting - *Place Interactively* to **No**.
3. Under the **Geometry** tab, set the *Geo Priority* setting to **Raster Header** since the coordinate assignments are in the file.

4. Set the **Inherit GeoCS from Model** to **Not Inherited** since the coordinate system of the design file is different from that of the image.



5. Select **Attach** to reference the image.



Workflow MS 4 - Working with Model Files and Sheet Files

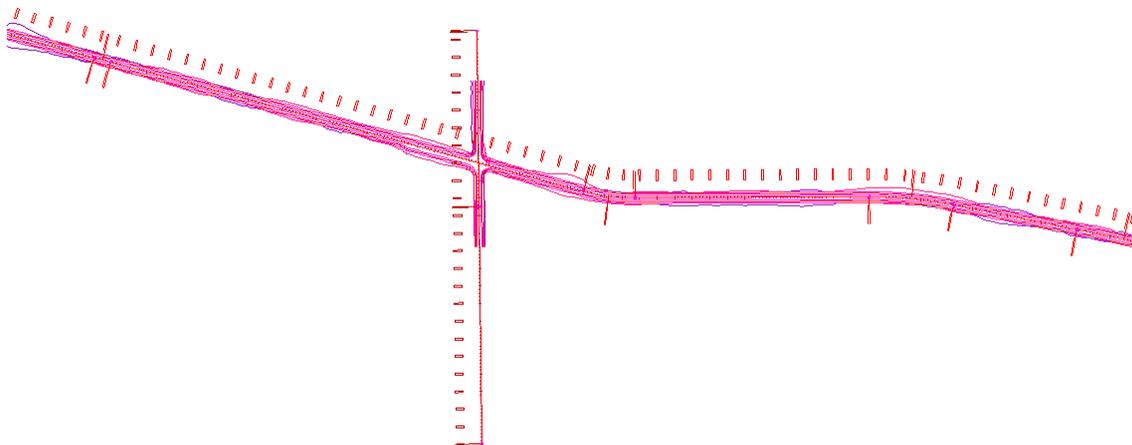
This document defines how to use and manage model and sheet files in a typical CDOT workflow. The document begins by describing the data that each type of file should contain along with typical examples to illustrate the differences. The locations for storing these files are identified. The steps to create a new model and sheet files and how to change the file settings to work with different plotting scales are explained. Finally, the process for referencing model files for review or printing is covered.

File Types

Model Files

Model files usually contain *design graphics* that are placed at the correct real world coordinates or *detail graphics* that are not dependant on real world coordinates. Model files are files that are ready to be used as a reference file to other model files for further design or to be referenced by sheet files for the purpose of plotting. Typical data included in a model file that is drawn at the correct real world coordinates would include planometrics for alignments, contours, utility lines, building outlines, structures, and any other DTM features. Model file data that is not dependent on real world coordinates would include typical sections, profiles, detail drawings, and tabulation sheets.

A model file will usually contain only one type of data. For example, one model file would contain only existing topography data, while another would contain only geometry data. Separate model files should be used for cross-sections and profiles. Dividing the data types into separate model files will allow for the most flexibility in how the data is utilized both by the specialty group team members and the secondary users that need to reference the data. This method of managing model files also minimizes level management by not having unrelated data in the file.



Another characteristic of the design file is that the graphics in the file usually represent the entire project. These graphics will later be referenced into a sheet file and clipped to fit the boundaries of the sheet.

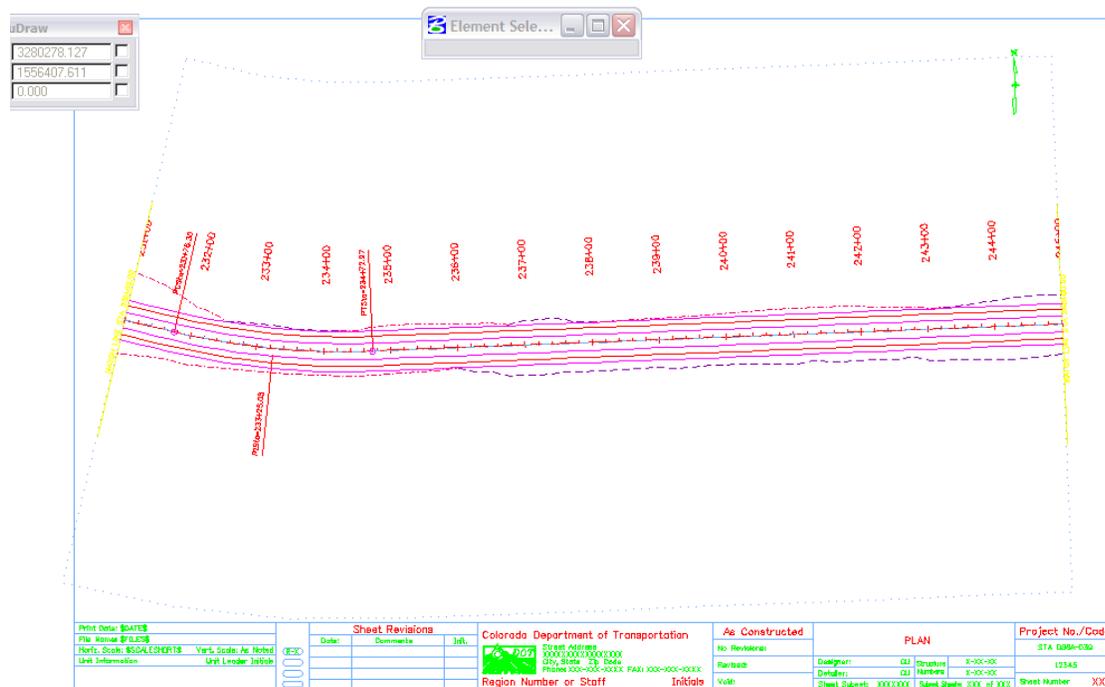
A distinct type of model file is the *working file*.

Working Files

Working files are model files that are being developed and/or revised and are not ready for use by other specialty groups or team members. These files usually have the owners' initials included in the filename as a way to distinguish the file from the ready-to-use model file. The differences between a model file and a working file is the completeness of the file and its availability to others.

Sheet Files

Sheet files are MicroStation DGN files that contain the data required for printing. They are created by referencing in various model files that either represent directly or add clarification to the features that will be constructed from the printed sheet and include a border file. In addition to containing reference files, typical data that would be included in a sheet would be informational text, such as callouts and dimensions, a directional arrow if appropriate, and other non-engineering information such as logos or stamps.



The graphics in a sheet file represent only a portion of the entire design and are usually included within a standard border. The image above is a portion of the graphic representing the design file shown on the previous page.

File Management

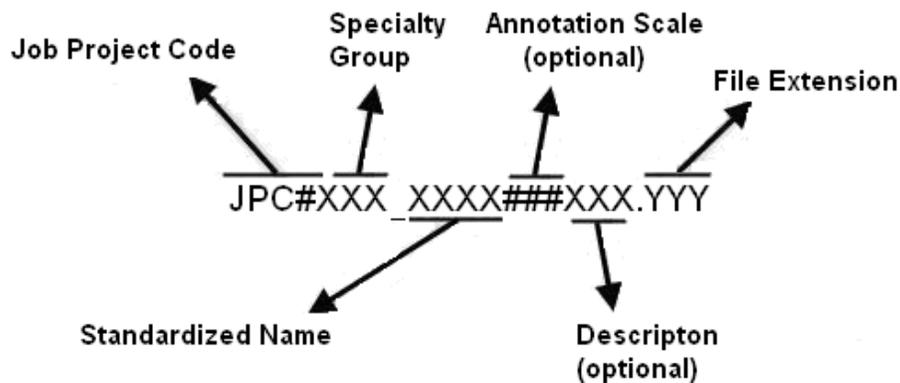
Each of these files is owned by the Project Manager of the specialty group whose data is contained in the file and updated by the assigned team member. A team member from one specialty group should not update the file(s) of a team member from another specialty group.

File Naming Conventions

The CDOT naming standard uses a formula that restricts the character placement, ensures unique file names, and identifies the information contained in the file.

All CDOT projects must follow these file naming conventions. Standardizing file names is necessary for effective management of the large numbers of files needed to produce a set of design plans.

CDOT files are named in a standard format that identifies the file's project, the data contained within it, and the product used for its creation. The naming convention is illustrated as follows:



- ◆ **Job Project Code (JPC)** is the CDOT project code, formerly known as the project subaccount number.
- ◆ **Specialty Group** is the standardized abbreviation for the specialty group that the owner of the file is with.
- ◆ **Standardized Name** denotes the type of data that is contained in the file.
- ◆ **Annotation Scale** including the annotation scale in the file name is optional. However, it should be included in file names for projects that use multiple annotation scales.
- ◆ **Description** A brief description can be used to further identify a model file. For sheet files, this field is used as a counter to differentiate between multiple files of a specific type.
- ◆ **File Extensions** define the product used for its creation. Examples would be DGN for MicroStation, DTM for an InRoads surface, etc.

An example file name for a MicroStation design file would look like the following,
12345DES_Model100US285.dgn

12345 indicating the CDOT Project Number, **DES** indicates it is Roadway Design's model file and **100** indicating it uses a 1"=100' annotation scale, US285 is a description identifying the highway this model depicts. **DGN** is the default extension for MicroStation design files.

Note: A seventh segment is used on Working Files. This segment should be the initials of the designer or engineer who is working on the file.

Example: **CU12345DES_Model100.dgn** where CU, are the initials of the designer or engineer (in this example, CU stands for "CDOT User").

Storing Model Files and Sheet Files

Model File Location

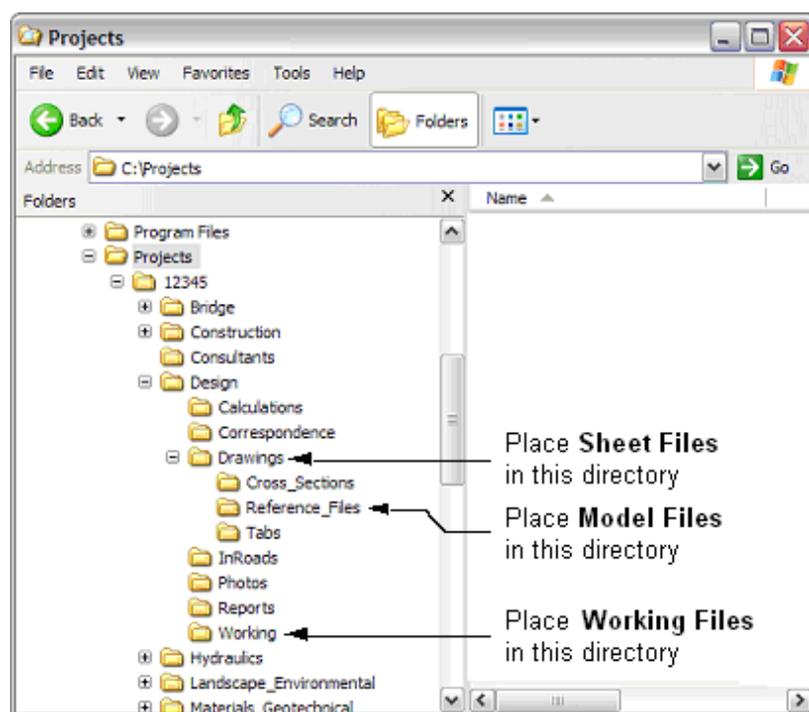
Model files should be stored in the **JPC#\SpecialtyGroup\Drawings\Reference_Files** folder. The exception to this is for cross-sections (design or construction) which have their own sub-directory under **\Drawings** sub-directory. Cross sections are separated from the rest of the model files at the request of the Reproduction department to simplify the process of assembling plan sets.

Working File Location

Working files should be stored in the **\JPC#\Specialty Group\Working** folder.

Sheet File Location

Sheet files should be stored in the **\JPC#\Specialty Group\Drawings** folder.



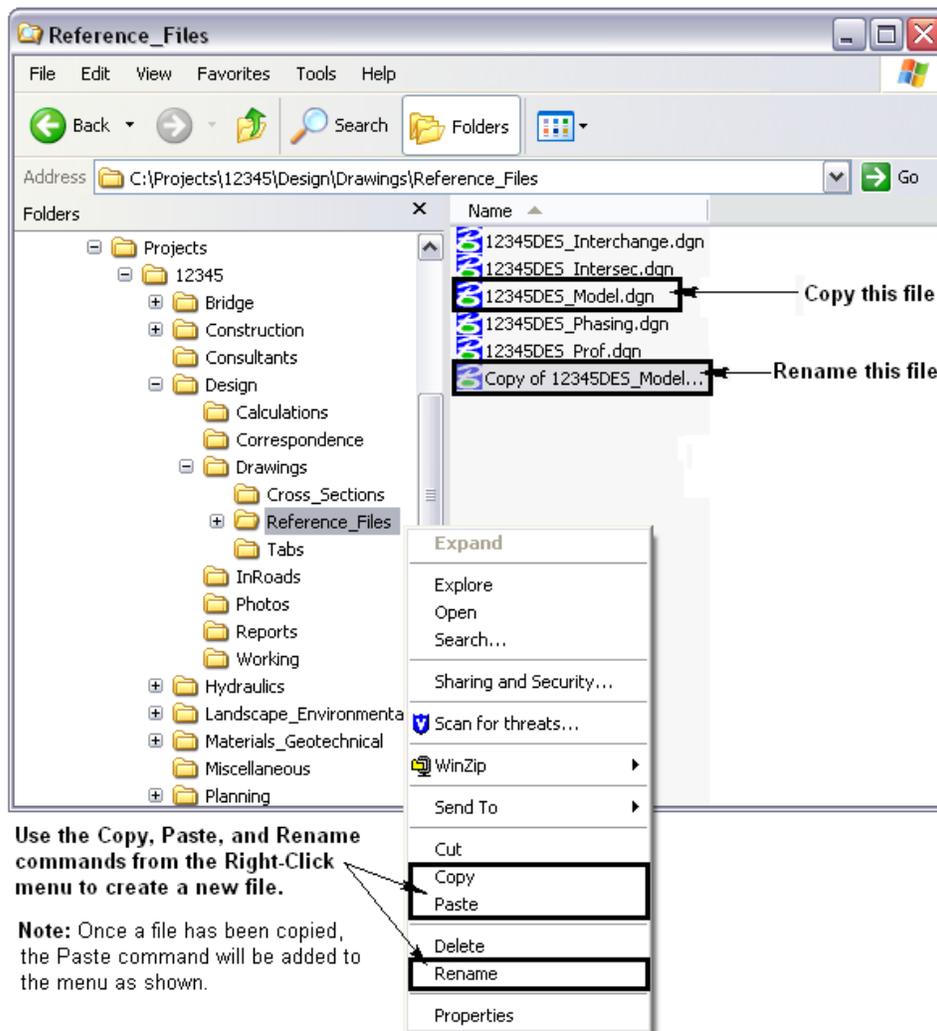
Creating a Model and Sheet Files

During the setup of a project, several model and sheet files are auto-populated into the **\JPC#\SpecialtyGroup\Drawings\Reference_Files** and **\JPC#\Specialty Group\Drawings** directories of each of the specialty group folders and have the CDOT standard file names already assigned. (Construction and Planning are exceptions and do not have any auto-populated files.) These auto-populated files can be modified to include project specific information before being used to create new drawings. In addition to the auto-populated files, standard 2D and 3D seed files are available from the **C:\Program Files\Workspace-CDOT\Standards-Global\MicroStation\Seed** directory. These files are global standards and are write protected so that no changes can be made.

Several of methods can be used to begin a new drawing; 1) Use the Windows Explorer to copy, paste, and rename a file, or 2) use the MicroStation Manager window to create a new file using a seed file or to open a drawing and then use the “save-as” command to create the new file. If a new file with project specific data is required, use the Windows Explorer method. Otherwise, the MicroStation Manager method should be used.

Using Windows Explorer

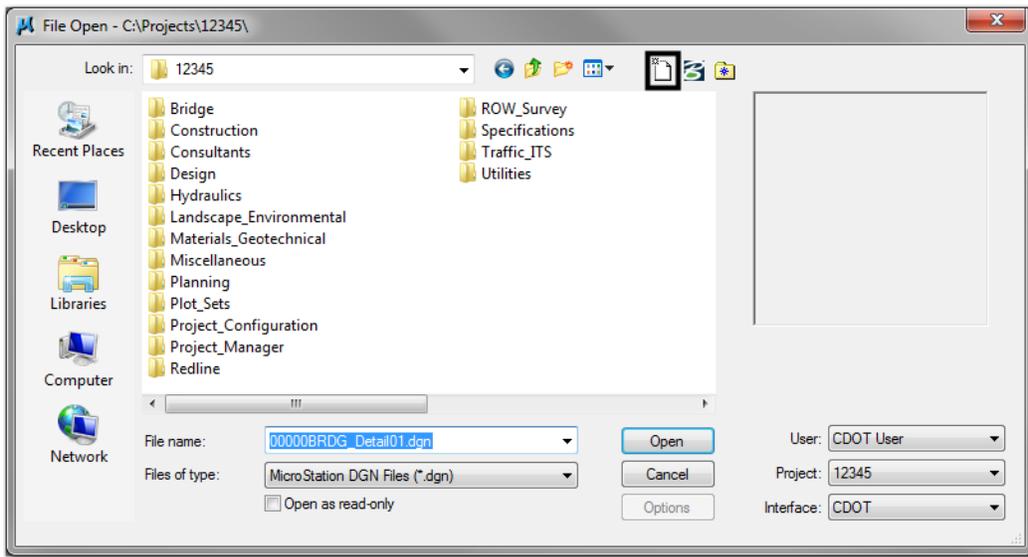
1. Open the Windows Explorer window and navigate to the desired `\Projects\JPC#\Specialty Group\` folder. **<R>** on the desired file and select **Copy** from the menu.



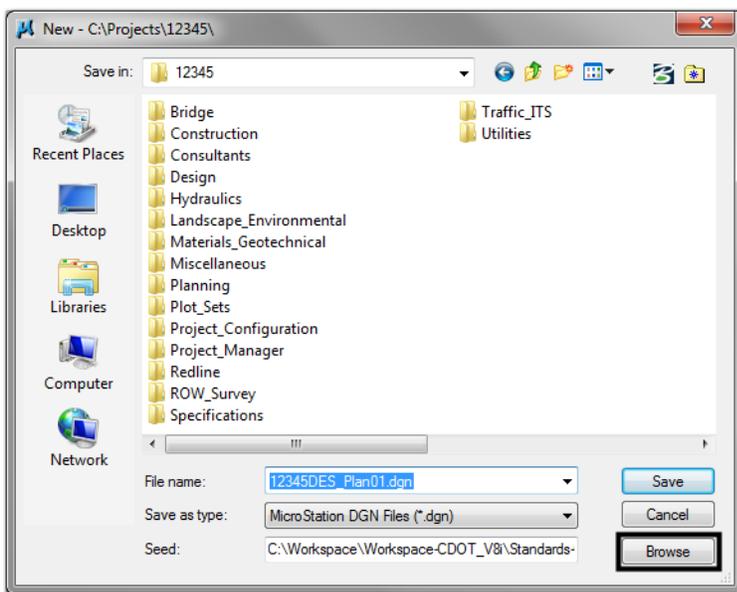
2. In the blank area below the file list, right click and select **Paste** from the menu.
3. A copy of the selected file is placed in the folder. Rename the new file according to the file naming conventions. To rename the file **<R>** on the file name and select
4. **Rename** from the menu. Type in the new name and press the **Enter** key to finish.

Using a Seed File

1. Open MicroStation from the Start menu (or desktop icon if available). From the **File Open** dialog box select the **New** file icon. If MicroStation is already open, select **File > New** from the menu. Both operations will display the **New** window.



2. From the **New** window, click on the **Browse** button to display the **Select Seed File** window.



3. From the **Select Seed File** window, highlight the desired seed file.

Note: All disciplines use the *2D-Seed_CDOT.dgn* and the *3D-Seed_CDOT.dgn*. The *Bridge-2D-Seed_CDOT.dgn* and *Bridge-3D-Seed_CDOT.dgn* have specific settings for Bridge.

4. Click the **Open** button to accept the selection. This will dismiss the **Select Seed File** window.

5. In the **New** window, type the desired file name (refer to the naming conventions above). Click the **Save** button to accept the file name. MicroStation will open with the newly created file.

Annotation and Line Style Scale

While the elements themselves are drawn at a 1' = 1' scale, a scale factor is set for line styles and text so that its size will be appropriate when printed.

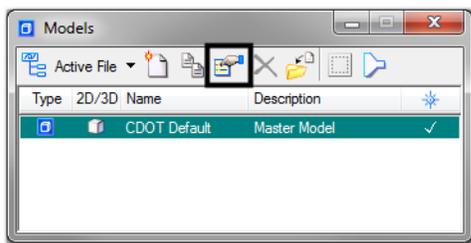
Setting the Annotation Scale

Annotation Scale controls text, dimension, and linestyle sizes. It is set in the model properties dialog box or in the drawing scale toolbox docked at the bottom of the application screen.

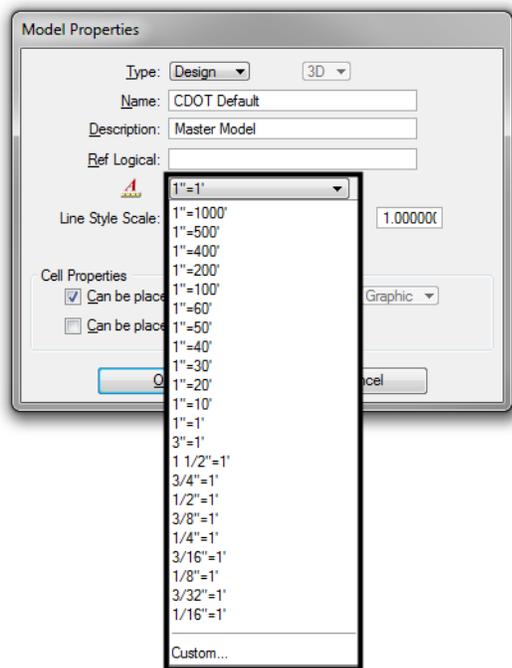
1. Select the **Models** icon from the **Primary Tools** toolbar.



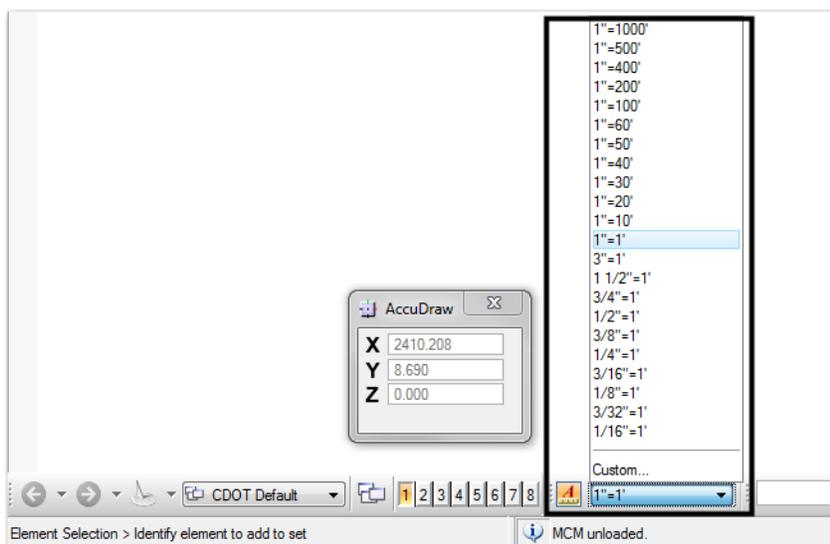
2. This displays the **Models** dialog box. From here, select the **Edit Model Properties** icon.



- In the **Model Properties** dialog box, select the desired **Annotation Scale**.



- <D> the **OK** icon to accept the selection. This will close the **Model Properties** dialog box. The **Models** dialog box can also be closed.
- Changing the Annotation Scale from the Drawing Scale toolbox is the faster way to make this change since it doesn't require any dialog boxes to be opened.

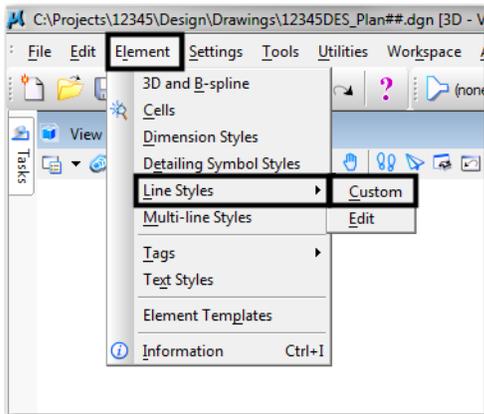


Line Style Scale Settings

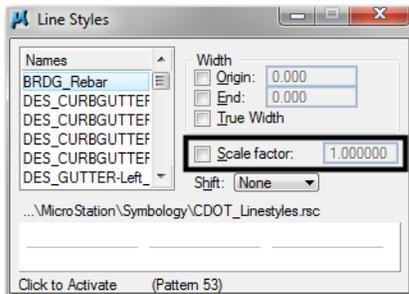
The Line Style Scale settings are set based on the type of data that is in the model or sheet file. Graphics that are generated in MicroStation will behave differently than data that is generated from InRoads. Applying the wrong setting will display the linestyle symbology incorrectly in the model and when referenced into other drawings.

MicroStation graphics are drawn at a scale of 1 and utilize the annotation scale setting to view the linework in the appropriate print scale. InRoads hard codes the line style scale to the graphics based on the **Project Options Factors**.

1. Open the **Line Styles** dialog box by selecting, **Element > Line Styles > Custom**.

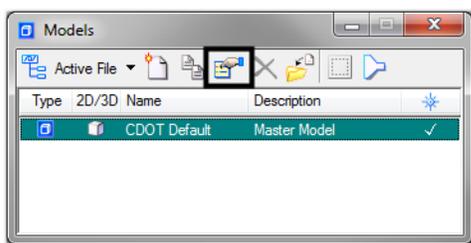


2. Verify the **Scale factor**: setting is toggled off.

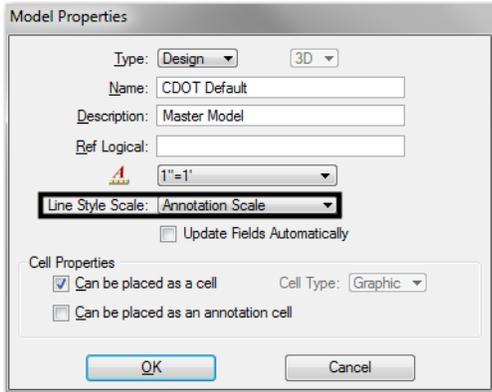


MicroStation graphics

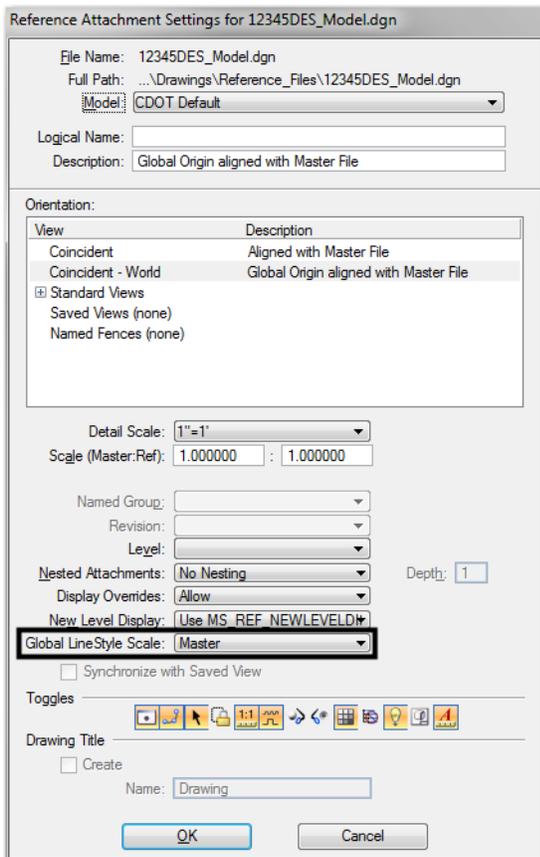
1. Open the **Model Properties**.



- Verify the **Line Style Scale** setting is set to **Annotation Scale**.



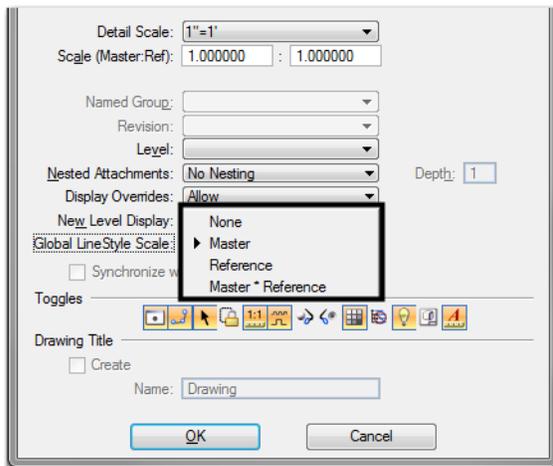
- Close the **Model Properties** dialog box by selecting the **OK** button.
- Changing the **Annotation Scale** will now modify the **Line Style** scales in the models
- When referencing models that contain MicroStation generated graphics, set the **Global LineStyle Scale:** to **Master**



Note: This will force the reference line styles to read the sheet file annotation scale and apply it to the reference line styles.

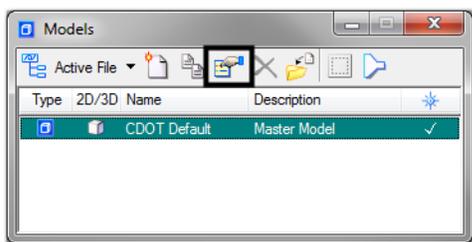
6. Settings for the Global LineStyle Scale are as follows:

- ◆ None - no scaling is applied, line styles will be viewed at a 1 to 1 scale
- ◆ Master - the reference line styles will be scaled to the annotation scale setting in the open file
- ◆ Reference - the reference line styles will be scaled to the annotation scale setting in the referenced file
- ◆ Master*Reference - the line styles will be scaled to both annotation scales together

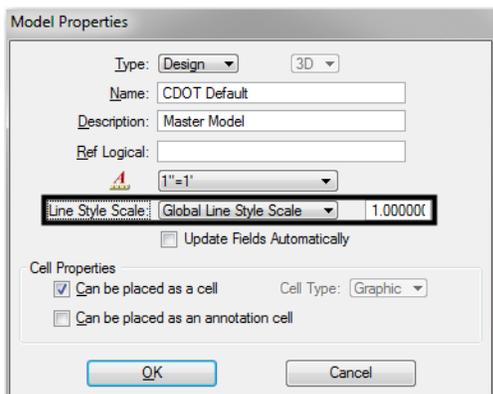


InRoads Graphics

1. Open the **Model Properties**.

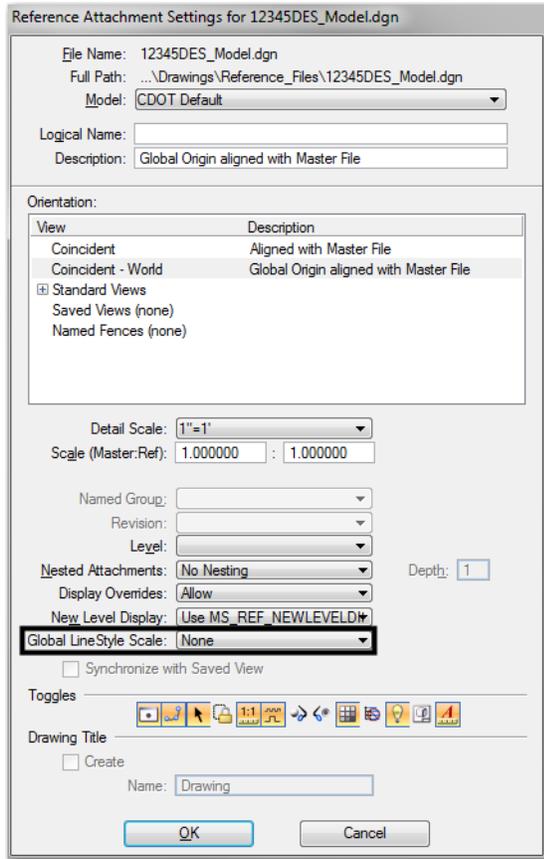


2. Verify the **Line Style Scale** setting is set to **Global Line Style Scale** and set to a value of **1**.



3. Close the **Model Properties** dialog box by selecting the **OK** button.

4. If the print scale of the sheet file changes, the InRoads graphics will have to be re-displayed with the new print scale set in the **Factors** tab in InRoads. The annotation scale settings will not affect this file.
5. When referencing models that contain InRoads generated graphics, set the **Global LineStyle Scale:** to **None**



Using Model Files From Other Users As References

A reference is a model that is attached to and displayed within the active model or sheet file for design or printing purposes. Elements in a reference display as though they were in the active model. Although you cannot manipulate the elements in a reference, you can snap to them and even copy them into the active model.

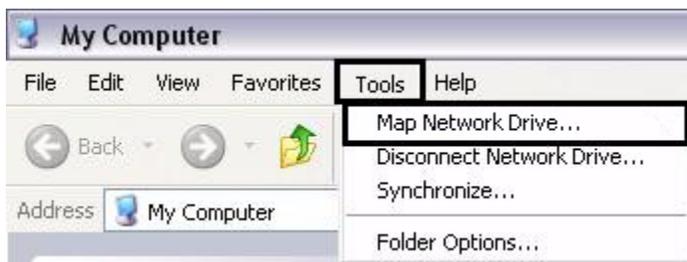
Model files created by other users can be used as references even if the file resides on a different computer. This is done by mapping the remote computer (the one containing the file to be referenced) to a drive letter on the local computer.

Mapping a Remote Computer

1. Open the **My Computer** window from the **Start** menu or desktop icon (if available).

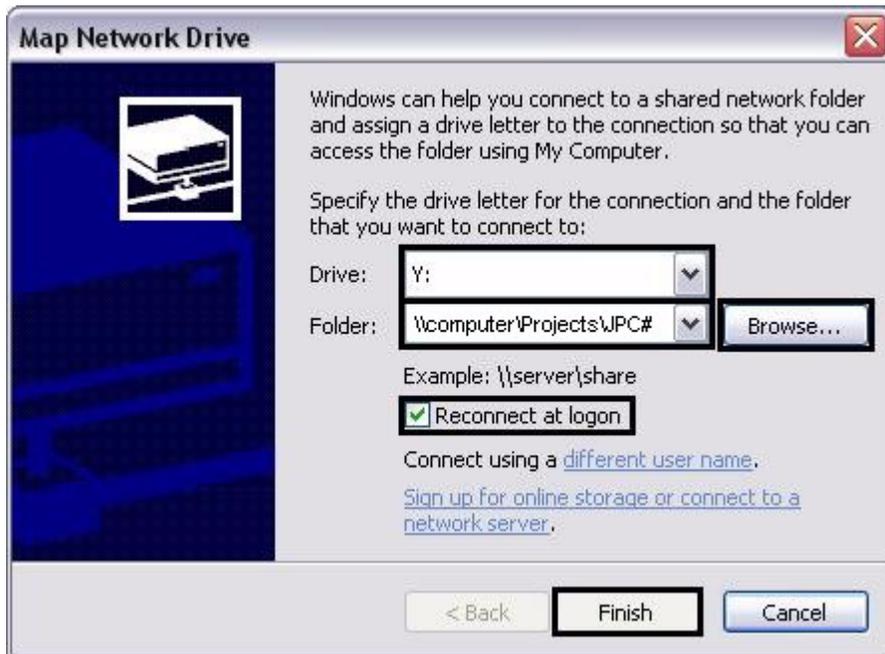


2. From the **My Computer** window, select **Tools > Map Network Drive**.



3. In the **Map Network Drive** dialog box, select the desired **Drive** letter.
4. In the **Folder** field, enter the desired computer name and directory. The **Browse** icon can also be used to locate and select this information. The following format is used when keying in the computer information:
\\computer_name\Projects\JPC#\.
5. If the information on the remote computer will be required over a period of many days, check on the **Reconnect at Login** option.

6. <D> the **Finish** icon to complete the process.



7. Files from the remote computer can now be referenced into local drawings. The procedures for referencing files are covered in the following workflows: [CDOT Sheet File Creation](#), [CDOT Sheet File Creation Multiple Scales](#).

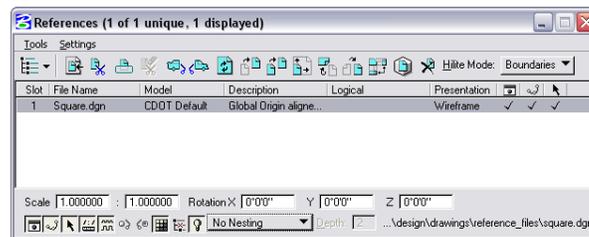
Nested Attachments

Reference attachment nesting determines what happens when a file containing attachments is attached to the active dgn file. The following examples are used to illustrate the different nesting options.

Four files are used in the examples. **Blank.dgn** is the active file. **Square.dgn**, **Triangle.dgn**, and **Circle.dgn** will be used as attachments. For the purposes of the examples, **Circle.dgn** has been previously attached to **Square.dgn** and **Triangle.dgn** has been previously attached to **Circle.dgn**.

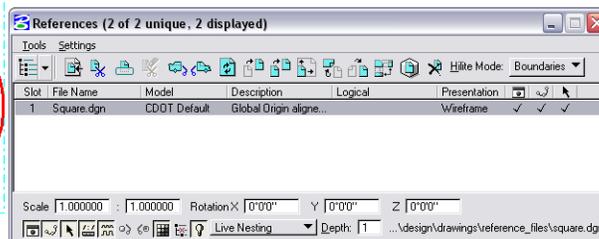
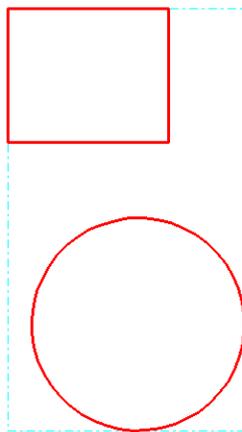
No Nesting

1. With this option, only the selected file will visible in the active file.

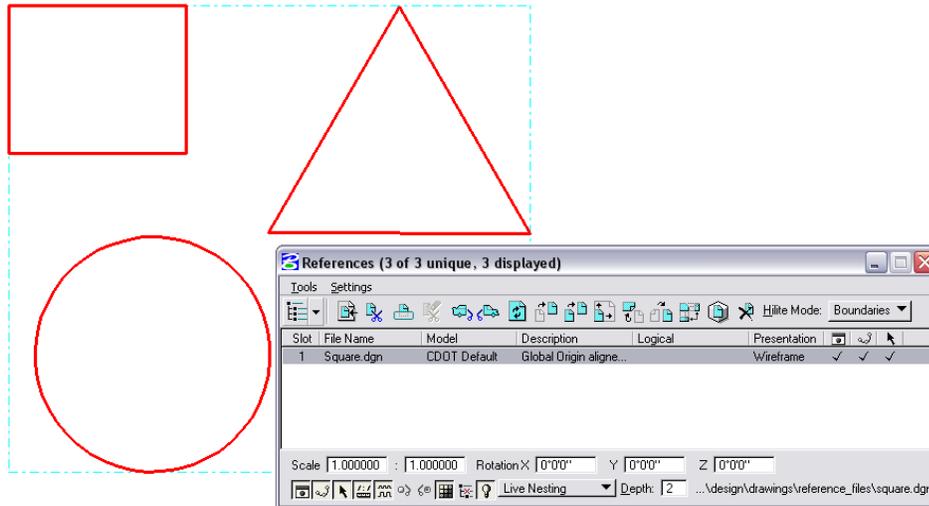


Live Nesting

1. This option allows files that are attached to the selected file to be viewed.



- The number of levels of attachments that can be viewed in this manner is controlled by the **Depth** setting. In the above illustration, **Circle.dgn** is attached directly to **Square.dgn** and is visible with a **Depth** setting of **1**. By changing the **Depth** setting to **2**, files attached to **Circle.dgn** (in this case **Triangle.dgn**) become visible.

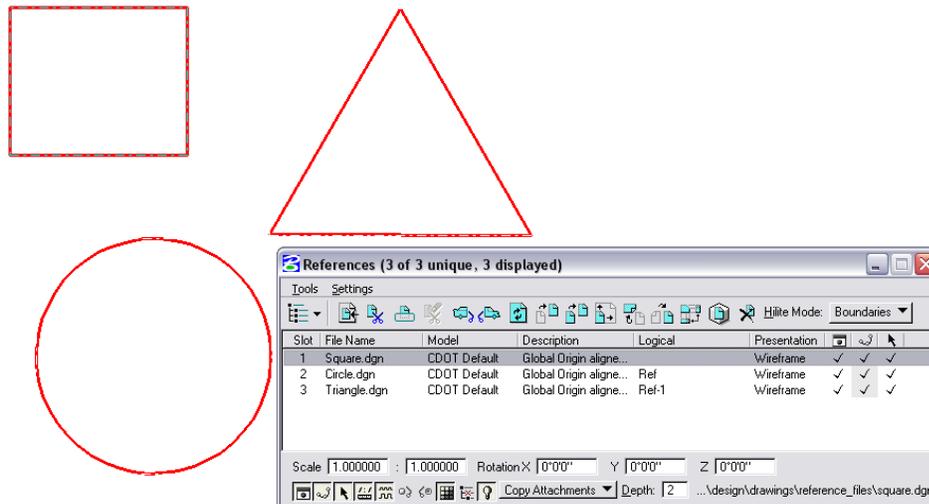


- With live nesting, any reference file settings changes affect all of the visible files. So, for example, if the **Display** is turned off for **Square.dgn**, **Circle.dgn** and **Triangle.dgn** are turned off also.

Note: Level display of nested attachments is discussed below.)

Copy Attachments

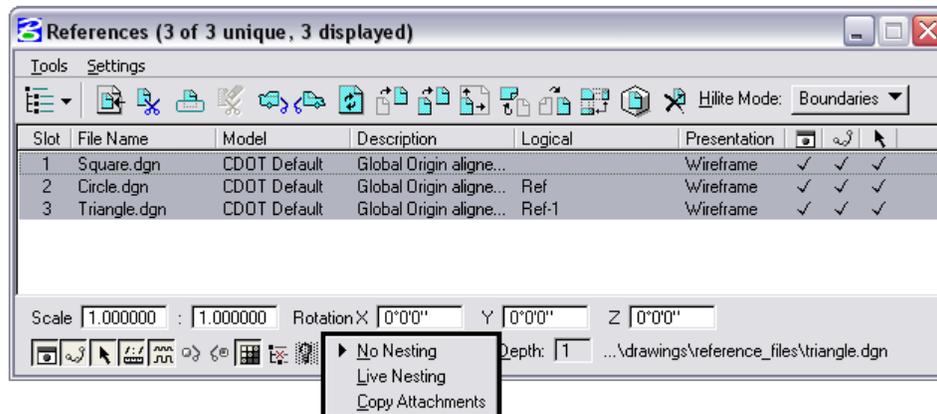
- This option also allows multiple levels of attachments to be viewed, however, it also allows independent control of each attachment. Compare the illustration below with those for **Live Nesting**. Here, each attached file is listed in the **References** dialog box and its settings can be adjusted independently.



Changing the Nesting Mode

The **Nesting Mode** for a single file or a group of attachments can be changed from the **References** dialog box. To change the nesting mode:

1. Highlight the desired files from the list.
2. Use the pull-down at the bottom of the dialog box to select the desired nesting mode.



Attachment Level Display

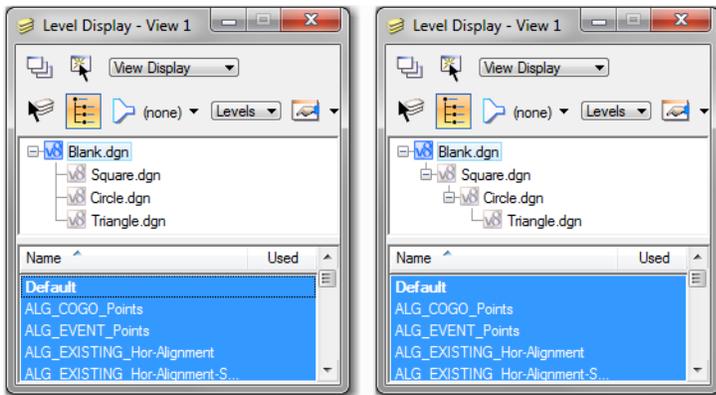
It is probable that elements in attachments will occupy levels that have the same name as levels in the active file or other attachments. This is possible because the level display operates independently on the active file and each attachment regardless of the nesting mode.

Turning Levels On and Off in Attachments

1. Select the **Level Display** icon from the MicroStation **Primary Tools** tool bar.

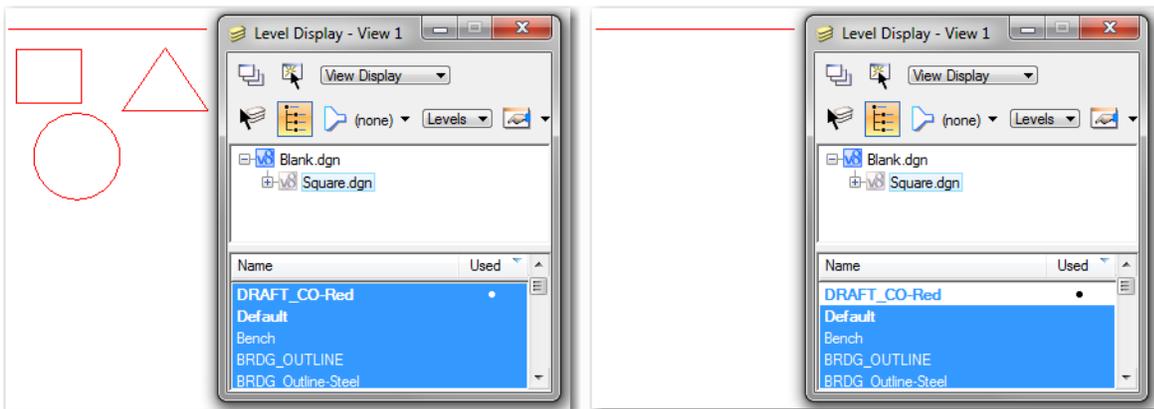


- Select the file whose levels will be turned on or off. The file display within the Level Display dialog box will be different depending on the nesting mode.

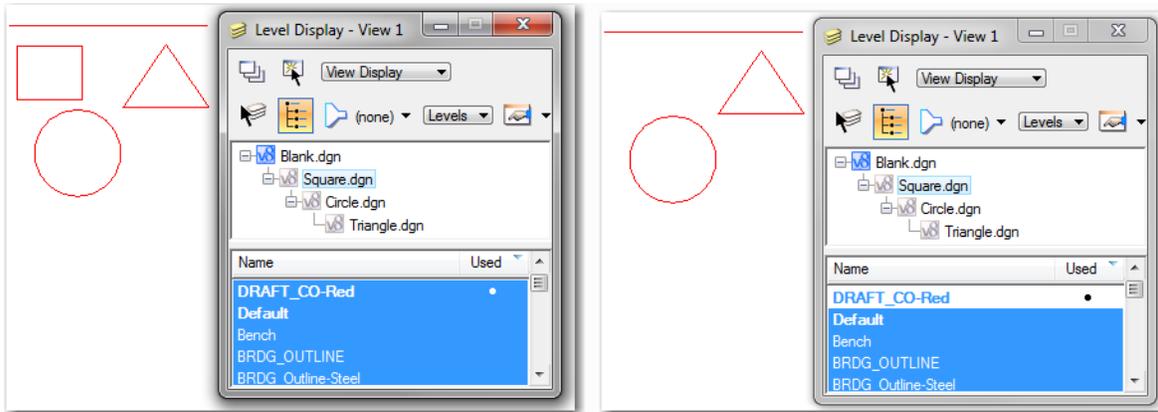


Note: On the left the files were attached separately or with the **Copy Attachment** nesting mode. On the right, the files were attached using live nesting.

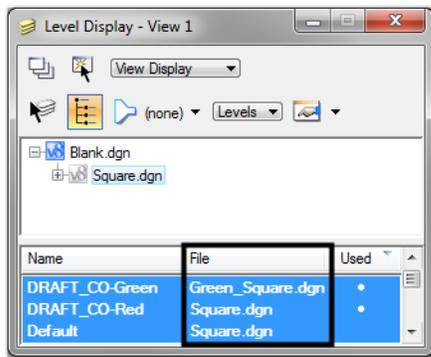
- Click on the desired level to change its view status. When using live nesting, if the file tree is not expanded, level display changes to a particular file will affect all the files collapsed underneath it.
- Continuing the examples above, the attachments were made using **Live Nesting** with a Depth of **2**. All of the elements shown were drawn on the DRAFT_CO-Red level (the line is in the active file, **Blank.dgn**). In the illustration below, the DRAFT_CO-Red level is turned off in **Square.dgn** with the file tree collapsed. This causes the elements in the files collapsed under **Square.dgn** to be turned off also.



- In this illustration, the file tree has been expanded so that when the DRAFT_CO-Red level in *Square.dgn* is turned off the other files are unaffected and only the square disappears.

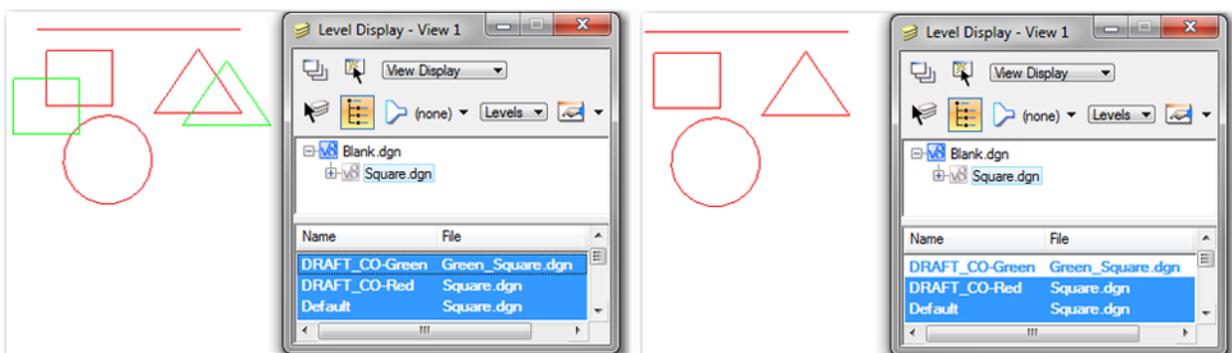


- Levels that are used in nested attachments which are not used in the main attachment will be displayed in the **Level Display** dialog box. The name of the first attachment containing the level is displayed.



Note: With the tree view collapsed, turning on or off a level in a collapsed file will affect all collapsed files using that level.

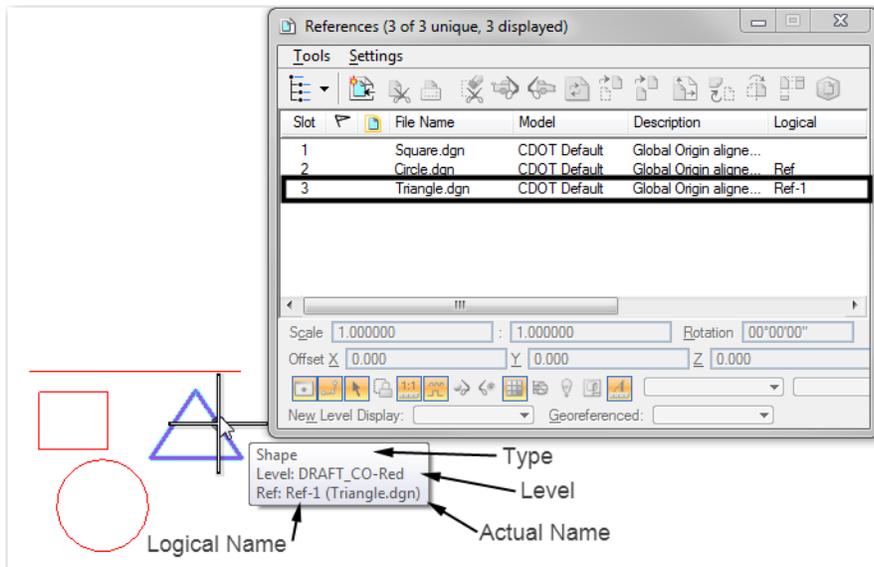
- Two more files have been added to the example, *Green_Triangle.dgn* and *Green_Square.dgn*. Each of the new files use the DRAFT_CO-Green level. These are attached to *Square.dgn* and are displayed by **Live Nesting**. With the file tree collapsed, turning off the DRAFT_CO-Green level turns off the display in both files.



- With the file tree expanded, the levels for the individual files can be manipulated without affecting the same named levels in other attachments.

Determining an Element's File

- Just by looking, there is no way to determine which file an element belongs to. However, a **<T>** snap on the element will display a tool tip listing the element's **Type**, **Level**, the **Logical Name** of the attachment, and its actual file name.

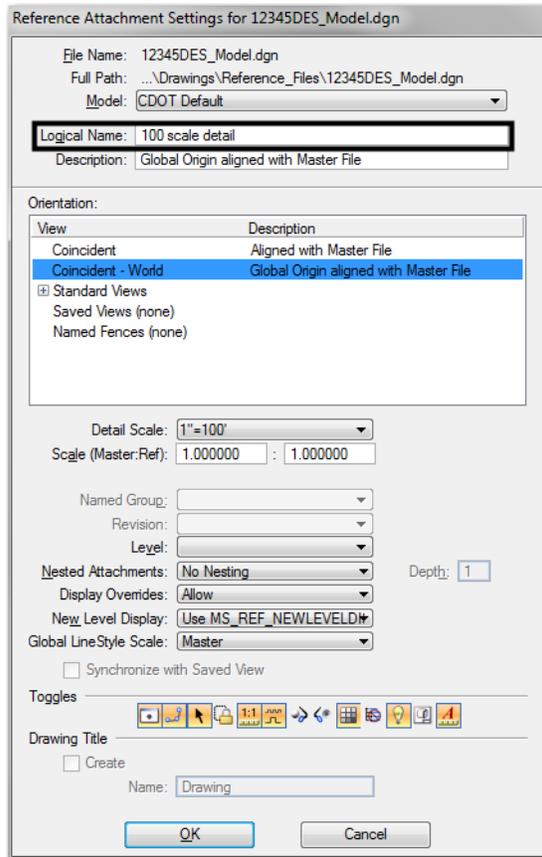


Logical Names and Slot Numbers for Reference Attachments

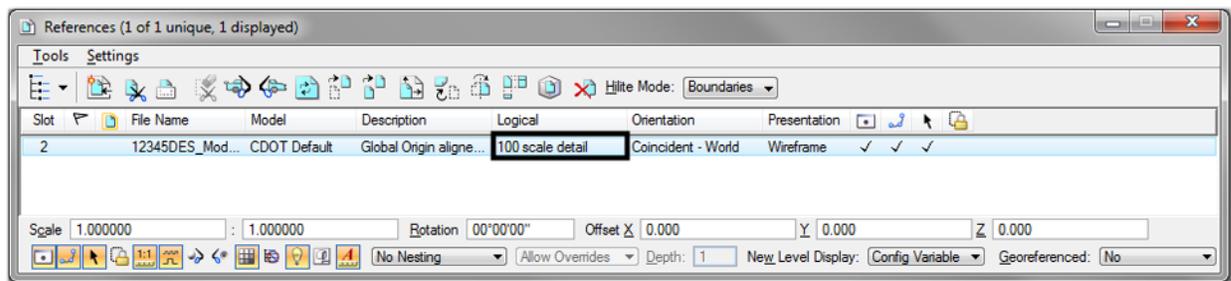
Logical Names

- In MicroStation, a file can be used as an attachment within a single file numerous times. **Logical Names** are used to distinguish one version of the attachment from another. A logical name can be given to any attachment, but must be given to the second and subsequent attachments of a file.

- To give a logical name to an attachment, begin the attachment procedure as normal. When the **Reference Attachment Settings** dialog box displays, **key in** the desired logical name in the field provided. Finish the attachment process as normal.



- The logical name is displayed in the **References** dialog box as illustrated below:



Slot Numbers

- Slot numbers are assigned to attachments to provide another method of grouping the files. They are used to assign the processing order when making shaded color or grayscale prints. For more information on using slot numbers in this process, see the workflow [CDOT Shaded Color And Grayscale Printing](#).

Workflow MS 5 - Sheet File Creation

This document guides you through creating a new sheet file in MicroStation. We will be going over placing the sheet border around coordinate based model graphics. Setting up sheets this way maintains the coordinate based information and measurements are in real-world dimensions.

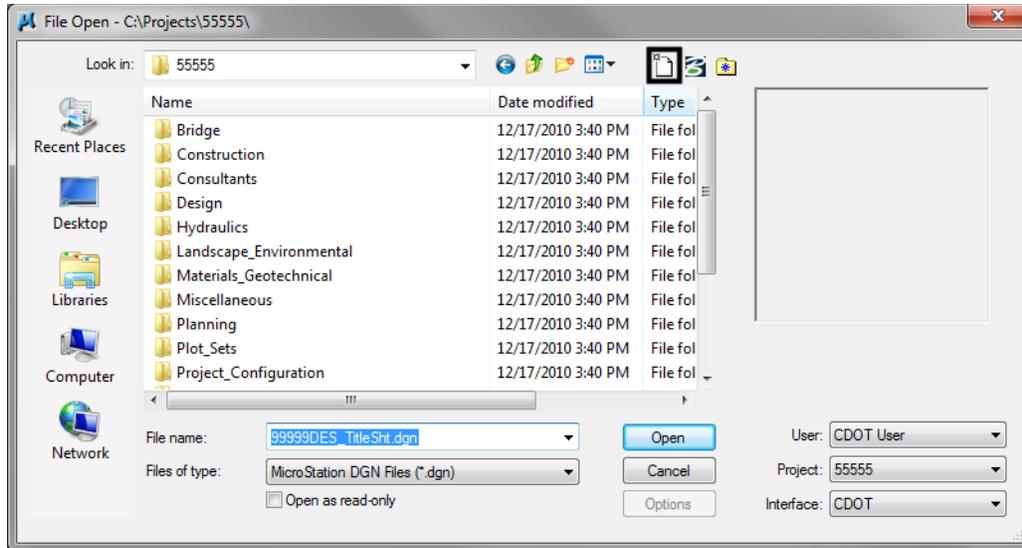
Workflow Outline

Setting up the Sheet File - The sheet file contains the sheet border and related data along with reference files of the project data. Setting up the Sheet File includes creating the blank dgn file, attaching the references and rotating the view to the correct orientation.

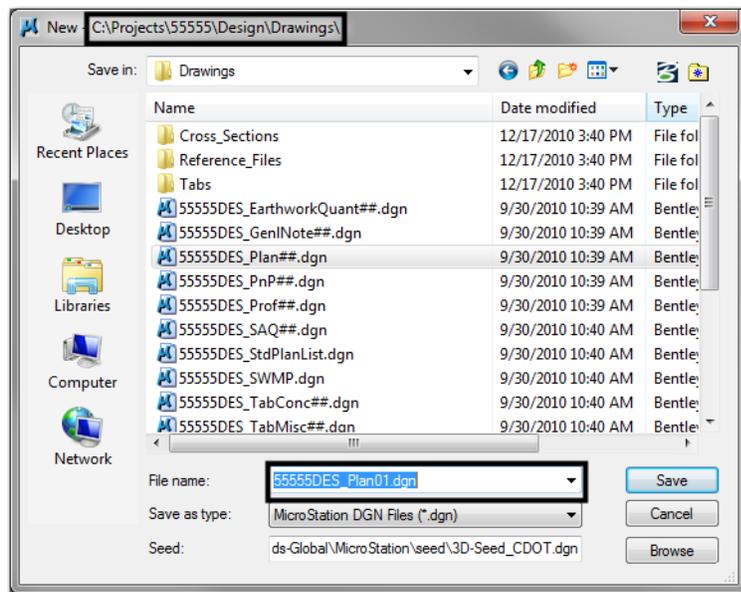
- ◆ **Create a New Drawing File** - The new drawing file will contain the sheet border and related material.
 - Commands Used: **File > Open** - Used to access the MicroStation Manager dialog box. From there, a new file can be created.
 - **New File** - Accesses the New File dialog box. The new file is created here.
- ◆ **Attach Model Files** - The model files are attached so that the view rotation angle can be determined.
 - Commands Used: **File > Reference** - Used to access the references dialog box. From there, the model files are attached.
 - **Tools > Attach** - Used to select the model files for attachment.
 - **Reference Attachment Settings** - Used to select the View and Scale for the model file.
- ◆ **Rotating the View** - Rotating the view so that the sheet is orthogonal to the screen makes the file easier to read and print.
 - Commands Used: **rv=0,0,## key in** - A method to rotate the view.
 - **Rotate View > 3 Points** - A method to rotate the view.
- ◆ **Attaching Border and Related Cells** - The sheet border, north arrow, and other cells are placed to create the sheet.
 - Commands Used: **CDOT Menu > Drafting > Border** - Used to set the rotation and scale, select, and place cells.
- ◆ **Clipping Reference Files** - When attached, the full contents of the reference files are displayed. Clipping reduces the visible portion of the reference files to the area within the sheet border.
 - Commands Used: **CDOT Menu > Drafting > Border > Clip Boundary** - Used to draw the clip boundary. The clip boundary is a shape that denotes the limits of the viewable area for the reference files.
 - **References > Clip Boundary** - Used to hide reference file data in areas outside of the clip boundary.
- ◆ **Setting The Annotation Scale** - For sheets that are printed at a scale other than 1" = 100', the annotation scale must be changed to match that printing scale.
 - Commands Used: **Models > Properties > Annotation Scale** - Used to adjust text and linestyle scales to match the desired print scale.

Setting up the Sheet File

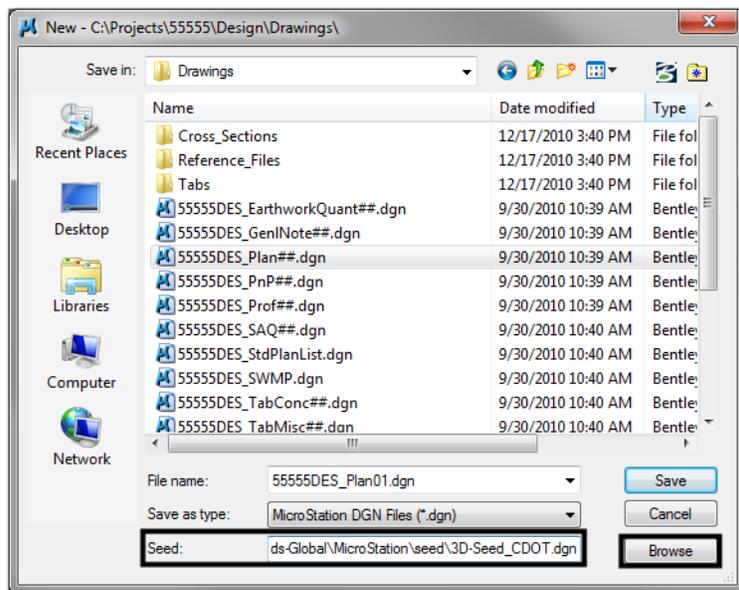
1. Create a new drawing file from the **File > Open** dialog box, select the **New File** icon.



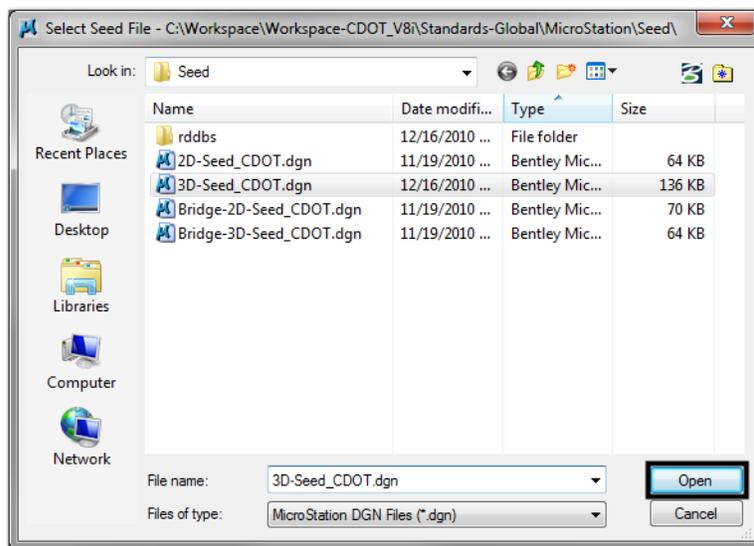
2. Enter a drawing file name that corresponds to the next consecutive sheet number and place it under the appropriate file location under **C:\Projects\.....**



3. Verify that the desired **Seed File** is selected. If it is not, <D> **Select** and navigate to **C:\Program Files\Workspace_CDOT\Standards-Global\MicroStation\Seed**.

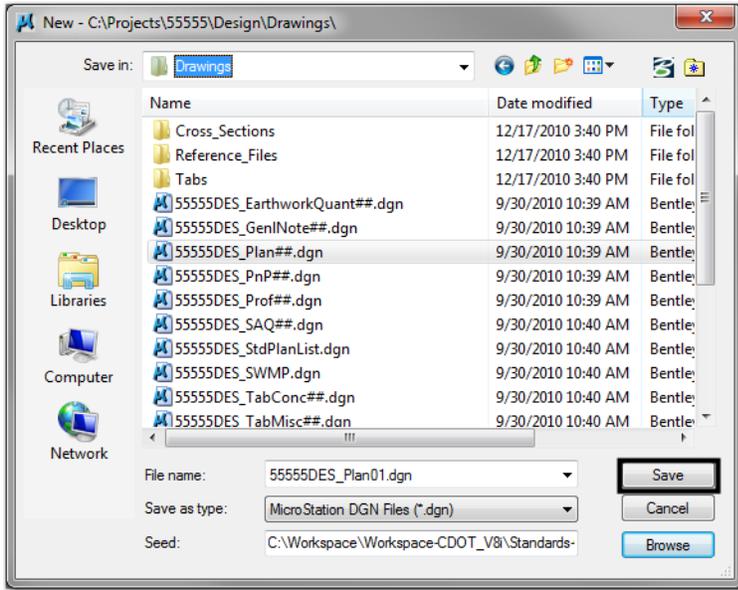


4. Highlight the desired seed file (for this example: **3D-Seed_CDOT.dgn**) and <D> **Open**.

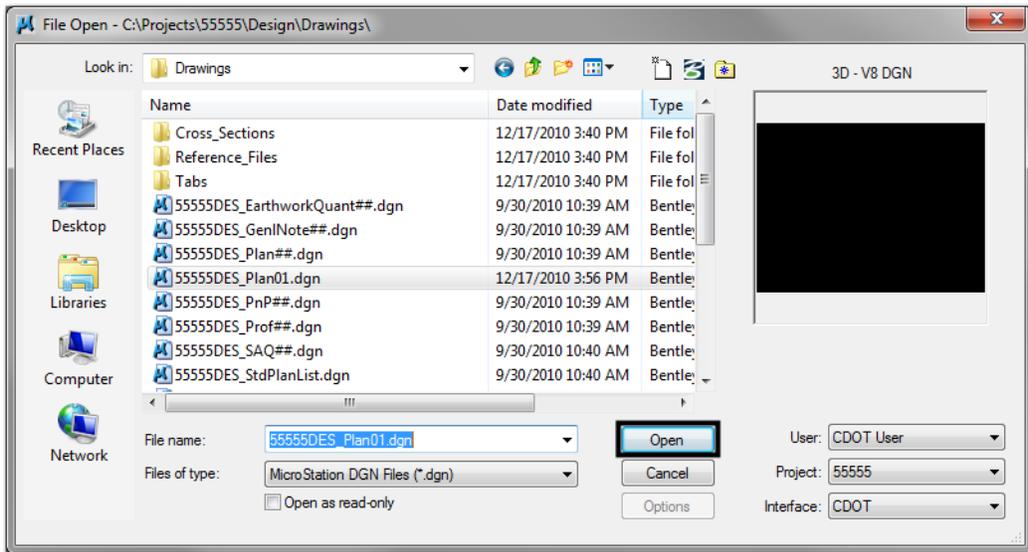


Note: All disciplines except for Bridge use the 2D-Seed_CDOT.dgn and the 3D-Seed_CDOT.dgn. The Bridge-2D-Seed_CDOT.dgn and Bridge-3D-Seed_CDOT.dgn has specific settings for Bridge only.

- In the **New** dialog box, **<D> Save**.



- The file you created will be highlighted in the **File Open**. **<D> Open** to open that file.



Attaching Model Files to the Sheet File

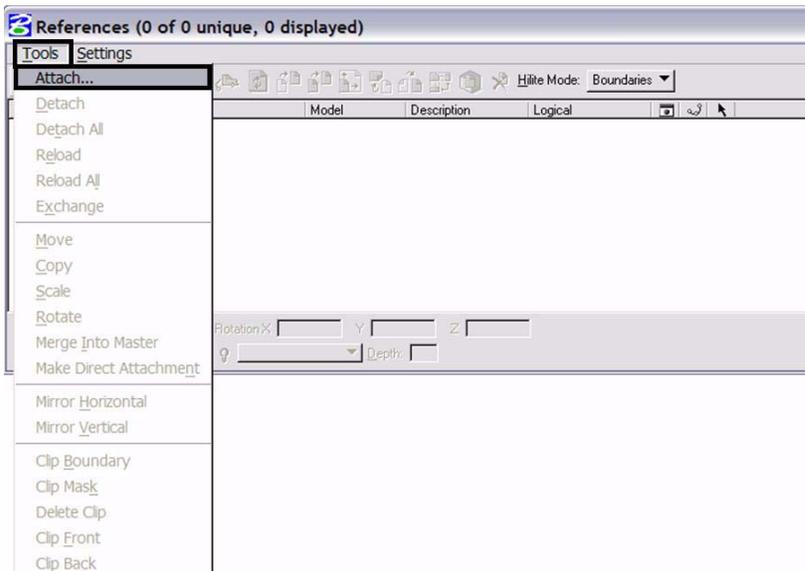
1. Select **File > Reference**.



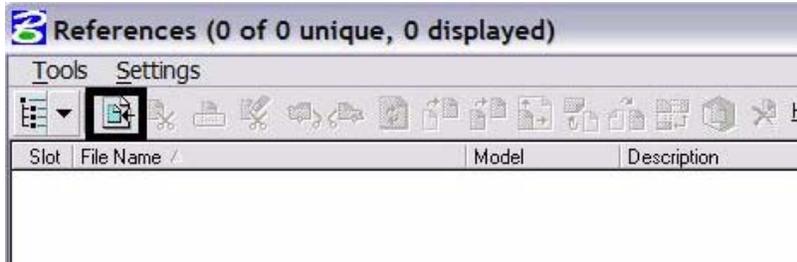
2. Or choose the **Reference** icon  from the **Primary Tools** toolbar.



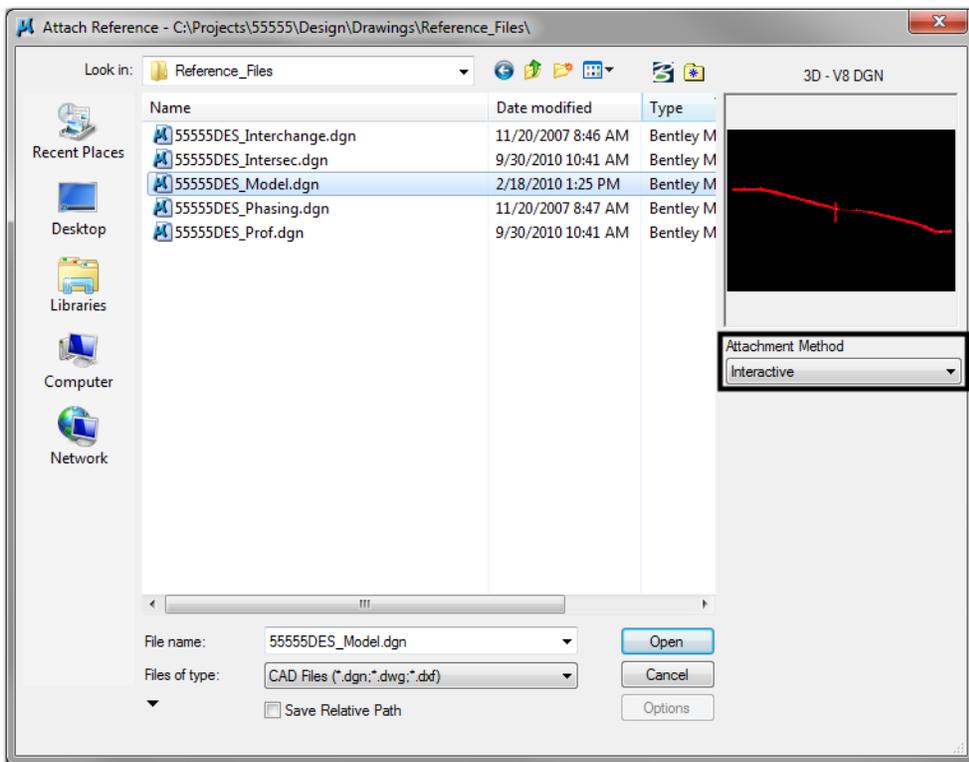
3. From the **Reference Manager** tool bar select **Tools > Attach**.



4. Or choose the **Attach Reference** icon .

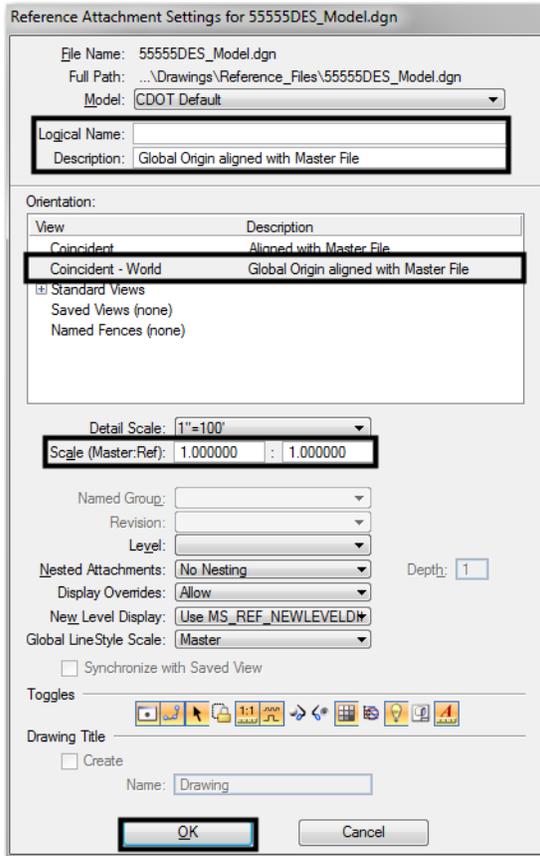


5. Search for the model file and verify the **Attachment Method** is set to **Interactive**. <D> Open.



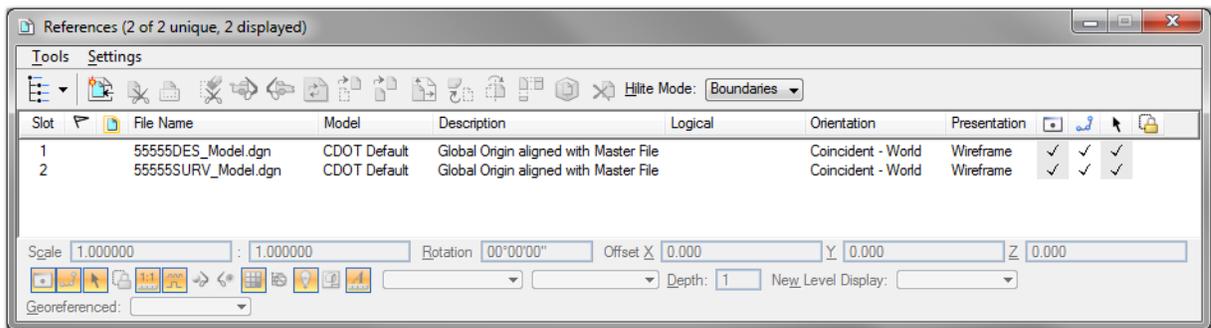
Note: You can select more than one file at a time by holding the **Shift** or **Ctrl** keys down while making your selection. You can also *Drag and Drop* directly from Windows Explorer into the **Reference Manager** Tool box, selecting several files at one time as mentioned above.

- In the **Reference Attachment Settings** dialog box, key in a logical name and a description. For instance, the logical name might be **Design** for the Design Model drawing. The other settings should not have to be edited. **Coincident-World** is selected by default. Also the **Scale (Master:Ref)**: is set at **1:1** by default. <D> OK.



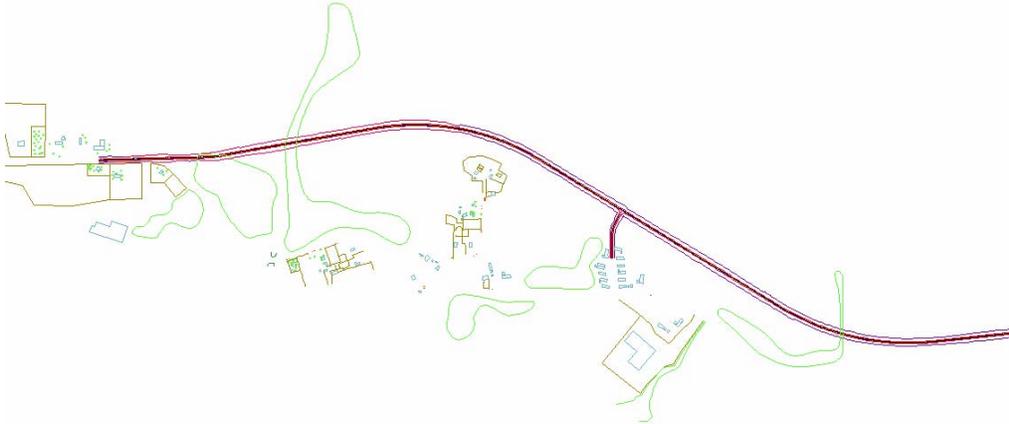
Note: When **Coincident World** under **Orientation** is selected and a **Scale** factor of **1:1** is entered, plan graphics are being referenced to the sheet file with the true coordinate information. All other attachment methods will not maintain the true coordinate values.

- The files will be shown in the **References** dialog box.

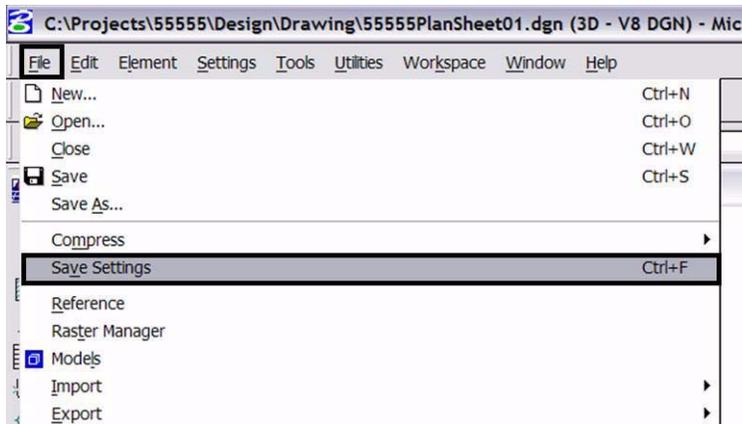


Note: Whenever you make graphical model file changes, your sheet file will automatically update.

8. **Fit View** using the icon  so all graphics are displayed.



9. Select **File > Save Settings** from the **Primary** toolbar.



Rotating the View

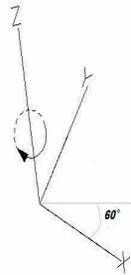
1. After the references are attached, you may need to rotate the view depending on the layout of the sheet.

Note: You are not rotating the reference file(s). You are only rotating the view. The coordinate system will not change.

2. One option to rotate the view is to Key-in **rv = x,y,z** and press <Enter> or <Tab>.



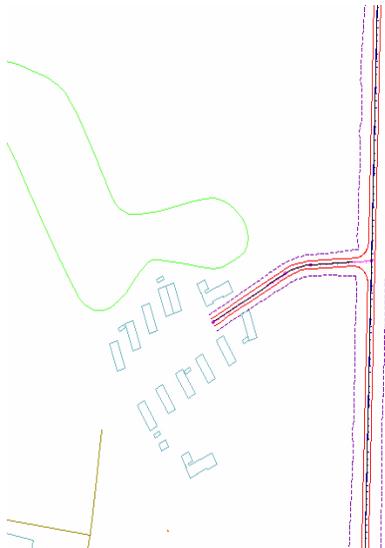
Note: Entering the recommended values $x = 0$, $y = 0$, and $z = \text{Rotation Angle}$ will ensure the view is rotated about the z-axis in a 3D file. You are rotating the view about the z-axis. This is the axis perpendicular to the view. Otherwise, if you are working in a 2D file the key-in would be **rv = value of rotation**.



3. You will be prompted to select the view you would like to rotate in. **<D>** in the active view window to select the view.

Rotate View (Relative) > Select view

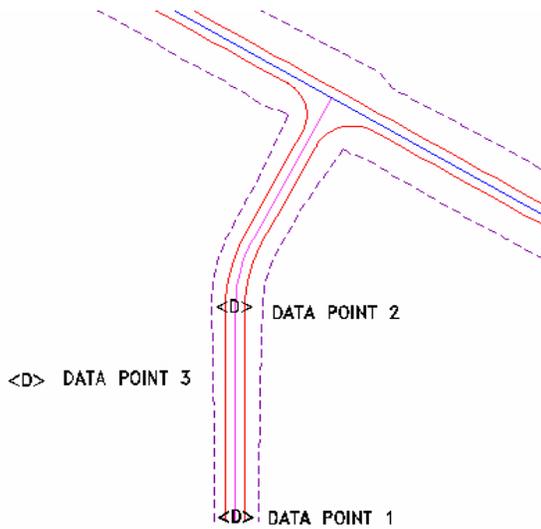
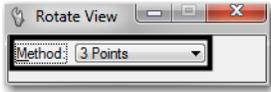
4. The view will be rotated.



5. You can also elect to rotate the graphics using **3 Points**. Select **Rotate View**.



- Change the **Method** to **3 Points**.



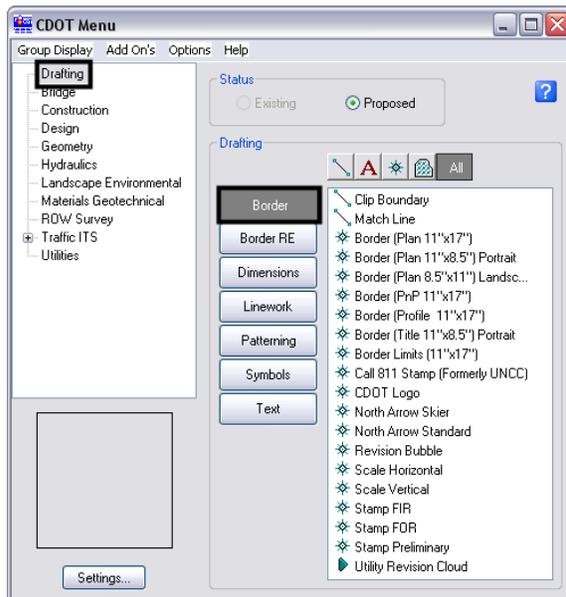
Note: Make sure you are picking a data point near the 3D element. Do not snap to 3D elements because you will be rotating along the z axis instead of just the x and y plane. Turn AccuSnap off or you can hold the <Ctrl> and <Enter> keys down at the same time to temporarily disable AccuSnap while you are locating the data points.

- The view will be rotated.

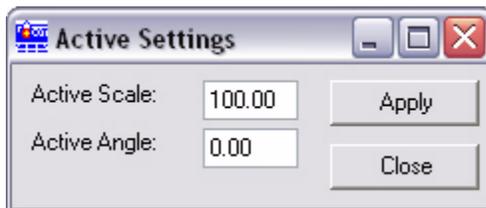


Attaching the Border, Bar Scale, North Arrow, and Resident Engineer/Survey Supervisor Cells

1. From the **CDOT Menu**, select **Drafting > Borders**.

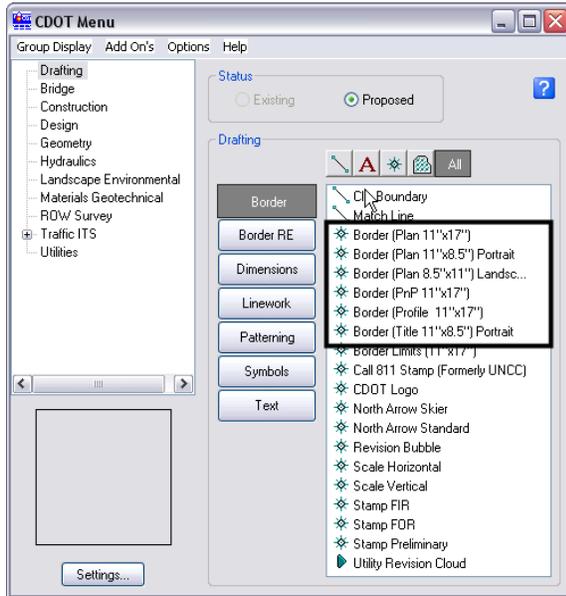


2. **<D> Settings** if the desired sheet scale is something other than 1" = 100'. In the **Active Settings** dialog box you can change the **Active Scale** and the **Active Angle**.



Note: The Active Angle is view independent and not associated with view rotation. Therefore, the x-axis is always horizontal regardless of the view rotation. You will not need to set this for correct placement of the North Arrow or other cells.

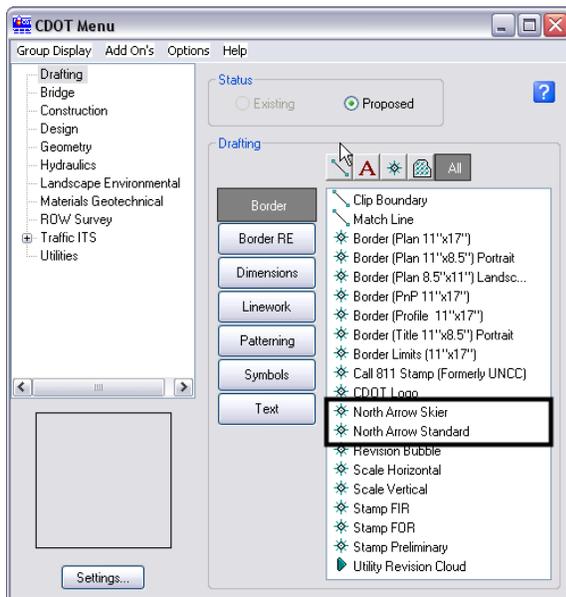
3. Select the desired sheet border cell from the list.



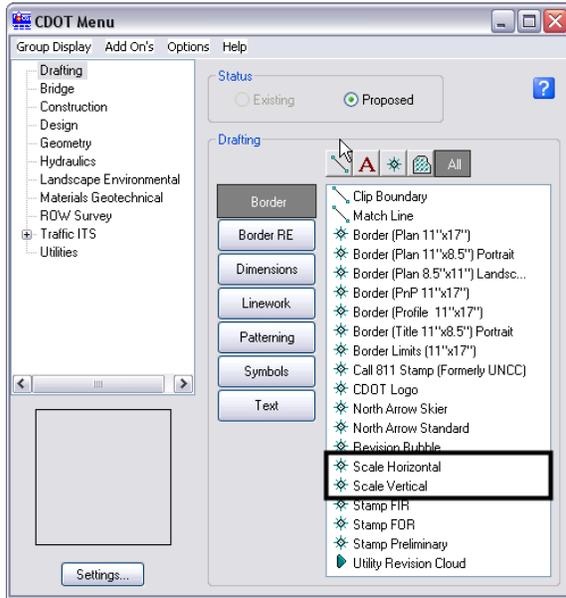
4. Once a sheet border is selected, you will be prompted to locate the lower left hand corner of the sheet border (the cell's origin). Move the cell to the desired location and **<D>**.

Place Active Cell > Enter cell origin

5. Select the desired **North Arrow**. Move the cell to the desired location and **<D>**.



6. Select a Bar Scale if desired. Move the cell to the desired location and <D>.



7. Finally, select the Border RE button, then select the desired Region Engineer cell. <T> to the location shown in the illustration below and <D> to accept placement.



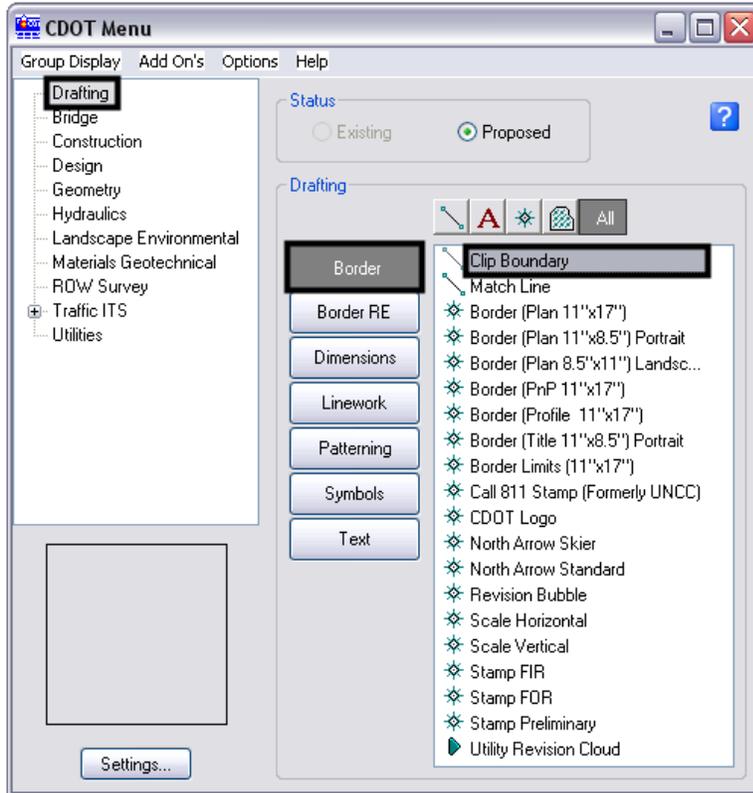
Note: Contact the CADD Manager if any edits need to be made to a Region Engineer cell. Remember, you **can** edit the cell with the **Edit Text** command until the changes are available in the next configuration.

8. Double click on any of the text fields in the border to add sheet specific information.

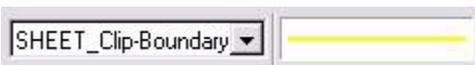
Note: Coordinate with the Region Surveyor when you are creating sheets that are not at a 1:100 scale. They will provide you with the topography and survey MicroStation files at a different scale. Otherwise, the line work and cells will not be the correct size for the print scale.

Placing a Clip Boundary

- From the CDOT Group Menus select **Drafting > Border > Clip Boundary**.

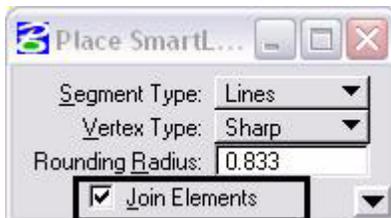


- Verify the **SHEET_Clip-Boundary** level is active.

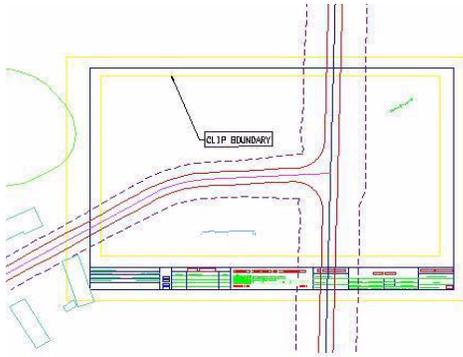


Note: The level **SHEET_Clip-Boundary** will not print.

- The **Place Smart Line**  command will be active. Verify the option for **Join Elements** is checked **ON** and draw a closed shape that will represent your clipping boundary of the model file.

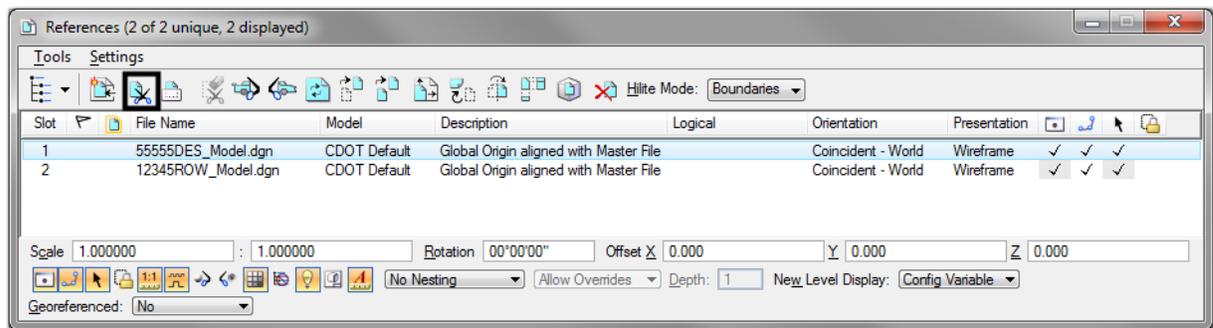


- Otherwise, if the clipping boundary shape is rectangular, select the **Place Block** icon  from the **Main** toolbar.



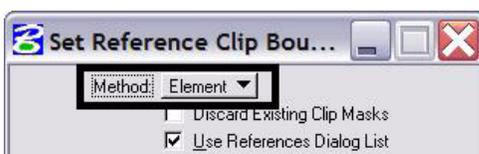
Clipping the Reference File

- In **References** dialog box, highlight the Reference file to be clipped. Select the **Clip Reference** icon.



Note: You can select more than one reference file at a time by holding the <Shift> or <Ctrl> keys down while you are making your selection. You can clip multiple drawings in one step when they are all selected.

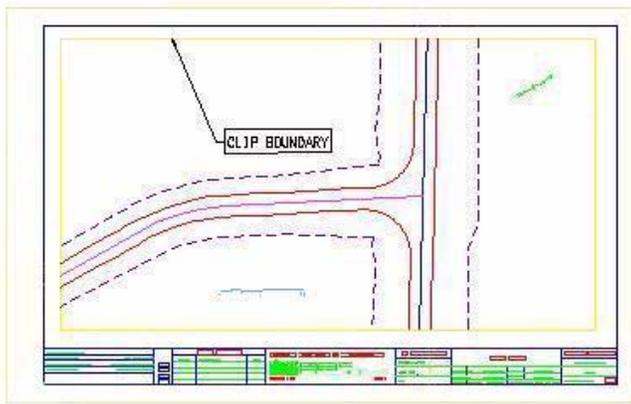
- The following dialog box will open. Verify **Method** is set to **Element**.



- You will be prompted to select the **Element** you want to clip the reference from. Select the rectangular element that was placed inside the border on **GEN_SHEET_Clip-Boundary** level.

Set Reference Clip Element > Identify Clipping Element

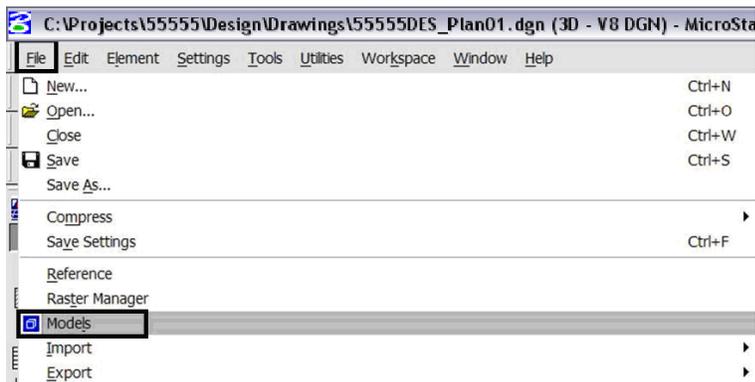
- Fit** the MicroStation view  and **Save Settings** after clipping the reference files.



Note: Once the clipping boundary is placed, do not delete it. The clipping region of the reference file will be lost.

Additional Sheet File Information

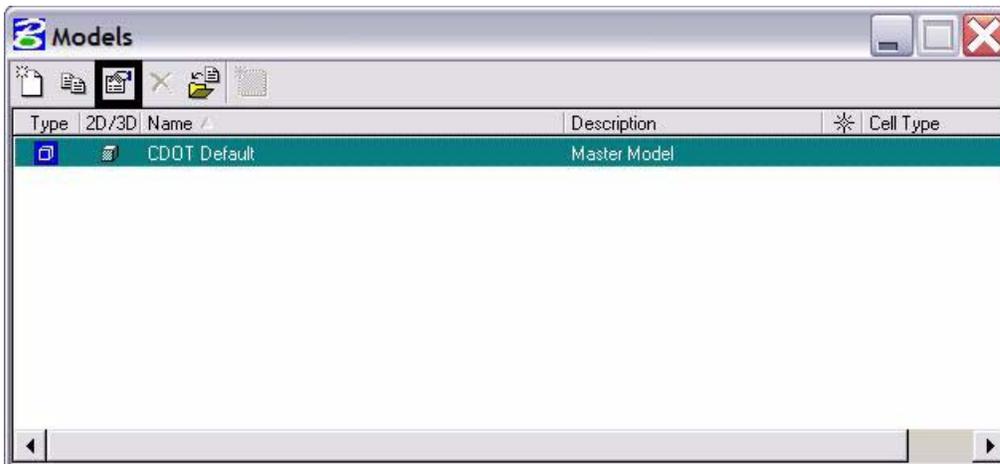
- Setting up text and dimension scale in the sheet file must change the Annotation Scale Factor if the border cell was scaled to a factor other than 1:100. Otherwise, the text size in the sheet file will not correspond to the scale factor chosen when placing the border cell.
- Select **File > Models** from the **Primary** toolbar.



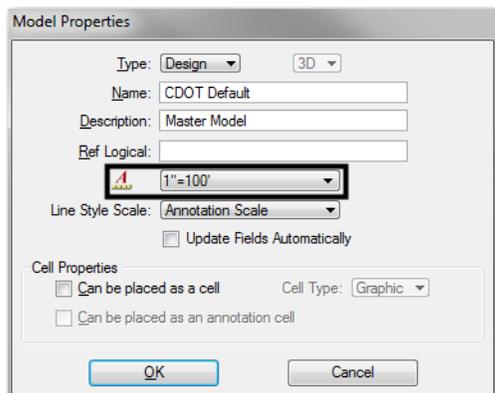
- Or select **Models** icon  from **Primary Tools**.



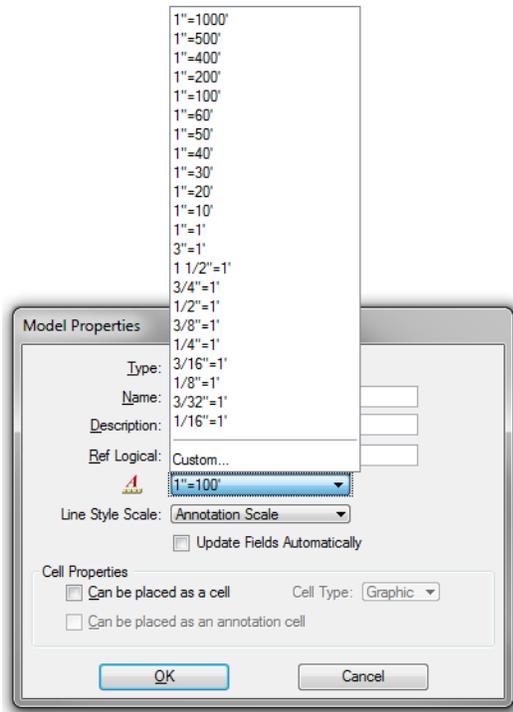
- Select the **Edit Model Properties** icon .



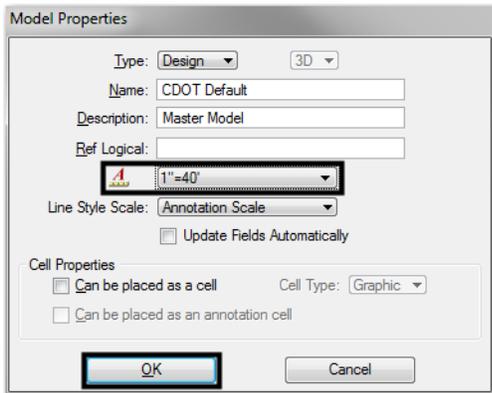
- The **Annotation Scale** factor defaults to 1:100. Select the arrow to change the scale factor. If you try to place text before setting this, it will be too large since the drawing plot scale is at a 1:40.



- From the pull down, select the **Annotation Scale** factor to match the scale factor used when placing the border cell.

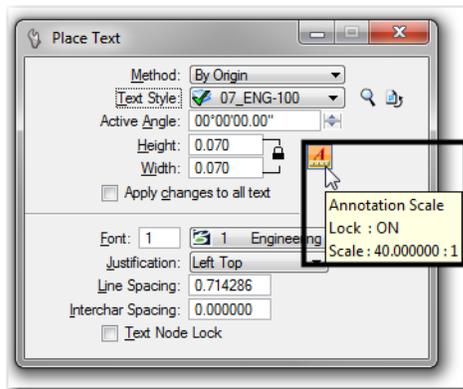


- In this example, an annotation scale factor of 1:40 is chosen. Select **OK**.



Note: The annotation scale will take affect immediately.

8. You can now add text to the new sheet file. It will be scaled to the correct height based on the plot scale or in this case 1:40.



Note: Annotation Scale Lock must be turned **ON** when placing text or dimensions for the scale factor to take affect. Verify it is **ON** by hovering with your cursor over the  icon.

9. Select **File > Save Settings** before you exit MicroStation.

Workflow MS 6 - Sheet File Creation - Multiple Scales

This document guides you through creating a sheet file with multiple scales. First, we will be going over placing the sheet border around coordinate based model graphics. Then, we will go over attaching and scaling additional model files. Lastly, placing text and dimensions in the sheet file will be covered. For setting up plan sheets see the CDOT Sheet File Creation document.

Note: This example uses details from the Bridge discipline. This procedure applies to any sheet file with multiple scales. If you are in another specialty, please substitute with your specialty group's information.

Setting up the Sheet File - The sheet file contains the sheet border and related data along with reference files of the project data. Setting up the Sheet File includes creating the blank dgn file, attaching the references and rotating the view to the correct orientation.

- ◆ **Create a New Drawing File** - The new drawing file will contain the sheet border and related material.
 - Commands Used: **File > Open** - Used to access the MicroStation Manager dialog box. From there, a new file can be created.
 - **New File** - Accesses the New File dialog box. The new file is created here.
- ◆ **Attach Model Files** - The model files are attached so that the view rotation angle can be determined.
 - Commands Used: **File > Reference** - Used to access the references dialog box. From there, the model files are attached.
 - **Tools > Attach** - Used to select the model files for attachment.
 - **Reference Attachment Settings** - Used to select the View and Scale for the model file.
- ◆ **Rotating the View** - Rotating the view so that the sheet is orthogonal to the screen makes the file easier to read and print.
 - Commands Used: **rv=0,0,## key in** - A method to rotate the view.
 - **Rotate View > 3 Points** - A method to rotate the view.
- ◆ **Attaching Border and Related Cells** - The sheet border, north arrow, and other cells are placed to create the sheet.
 - Commands Used: **CDOT Menu > Drafting > Border** - Used to set the rotation and scale, select, and place cells.
- ◆ **Clipping Reference Files** - When attached, the full contents of the reference files are displayed. Clipping reduces the visible portion of the reference files to the area within the sheet border.
 - Commands Used: **CDOT Menu > Drafting > Border > Clip Boundary** - Used to draw the clip boundary. The clip boundary is a shape that denotes the limits of the viewable area for the reference files.
 - **References > Clip Boundary** - Used to hide reference file data in areas outside of the clip boundary.

Adding Models of a Different Scale - After the basic sheet is set up, the detail reference files are added.

- ◆ **Attach Model Files** - The model files are attached so that the view rotation angle can be determined.
 - Commands Used: **File > Reference** - Used to access the references dialog box. From there, the model files are attached.

- **Tools > Attach** - Used to select the model files for attachment.
- **Reference Attachment Settings** - Used to select the View and Scale for the model file. The scale factor = Border Scale / Detail Plot Scale.

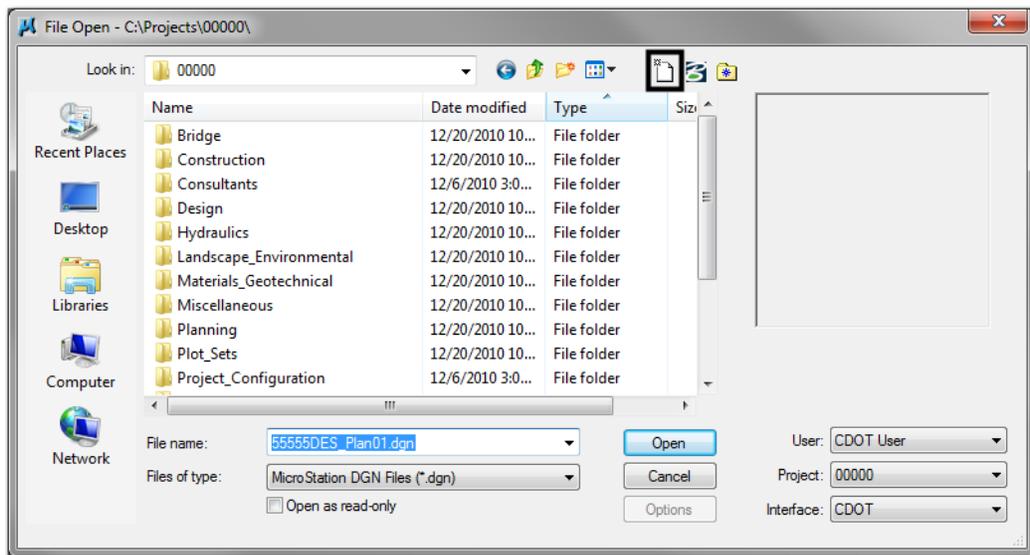
Setting The Annotation Scale - For sheets that are printed at a scale other than 1" = 100', the annotation scale must be changed to match that printing scale.

- ◆ Commands Used: **Models > Properties > Annotation Scale** - Used to adjust text and linestyle scales to match the desired print scale.

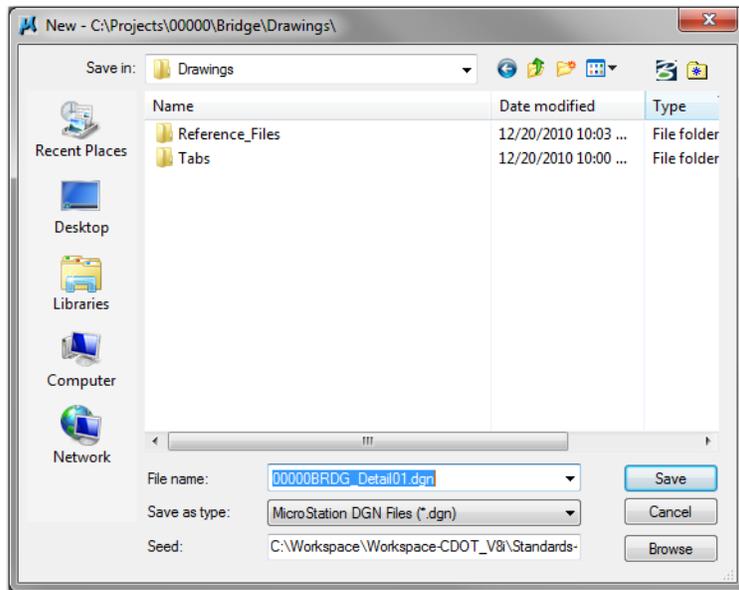
Setting up the Sheet File with Multiple Scales:

Beginning a New Drawing File

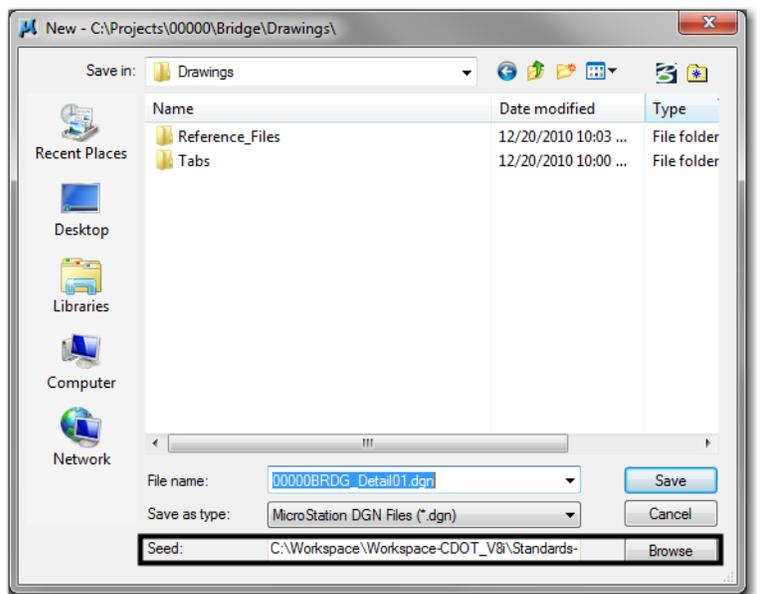
1. From the **File > Open** dialog box, select the **New file** icon.



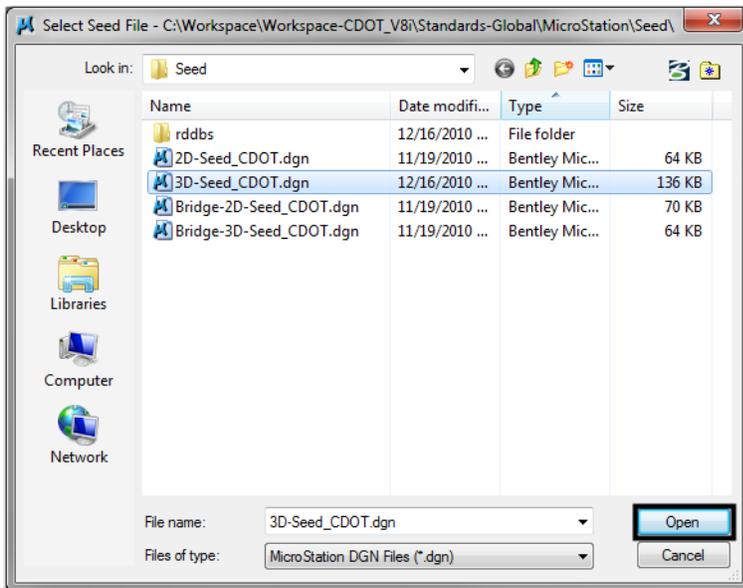
2. Enter a drawing file name that corresponds to the next consecutive sheet number and place it in the appropriate folder located under **C:\Projects\.....**



3. Verify that the correct **Seed File** is selected. If it is not, **<D> Browse** and Navigate to **C:\Workspace\Workspace_CDOT_V8i\Standards-Global\MicroStation\Seed**.

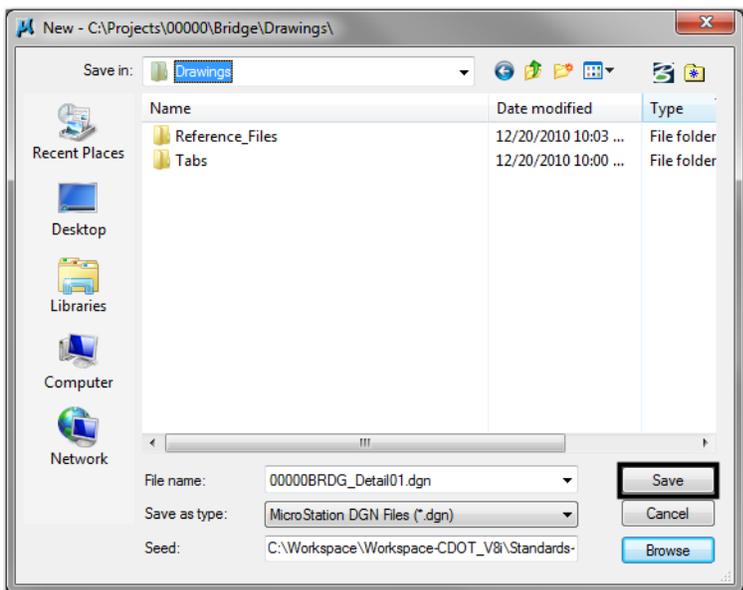


4. Highlight the desired seed file from the files list box (for this example: *3D-Seed_CDOT.dgn*) and **<D> Open**.

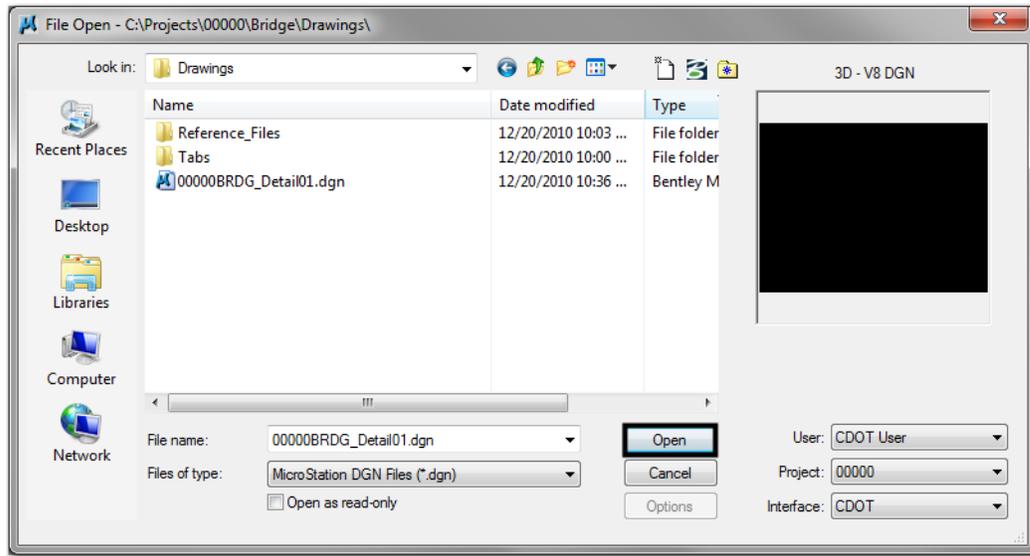


Note: All disciplines use the *2D-Seed_CDOT.dgn* and the *3D-Seed_CDOT.dgn*. The *Bridge-2D-Seed_CDOT.dgn* and *Bridge-3D-Seed_CDOT.dgn* has specific settings for Bridge.

5. In the **New** dialog box, **<D> Save**.



- The file you created will be highlighted. <D> **Open** to open the file.

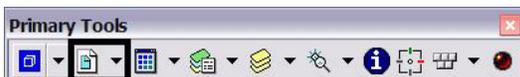


Attaching Model Files to the Sheet File

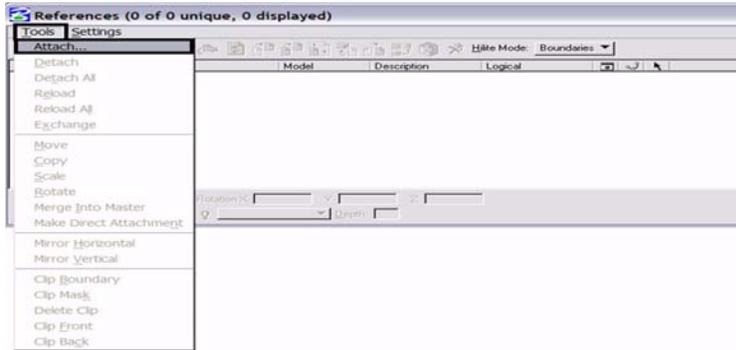
- Select **File > Reference**.



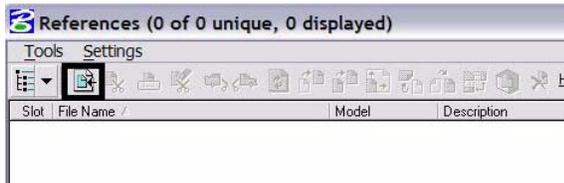
- Or choose the **Reference** icon  from the **Primary Tools** toolbar.



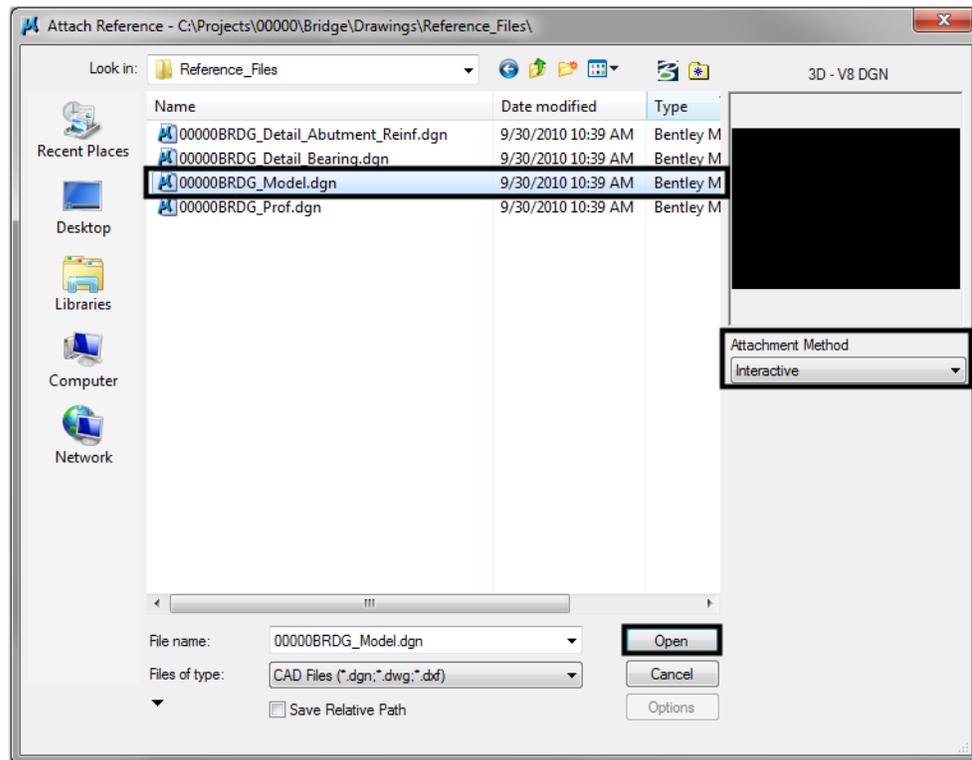
- From the **Reference Manager** tool bar select **Tools > Attach** .



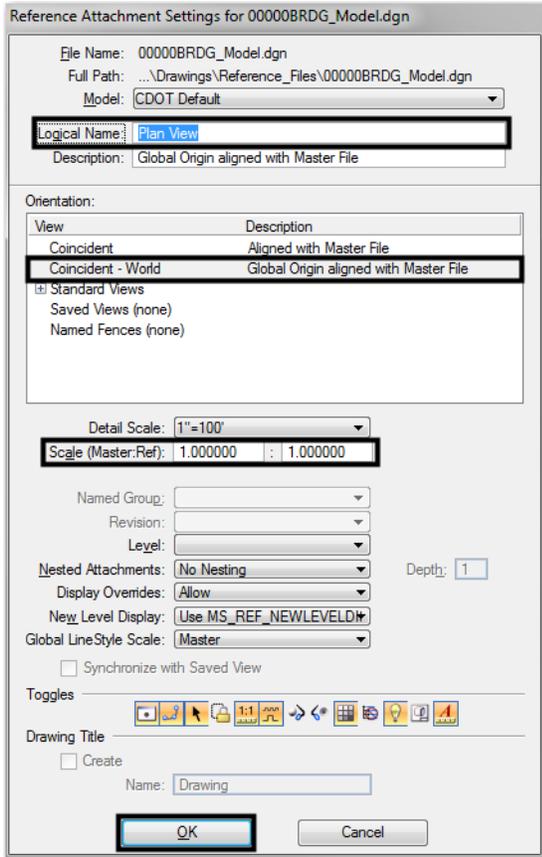
- Or choose the **Attach Reference** icon .



- The first model file you reference should be the one containing coordinate based information. Search for that model file and verify the **Attachment Method** is set to **Interactive**. <D> **Open**. If you are creating a sheet file containing details only, with no coordinate based information, bring in the detail with the largest scale factor first and scale the border to this detail. Once the detail with the largest scale factor has been referenced, attach the remaining details into the sheet file following the procedure outlined below.

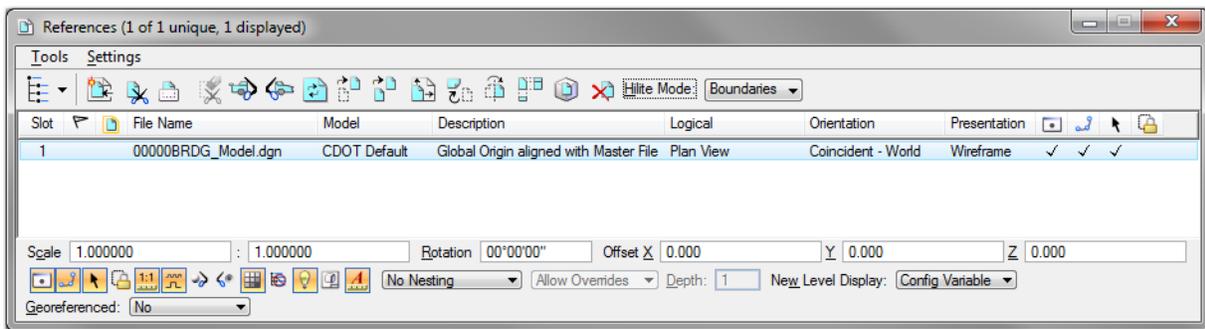


- In the **Reference Attachment Settings** dialog box, key in a logical name and a description. For instance, the logical name might be **Plan View** for the Bridge Model drawing. The other settings should not have to be edited. **Coincident-World** is selected by default. Verify the **Scale** is to set to **1:1**, <D> OK.



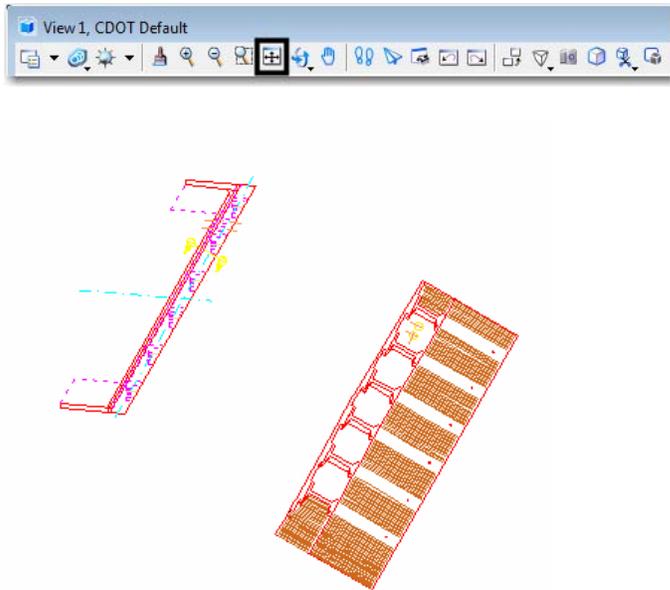
Note: When **Coincident World** under **Orientation** is selected and a **Scale** factor of **1:1** is entered, plan graphics are being referenced to the sheet file with the true coordinate information. All other attachment methods will not maintain the true coordinate values.

- The file will be shown in the **References** dialog box.

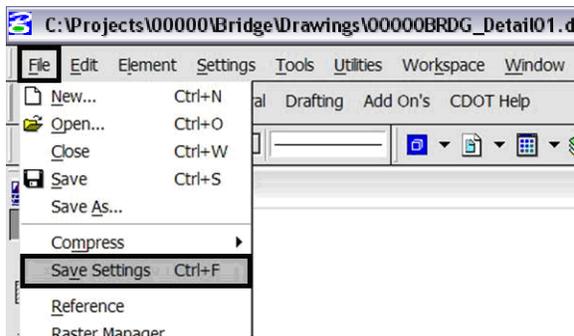


Note: Whenever you make graphical model file changes, your sheet file will automatically update.

8. **Fit View** using the icon  so the graphics for the first model file are displayed.



9. Select **File > Save Settings**.



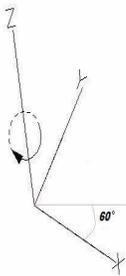
Rotating the View

1. After the references are attached, you may need to rotate the view depending on the layout of the sheet.

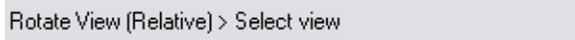
Note: You are not rotating the reference file(s). You are only rotating the view. The coordinate system will not change.
2. One option to rotate the view is to Key-in **rv = x,y,z** and press **<Enter>** or **<Tab>**.



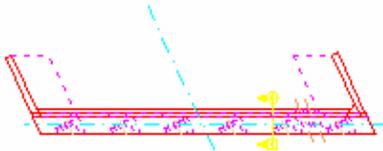
Note: Entering the recommended values of $x = 0$, $y = 0$, and $z = \text{Rotation Angle}$ will ensure the view is rotated about the z-axis in a 3D file. This is the axis perpendicular to the view. Otherwise, if you are working in a 2D file the key-in would be ***rv = value of rotation***.



3. You will be prompted to select the view you would like to rotate in. **<D>** in the active view window.



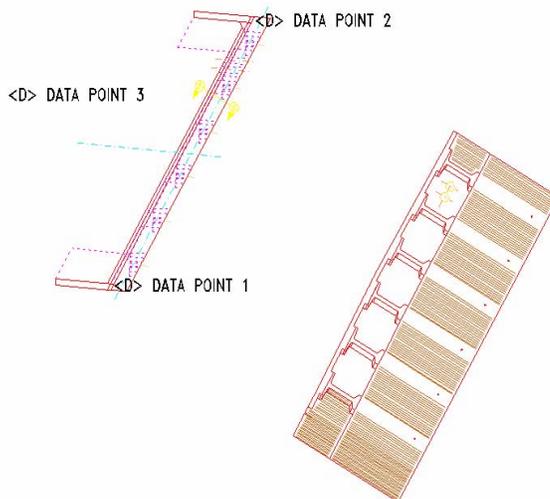
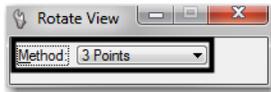
4. The view will be rotated.



5. Or you can rotate graphics using **3 Points**. Select **Rotate View**.

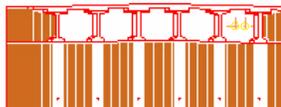
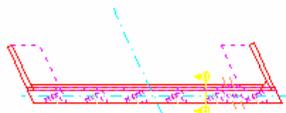


- Change the **Method** to **3 Points**.



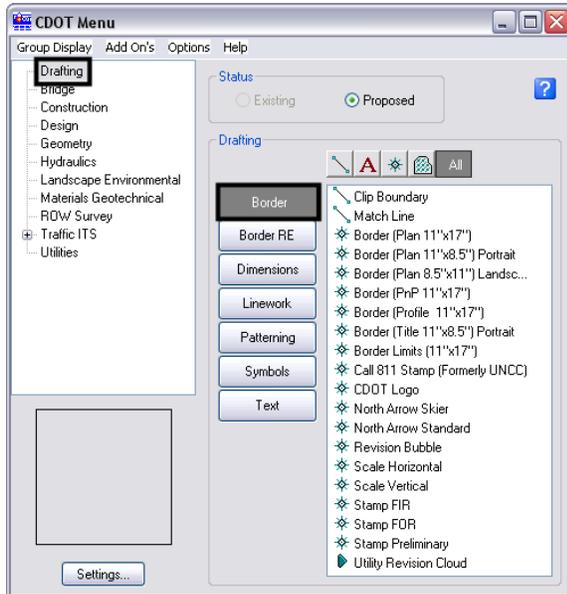
Note: Make sure you are picking a data point near the 3D element. Do not snap to 3D elements because you will be rotating along the z axis instead of just the x and y plane. Turn AccuSnap off or you can hold down the <Ctrl> and <Enter> keys down at the same time to temporarily disable AccuSnap while you are locating the data points.

- The view will be rotated.

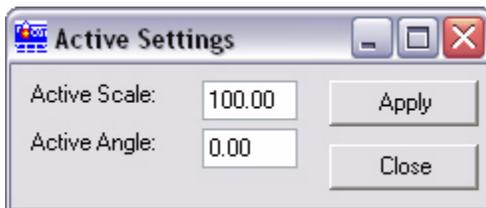


Attaching the Border and Resident Engineer Cell

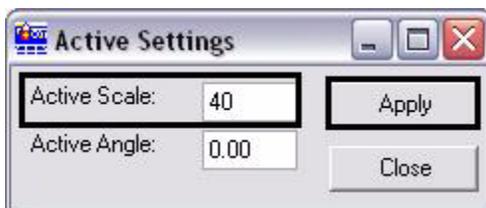
1. From the CDOT Menu, select **Drafting > Borders**.



2. **<D> Settings** if the desired sheet scale is something other than $1'' = 100'$. In the **Active Settings** dialog box you can change the **Active Scale** and the **Active Angle**. In this example, the standard 11x17 sheet border is too large for the plot area when the **Active Scale** is set at $1'' = 100'$.

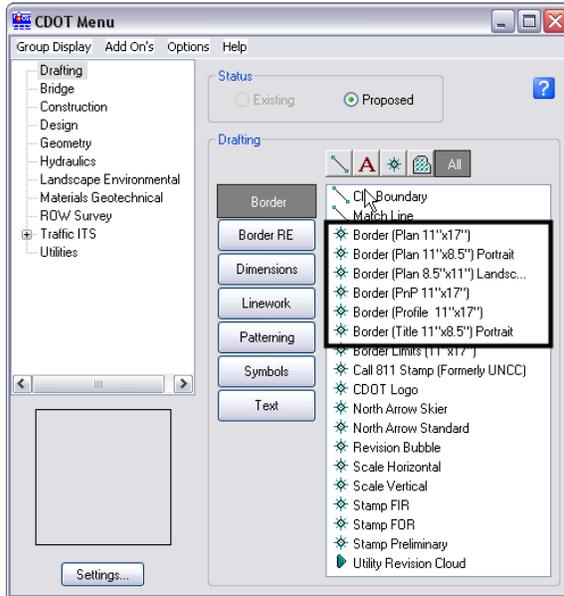


3. Prior to placing the border and border information, set the **Active Scale**. This should be set to the largest proposed scale factor you plan to have on your sheet. For example, if you have a plan view that should be plotted at $1'' = 40'$ and a detail that should be plotted at $1'' = 5'$, the largest scale detail would be $1'' = 40'$. Choose a scale factor in even increments such as 10, 20, 30, 40, 50, 60, 100, etc. **<D> Apply**.



Note: The Active Angle is view independent and not associated with view rotation. Therefore, the x-axis is always horizontal regardless of the view rotation. You will not need to set this for correct placement of the North Arrow or other cells.

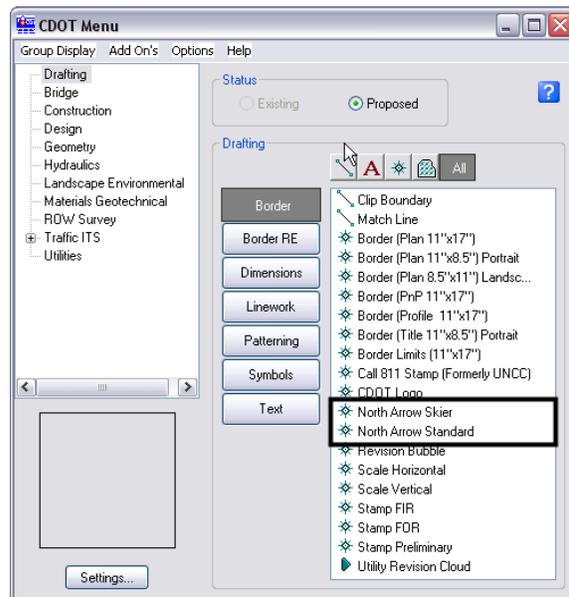
4. Select the desired sheet border cell from the list.



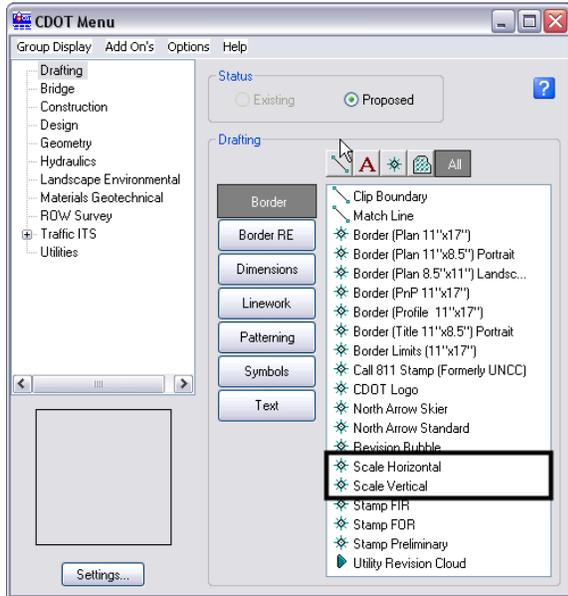
5. You will then be prompted to locate the lower left hand corner of the sheet border (the cell's origin). Move the cell to the desired location and <D>.

Place Active Cell > Enter cell origin

6. Select the desired **North Arrow**. Move the cell to the desired location and <D>.



7. Select a Bar Scale if desired. Move the cell to the desired location and <D>.



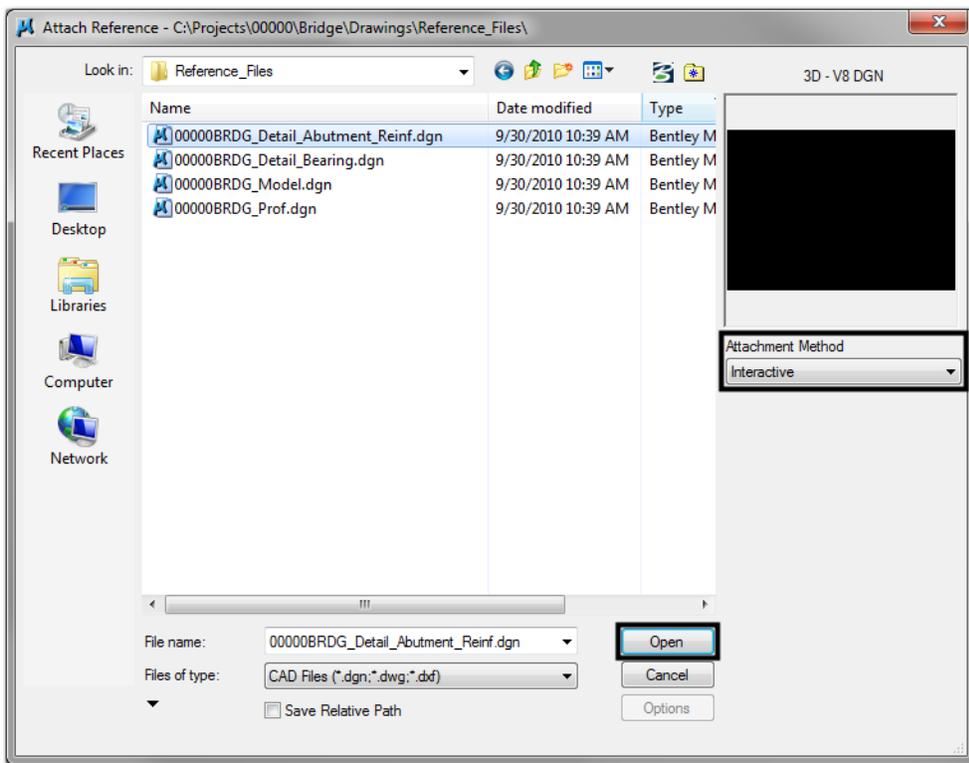
8. Lastly, select the Border RE button, then select the desired Region Engineer cell. <T> to the location shown in the illustration below and <D> to accept placement.



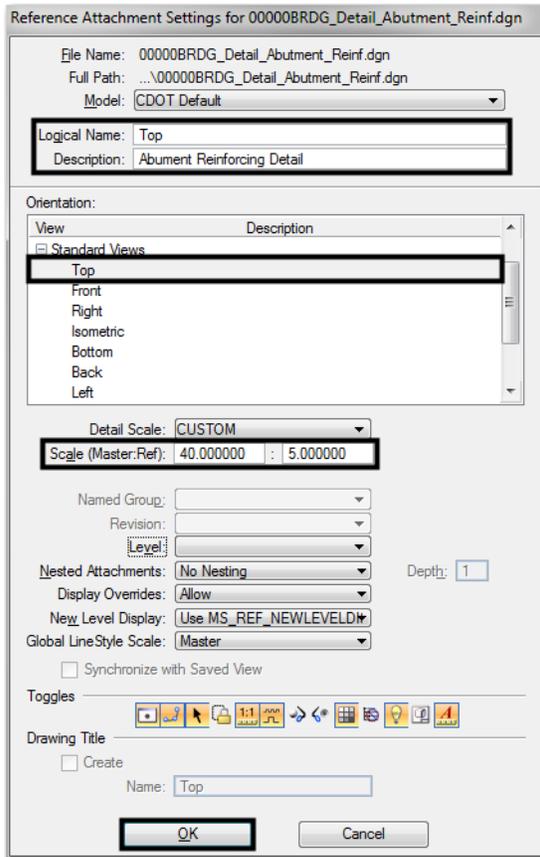
Note: Contact the CADD Manager if any edits need to be made to a Region Engineer cell. Remember, you **can** edit the cell with the Edit Text command until the changes are available in the next configuration.

Adding Additional Model Files to the Sheet File

1. Once you have referenced the model file with coordinate based information and added the border, you can begin referencing additional files with various scales. Select the **Attach Reference** icon  located on the reference file dialog box. Locate the file you want to attach. <D> **Open**.



- In the **Reference Attachment Settings** dialog box, key in a logical name and a description. Set the **Orientation** to **Standard Views > Top** and set the **Scale**. When you set the **Scale**, key-in the scale factor of the border sheet into the first field. In this example it is **40**. In the second field, key-in the scale factor you want the detail to be plotted at. In this example **5** represents 1"=5'. The overall scale factor for the detail is $40/5 = 8$. MicroStation will calculate this for you.



Formula:

Border Scale: scale the border cell was inserted

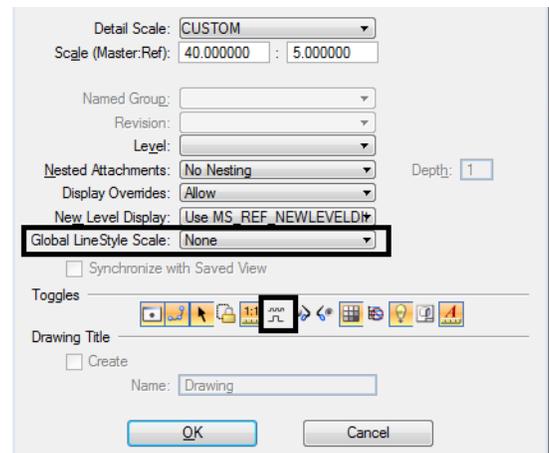
Detail Plot Scale: scale for specific detail to be plotted (See Step 22)

Scale Factor: model file insertion value

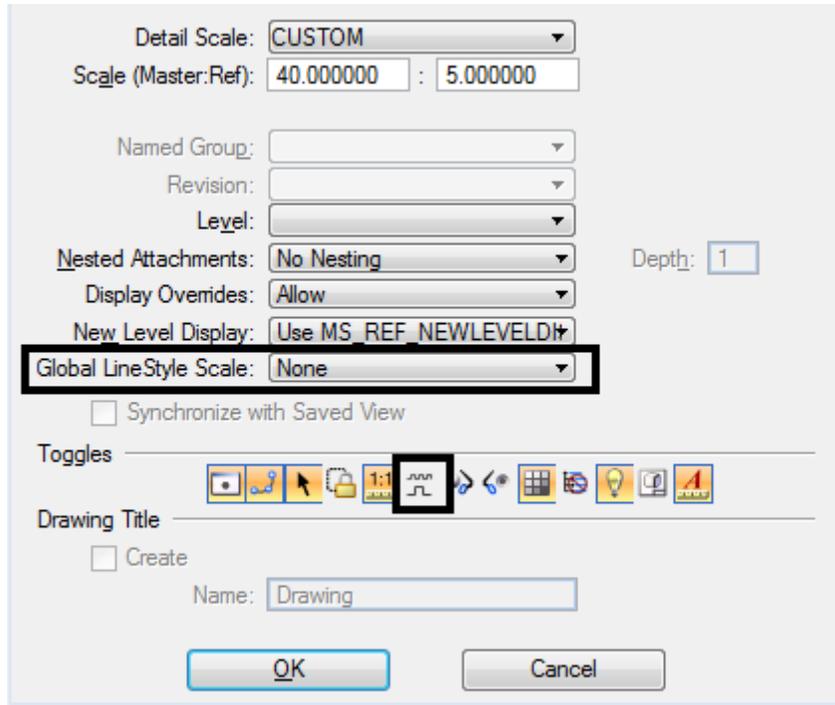
Scale Factor = Border Scale / Detail Plot Scale

Alternatively, you could key-in 8 into the first field and 1 in the second field. This means the new detail is 8 times larger than the first detail

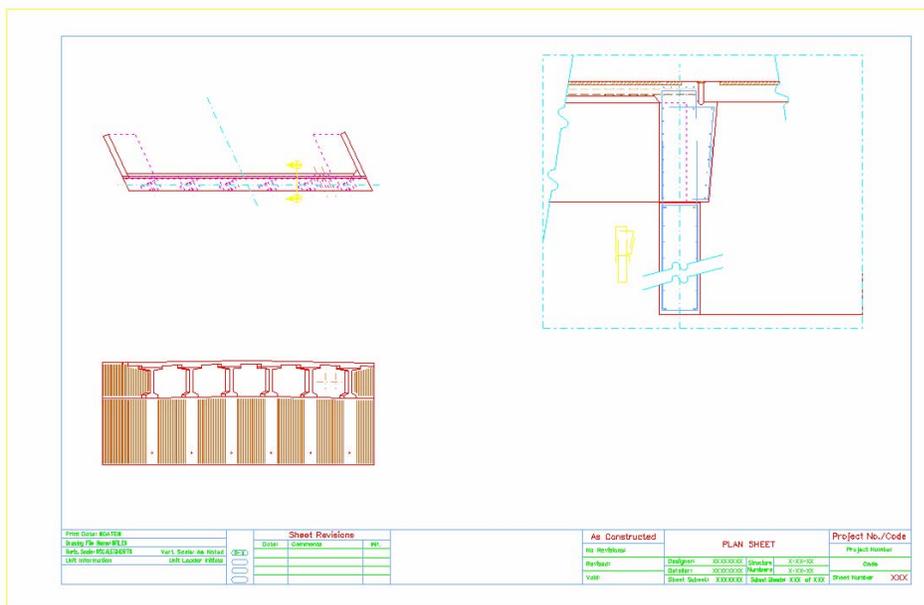
Note: Custom Line Styles will be scaled equal to the scale defined in the Scale (Master:Ref) field. If referencing topography drawings provided by the Survey discipline and uniform symbology is desired set the **Global LineStyle Scale** field to **None** to negate scaling referenced Line Styles by the active models Line Style Scale factor. Additionally toggle **off Scale LineStyles by Reference Scale** to eliminate scaling referenced Line Styles by the Master:Ref scale factor.



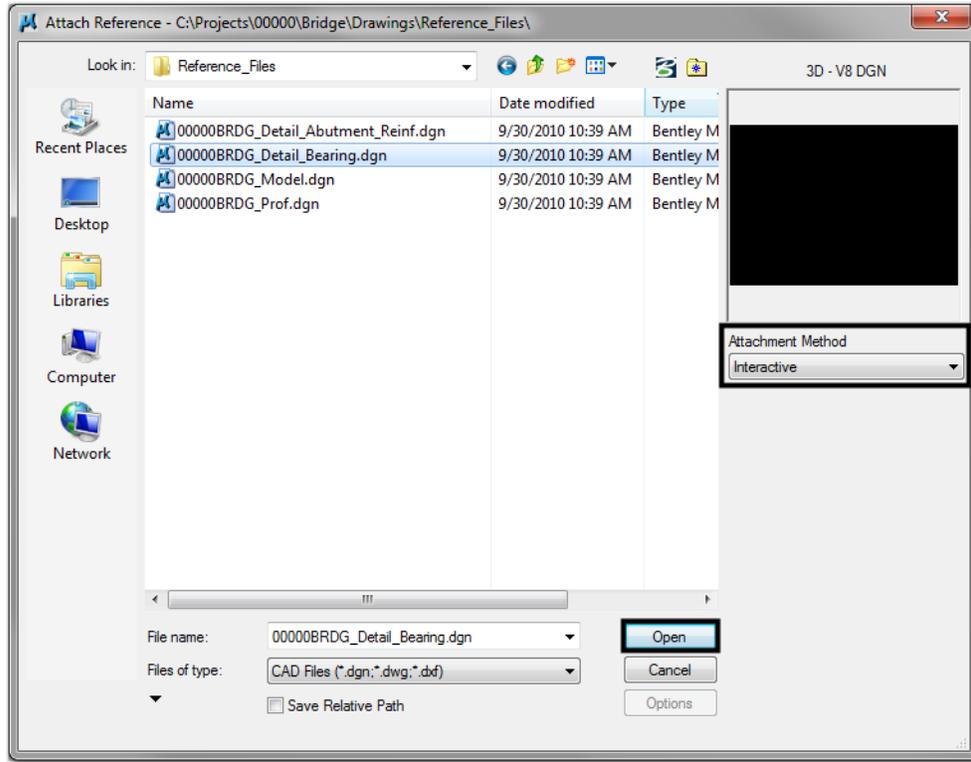
- With the **Orientation** set to **Top**, the model file is anchored to your cursor and you can place it interactively.



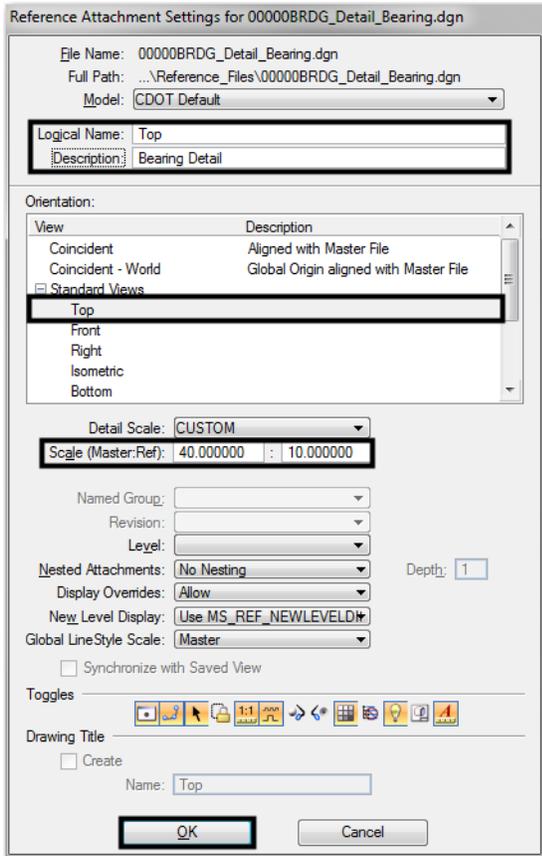
- After the model file is positioned in the area you would like, **<D>** to accept the placement of the additional model in the sheet file. The model file is placed relative to your active Z. Verify the active Z by snapping somewhere in the view, prior to placing the new detail. If the Z is not correct, you can interactively key-in **AZ=0**, select the view, hit reset and continue with the reference attachment.



- Attach additional model files you would like to add to the sheet file.



- In the **Reference Attachment Settings** dialog box, key in a logical name and a description. Set the **Orientation** to **Standard Views > Top** and set the **Scale**. In this example the border cell was inserted at 40. If you want the last detail to be plotted at a 1"=10' scale, leave **40** in the first field and key-in **10** to the second field. The overall scale factor for the detail is 40/10 = 4. MicroStation will calculate this for you.



Formula:

Border Scale: scale the border cell was inserted

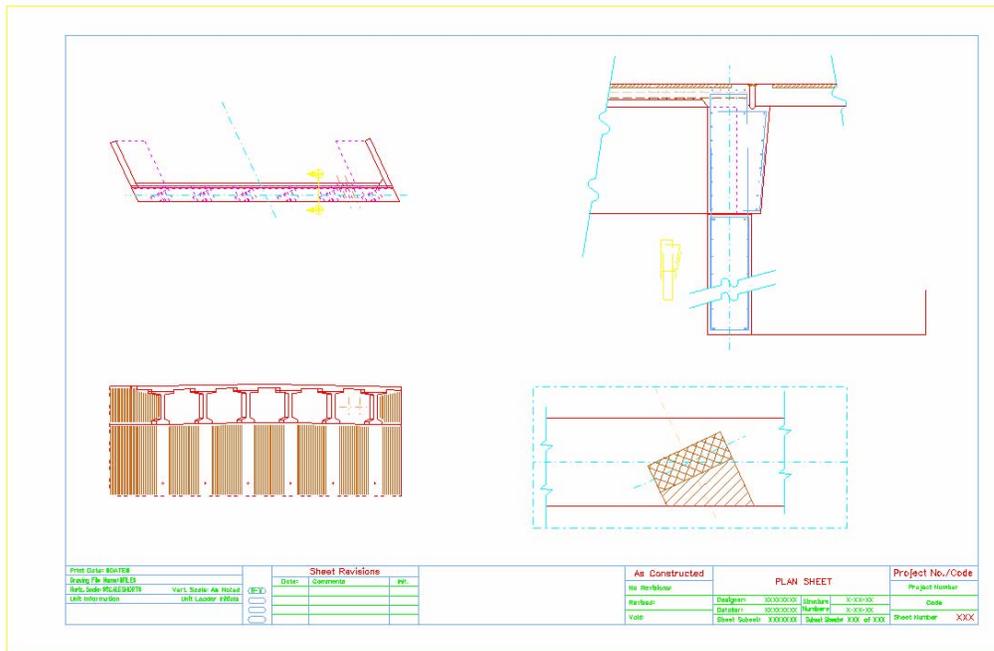
Detail Plot Scale: scale for specific detail to be plotted (See Step 22)

Scale Factor: model file insertion value

Scale Factor = Border Scale / Detail Plot Scale

Alternatively, you could

- Place the model file interactively and <D> to accept placement in the sheet file.

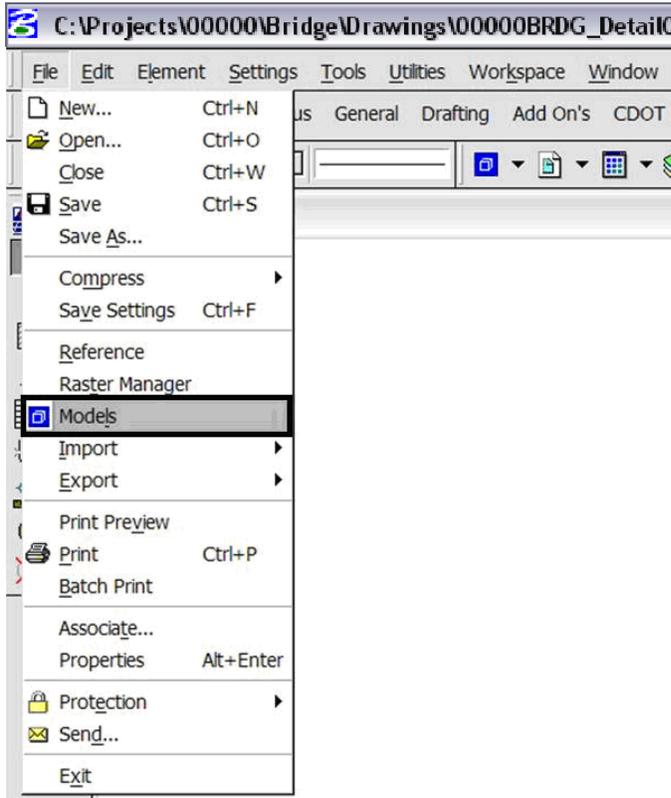


Additional Sheet File Information

Setting up Text and Dimension Scale in the Sheet File

- You must change the Annotation Scale Factor if the border cell was scaled to a factor other than 1:100. Otherwise, the text size in the sheet file will not correspond to the scale factor chosen when placing the border cell.

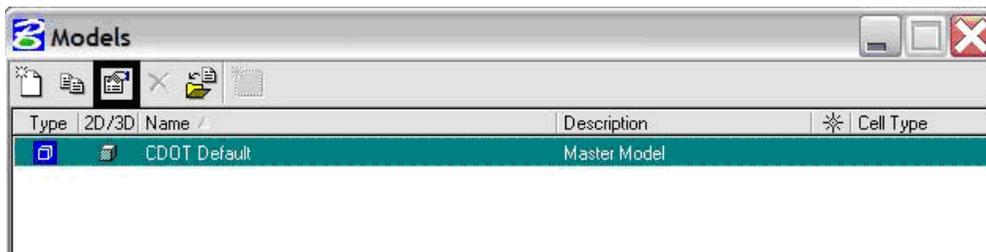
2. Select **File > Models** from the **Primary** toolbar.



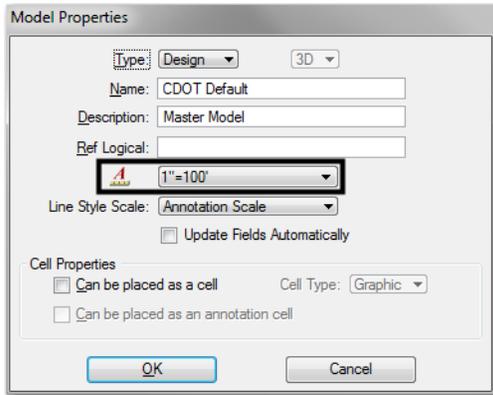
3. Or select **Models** icon  from **Primary Tools**.



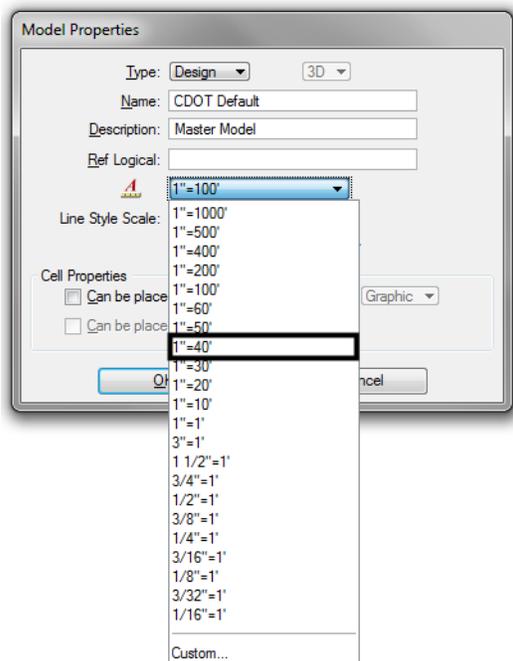
4. Select the **Edit Model Properties** icon .



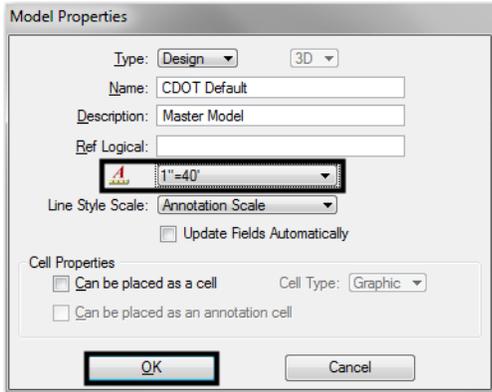
- The **Annotation Scale** factor defaults to **1:100**. Select the arrow to change the scale factor. If you try to place text before setting this, it will be too large since the drawing plot scale is at a 1:40.



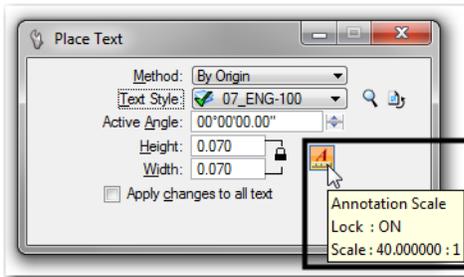
- From the pull down, select the **Annotation Scale** factor to match the scale factor used when placing the border cell.



- In this example, an annotation scale factor of **1:40** should display. <D> OK to accept.

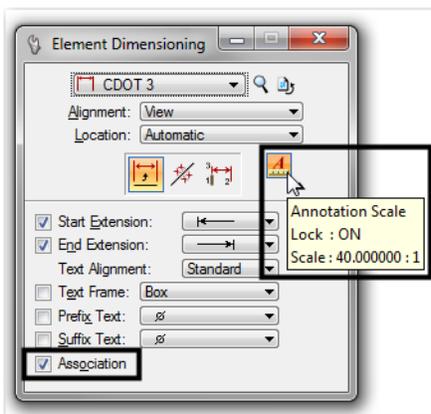


- Now, you can add text to the new sheet file. It will be scaled to the correct height based on the plot scale or in this case 1=40.



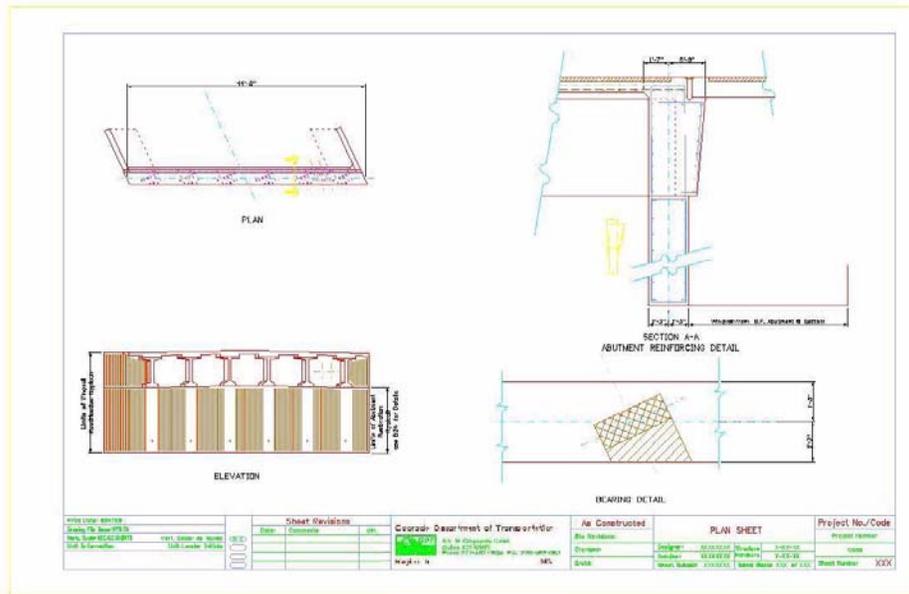
Note: Annotation Scale Lock must be turned **ON** when placing text or dimensions for the scale factor to take affect. Verify it is **ON** by hovering with your cursor over the  icon.

- You can dimension the model files in the new sheet file. The dimensions will be scaled to the correct size based on the plot scale or in this case 1:40.



Note: Annotation Scale Lock must be turned **ON** when placing text or dimensions for the scale factor to take affect. Verify it is **ON** by hovering with your cursor over the  icon. Also, verify the **Association** is **ON** so the dimensions will dynamically update when model changes are made. This setting is turned on by default.

10. The Sheet file now includes text and dimensions for multiple scaled details.



11. Select **File > Save Settings** before you exit MicroStation.

Workflow MS 7 - Creating Multiple Plan Sheets

This document guides you through manually assembling multiple plan sheets using MicroStation. Your first step will be to create a layout of how you want all your sheets printed out. Second, you will create the individual sheet files using those layouts. The major benefit of this workflow is the limits and orientations of plan sheets are determined early in the process. These sheet limits can be used to identify proper position, size, and rotation of text and tables.

Workflow Outline

Placing the Sheet Plan Limits Cell - The sheet limits cells are used to mark the location of each sheet on the project. The cells are placed along the project's alignment and rotated so that the alignment runs across the cell.

- ◆ **Commands Used: CDOT Menu > Drafting > Border** - Used to set the rotation and scale, select, and place cells.
- ◆ **Measure Angle** - Used to determine the rotation angle for the sheet.
- ◆ **Rotate** - Used to rotate the cell by the angle determined above.
- ◆ **Edit Text** - Use to record rotation angle and scale on the sheet limits cell.

Assembling the First Plan Sheet - The first sheet is created by rotating the view if necessary, adding the sheet border and other cells, and clipping reference files to the sheet limits.

- **Commands Used: rv=0,0,## key in** - A method to rotate the view.
- **CDOT Menu > Drafting > Border** - Used to set the rotation and scale, select, and place cells.
- **References > Clip Boundary** - Used to hide reference file data in areas outside of the clip boundary. The Element method is used to clip the references.

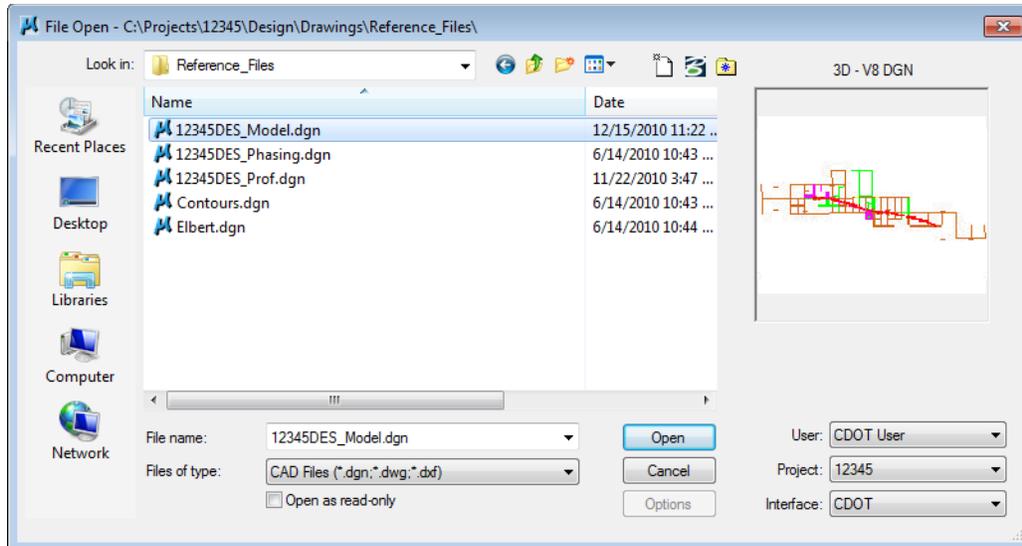
Assembling the Remaining Plan Sheets - The remaining sheets are created by Copying the first sheet then modifying the copy. This is done by moving the sheet border and other cells to the location of the new sheet, rotating them to match the sheet orientation, and reclipping the reference files.

sheet border and other cells, and clipping reference files to the sheet limits.

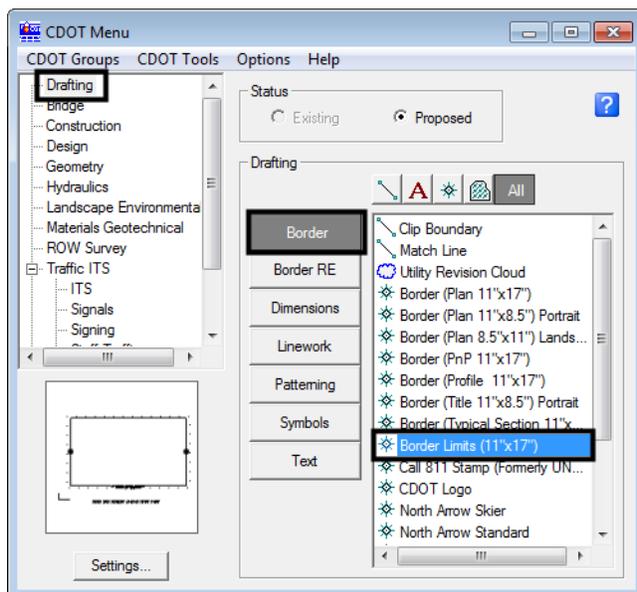
- **Commands Used: File > Save As** - Used to make a copy of the first pan sheet.
- **Move** - Used to reposition the border and other cells.
- **Rotate** - Used to rotate the cells to the proper angle for the new sheet.
- **rv=0,0,## key in** - A method to rotate the view.
- **References > Clip Boundary** - Used to hide reference file data in areas outside of the clip boundary. The Element method is used to clip the references.

Placing the Sheet Plan Limits Cell

1. Open a MicroStation model file that you will be basing your plan sheets on.



2. On the **CDOT Menu**, select the **Drafting** group.
3. <D> the **Border** button.
4. <D> on **Border Limits (11"x17")** in the options list.

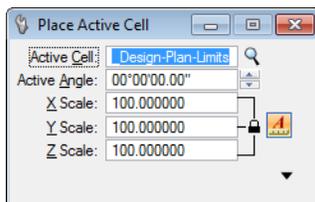


Note: About the Sheet Plan Limit cell: This cell helps to define the plan sheet limits in the model file before placing the border. It contains text characters that can be edited to indicate sheet name, rotation, & scale. The outer line-work depicts the maximum display limits for graphics as it relates to the border sheet. The inside shape reflects ½ inch inside this maximum limit and is the clipping boundary. All graphical information for this cell is on the MicroStation level, **DRAFT_INFO_No-Plot**.



SHEET XXXX ROTATION XX-XX-XX SCALE 1"=XXX

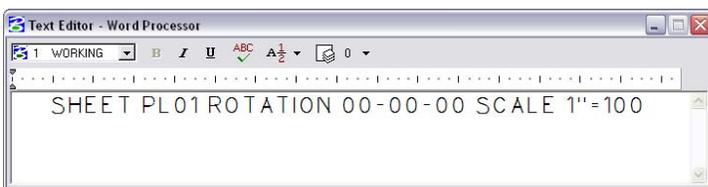
5. In the **Place Active Cell** dialog box, set the **Active Scale** to the desired plot scale and set the **Active Angle** to **0**.



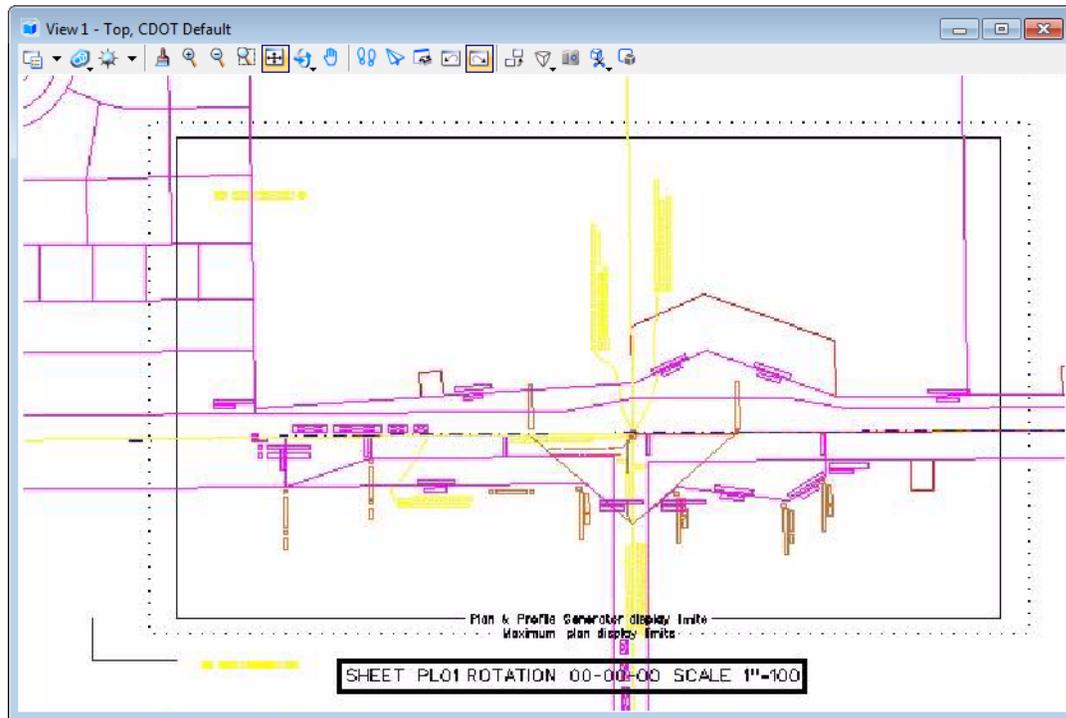
- Position the **Sheet Plan Limit** cell as you see fit in the MicroStation view, then place the cell in the model file.



- Use the **Edit Text** command to update the text at the bottom of the sheet. This will assist you in managing the sheet plan limits. Select the text at the bottom of the layout sheet and replace the appropriate sheet information in the **Text Editor**.



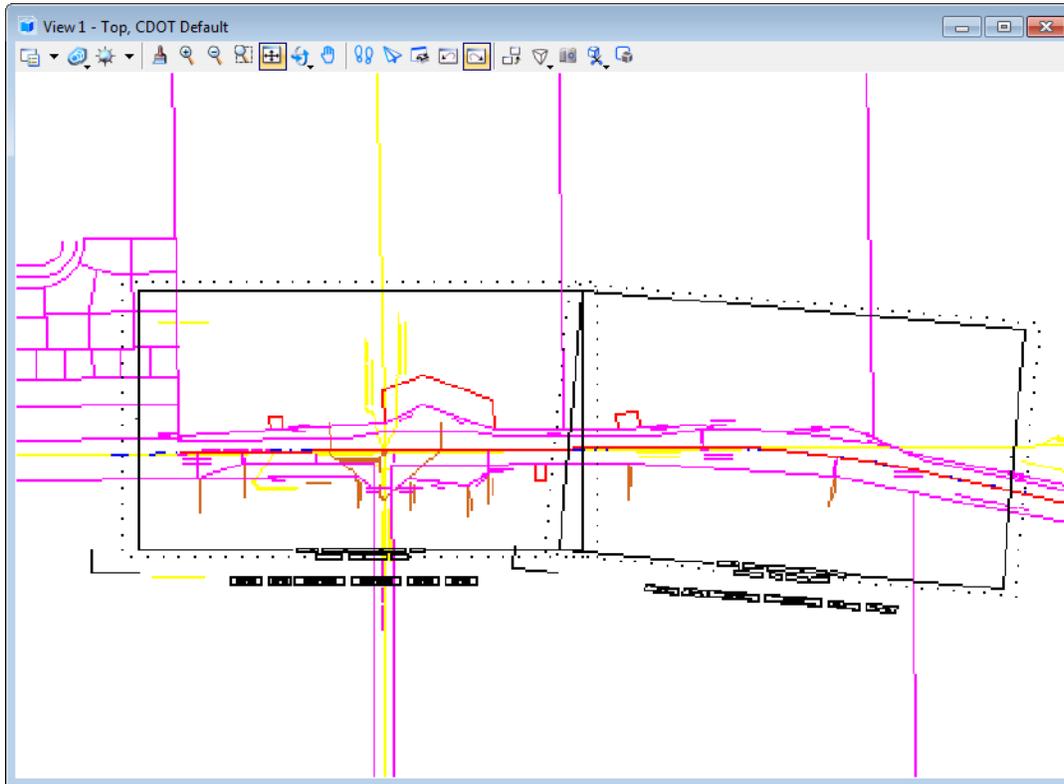
- The plan sheet information text will be updated.



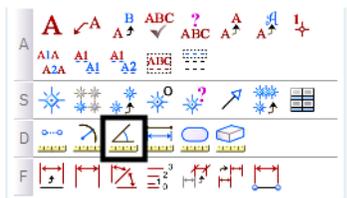
- Use the MicroStation **Copy** command to duplicate the cell graphics for the second sheet.
- Use the MicroStation **Rotate** command to align the graphics for the second sheet.

Note: Rotate the cell only and not the model file.

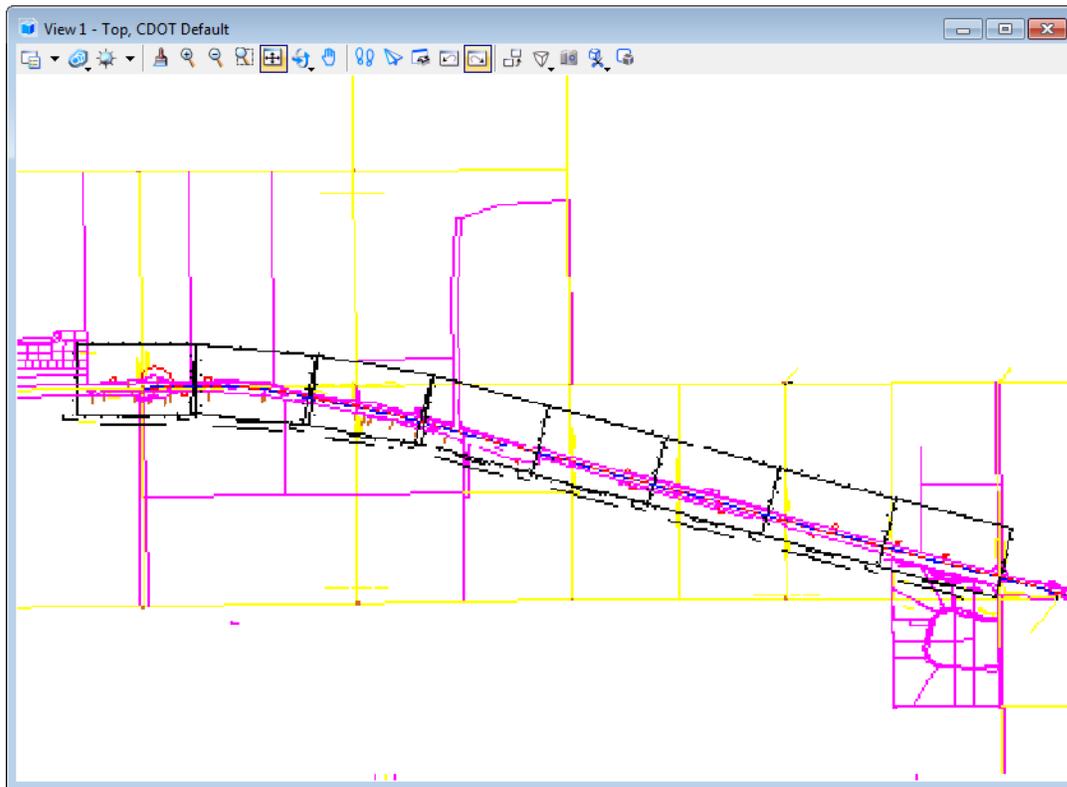
11. Edit the information based on the Sheet name and Rotation angle for the second sheet using the **Edit Text** command.



Note: If the *Sheet Plan Limits* cell is placed at an arbitrary rotation angle, you will have to manually measure the angle. This is done by drawing a line horizontal from the lower left hand corner of the Sheet Plan Limits cell and then using the **Measure Angle** command in MicroStation. Measure the angle in-between the horizontal line drawn and the bottom edge line of the cell.



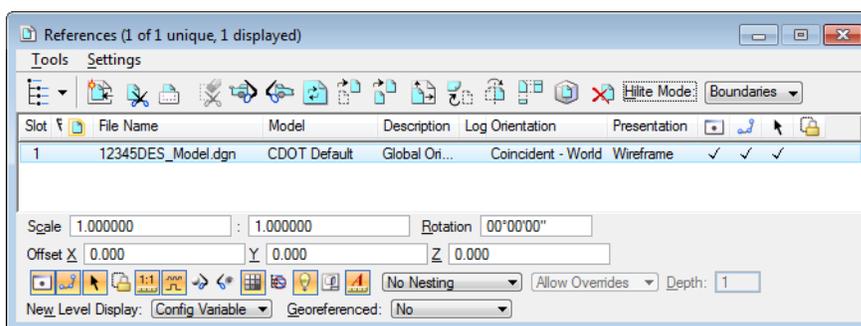
- Continue planning the sheet layout for the remainder of the project.



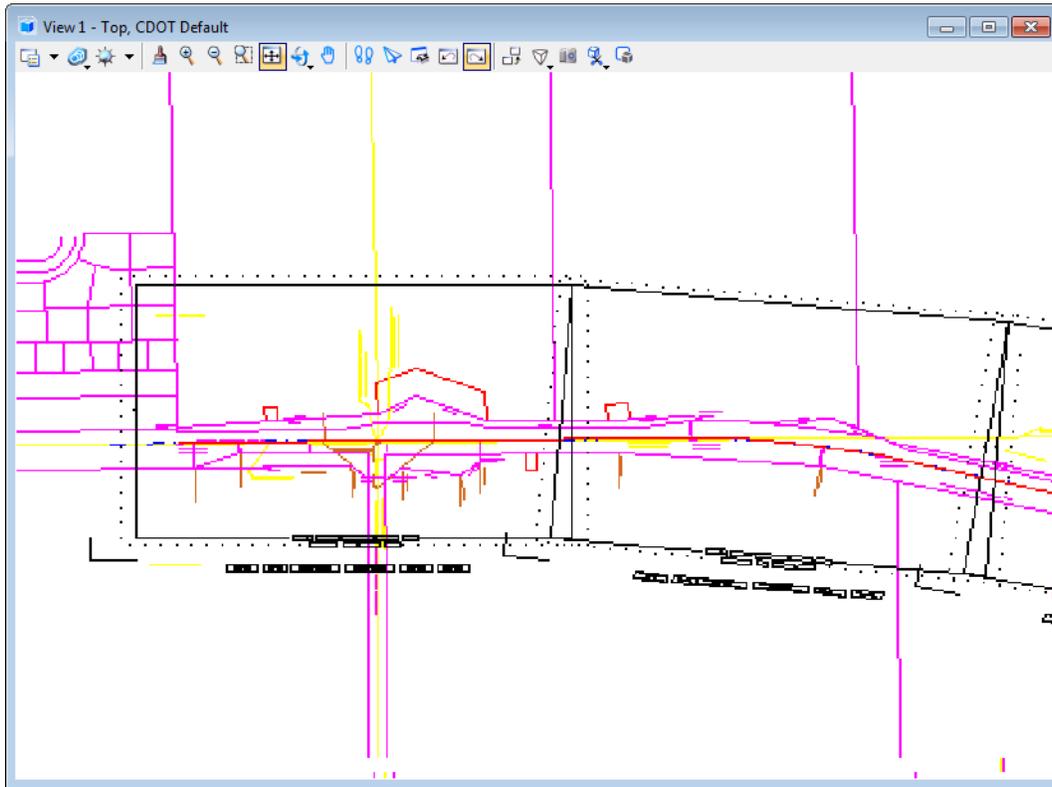
Note: The *Sheet Plan Limit* cell is to be placed side by side. This cell is setup to have no overlap in the plan view.

Assembling the plan sheets

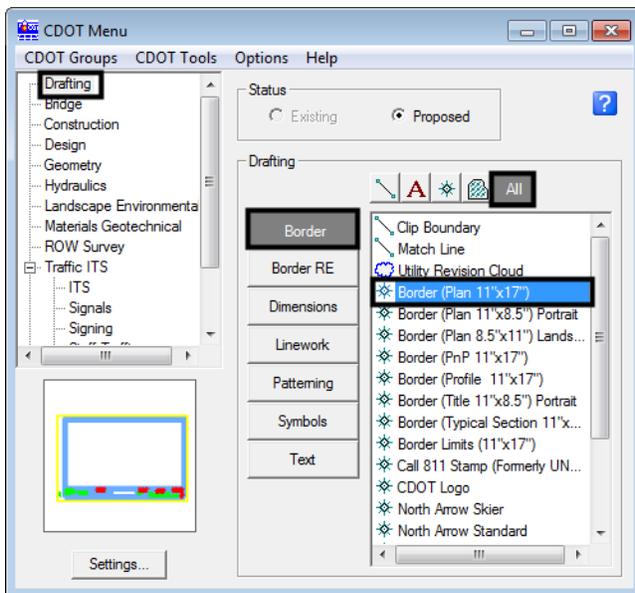
- Open up a MicroStation Sheet file and attach the model file that contains the *Sheet Plan Limit* cells.



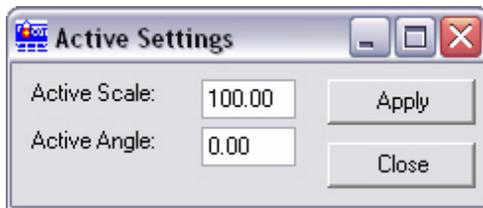
2. **Window** or **Zoom** into the beginning of the project so you can begin placing the border cell.



3. From the **CDOT Menu** select the **Drafting** from the group display area, **<D>** the **Border** button, use the **All** filter, and then select **Border (Plan 11x17)** from the item list.

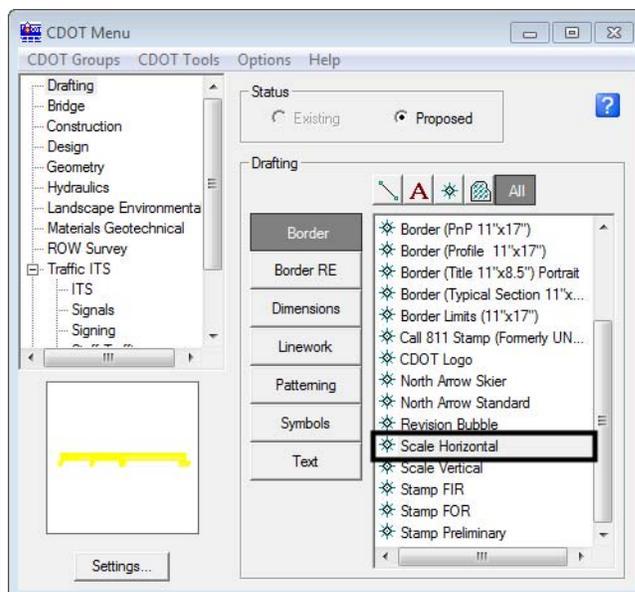


4. **<D> Settings** if the desired sheet scale is something other than **1"=100'**. In the **Active Settings** dialog box you can change the **Active Scale** and the **Active Angle**.



Note: The Active Angle is view independent and is not associated with view rotation. Therefore, the x-axis is always horizontal regardless of the view rotation. You will not need to set this for correct placement of the North Arrow or other cells.

5. **<D> Apply** in the **Active Settings** dialog box after desired changes are made.
6. **<D>** at the desired location in the MicroStation view to accept placement of the border.
7. Select the **Scale Horizontal** from the item list.



8. **<D>** at the desired location inside of the sheet border to accept the placement of the bar scale.

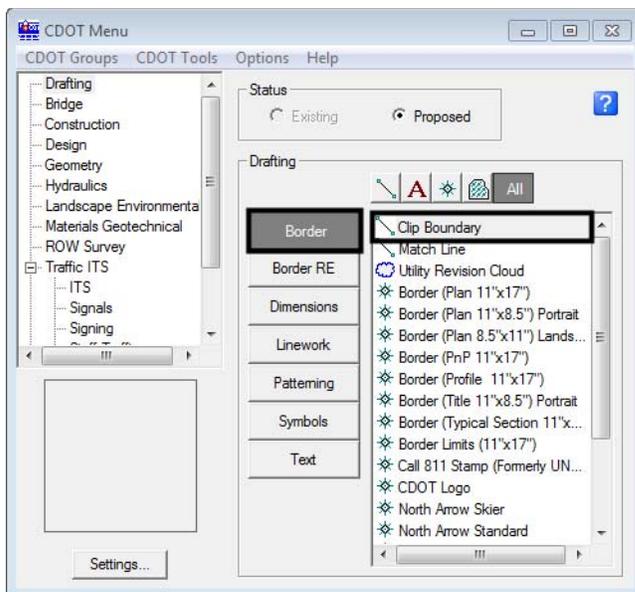
Note: Contact the CADD Manager if any edits need to be made to a Region Engineer cell. Remember, you *can* edit the cell with the **Edit Text** command until the changes are available in the next configuration.

13. Double click on any of the text fields in the border to add sheet specific information.

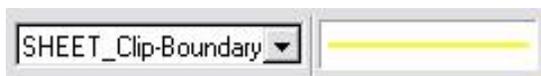
Note: Coordinate with the Region Surveyor when you are creating sheets that are not at a 1:100 scale. They will provide you with the topography and survey MicroStation files at a different scale. Otherwise, the line work and cells will not be the correct size for the print scale.

Placing a Clip Boundary

1. Select the **Border** button and then select the **Clip Boundary** from the item list.

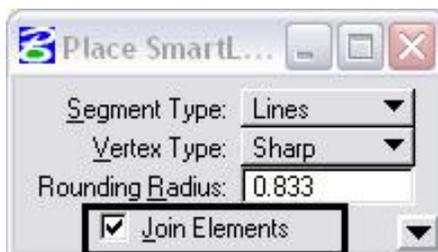


2. Once **Clip Boundary** has been selected, verify the **SHEET_Clip-Boundary** level is active.

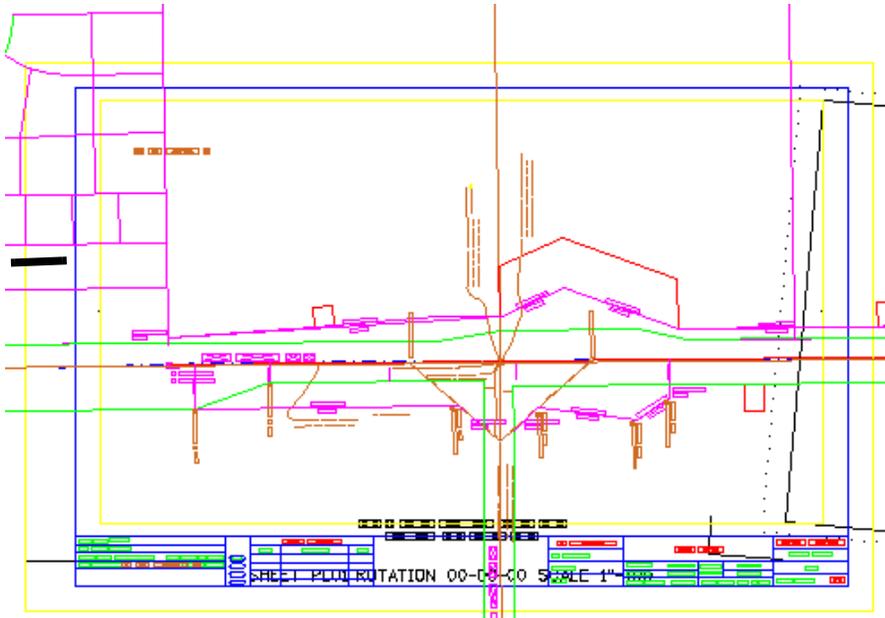


Note: The level **SHEET_Clip-Boundary** will not print.

3. The **Place Smart Line** command will be active. Verify the option **Join Elements** is checked **ON** and draw a closed shape that will represent the clipping boundary of the model file.

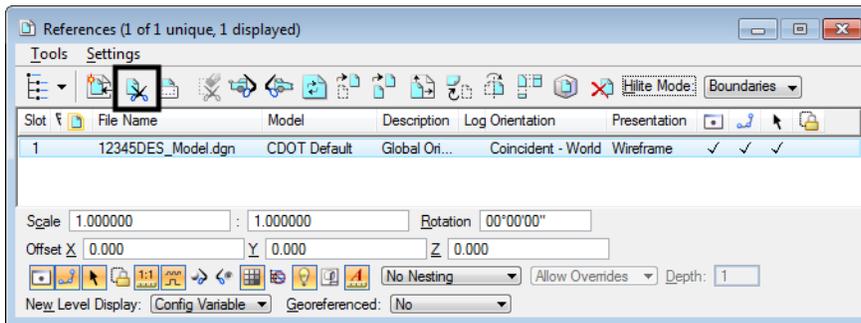


- If the clipping boundary shape is rectangular, select the **Place Block** command  from the **Drawing** task tab.



Clipping the Reference File

- In the **References** dialog box, highlight the Reference file to be clipped. **<D>** the **Clip Reference** icon.



Note: You can select more than one reference file at a time by holding the **Shift** or **Ctrl** keys down as you are making your selections. Multiple drawings can be clipped in one step when they are all selected.

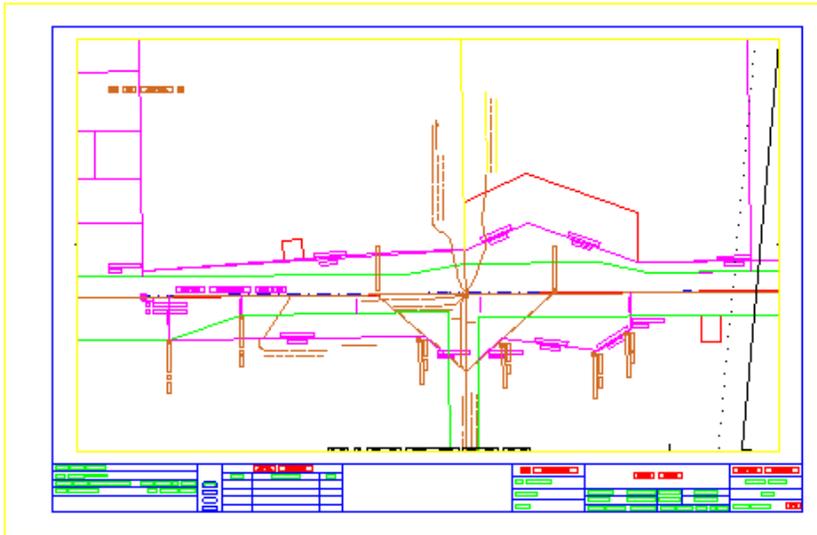
- The **Set Reference Clip Boundary** dialog box will open. Verify **Method** is set to **Element**.



- You will be prompted to select the **Element** you want to clip the reference from. Select the rectangular element that was placed inside the border in the previous steps on the **SHEET_Clip-Boundary** level.

Set Reference Clip Element > Identify Clipping Element

- Fit** the MicroStation view  and **Save Settings** after clipping the reference files.



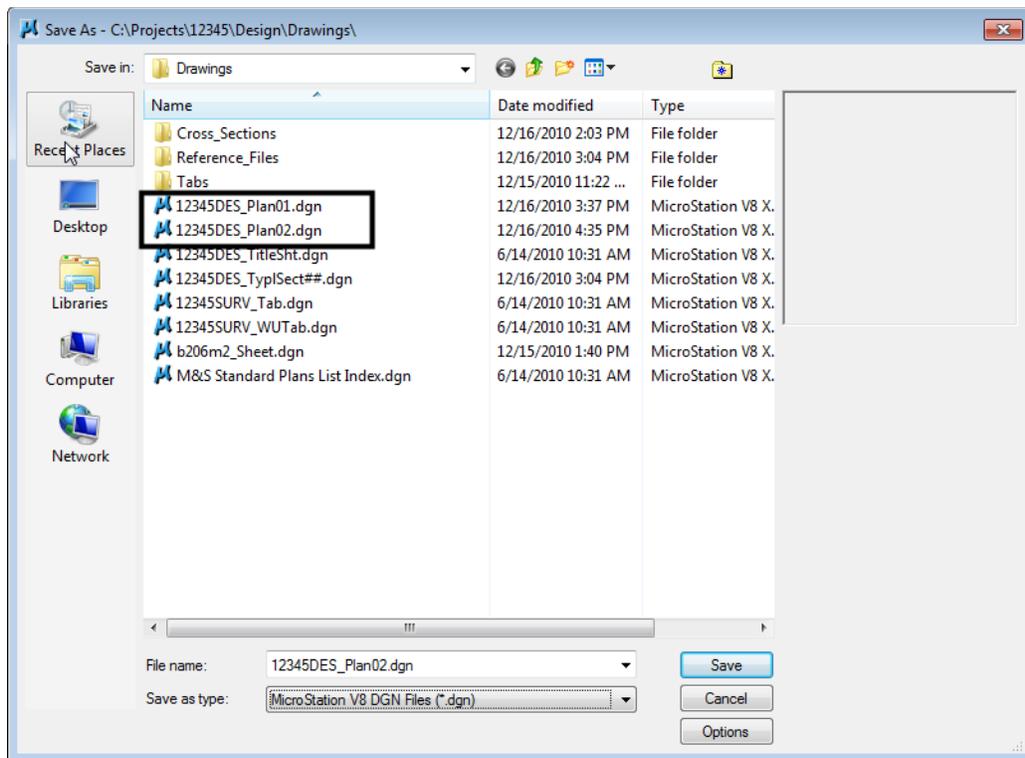
Note: Once the clipping boundary is placed, do not delete it. If it is deleted, the clipping region of the reference file will be lost.

- Edit the title block text and add any sheet specific information. You can turn off the level **DRAFT_INFO_No-Plot** so the Sheet Plan Limits cell information does not display.
- Select **File > Save Settings**.

Note: This completes the first sheet. It should be noted that setting up sheets this way maintains the coordinate based information and measurements are in real-world dimensions.

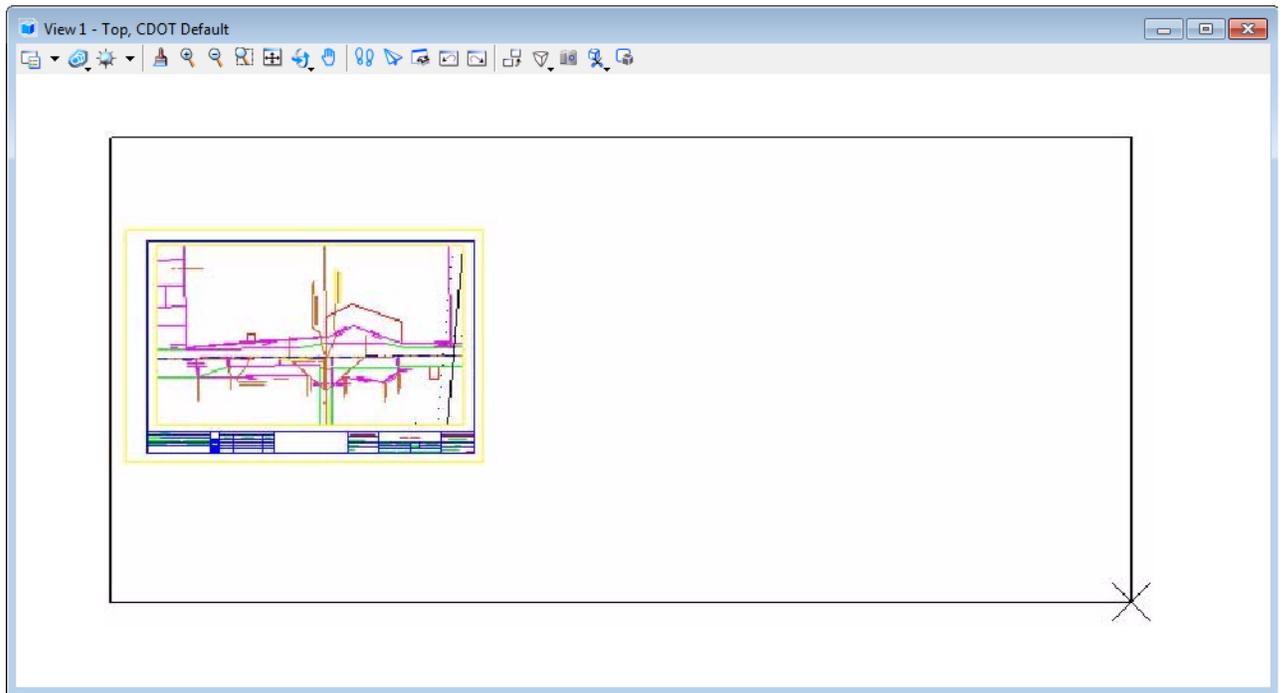
Subsequent sheet creation is accomplished by duplicating the first sheet. This process is streamlined because all the reference files already attached. The process for creating subsequent sheets involves moving the border sheet and redefining the clipping boundaries.

7. Select **File > Save As** and input the name of the next sheet file to be created (sheet file names should be numbered consecutively).

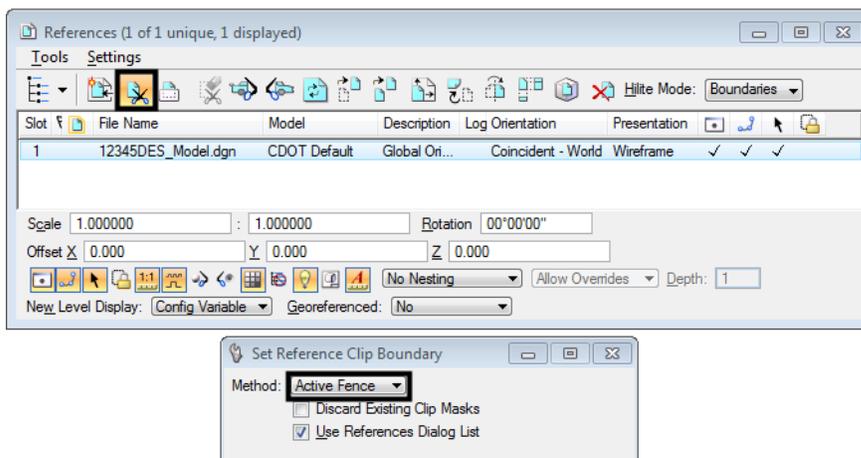


Note: The **Save As** command will automatically save the current drawing to the current directory, then copy and rename to the specified file name and open the new drawing.

- Place a MicroStation **fence** over an area that would encompass the next sheet in the set.

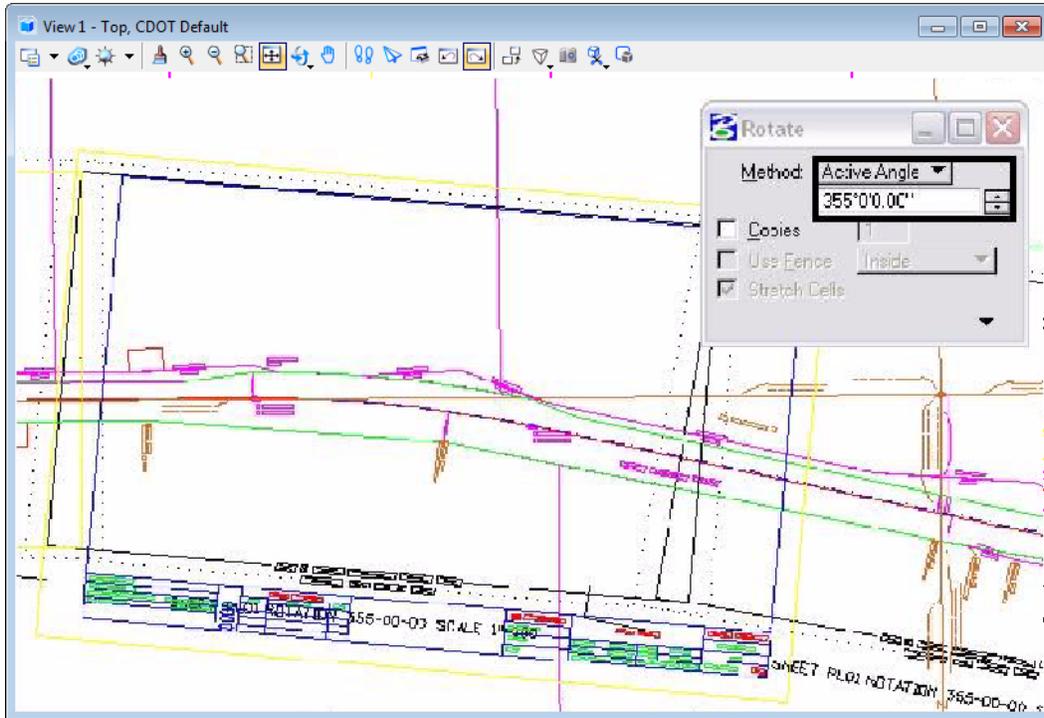


- In the References dialog, highlight all files and Select **Tools > Clip Boundary**. The **Method** should be set to **Active Fence**. **<D>** on the MicroStation screen to accept the new clip boundary. This will re-clip the previous Clip Boundary placed inside of the border cell.



- Turn On** the level, **DRAFT_INFO_No-Plot** in the model file where the Sheet Plan Limits cells were placed.

11. Use the MicroStation **Move** command to relocate the border cell. Also **Rotate** the border sheet to align with the predefined sheet limits if the Sheet Limits cell was placed at an angle. Remember, the value of the angle is located in the text of the Sheet Limits cell.



12. You may need to rotate the MicroStation view depending on the layout of the sheet. If you are in a 3D file, key-in **rv = x,y,z** and press **Enter** or **Tab**.

Important! Use the following values when rotating a 3D view: **$x = 0$, $y = 0$, and $z = \text{Rotation Angle}$** . You are rotating the view about the z-axis because this is the axis perpendicular to the view. If you are in a 2D file, key-in **rv = angle of rotation**.

<D> in the active view window to initialize the rotation.

Note: Rotating a MicroStation view simply rotates the viewing of the graphics. The coordinate system is still relative to the graphics and any coordinate or alignment information extracted will be correct.

13. Define the reference file clip boundaries as in the previous steps.
14. Update information in the title block of the sheet as necessary
15. Select **File > Save Settings**.
16. Repeat this procedure to complete the remainder of the sheets.

Workflow MS 8 - Title Sheet Vicinity Map

This document defines the procedure for inserting a Vicinity Map into the Project Title Sheet.

Vicinity Map Insertion Procedure

1. Open the file **JPC#DES_TitleSht.dgn** under **C:\Project\.....\Design\Drawings** or **JPC#ROW_TitleSht.dgn** under **C:\Projects\.....\ROW_Survey\Drawings** that is automatically created when you run the **Create Project Utility** program upon project startup.

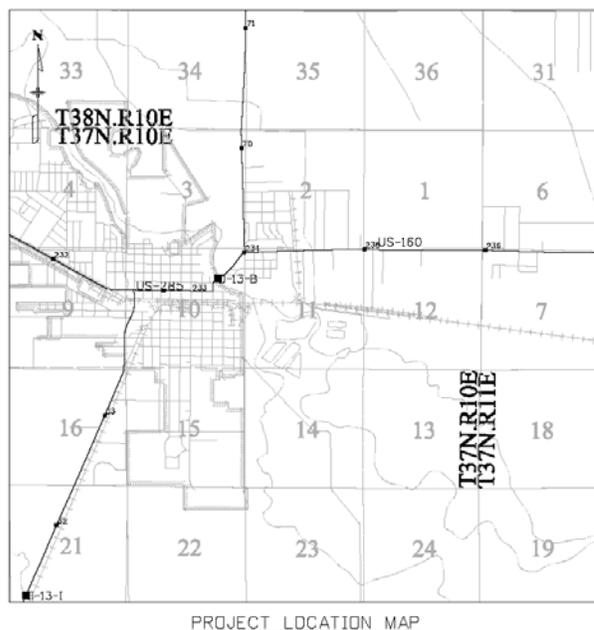
Note: The 'JPC#' will be replaced by the 5 digit Job Project Code.

2. County Maps for all counties within Colorado have been translated from GIS information, and can be found on the Shared Drive [\\public\CADD County Maps\](#). These maps should be used to build your Vicinity Map. The County of interest should be copied down to your project location Drawings folder and so it can then be attached as a reference file to the Title Map. The local map can be edited as desired without affecting the original.

Note: If you choose to attach the map directly from the Shared Drive as a reference file, the map will remain in a read-only state. No editing will be allowed nor will saving additional views be permitted.

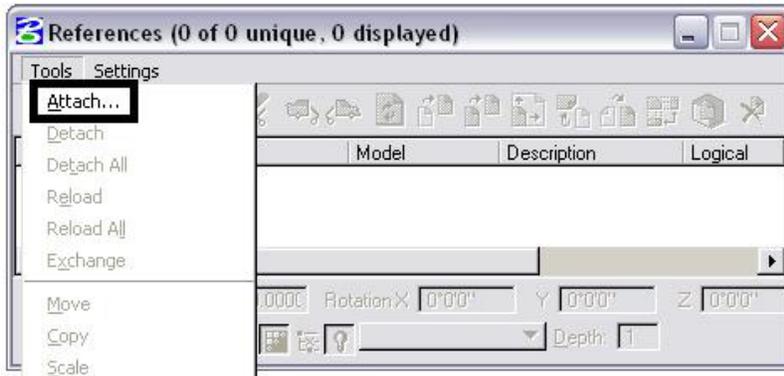
3. The **CDOT-PenTable.tbl** has been updated to plot the title map with dithering on certain entities. It should be set by default. No adjustments will need to be made.

Title Map Example

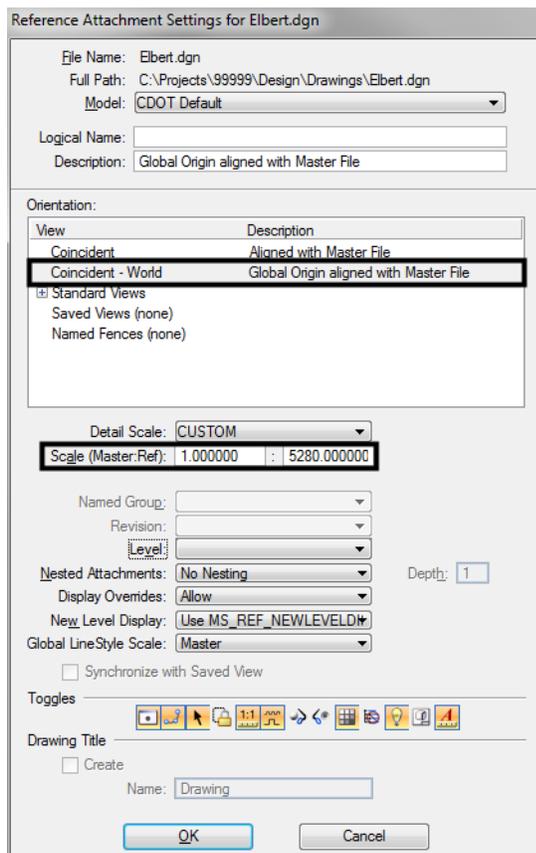


Reference File Attachment

1. The county map should be attached as a reference file to the Title Sheet. Once the desired County has been copied down your Project location, select **File > Reference** to open the **References** dialog box. Select **Tools > Attach**, then navigate to the file, select it and **<D> OK**.

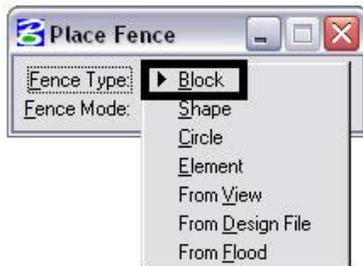


2. The **Reference Attachment Settings** dialog box will appear. The Map has been designed to be inserted at a scale factor of 1:5280 (Master: Reference). Select **Coincident - World**.

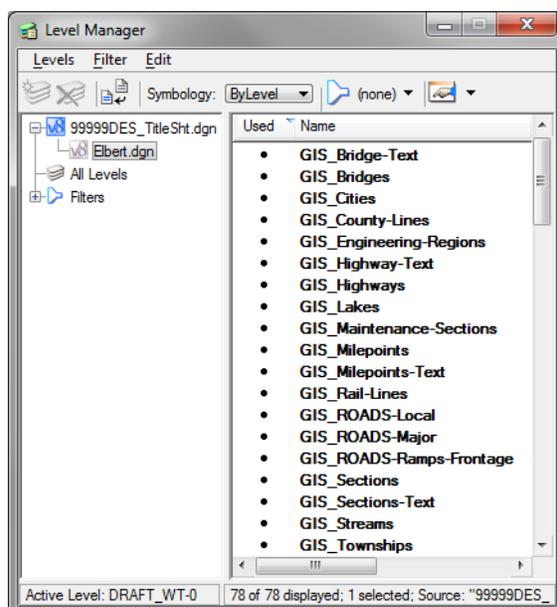


- When **<D> OK**, the map will be attached to the end of the cursor. Place the map within the limits of the Title Sheet drawing, Project Location Map area, located in the middle of the sheet. If the limits of your project are not shown within the area on the screen, you can zoom out in the view, place a large **Fence Block**, and perform a **Reference File Clip Boundary** command. This will re-clip the limits of the Reference File, allowing you to see much more of the map.

Note: Your **Fence Type** should be set to **Block** not to **Element**.



- Once you have located your project limits, **Zoom** into the area where it is located. Re-position the project limits within the center the Title Sheet with the **Move** reference file command. Re-Clip the limits of the project as desired. This time you can use either a **Fence Type** of **Block** or **Element**, whichever you prefer. If you are going to use **Element**, **<D>** the Blue shape in the middle of the Title sheet and accept it on the screen. If you choose a **Fence Type** of **Block**, **<T>** to either corner of the Blue shape and **<D>** to accept it. This will re-define the limits of the Project Location Map.
- A DGNLIB including the GIS levels has been included in the configuration and has been assigned to all the County Model Files by default. The Reference Levels can be manipulated as desired from the **Level Manager** dialog box.



- The Township and Range Text can be copied into your sheet and positioned where you want it. Turn off the Reference file level **GIS_Townships-Text** if you have copied it into your file.

Note: If you want the map at a different scale other than 1:5280 (1 inch = 1 mile) it can be rescaled through the reference dialog box. It should be noted that the linestyle scale factors and text were defined based on a 1 mile insertion. The linework and text can be re-scaled within the original Region area, only if it has been saved to your hard drive.

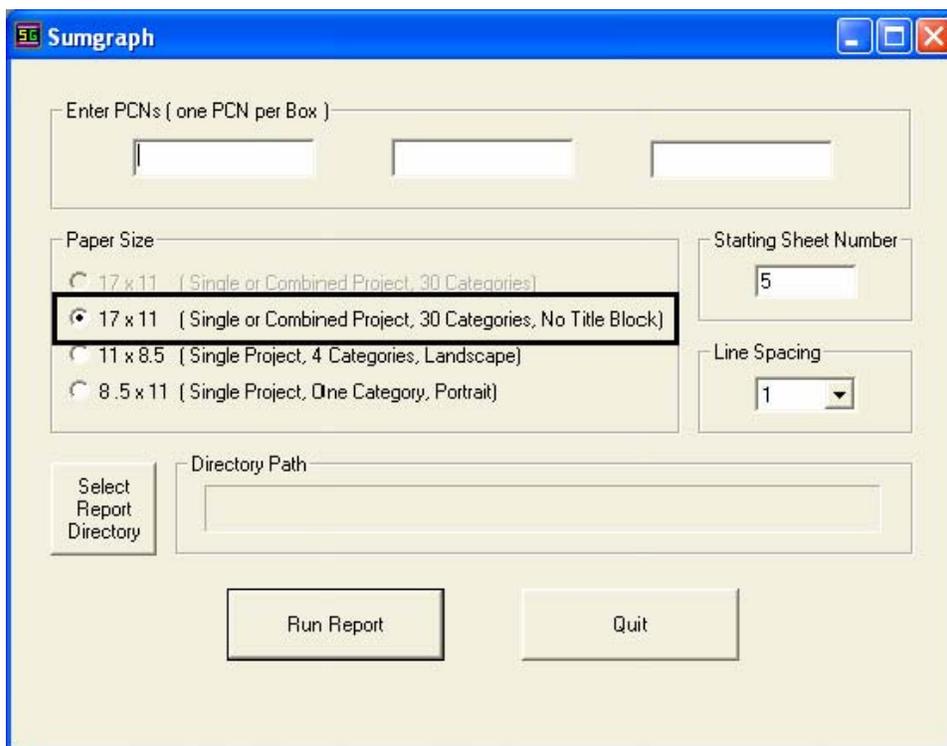
Workflow MS 9 - SAQ Sheets

This document guides you through opening the Summary of Approximate Quantities Sheet created within your project folder and attaching the DXF files created from the Sumgraph software, through the use of MicroStation Reference file tools. Upon completion of the following procedures, the Sumgraph sheets can be plotted with the CDOT Batch Printing Process.

Summary of Approximate Quantities (SAQ) Sheets Creation

Saving the SAQ Sheets

1. Generate your SAQ Sheets through the Sumgraph program. Ensure that the Directory Path for the DXF files is set to the Project Specific **Design\Drawings\Reference_Files** folder. The MicroStation levels have been adjusted in Sumgraph to accommodate the latest CDOT configuration. The following Menu has been modified. The default selection is shown below:



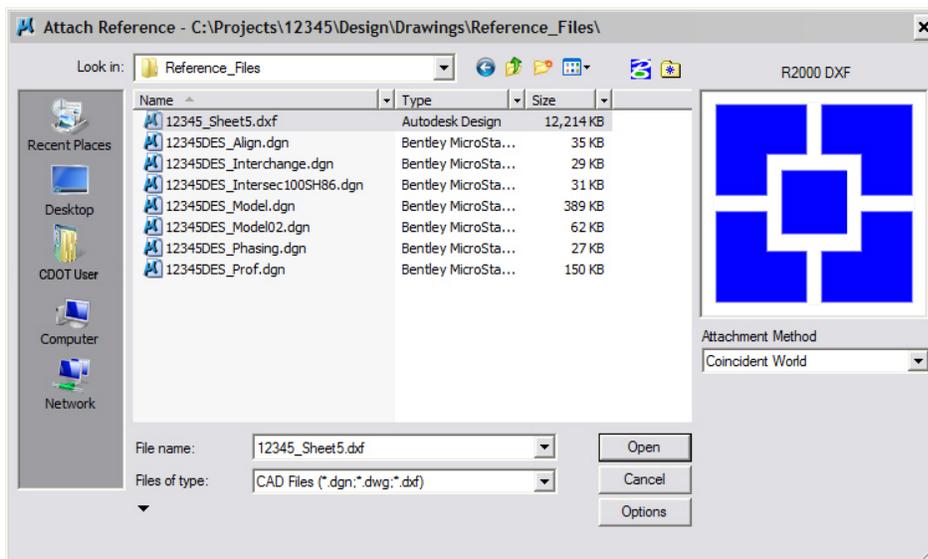
Note: The designer no longer has the option to select the Sumgraph sheet creation that includes a 17x11 border. The only method available is the No Title Block option.

Creating the MicroStation Sheet Files

1. The Drawing Sheet file to be used is located in the project directory structure under the **\Design\Drawings** folder called **45454DES_SAQ##.dgn**. The Project Creation Utility has replaced the JPC# portion of the file name with the unique Project Code, in this example shown as 45454. The file can be renamed to **45454DES_SAQ01.dgn**, replacing the ## with a sheet number value. The **Windows Explorer Copy & Rename** can also be used in order to preserve the original drawing file, if desired.

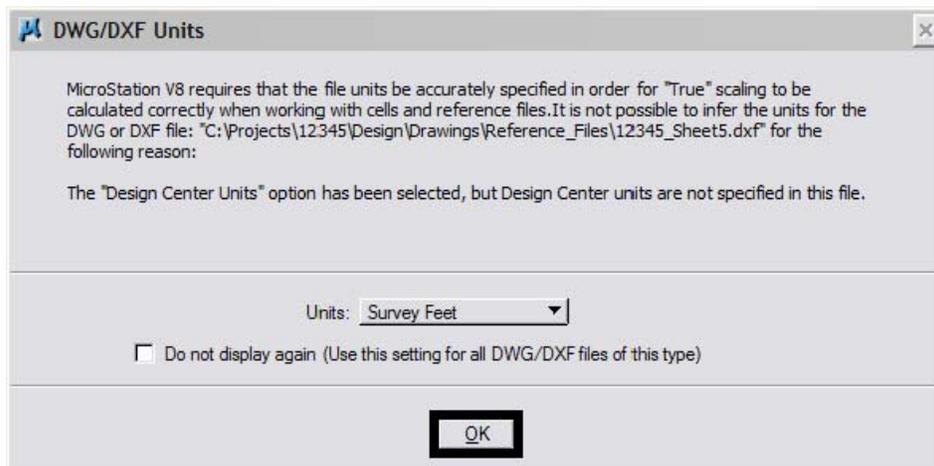
Note: It is an acceptable procedure to place all your SAQ sheets within one file if desired, but this exercise will only cover the placement of one SAQ sheet per Drawing file.

2. Open the **45454DES_SAQ01.dgn**. Notice that the Border Cell has already been placed within the file. The cell should not need to be relocated or scaled, as it has been positioned at the correct coordinates and scaled appropriately to accommodate the Sumgraph DXF reference file attachment. Additionally, the drawing has been scaled to 1"=200' and the coordinates for the lower left hand corner of the border read X=43.50, Y=-1.00, Z=0.
3. From the MicroStation Main Menu, select **File > Reference** to open the **Attach Reference** dialog box. Navigate to the project specific **\Design\Drawings\Reference_Files** folder and select the Sumgraph DXF from the **Files** list. It may be necessary to manually move the desired files to this location, prior to attachment, if the sheets were not placed in this folder in step 1 above. **<D> OK** to proceed.



Note: If the DXF file does not show up in the list, it may be necessary to change the **List Files of Type** to show CAD Files (*.dgn, *.dwg, *.dxf). After making the change, the list should contain the desired file.

- The **DWG/DXF Units** dialog box will now appear. The units should be set by default to Survey Feet. Accept this setting by **<D> OK**.



Note: Do not check the “Do not Display again” settings box, as this reminder is necessary for all DWG/DXF attachments and may vary on occasion.

- The Sumgraph DXF sheet will now be attached as a reference file in the correct location for printing. Place the appropriate Resident Engineer Identification cell and update any other Titleblock information desired. The CDOT Titleblock can be updated with the **Edit Text** command.
- After the initial sheet has been created, each consecutive sheet can be copied and renamed using the Windows Explorer or through the **File > Save As** command in MicroStation. The reference file attachment will need to be updated for each sheet. Select **File > Reference** to open the **References** dialog box, Double click on the attached Reference file to display the **Attachment Settings** dialog box. Navigate to the desired location, select the desired sheet and **<D> OK** twice. The Sheet file will now contain the correct Sumgraph DXF sheet.
- After creating the desired SAQ sheets, proceed with the **CDOT Batch Printing** Process. Instructions for batch printing can be found on the **Start> All Programs > _CDOT_CADD_Information > Workflows > CDOT Batch Printing** or on the **CDOT Menu** under **Help > Workflows**.
- The Sumgraph program may need to be re-run during the course of the Design Project so that SAQ DXF Sheets are updated with revised information. Make sure to maintain the identical naming convention for the DXF files that are updated and save the files to the correct folder in the Project directory structure and proceed with CDOT Batch Printing.
-

Workflow MS 10 - Converting AutoCAD Files to MicroStation

This document guides you through translating AutoCAD files into MicroStation using a .CSV remapping file. The MicroStation dgn files produced using this workflow will have standard CDOT levels using bylevel symbology. For plotting AutoCAD files only, see the workflow, *CDOT Printing AutoCAD Files in MicroStation*.

Workflow Outline

Batch Conversion Of AutoCAD Files - All of the file within a directory can be converted at one time using Batch Processing. Because the level conversion table will be set up for only the open drawing it may not convert all AutoCAD level into Microstation levels. When these unconverted levels are discovered, repeat this process to convert the remaining AutoCAD levels.

- ◆ **Commands Used: File > Open** - Used to access the MicroStation Manager dialog box. From there, the desired AutoCAD file can be selected.
- ◆ **DWG/DXF Units** - This is a message window displayed when an AutoCAD file is opened in MicroStation. Set the Units to Survey Feet.
- ◆ **Utilities > Batch Converter** - This command is used to select the AutoCAD files for conversion, set up the conversion table, and convert the files.
 - **Edit > Add Files** - Used to select the AutoCAD files for conversion
 - **Edit > V8 Save Options** - Used to access the remapping CSV file.
 - **Excel > Level** - This button (in the Excel spreadsheet) queries the dgn file for AutoCAD level names and places them into the spreadsheet.
 - **Excel Cut and Paste** - In the Spreadsheet, MicroStation level names are cut from their current location and pasted next to the corresponding AutoCAD level. This tells the batch converter what to rename the AutoCAD levels too.

Fixing Converted Files with Multiple Models - Some AutoCAD files may have multiple models, usually a sheet border model and a data model. Because the CDOT standard is one model per dgn, these will have to be separated

- ◆ **Commands Used: File > Save As** - Used to create a dgn file to contain the sheet border data.
- ◆ **Delete** - Used to remove the data from the Default Model.
- ◆ **References > Attach** - The file is attached to itself so that the sheet border data can be moved into the Default Model.
- ◆ **Copy** - Used to copy the referenced sheet border data into the Default Model.
- ◆ **Models > Delete** - Used to remove all models except the Default Model.
- ◆ **Color Table > File > Default** - Used to set the CDOT standard color table active.
- ◆ **CDOT Menu > Drafting > Dimensions** - Used to replace the AutoCAD dimensions.
- ◆ **CDOT Menu > Tools > Text to Node** - Used to group lines of text into paragraphs.
- ◆ **annotationscale add** - A MicroStation key in that adds the annotation scale attribute to the text.
- ◆ **Change Text Attributes** - Used to assign a CDOT text style to the text.

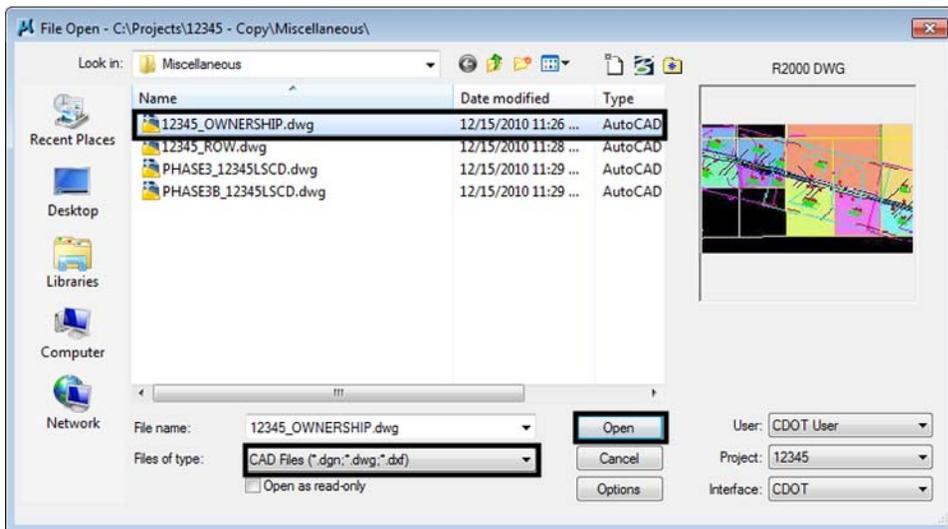
Batch Conversion Of AutoCAD Files

Entire directories can be processed at one time using the Batch Converter. Using this option, a large number of files can be processed quickly. However, because only one of the files can be used to create the CSV file (the open file), many AutoCAD levels may be transferred to the MicroStation files. As the user finds MicroStation files with AutoCAD levels, those files can be used to create a new csv file and the Batch Converter can be re-run on all the files. By repeating this process all of the AutoCAD levels will be gradually eliminated.

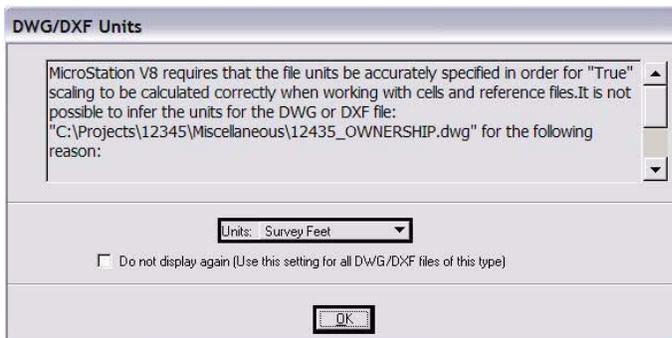
The steps below describe how to set up and run the Batch Converter.

Opening an AutoCAD file in MicroStation

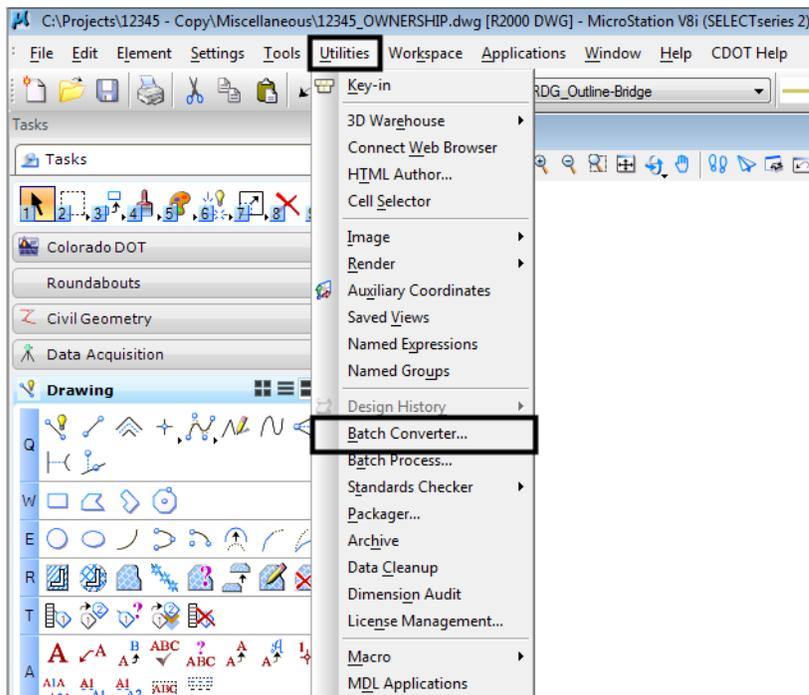
1. From the **File Open**, open an AutoCAD (*.dwg) drawing file. (Change **List Files of Type** to **CAD Files (*.dwg, *.dgn, *.dxf)** to see the AutoCAD files in the selected directory).
2. <D> the desired file then <D> **OK**.



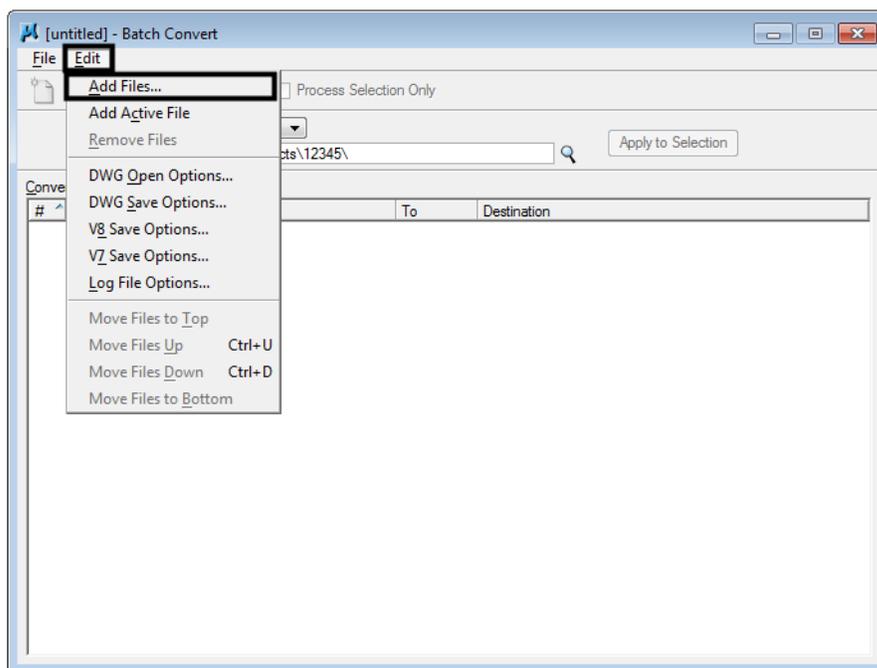
3. The **DWG/DXF Units** dialog box will appear. Verify the **Units** are set to **Survey Feet** and <D> **OK**.



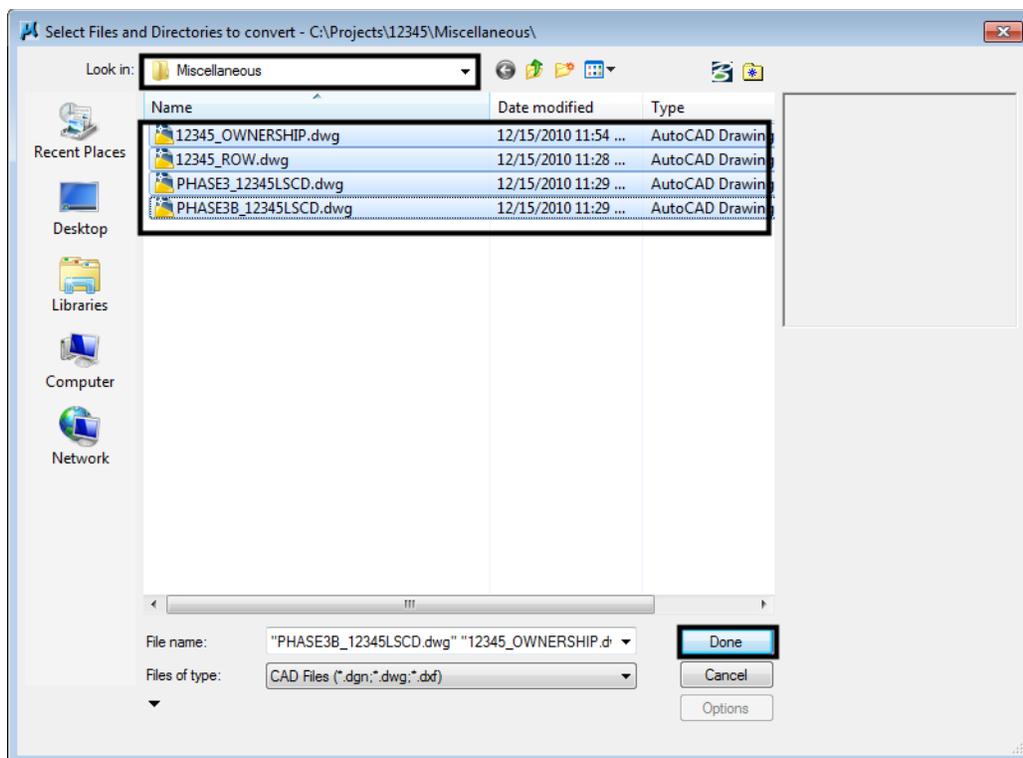
4. Select **Utilities > Batch Converter** from the MicroStation menu. The **Batch Convert** dialog box is displayed.



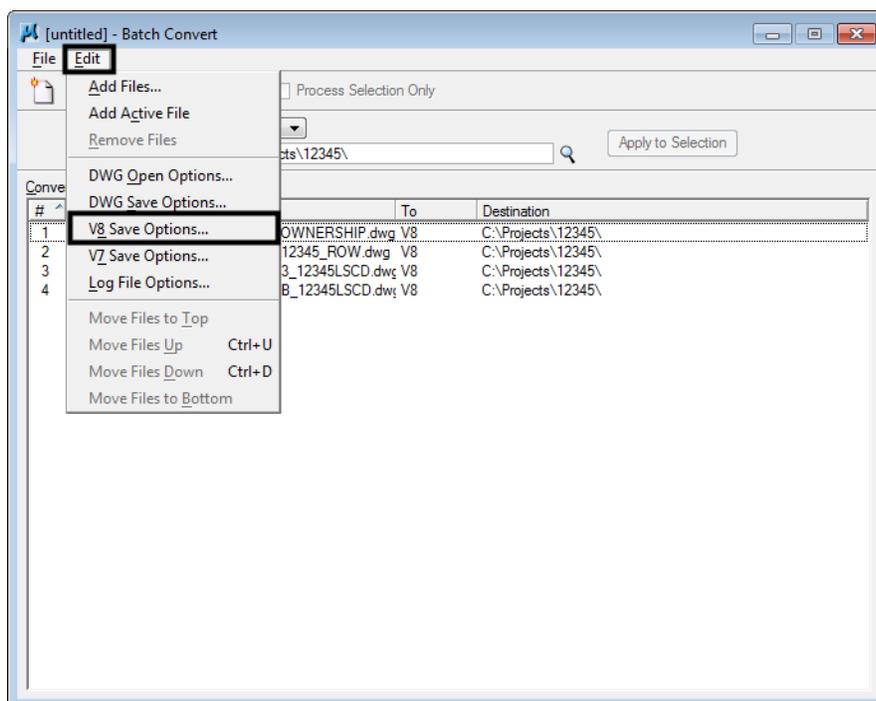
5. Select **Edit > Add Files** from the menu.



- From the **Select Files and Directories to Convert** dialog box, Navigate to the directory containing the files to be converted, then highlight the files to be converted. **<D> Done** to complete the selection.

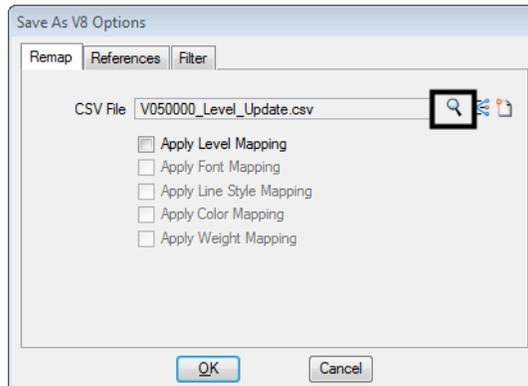


- Back on the **Batch Convert** dialog box, select **Edit > V8 Save Options** from the menu.

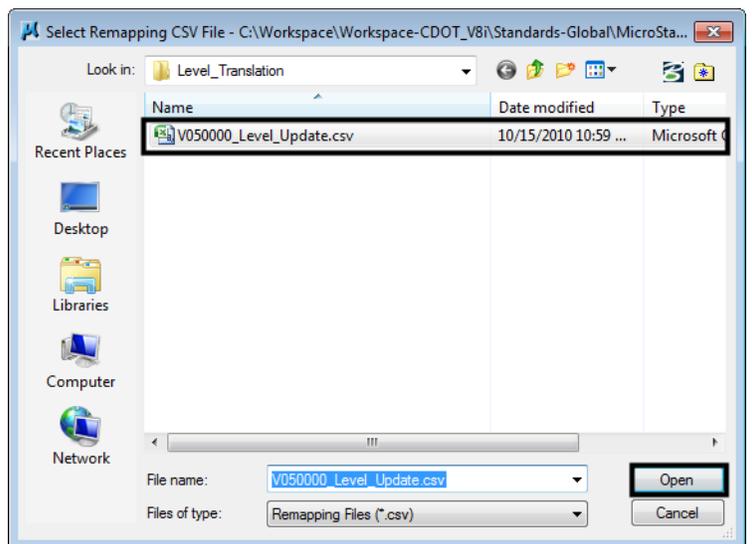


Editing the CSV file

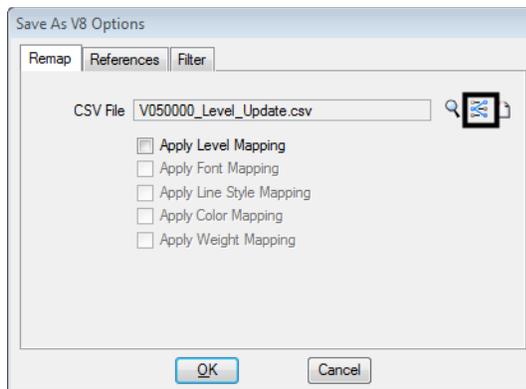
1. In the **Save As V8 Options** dialog box, <D> the **Browse for CSV remapping file** icon to edit the CSV file.



2. Navigate to the following directory: **C:\Workspace\Workspace-CDOT_V8i\Standards-Global\MicroStation\Tables\Level_Translation** and select the **V050000_Level_Update.csv** file. The CSV file maps all of the previous AutoCAD layers to the standard CDOT MicroStation levels.



- The **CSV File** field will be populated with the correct level mapping file. In the **Save As V8 Options** dialog box, <D> the **Edit CSV remapping file** icon.



- Microsoft Excel will activate. If the **Security Warning** dialog box appears, <D> **Enable Macros**.



- The fields under **Level** will be populated with the layers that are defined in the AutoCAD file.

	A	B	I	J
1				
2				
3		Level Mapping Table		
4		<input type="checkbox"/> Show Optional Columns		
5				
6		Level	V8OutputLevel	DWGOutputLayer
7		TEXT		
8		BROKEN		
9		HIDDEN		
10		OUTLINE		
11		TITLE		
12		HATCH		
13		Center		
14		Dimensions		
15		REBAR		
16		Defpoints		
17		Zigzag		
18		0		
19		DRAFT_Text-1		
20		DRAFT_Text-2		
21		DRAFT_Text-3		
22		DRAFT_WT-0		
23		DRAFT_WT-1		
24		DRAFT_WT-3		
25		DRAFT_WT-2		
26		DRAFT_WT-4		
27		DRAFT_WT-5		
28		DRAFT_WT-6		
29		DRAFT_WT-7		
30		DRAFT_Screened-40		
31		DRAFT_Screened-70		
32		DRAFT_Pattern		

In the example above, the first 12 levels listed are the AutoCAD layer names. The levels below them are the CDOT standard MicroStation levels.

- In order to remap the AutoCAD layers to the standard CDOT levels, you will need to manually populate the **V8OutputLevel** fields. To do this, find the desired CDOT standard MicroStation level in the Level column. Copy/Cut the level and paste it in the **V8OutputLevel** column directly across from the AutoCAD layer it is to replace.

	A	B	I	J
1				
2				
3		Level Mapping Table		
4		<input type="checkbox"/> Show Optional Columns		
5				
6	Level	V8OutputLevel	DWGOutputLayer	
7	TEXT	DRAFT_Text-3		
8	BROKEN	BRDG_BREAK		
9	HIDDEN	BRDG_HIDDEN		
10	OUTLINE	BRDG_OUTLINE		
11	TITLE	DRAFT_Text-2		
12	HATCH	BRDG_PATTERN		
13	Center	DRAFT_LC-Center_WT-0		
14	Dimensions	DRAFT_Text-1		
15	REBAR	BRDG_REBAR		
16	Defpoints			
17	Zigzag	DRAFT_CO-Violet		
18	0			
19				
20				
21				
22	DRAFT_WT-0			
23	DRAFT_WT-1			
24	DRAFT_WT-3			
25	DRAFT_WT-2			
26	DRAFT_WT-4			
27	DRAFT_WT-5			
28	DRAFT_WT-6			
29	DRAFT_WT-7			
30	DRAFT_Screened-40			
31	DRAFT_Screened-70			
32	DRAFT_Pattern			

MicroStation Levels moved from Levels column

In the above example, elements that were on the AutoCAD ‘TEXT’ layer will be placed on the ‘DRAFT_Text-3’ level’ after conversion.

Note: Not all levels need to be populated. Blank entries in V8OutputLevel column will be ignored when processed and the AutoCAD layer (if occupied) will be brought into the MicroStation file as a new level. Be aware that some of the MicroStation levels are not in alphabetical order. And take care to search the entire list for the desired level.

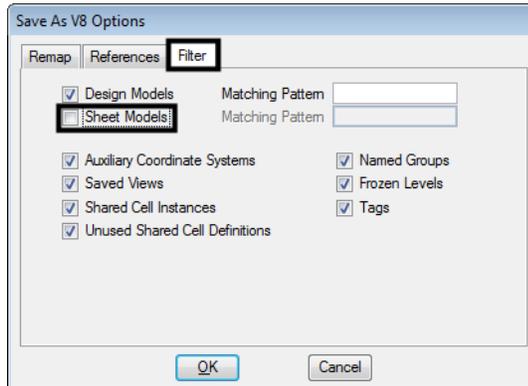
Layers generated in AutoCAD that will be recreated as cells in MicroStation such as the Border, North Arrow, and Bar Scales do not need to be remapped because they will automatically come in on the correct levels when the standard CDOT workflows are followed. Also, the layers used for creating AutoCAD viewports do not need to be remapped. Items on the Defpoints layer should be remapped to the level DRAFT_INFO_No-Plot.

The line styles, color, and weight of each level has already been taken into account through the CSV file. The translation variables in the CSV file have been set to remap all levels to bylevel symbology.

Note: Steps 13 and 14 below are available when converting a single file only. When doing a batch conversion, all of the models within the file will be converted.

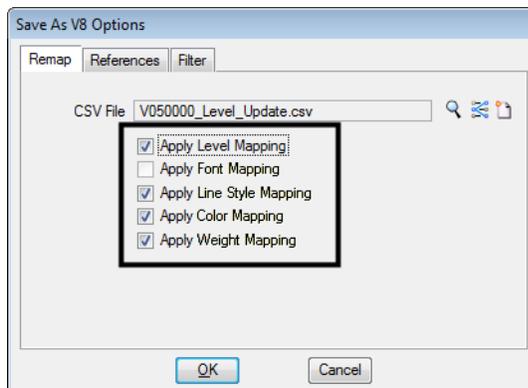
- In the **Save As V8 Options** dialog box, <D> the **Filter** tab.

- 9. Toggle off the **Sheet Models** check box.

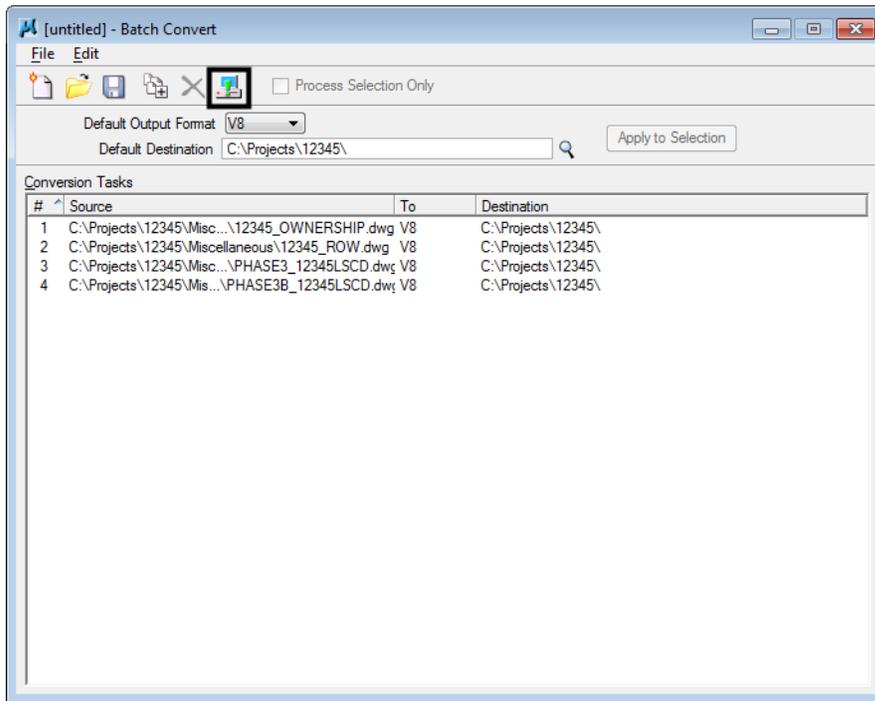


- 10. <D> the **Remap** tab.

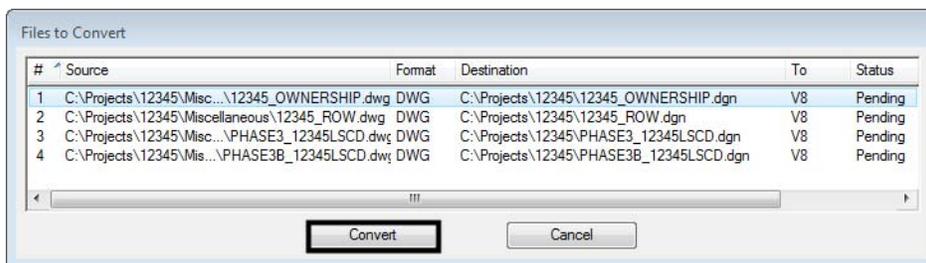
- 11. Check on the fields for **Apply Level Mapping**, **Apply Line Style Mapping**, **Apply Color Mapping**, and **Apply Weight Mapping**. <D> OK.



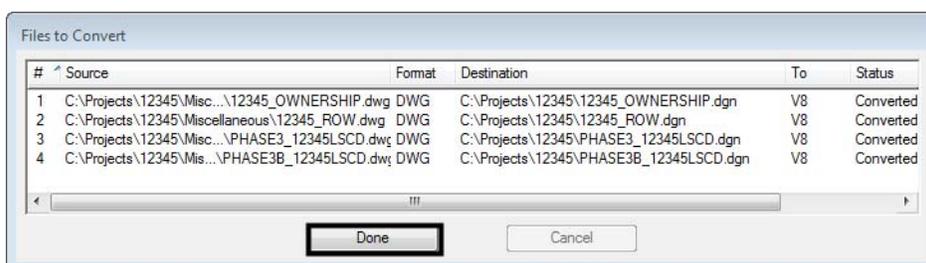
- From the **Batch Convert** dialog box, <D> the **Process Batch Convert Job** icon.



- The **Files To Convert** dialog box is displayed. From this dialog, <D> the **Convert** button.



- When the processing is complete, <D> the **Done** icon to dismiss the dialog box.



This will convert all of the levels in the active file (as specified in the csv file) and convert the same levels in the other specified files.

It is possible that the other files processed will have other AutoCAD levels. When these are discovered, repeat this conversion process on the previously converted MicroStation files. This will clean up the file that is currently being used and update the levels in other specified files.

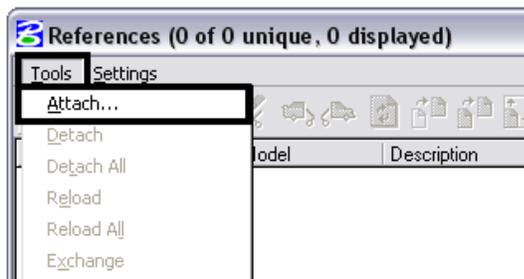
Fixing Converted Files With Multiple Models

Sheet Layout models are not used in the standard CDOT configuration. However, those models will be retained in batch converted files. If the Sheet Layouts contain information that is needed, they will need to be saved to individual dgn files. To do this we will reference a dgn file to itself, selecting the desired sheet model, in order to copy information from the sheet layout to the default model.

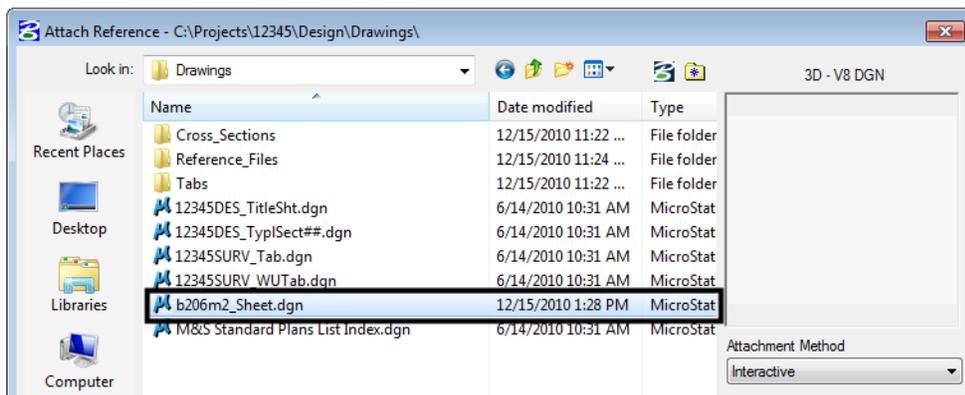
1. Open the converted dgn file that contains the Sheet Layouts to be saved.
2. Select **File > Save As** and name the file appropriately for the Sheet Layout to be saved and **<D> OK**.
3. This will open the copy of the file. **Delete** all of the elements from the **Default Model**.
4. **<D>** the **References** icon from the MicroStation **Primary Tools** toolbar.



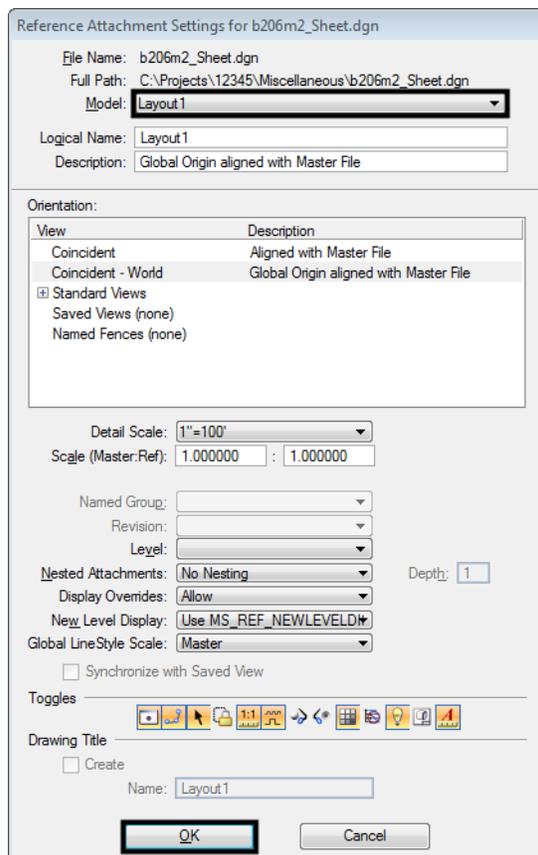
5. Select **Tools > Attach** from the References dialog box.



6. Select the open dgn file to attach it to itself. **<D> Open**.



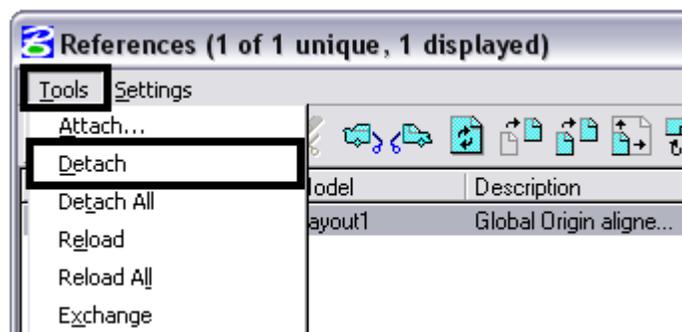
7. In the **Reference Attachment Settings** dialog box, select the desired Sheet Layout from the **Model** drop down menu. <D> OK.



8. <D> the **Fit** view control icon to display all of the elements in the view.
9. All of the elements in the view must be copied into the default model. This can be done using the **Element Selector** or with a **Fence**.

Note: When making the copy be sure to snap to an element when copying and the same point on the element when placing the elements. This will ensure that they are at the same coordinates in the default model as they were in the sheet layout model.

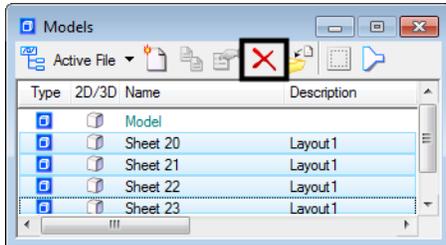
10. After the elements have been copied, **Detach** the reference file.



11. <D> the **Models** icon from the MicroStation Primary Tools toolbar.



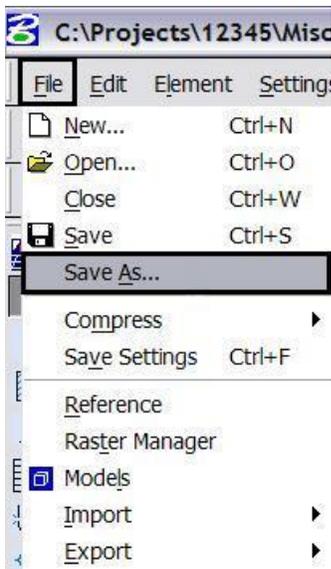
12. In the **Models** dialog box, <D> to highlight all of the models except the Default Model. <D> the **Delete** icon to remove all of the sheet layouts. <D> the 'X' to close the **Models** dialog box.



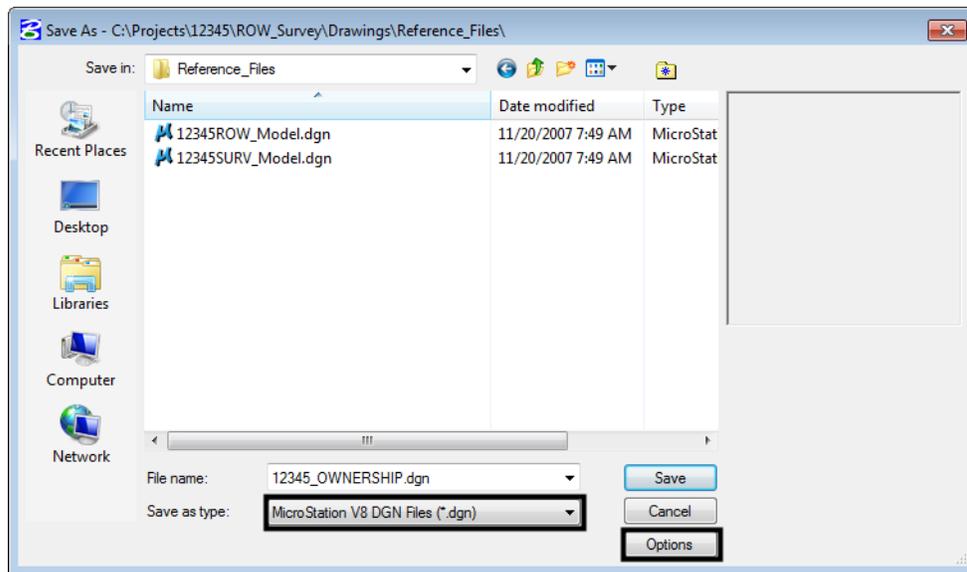
13. Steps 19 through 30 will have to be repeated for each sheet layout.

Converting a Single AutoCAD file

1. Open the desired AutoCAD file in MicroStation as described in steps 1 and 2 above.
2. Select **File > Save As**.

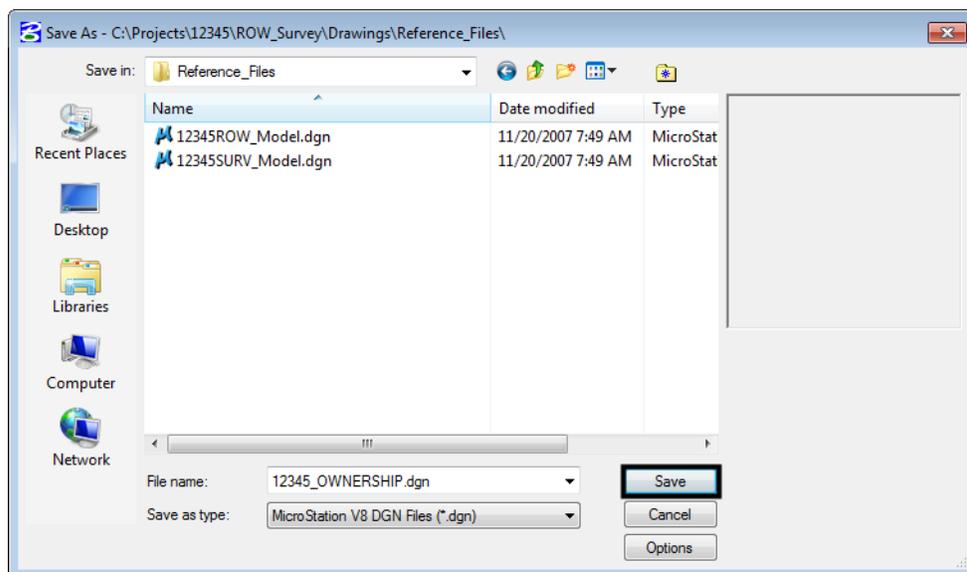


3. Change the **Select Format to Save** to **MicroStation V8 DGN Files (*.dgn)** and navigate to the appropriate folder under the Projects directory. The file will be automatically saved with the same name as the AutoCAD file with a different extension. You can rename the file at this time if you choose to do so.
<D> Options.



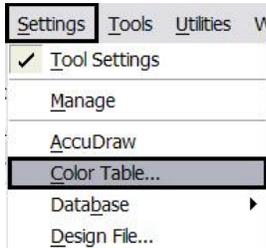
Note: Model files should be saved to the specialty group's **Reference_Files** folder. Sheet files are saved under the specialty group's **Drawings** folder.

4. **<D> Save** in the **Save As** dialog box. The CSV file will execute and the AutoCAD drawing file will be converted to a MicroStation file.

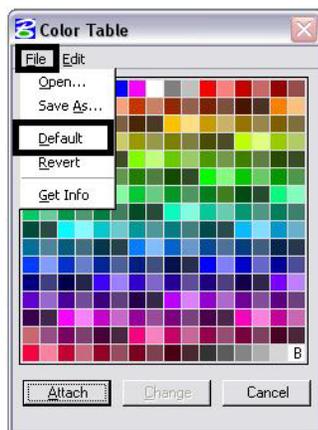


5. The file that is now open in MicroStation is the converted file. Running the CSV file changed the levels in the Model file to the CDOT Standard levels with bylevel symbology.

- From the MicroStation menu, selected **Settings > Color Table** after the MicroStation drawing file has been created.



- In the **Color Table** dialog box, select **File > Default**.



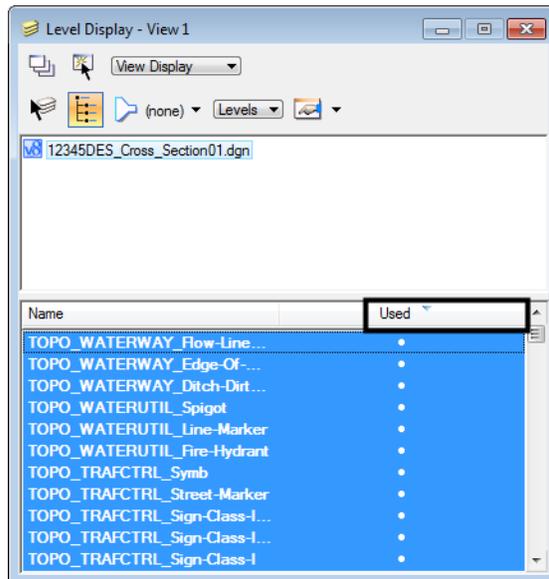
- <D> Attach.**



- Verify that the conversion was successful. **<D>** the **Level Display** icon from the MicroStation **Primary** toolbar.



10. In the **Level Display** window, **<D>** on the **Used** tab to sort the levels by those that have elements.



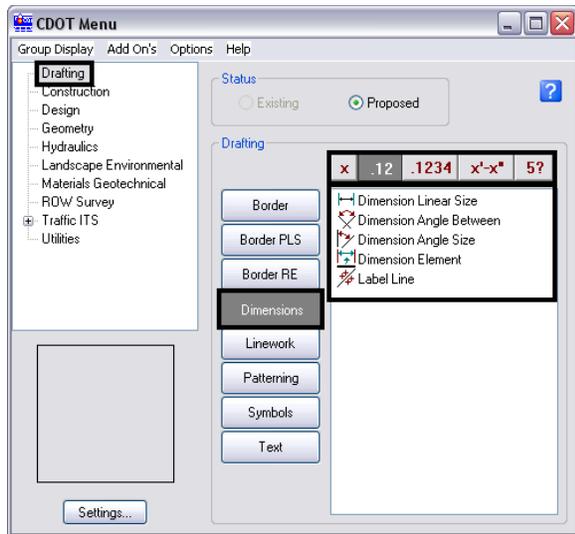
Note: levels with elements will have a dot in this column. If no used levels are visible, **<D>** on the tab again. If the triangle on the tab is pointing down, the used levels are at the top of the window.)

Other Drawing Elements

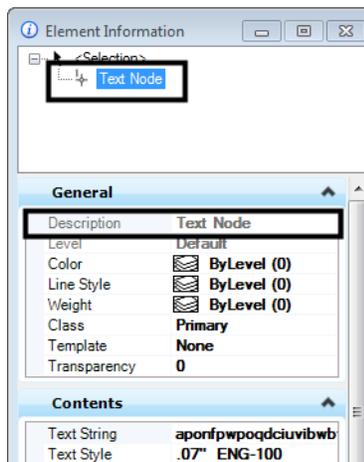
Other updates will need to be made to the files so all drawing elements and sheet setups conform to the CDOT standards.

All of the Sheet Layouts will need to be recreated using CDOT standard workflows. This means there can only be one Model for each MicroStation file. All of the sheet borders will need to be placed in their own separate file, called a Sheet File. Then, the Model file will be referenced to the Sheet File. Please refer to the documents *CDOT Sheet File Creation*, *CDOT Sheet File Creation Multiple Scales*, and *CDOT Creating Multiple Plan Sheets* for additional information about this procedure.

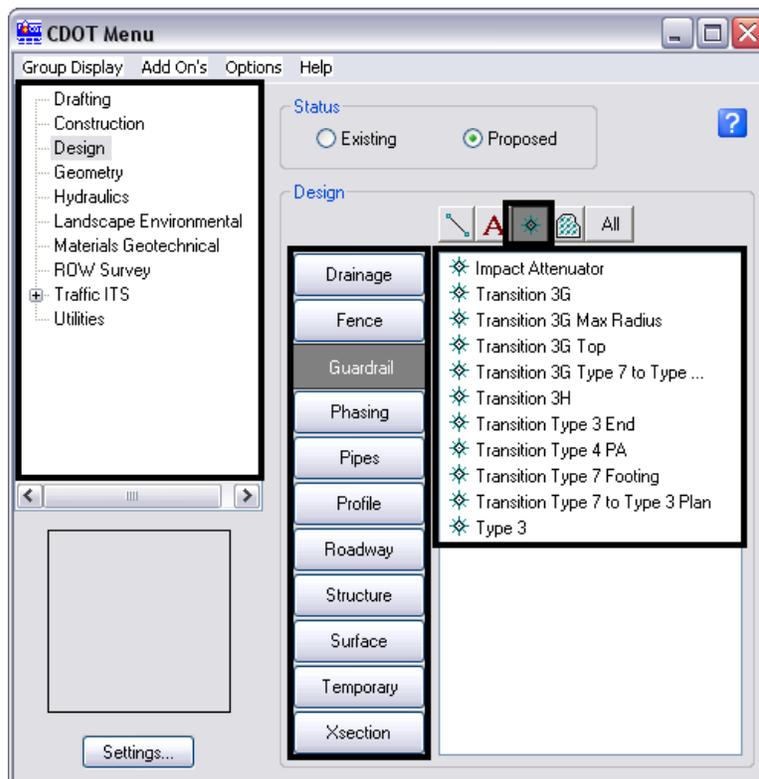
1. Recreate all Dimensions and leader lines (placed by AutoCAD) using the standard CDOT dimension styles. The dimensioning commands are found in the CDOT menu under **Drafting > Dimensions**.



2. Erase all hatch patterns generated in AutoCAD recreate using the MicroStation **Patterns** tools, shown below.



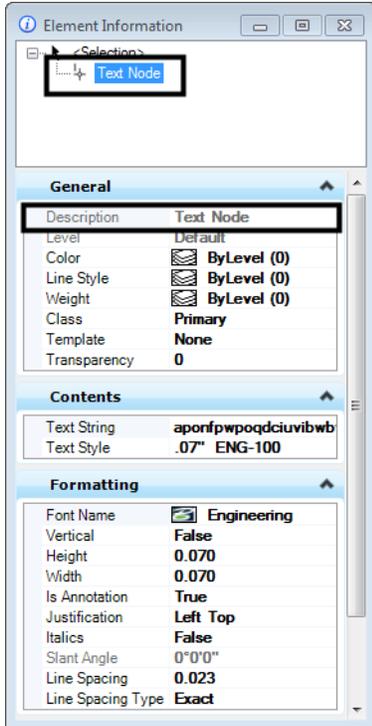
3. All blocks generated in AutoCAD will need to be replaced with the standard CDOT MicroStation Cells. The cells are found on the CDOT menu. Use the CDOT Menu Explorer to select the desired specialty group. Use the Category buttons and the Filter buttons to locate the cells within the menu. Select the desired cell from the list.



Updating Text

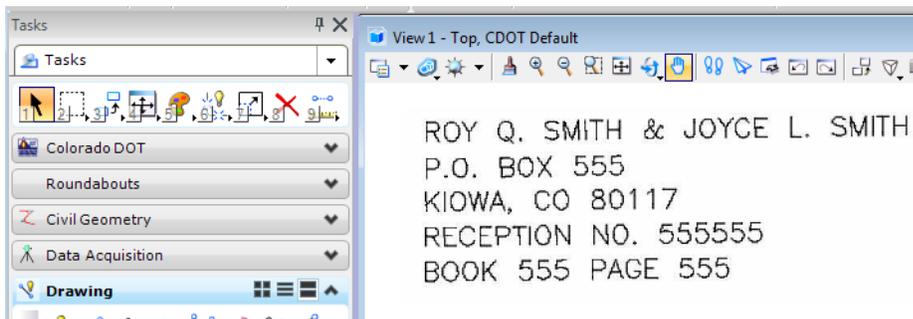
Text created in AutoCAD with multiple text strings can be converted to a text node in MicroStation. Some multiple text strings created in AutoCAD will be translated into a text node when the file is converted.

1. To verify this, <D> the **Element Information** icon . Text Nodes will display under the General Tab.

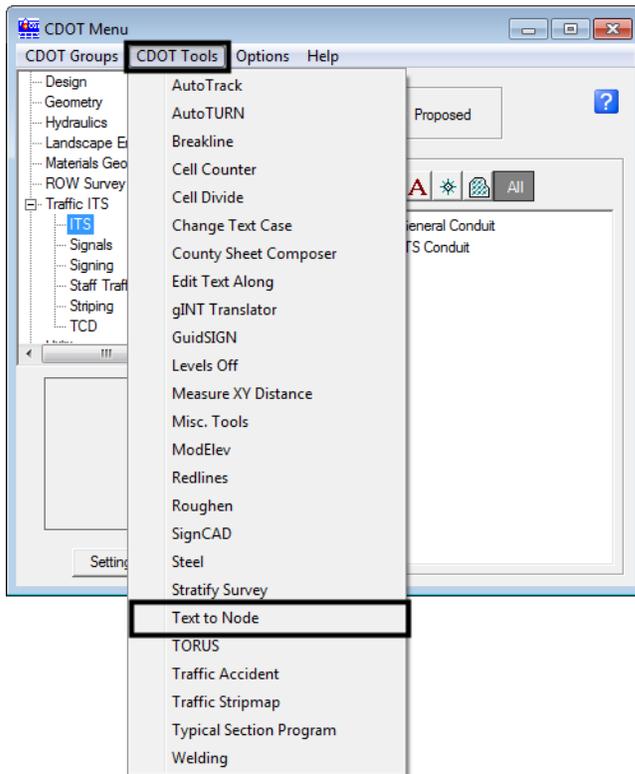


2. If not, select all text that will be combined into a text node using the **Element Selection** tool. While in the **Element Selection** command, hold down the **Ctrl** key to select individual text strings. Highlight them in the order they are to be placed into the text node.

Note: Do not *Window* around the multiple lines of text because the text strings may not merge in the desired order.



3. Select the **Text to Node** utility from the CDOT Menus under **Add On's**.



4. <D> the **Convert Text Element to Text Node** icon



5. The following dialog box will appear. The selected text will be anchored to the cursor.



ROY Q. SMITH & JOYCE L. SMITH
 P.O. BOX 555
 KIOWA, CO 80117
 RECEPTION NO. 555555
~~BOOK 555 PAGE 555~~
 KIOWA, CO 80117
 RECEPTION NO. 555555
 BOOK 555 PAGE 555

6. Check on **Delete Original**, set the **Justification**, and leave the **Line Spacing** set to **1.00**. Place the text in the desired location.

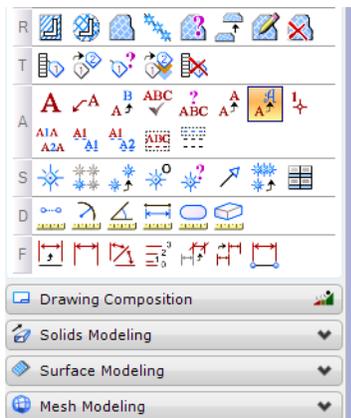


Note: If the Justification is set to anything other than **Left Bottom**, double <D> on the text after it is placed. The text will be brought into the Text Editor dialog. <D> again on the screen to place the text to its proper location and close the dialog.

7. Select all text and key-in **annotationscale add**. The text will now recognize the MicroStation Annotation Scale Factor.



8. Update the text style by <D> **Change Text Attributes**. Select the desired CDOT **Text Style** and select the text placed previously in AutoCAD.

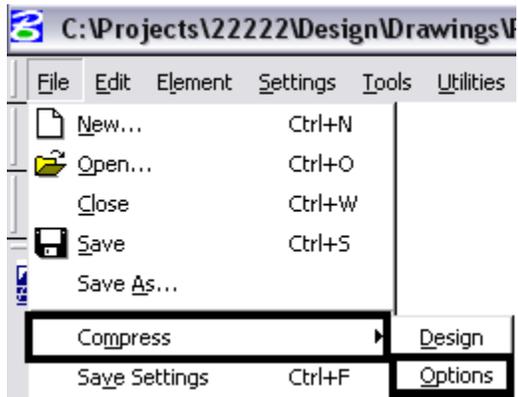


ROY Q. SMITH & JOYCE L. SMITH
 P.O. BOX 555
 KIDWA, CO 80117
 RECEPTION NO. 555555
 BOOK 555 PAGE 555

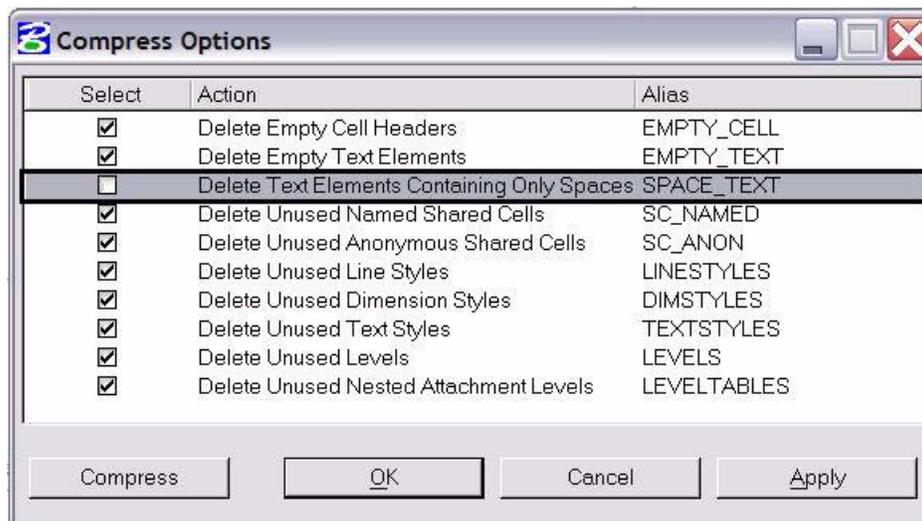
9. All fractions placed in AutoCAD will need to be re-typed in MicroStation so the format conforms to CDOT standards.

Compressing the Model File

1. After all changes and updates have been made to update the drawing into MicroStation using CDOT standards and standard workflows, you will need to compress the drawing in order to remove all AutoCAD information stored in the drawing buffer. This will ensure that AutoCAD data does not get repopulated into the drawing. Select **File>Compress>Options**.



2. Under **Compress > Options**, verify that all options are checked **ON** except **Delete Text Elements Containing Only Spaces**.



3. Once the correct options have been selected, <D> the **Compress** button.

Workflow MS 11 - Update Project Sheet Border to a ProjectWise Sheet Border

This document guides you through the conversion of an existing project sheet border that was built and stored on a local computer to a ProjectWise sheet border stored within ProjectWise. The benefits of using ProjectWise sheet borders stored in ProjectWise are; automatic backup of data, content management to reduce the potential of overwriting data, and having title block information automatically filled in using ProjectWise attribute data.

Workflow Outline

Request a ProjectWise Project - When migrating a project from the local computer to the ProjectWise server, the first step is to have the project directory built on the ProjectWise server.

- ◆ Commands Used: **E-mail Request** - to help@dot.state.co.us.

Store Sheet File in ProjectWise - Once the project directory has been built on the ProjectWise server, the existing sheet border files are copied to the proper location within that directory.

- ◆ Commands Used: **Drag and Drop** - Drag the sheet border files from a Windows Explorer window and drop them into the ProjectWise Explorer window.

Modify Sheet File Attributes - Attributes are project specific data that can be assigned to the dgn file once it is in ProjectWise. These attributes are used to populate tags within the dgn file to fill in sheet border information.

- ◆ Commands Used: **Properties > Attributes** - This is form used to fill in the attribute data.

Replace Border - The original sheet border in the drawing does not have the ProjectWise tags, therefore, it cannot use the attribute data added to the file. The existing border is replaced with a ProjectWise sheet border and the tags are updated with the attribute data.

- ◆ Commands Used: **Place Line** - Used to mark the insertion point for the sheet border.
- ◆ **Delete** - Used to remove the existing sheet border cell.
- ◆ **CDOT Menu > Drafting > Border ProjectWise** - Preferred method for placing the ProjectWise sheet border cell.
- ◆ **Place Active Cell** - An alternate method for placing the ProjectWise sheet border cell.
- ◆ **Delete** - Used to remove the insertion line drawn above.

Populate Tags with ProjectWise Attributes - Because the ProjectWise sheet border did not exist in the file when it was opened, the tags in the border have to be manually updated.

- ◆ **Update MS Tag Values with PW Attributes** - Used to add the ProjectWise attribute data the sheet border tags.

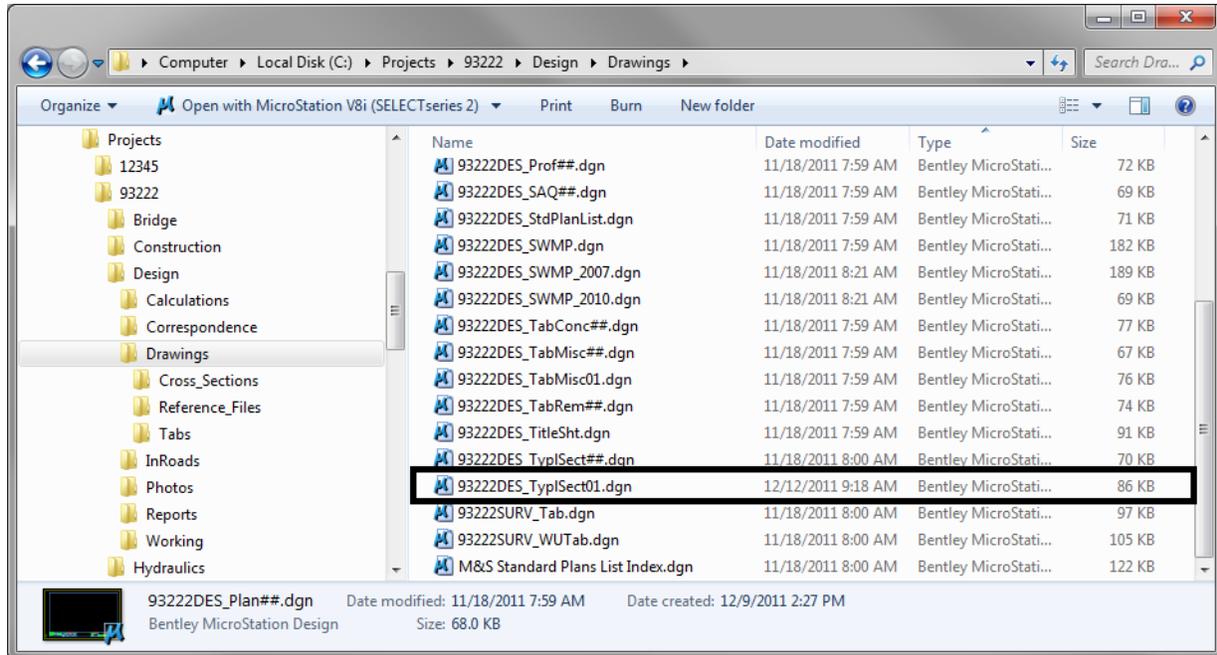
Request a ProjectWise Project

If existing project data currently exists on your local computer or on a shared network drive, it is important that the extended team is aware of the transition to ProjectWise.

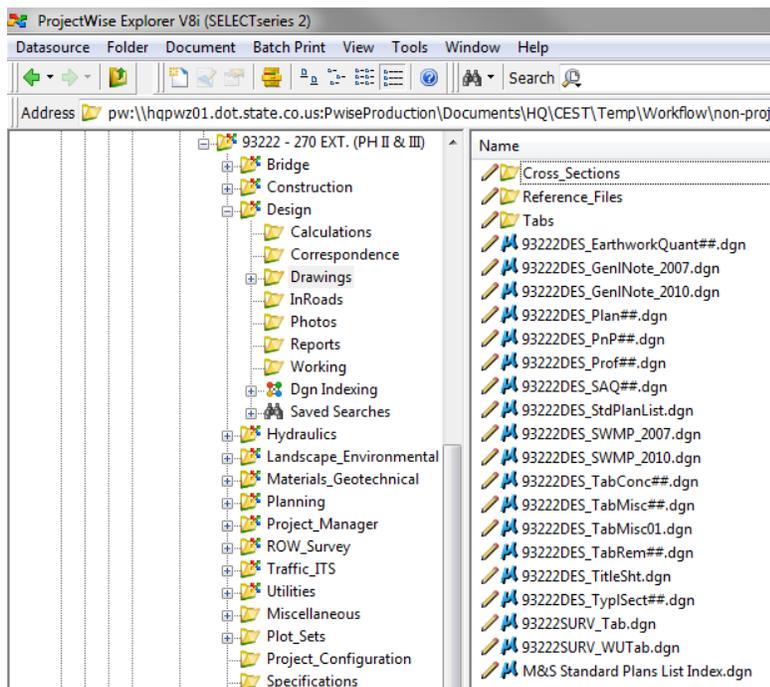
If your project has not been built in ProjectWise, submit an e-mail request to help@dot.state.co.us to have it done. This request should include the Project Manager's name and the Project Number.

Store Sheet File in ProjectWise

1. Open a Windows Explorer and browse to your project sheet border file.

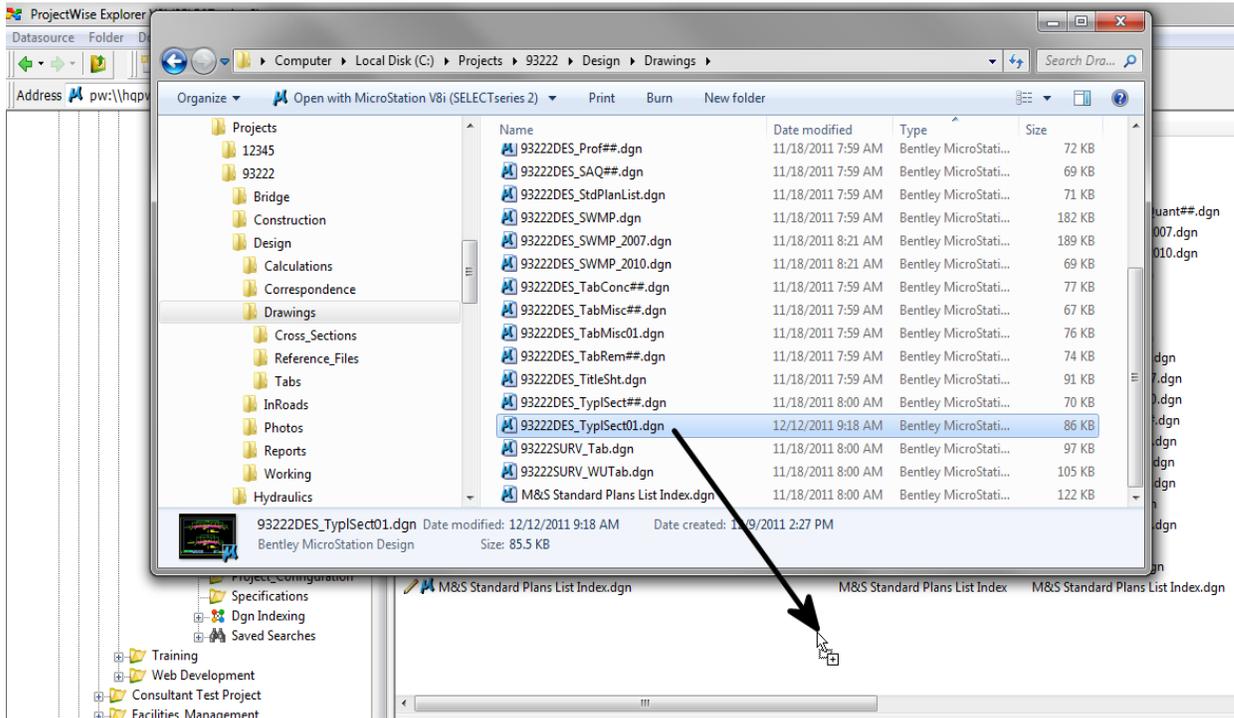


2. Open and login into ProjectWise then browse to your project.



Note: In ProjectWise you will see one of two different icons for your project or discipline folder called a sub project. A project folder has this icon,  Design and a non project folder has this icon,  Design. Regardless of this folder difference the drag and drop function works the same.

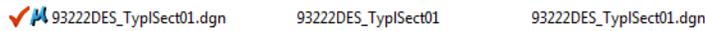
3. Drag and Drop the local copy into the ProjectWise folder to store the file.



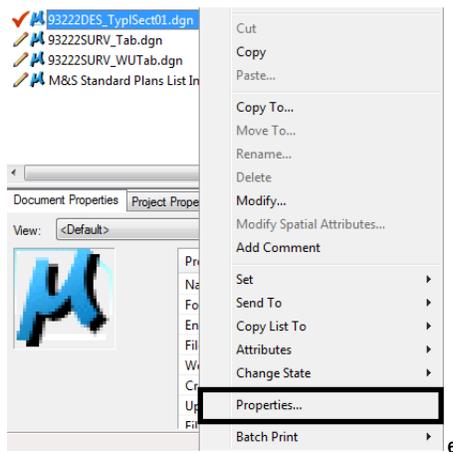
Modify Sheet File Attributes

1. Double click on the sheet border in the ProjectWise Explorer to Check Out and open the drawing in MicroStation.

Note: A red check mark will be displayed in ProjectWise Explorer noting you have this file checked out and have read/write access.



2. In ProjectWise Explorer, <R> on the dgn filename and select **Properties**.



3. <D> on the **Attributes** Tab.

93222DES_TypISect01.dgn

General Security **Attributes** More Attributes File Properties Audit Trail Workspace Components

Project Code 93222 Project Number IM 2706-030 Region 06

Project Location 1 270 EXT. (PH II & III)

Project Location 2

County Adams

Highway Number 076A

National Hwy? Yes

FHWA Oversight? No

Residency Name Denver-N. Project Team 3 Discipline Design

Address 1 4670 Holly Street Resident Engineer DUANE J HENDRICKSON

Address 2 Denver CO 80216 RE Initials DJH

Phone (303) 398-6780 Fax

Sheet Title Line 1

Sheet Title Line 2

Sheet Title Line 3

Unit Information

Designer

Unit Leader Initials

Subset Details Subset Code DDT SS Sub Desc

Subset Page Number Subset Total

Sheet Number Document Code

Save Undo Close 20/23

Note: Since the sheet border file was placed in a ProjectWise folder, the **Attributes** applied to the ProjectWise folder were automatically applied to the sheet border file.

4. Fill out the following Attributes based on the values in the existing sheet border. In the example below the following values are used:
 - a. Sheet Title Line 2 - TYPICAL SECTION
 - b. Subset - Typical Sections
 - c. Subset Page Number - 1
 - d. Subset Total - 3
 - e. Sheet Number - 65

93222DES_TypSect01.dgn *

General Security Attributes More Attributes File Properties Audit Trail Workspace Components

Project Code 93222 Project Number IM 2706-030 Region 06

Project Location 1 270 EXT. (PH II & III)

Project Location 2

County Adams

Highway Number 076A

National Hwy? Yes

FHWA Oversight? No

Residency Name Denver-N. Project Team 3

Address 1 4670 Holly Street

Address 2 Denver CO 80216

Phone (303) 398-6780

Sheet Title Line 1

a. Sheet Title Line 2 TYPICAL SECTION

Sheet Title Line 3

Unit Information

Designer

Unit Leader Initials

Detailer

Subset Typical Sections

Subset Code TS

SS Sub Desc

b.

c. Subset Page Number 1

d. Subset Total 3

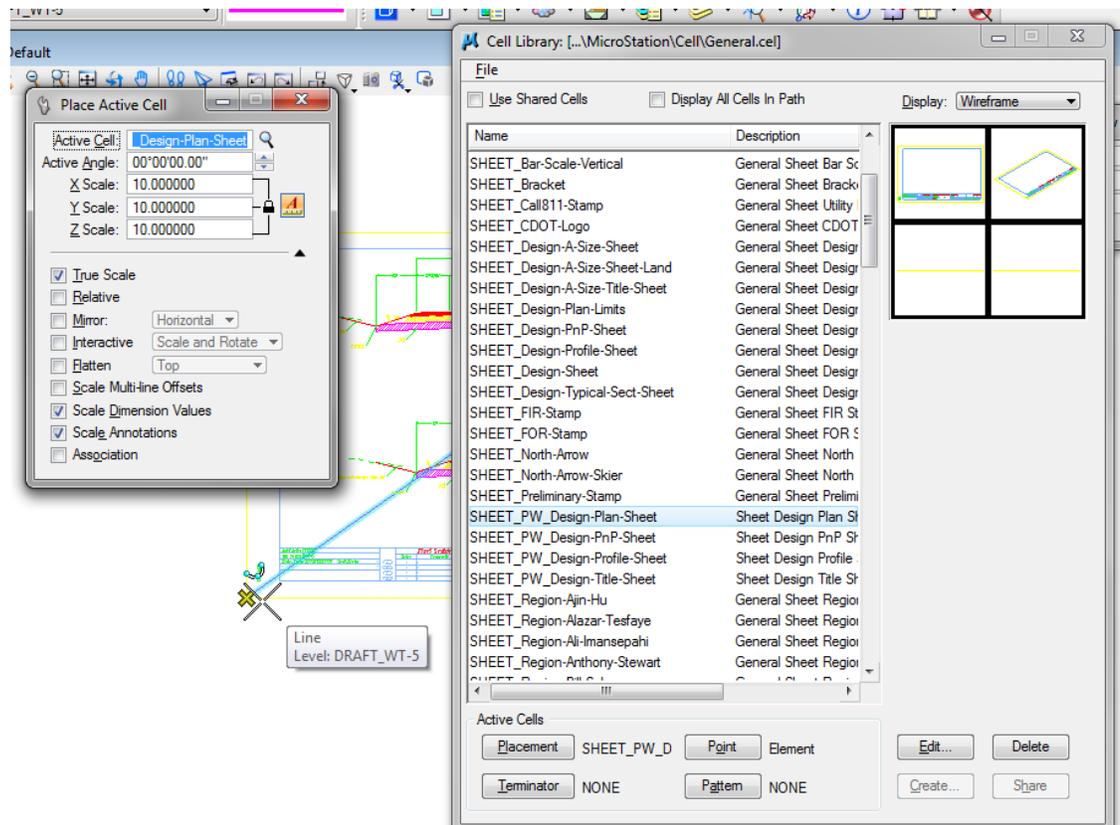
e. Sheet Number 65

Document Code

Save Undo Close |< < 20/23 > >|

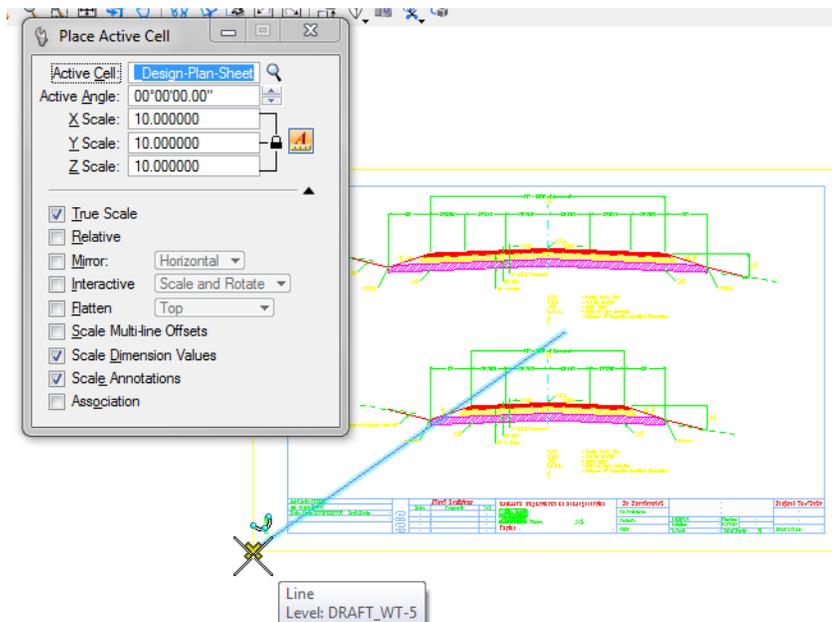
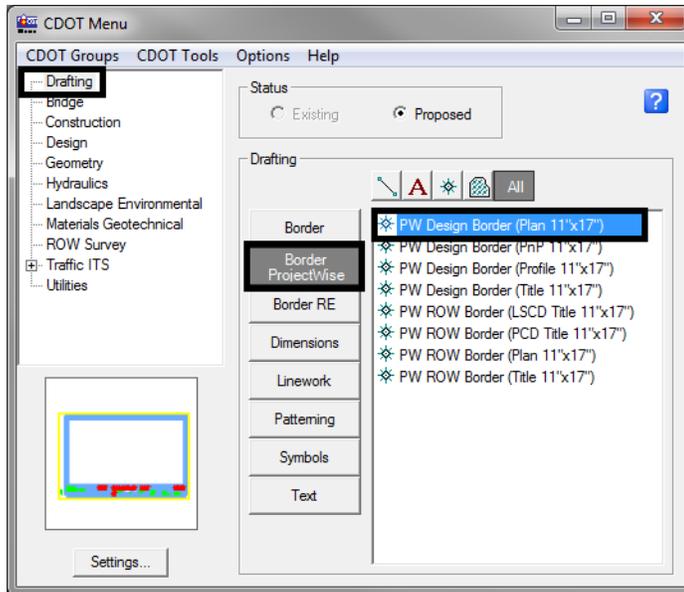
5. <D> Save and <D> Close to apply the changes to the ProjectWise Attributes.

3. Place the ProjectWise Plan sheet border at the insertion line. There are two ways to achieve this:
 - a. The first is through the Cell Library dialog box.
 - Open the **Cell Library** dialog box, Select **Element > Cells**.
 - Attach the **General.cel** library if it is not already attached.
 - Set **SHEET_PW_Design-Plan-Sheet** as the active cell.
 - Place the cell at the insertion point.

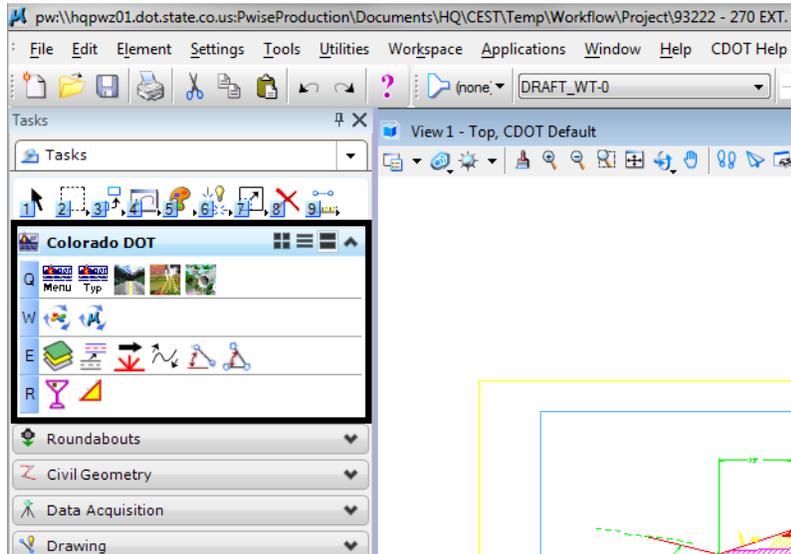


Note: Be sure to set the correct scale for the sheet border prior to placing the cell.

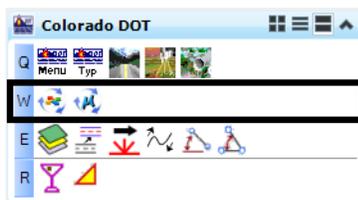
- b. The second and preferred method is to use the CDOT Menu to locate and place the ProjectWise sheet border.
 - From the **CDOT menu** select the **Drafting** group.
 - Choose the **Border ProjectWise** tab.
 - Select **PW Design Border (Plan 11"x17")**
 - Place the cell at the insertion point.



1. To manually refresh the tags with the ProjectWise attributes, open the **Colorado DOT** Task menu.



The second line of icons are the ProjectWise commands for attribute data.



2. **<D> Update MS Tag Values with PW Attributes** icon to populate the new sheet border. The second icon, updates the MicroStation tag values with ProjectWise attributes. When this icon button is used all the ProjectWise attributes for the drawing will overwrite the MicroStation tags.

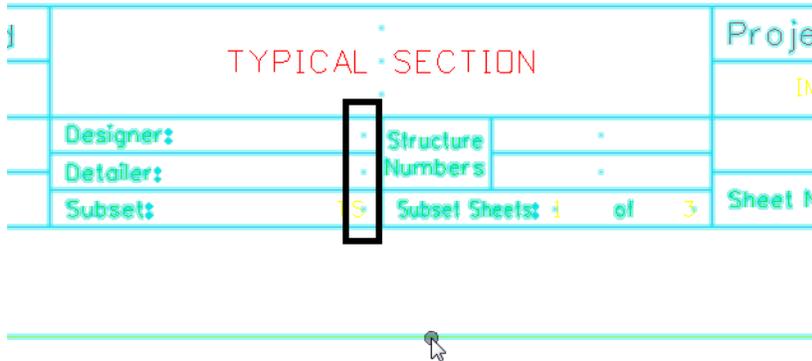


Important! Only use the first icon on a file with an existing ProjectWise sheet border that has had the tags refreshed then manually modified. If this command is ran on an unpopulated sheet border it will erase all of the attributes from the ProjectWise database.

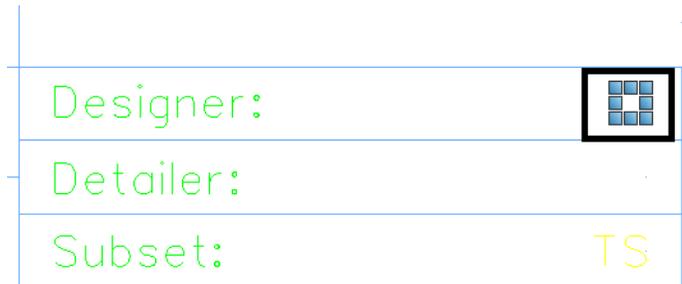
Push Tag Edits to ProjectWise Attributes

At anytime you can edit the tag attributes by double clicking on the blank tag value and use MicroStation to fill in the border information.

The insert point of the tag data is marked by a point.

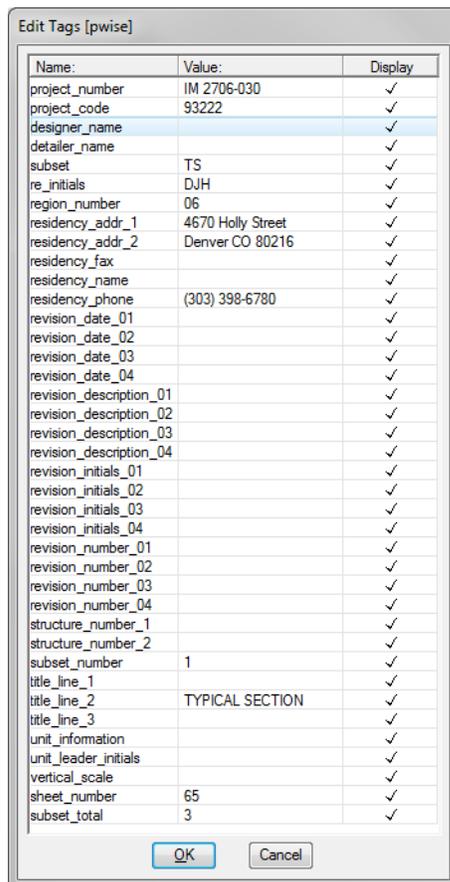


Near that point is the place holder for the tag.



1. Double click the place holder to open the **Edit Tags** dialog box. The **Tag Set** name is displayed in the header of the dialog box. The tag set name should be **pwise**.

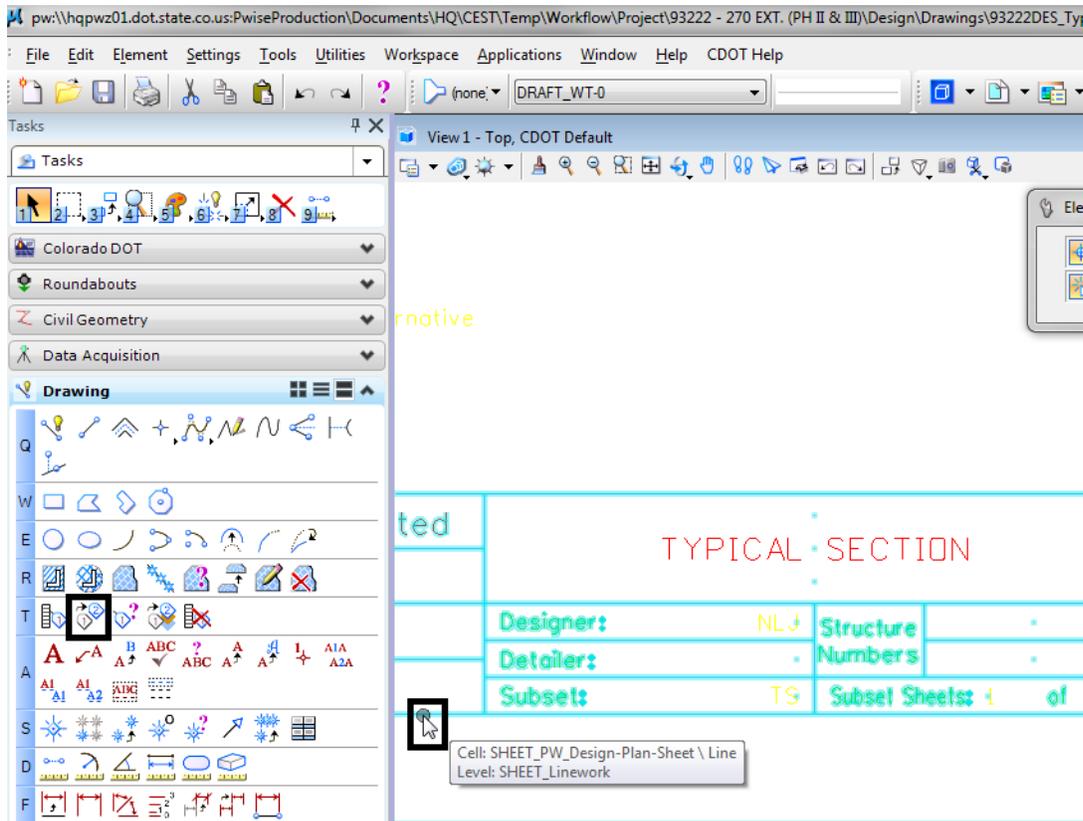
Note: You may find it easier to locate the tag by selecting the **Edit Tag** command then clicking in the area of the tag.



Name:	Value:	Display
project_number	IM 2706-030	✓
project_code	93222	✓
designer_name		✓
detailer_name		✓
subset	TS	✓
re_initials	DJH	✓
region_number	06	✓
residency_addr_1	4670 Holly Street	✓
residency_addr_2	Denver CO 80216	✓
residency_fax		✓
residency_name		✓
residency_phone	(303) 398-6780	✓
revision_date_01		✓
revision_date_02		✓
revision_date_03		✓
revision_date_04		✓
revision_description_01		✓
revision_description_02		✓
revision_description_03		✓
revision_description_04		✓
revision_initials_01		✓
revision_initials_02		✓
revision_initials_03		✓
revision_initials_04		✓
revision_number_01		✓
revision_number_02		✓
revision_number_03		✓
revision_number_04		✓
structure_number_1		✓
structure_number_2		✓
subset_number	1	✓
title_line_1		✓
title_line_2	TYPICAL SECTION	✓
title_line_3		✓
unit_information		✓
unit_leader_initials		✓
vertical_scale		✓
sheet_number	65	✓
subset_total	3	✓

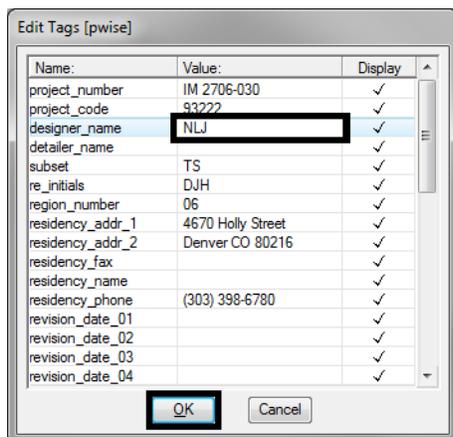
Note: The highlighted tag will be the place holder you double clicked on. In the example above this was the **designer_name**.

- If a place holder can't be found, use the **Edit Tag** button from the **Drawing Tasks** menu and select any element of the border cell.



Note: This method will highlight the first tag field and will not highlight the tag in the MicroStation view. This will require some knowledge of the tag field names.

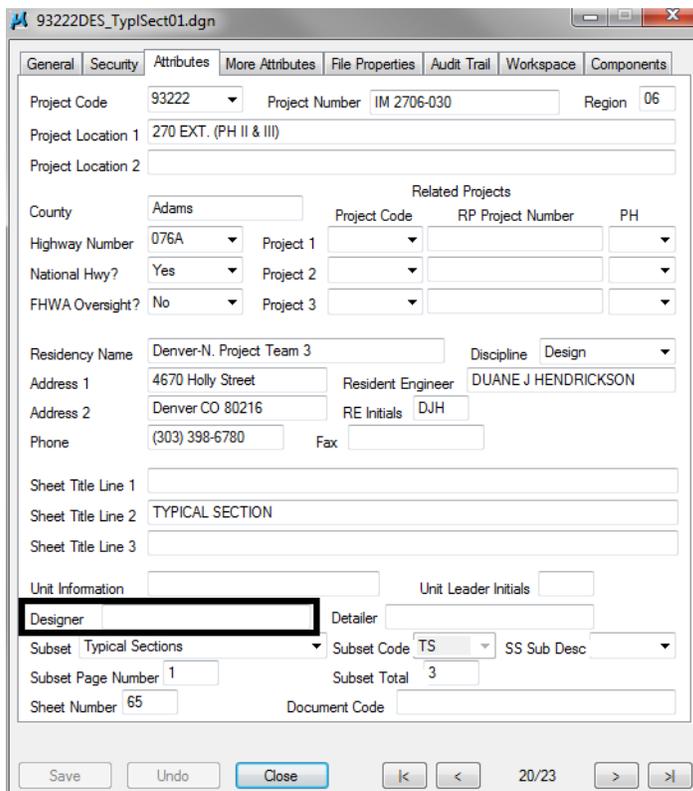
- Modify the **Value** column for the desired tag and **<D> OK**.



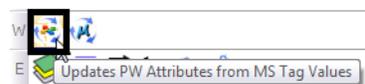
- The new value is displayed in MicroStation. In this example, the designer's initials are displayed.



However, this value is not in the ProjectWise File attributes.



- <D> on the **Update PW Attributes from MS Tag Values** icon.



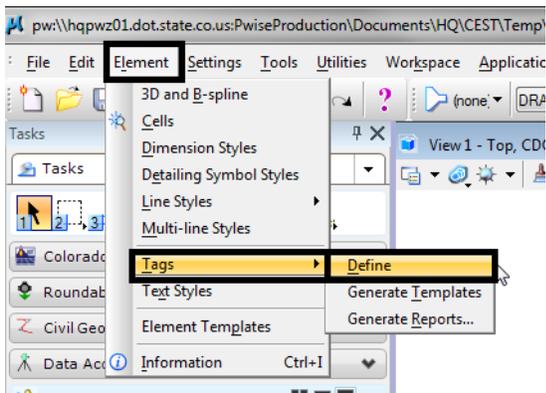
The attribute is now listed in ProjectWise File Attributes dialog box.

The screenshot shows the 'Attributes' tab of the ProjectWise File Attributes dialog box. The 'Designer' field is highlighted with a black box and contains the value 'NLJ'. Other fields include Project Code (93222), Project Number (IM 2706-030), Region (06), Project Location 1 (270 EXT. (PH II & III)), County (Adams), Highway Number (076A), Project 1 (13403), RP Project Number (IMB0253-165), PH (D), Residency Name (Denver-N. Project Team 3), Discipline (Design), Address 1 (4670 Holly Street), Resident Engineer (DUANE J HENDRICKSON), Address 2 (Denver CO 80216), RE Initials (DJH), Phone ((303) 398-6780), Sheet Title Line 2 (TYPICAL SECTION), Unit Information, Unit Leader Initials, Subset Details, Subset Code (TS), SS Sub Desc, Subset Page Number (1), Subset Total (3), Sheet Number (65), and Document Code.

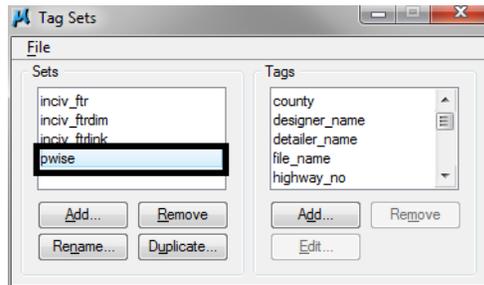
Troubleshooting

If for some reason the ProjectWise attributes will not populate into the MicroStation tags or MicroStation tags will not populate the ProjectWise attributes, check the MicroStation Tag Set name.

1. In MicroStation, **<D> Elements > Tags > Define.**

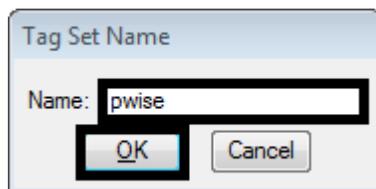


2. Verify that the **Tag Set** name of **pwise** is listed.



Note: Any variation of this name should be renamed to **pwise**. Typical variations would be **pwise1** or **pwise2**.

3. Highlight the pwise variation name in the **Sets** field.
4. <D> the **Rename** button.
5. Key-in **pwise** for the **Name**.
6. <D> **OK** to accept the new file name.



Important! Do not use the Remove button under the Sets or Tags sections. This will result in having to replace the sheet border cell in MicroStation to get those items back.

Workflow MS 12 - Accessing Imagery Files

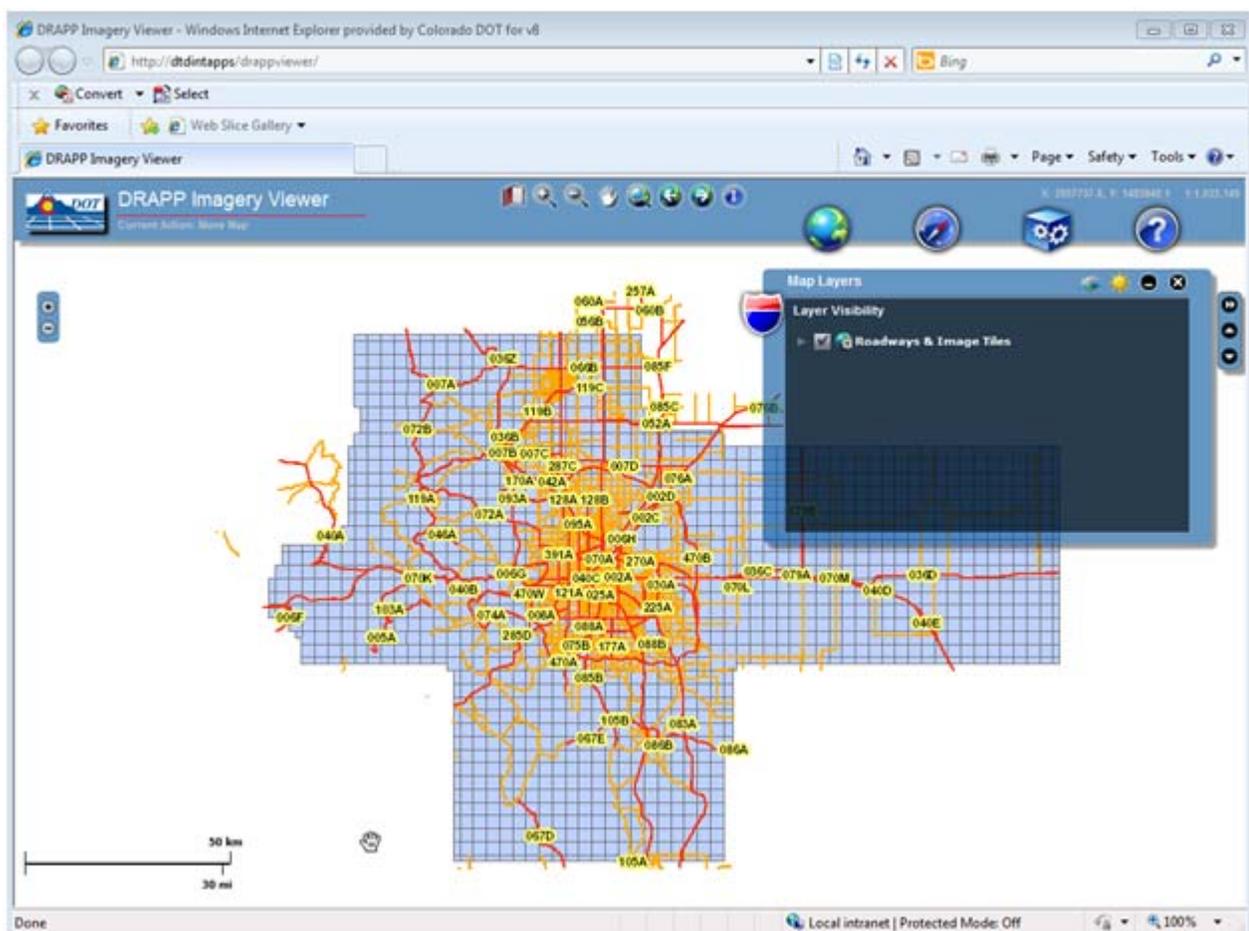
This document guides you through the process of locating and downloading imagery stored on CDOT servers.

Obtaining Image File Names

In order to download the correct image files for a project, the names of the image files must first be determined. The file names can be identified by using the DRAPP Imagery Viewer for Denver area files or the NAIP Imagery Viewer for statewide files. The process of identifying the image names is the same for both viewers. The steps below use the DRAPP Imagery Viewer.

1. Open an Internet Explorer window.
2. In the CDOT internal web site, navigate to **Organizations**. Scroll down to the **Project Development** heading and select the **Data Files Imagery Viewer (or Statewide Imagery Viewer)** link. or use the following link: <http://dtdintapps/drappviewer/> (<http://dtdintapps/naipviewer/> for statewide images).

This displays the DRAPP Imagery Viewer in the Internet Explorer window.

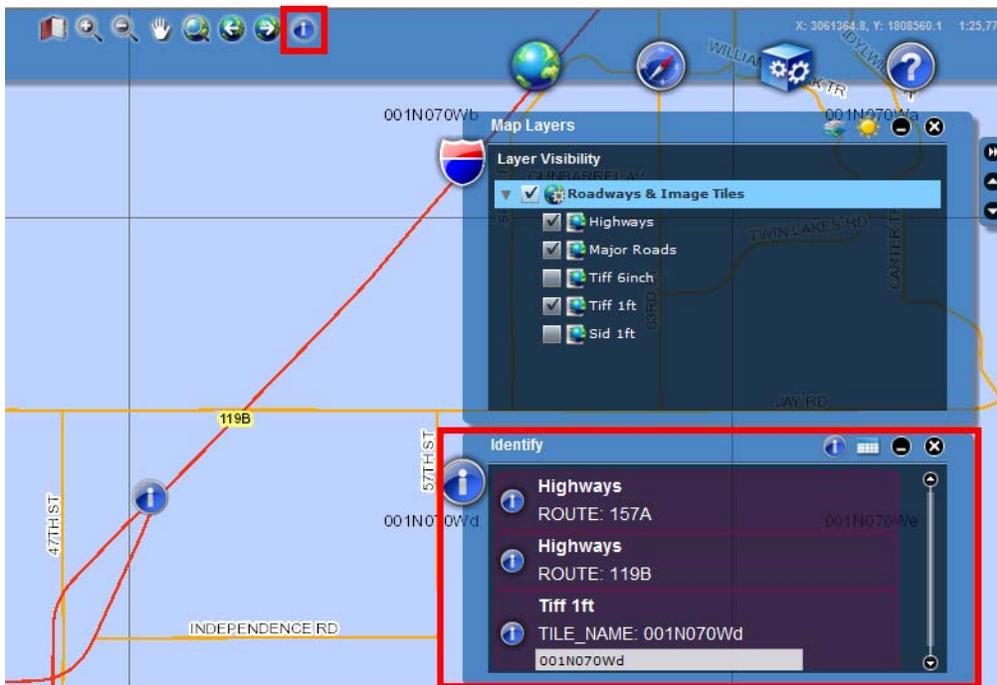


3. In the **Map Layers** dialog box, <D> the arrow next to **Roadways & Image Tiles** to expand the layer list.

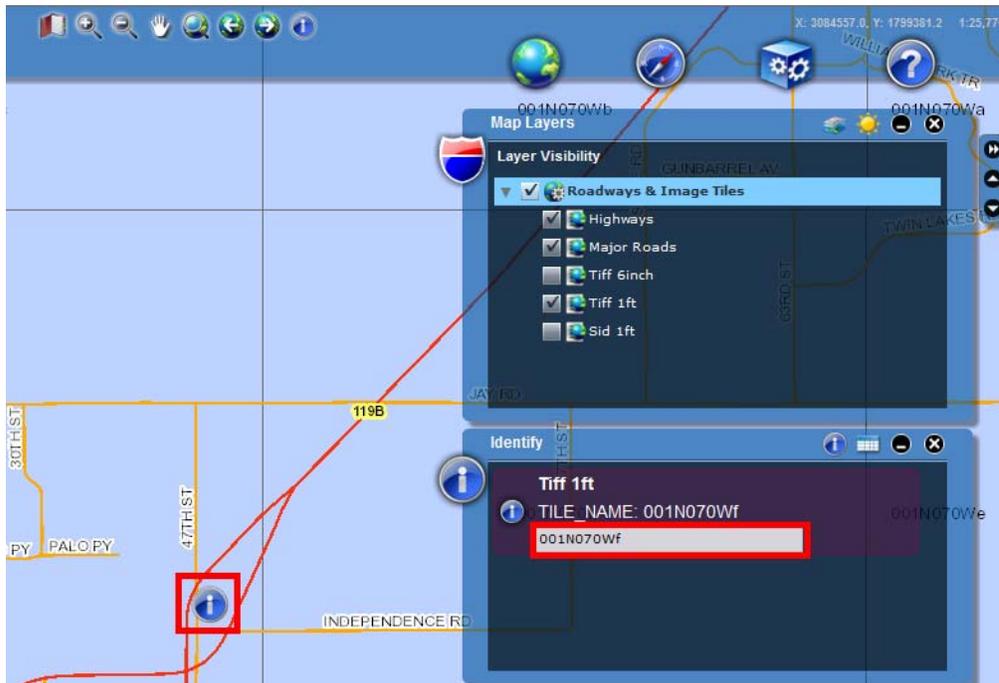
- Toggle on the desired image formats. The grid lines and names of the image tiles are displayed in the viewer.



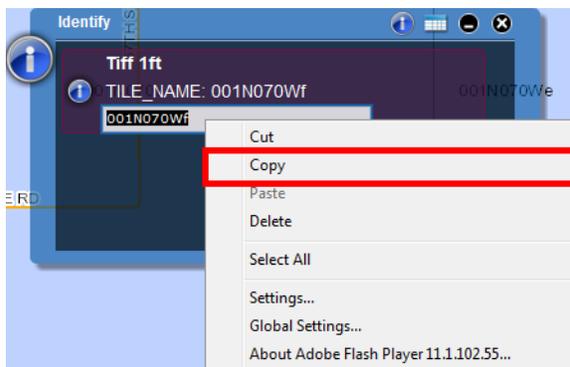
- Use the view controls at the top of the window or the mouse scroll wheel to zoom in to the area of your project.
- <D>** the **Identify** icon to display the **Identify** dialog box. The name of the selected image file is displayed in this dialog box.



- In the map area, **<D>** in the location that contains the image needed. This places the Identify icon at the point you picked and shows the image name in the Identify dialog box.



- In the Identify dialog box, highlight the image name.
- <R>** on the filename and select **Copy** from the menu. You can also press the Ctrl + c keys to make the copy.

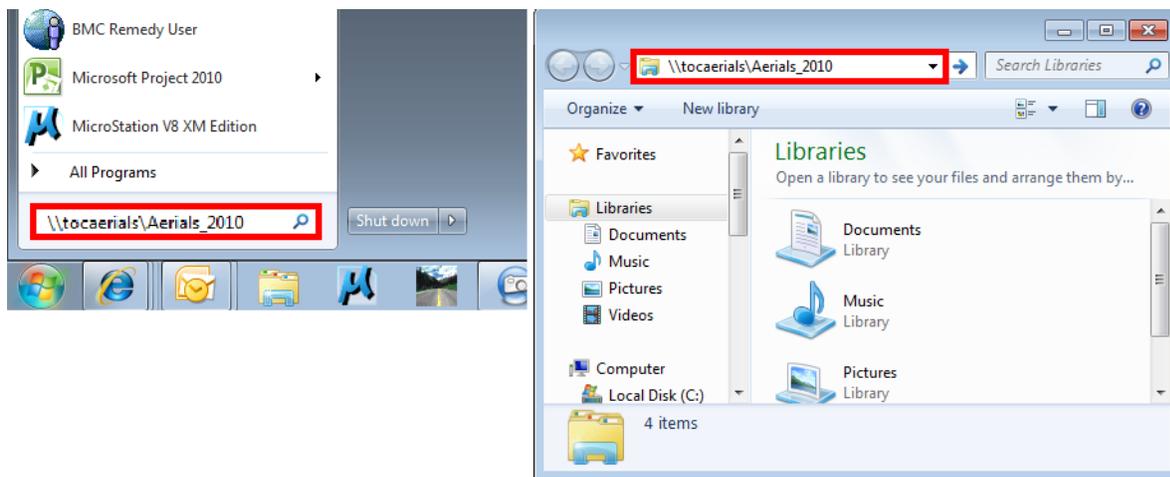


This image name is used as a search string in the next section of the workflow.

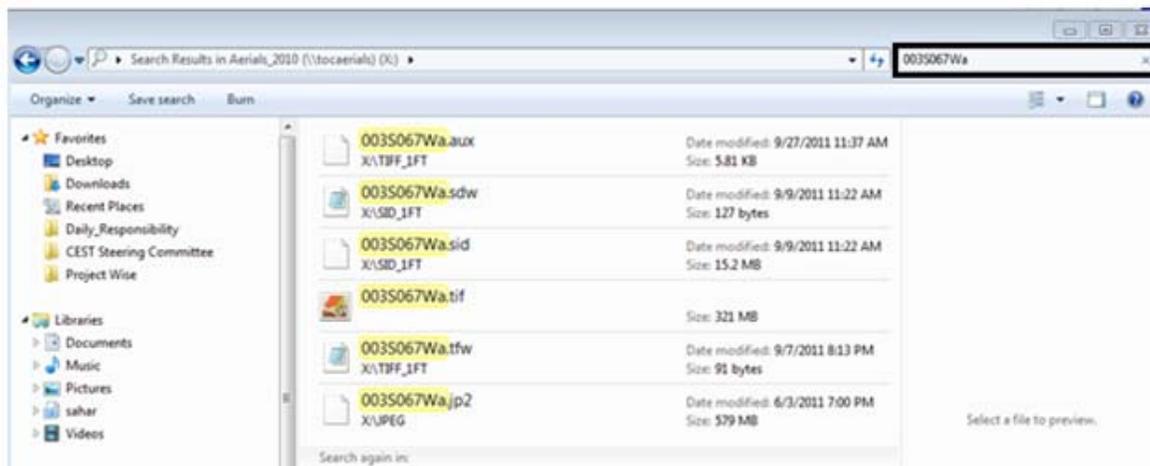
Downloading an Image From the Server

Once the name of the image has been identified, it can then be retrieved from the server for use. There are two servers that contain the image data, one for Denver area data and one for Statewide imagery data. The servers can be accessed from either the Start Menu or from the Windows Explorer. The process is the same for each server. The steps below use the DRAPP Imagery server.

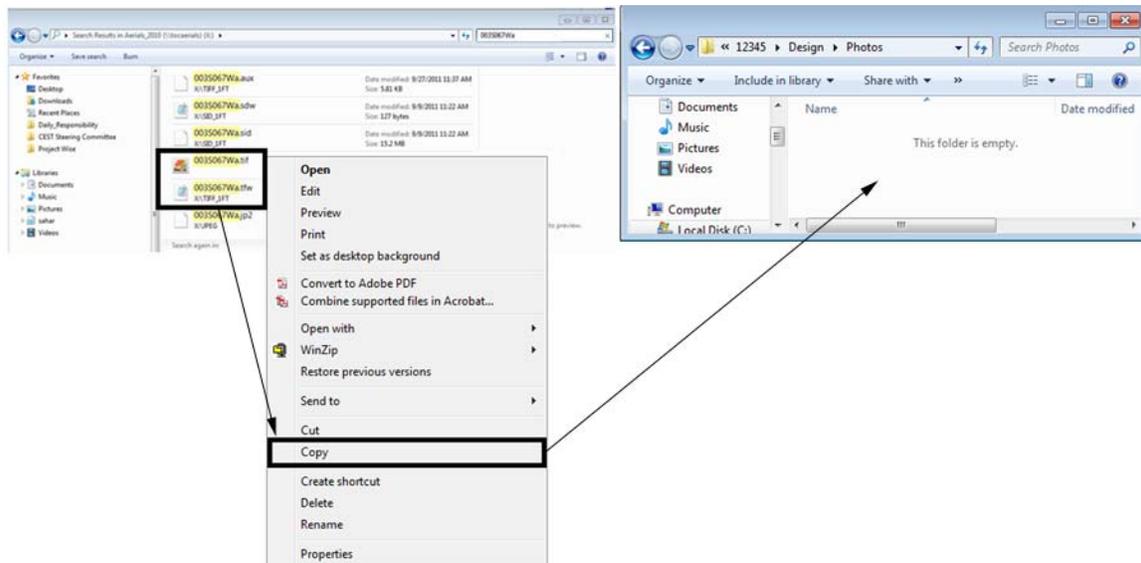
1. In either the Start Menu Search field or the Windows Explorer address field, key in **\\toacaerials\Aerials_2010** (**\\hqprdgising\NAIP09** for statewide images) .



2. Open a second Windows Explorer session and navigate to the project folder where the images will be stored.
3. In the **\\toacaerials\Aerials_2010** Windows Explorer session, paste the image name copied above into the **Search** field. The files found that match the name are displayed in the window.



4. **Copy** the desired image from the `\\tocaerials\Aerials_2010` Windows Explorer session and **Paste** it into the Project Windows Explorer session.



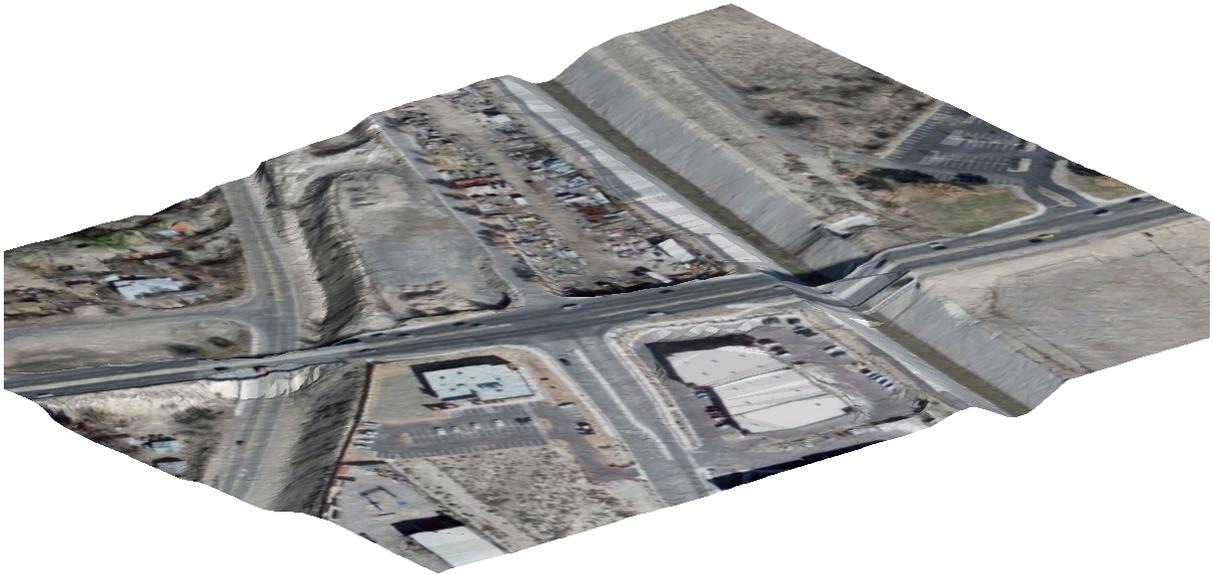
Note: Some image formats also have an associated sister (or world) file. If the file you are retrieving has a sister file, it will need to be copied as well. Otherwise it will not display at the correct location when referenced into MicroStation. **NAIP09** image files have the georeferencing data embedded within the file, so there are not sister files associated with these images.

For information on how to use georeferenced images with MicroStation, refer to the following workflows:

- ◆ CDOT Workflow Raster Manager
- ◆ CDOT Workflow Setting Geographic Project Coordinate System
- ◆ CDOT Workflow Placing Images to Project Datum
- ◆ CDOT Workflow Using Georeferenced Images in Raster Manager

Workflow MS 13 - Image Draping

This document guides you through the basic functions for draping a aerial photo over a digital terrain model (DTM). It is used to create a visual representation of the image in 3D. Make sure the MicroStation design file, Raster Image, and InRoads DTM files coordinately match up.



Workflow Outline

Setting up Preferences - The default value for a dgn background color is black. However when making images for printed material, a white background is preferred.

- ◆ Commands Used: **Workspace > Preferences > View Options** - Used to change the background color from black to white.

Attaching the Raster Image - A raster image will be used to texture the triangles of the surface. In order to specify a raster image as a texture, it must be attached to the drawing.

- ◆ Commands Used: **Raster Manager** - Used attach a raster image to a dgn file.

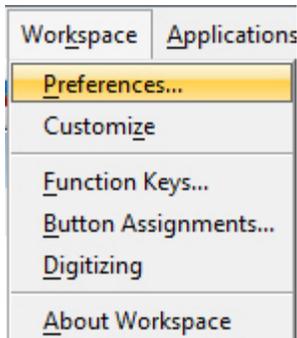
Displaying Triangles - Trinagles are used to give the image shape.

- ◆ Commands Used: **InRoads > Surface > View Surface > Triangles** - Used to display the surface triangles within the drawing.

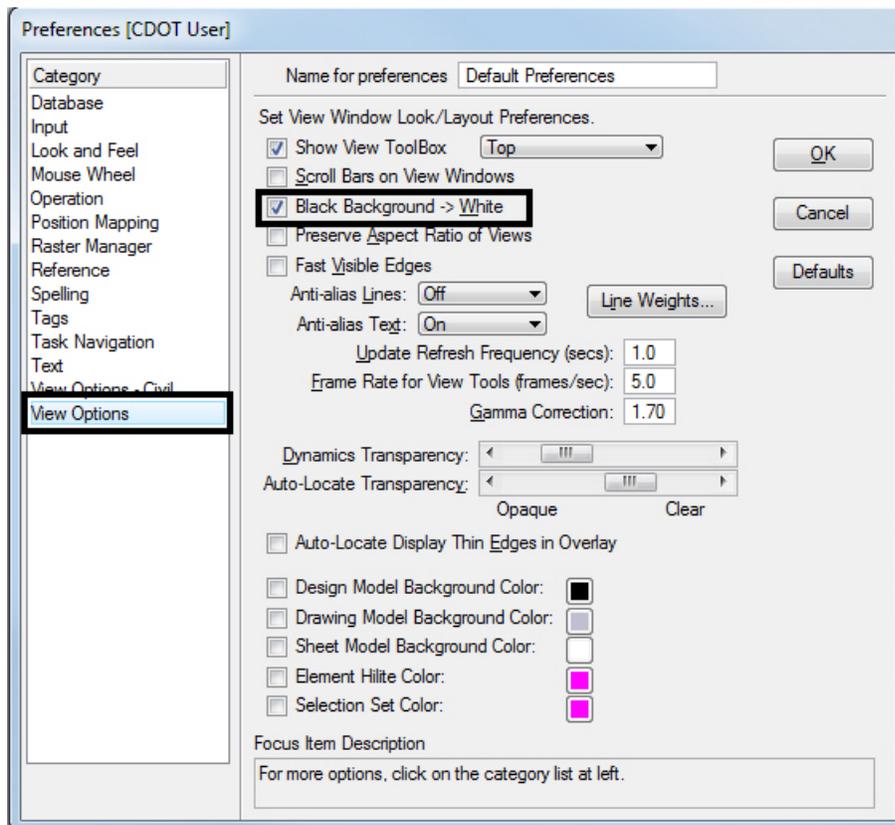
Draping the Image on to the Triangles - Now that both the image and the triangles are in the drawing, the image is draped on to the triangles to a textured surface.

- ◆ Commands Used: **Rotate View > Isometric** - Used to adjust the view angle so that the image and the triangles can be seen as separate elements.
- ◆ **Fit View** - Used to all elements within the drawing visible on the screen.
- ◆ **Visualization > Assign Material** - Used to drape the image to the triangles.
 - **Assign by Level/Color** - Used to Identify the level of the triangles so the the image will know what elements to drape to.
 - **Raster Manager > Draping** - Used to identify which image to drape.

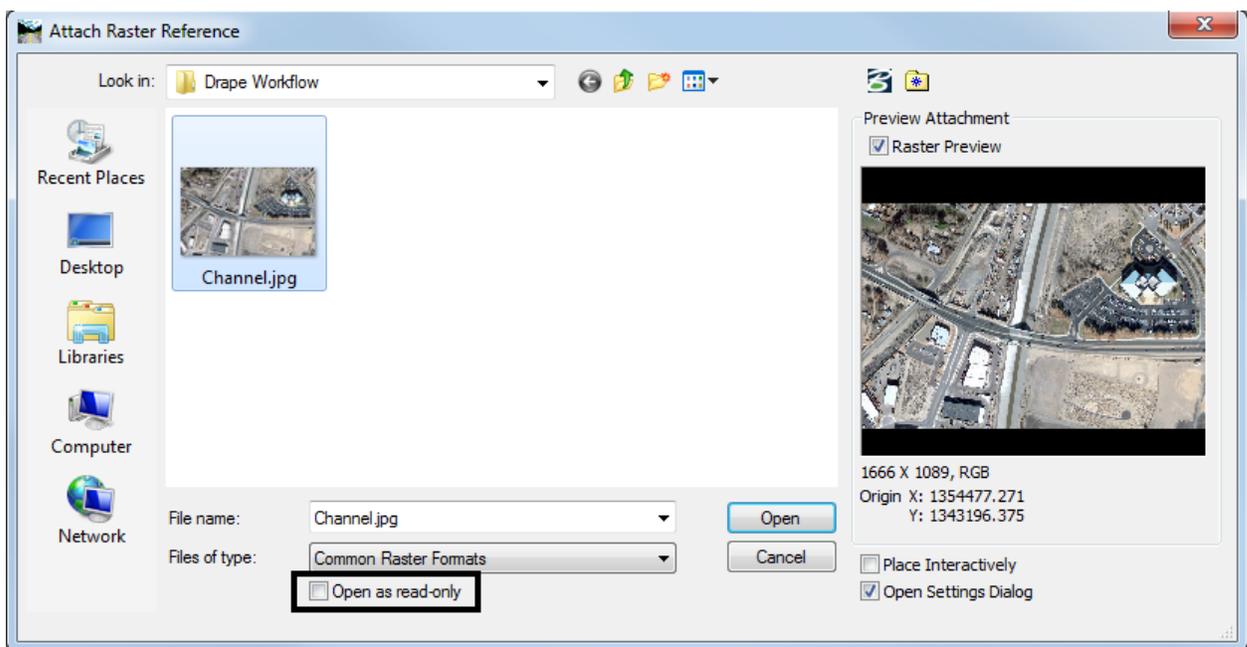
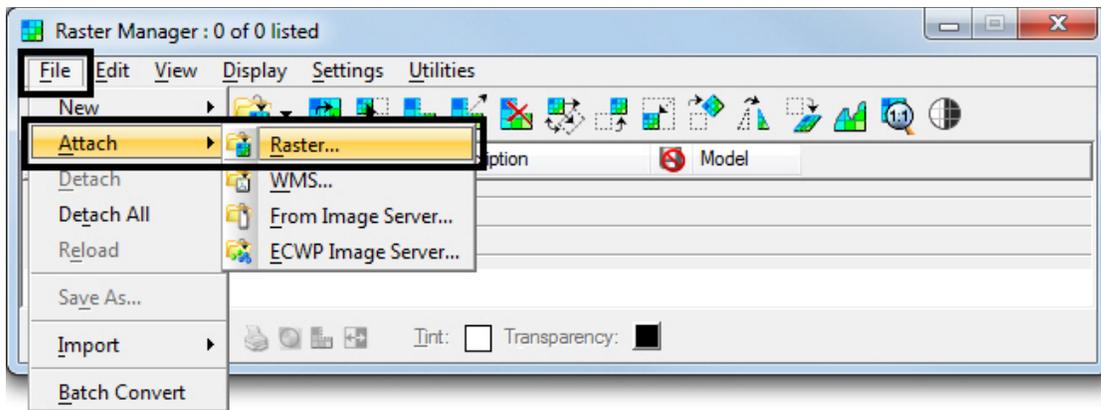
1. For printing purposes, begin by changing the background color of MicroStation to white. This can be completed through **Workspace > Preferences**. This will open up the **Preference** dialog box



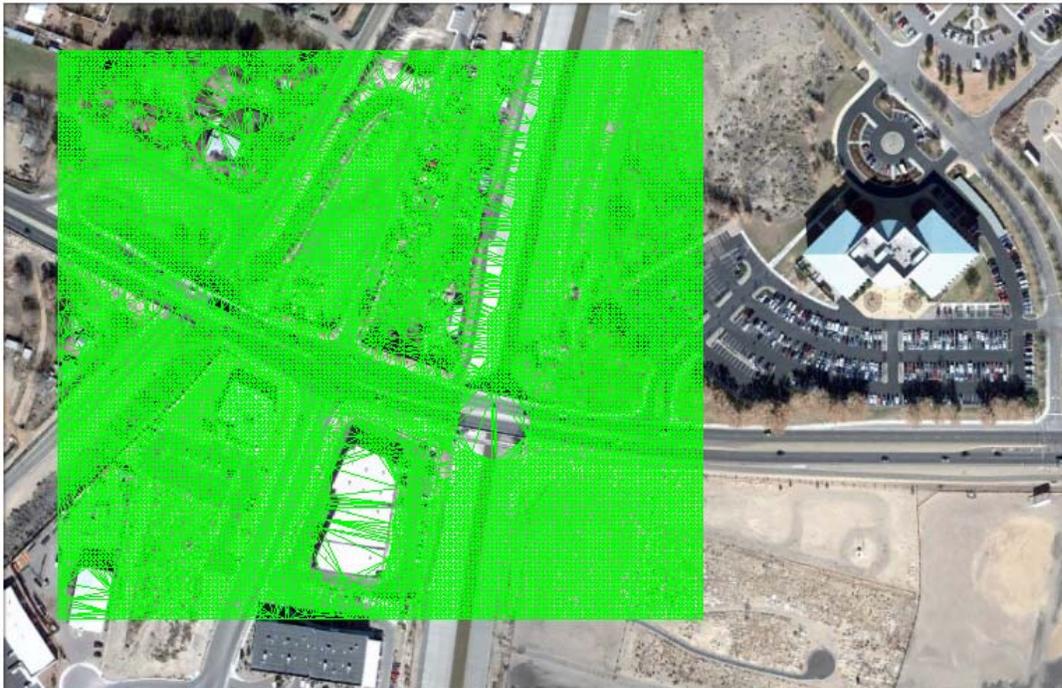
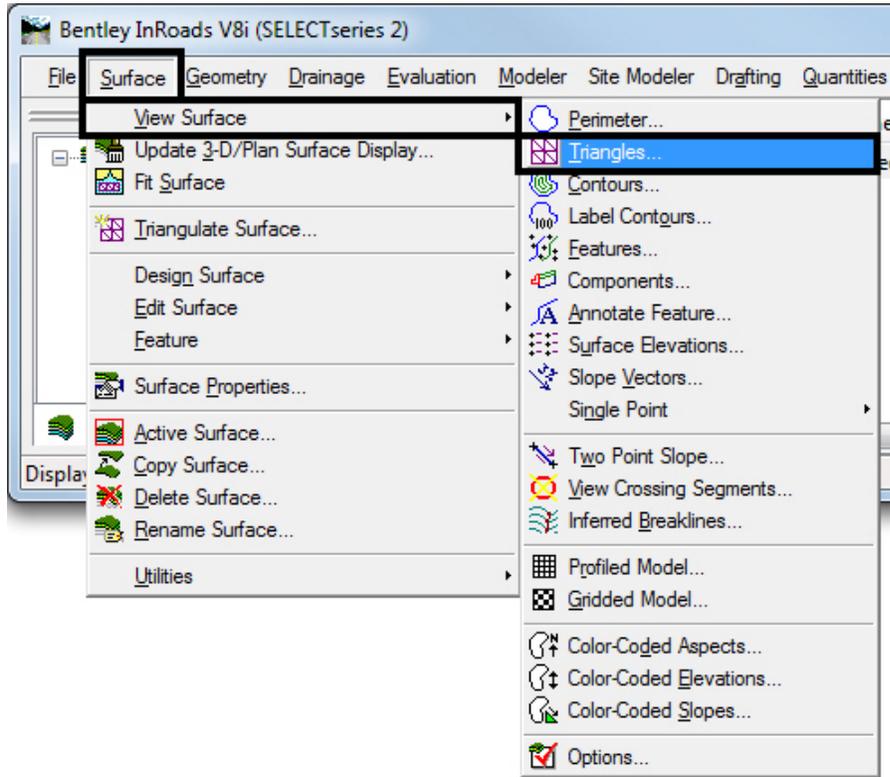
2. Under the **Category** column, select **View Options**. Toggle **ON** the box for **Black Background -> White** then select **OK** to close the dialog box.



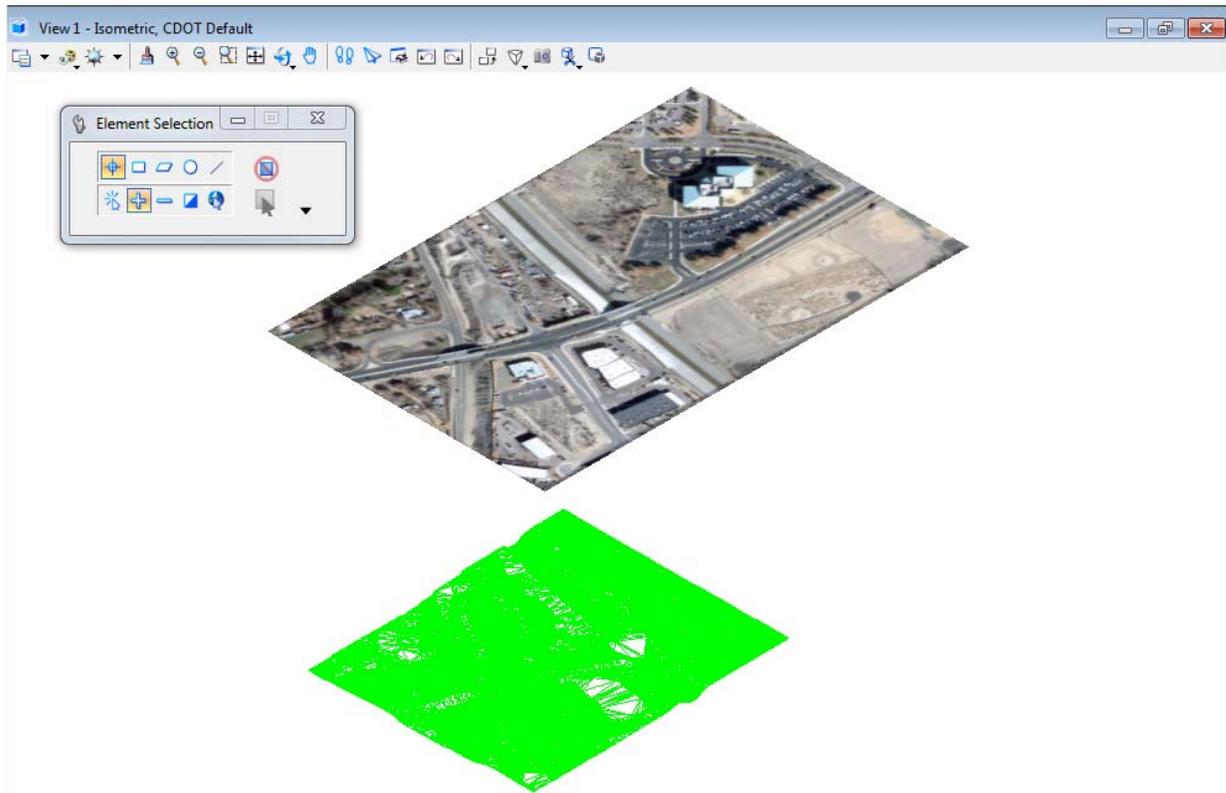
3. Begin by attaching an image using **Raster Manager**. Refer to the workflow document [CDOT Raster Manager.pdf](#) for guidance. Be sure Open as read-only is turned off.



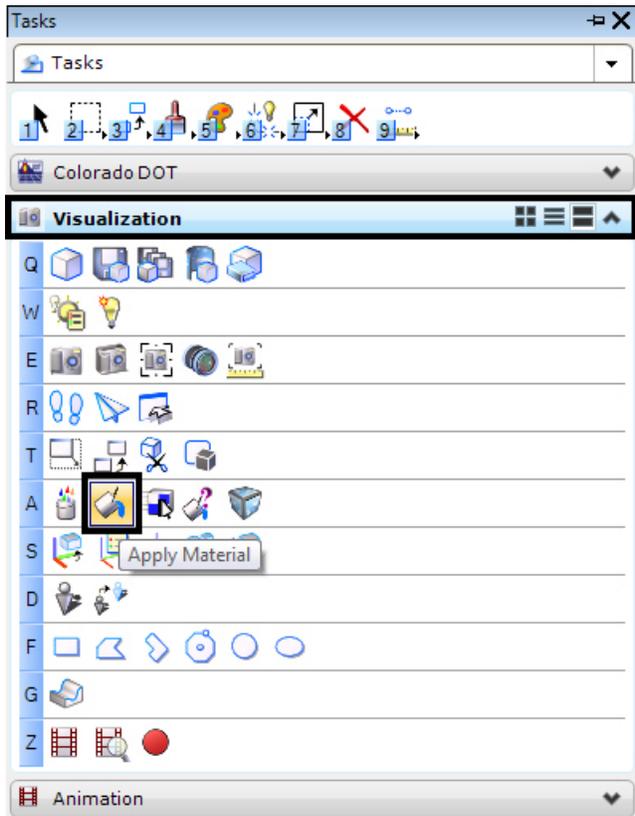
- 4. From InRoads, view the surface triangles for the DTM.



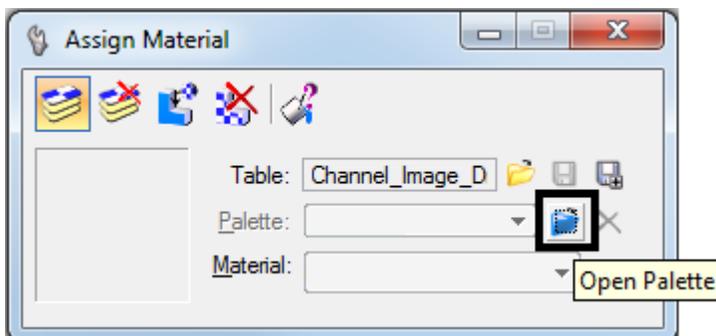
5. **Rotate** the view to **Isometric** and then complete a **Fit View**.



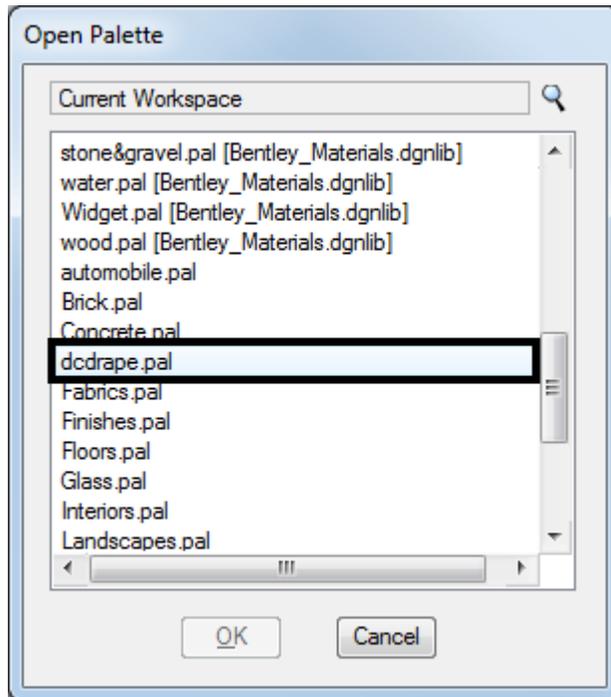
- 6. From the **Task Menu**, select the **Visualization** tab.



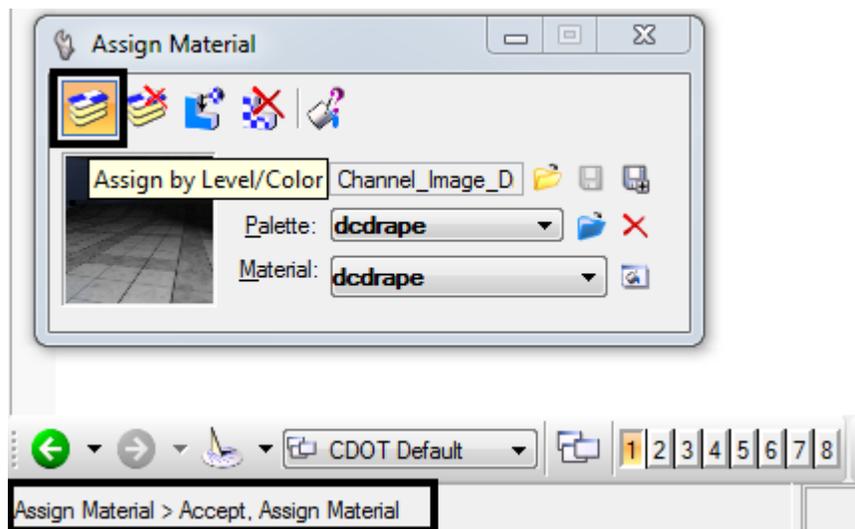
- 7. **Select** the **Apply Material** command. This will bring up the **Assign Material** dialog box.



8. **Select** the **Open Palette** icon and navigate to **dcdrape.pal** and **select OK**.

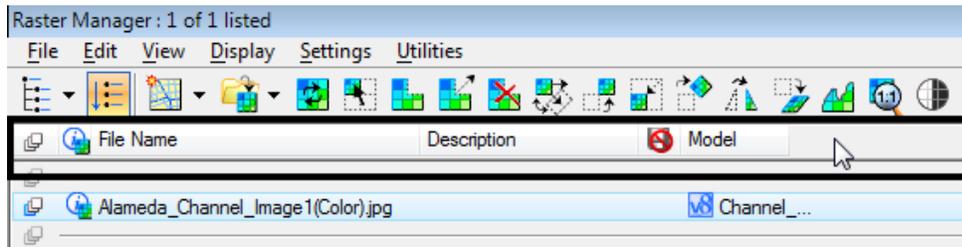


9. From the **Assign Material** dialog box, select **Assign by Level/Color**. MicroStation will ask you to **Assign Material**.

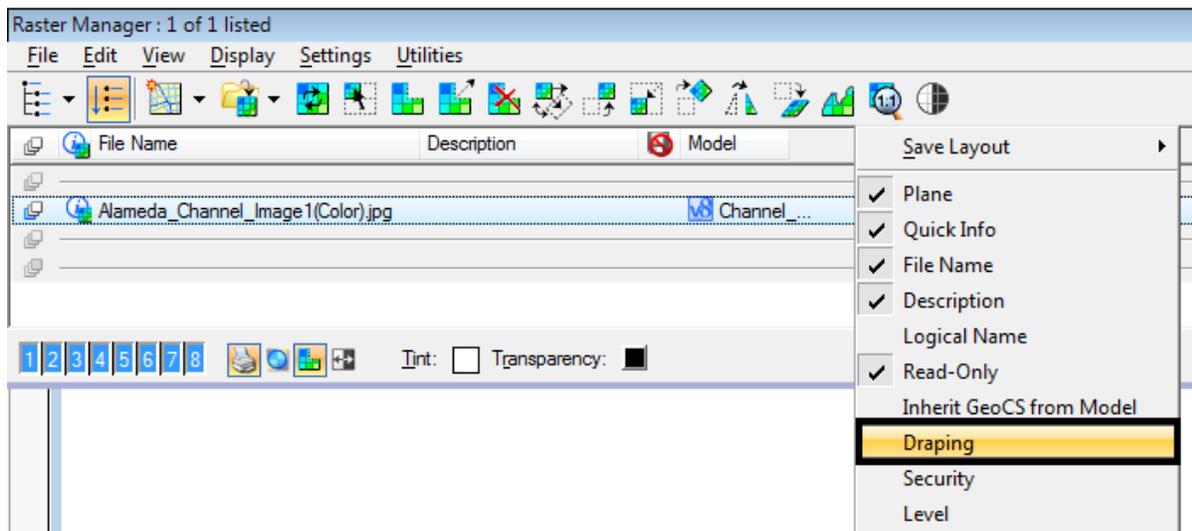


10. In the MicroStation Isometric view, **select** the DTM triangles and then accept by clicking a data point in the MicroStation view window.

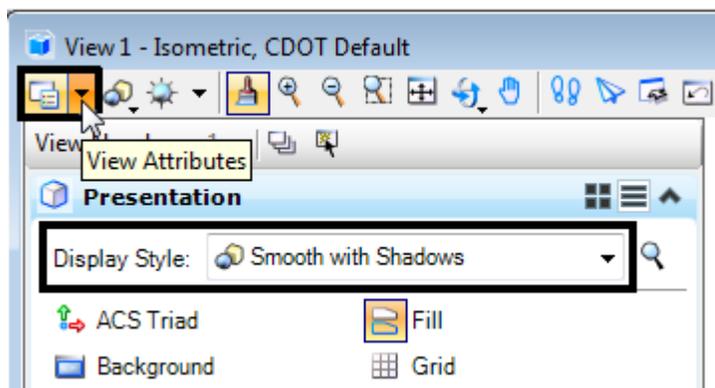
11. **Open Raster Manager** and **Right Click** on the column bar. This will bring up a drop down menu.



12. From the drop down menu, Toggle **ON** the **Draping** function.



13. From the **View Attributes**, change the **Display Style** to **Smooth with Shadows**.



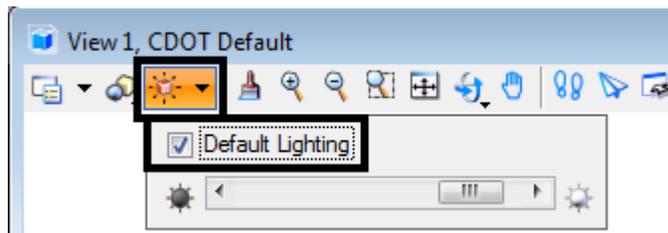
14. Complete a **Fit View**.

Note: The image will be clipped to the DTM triangles. Any part of the image that is not draped onto the DTM will not show.

15. Using the **View Rotation** command, rotate the view to a final position.



Note: The image brightness can be controlled by turning on Default Lighting and adjusting the view brightness.

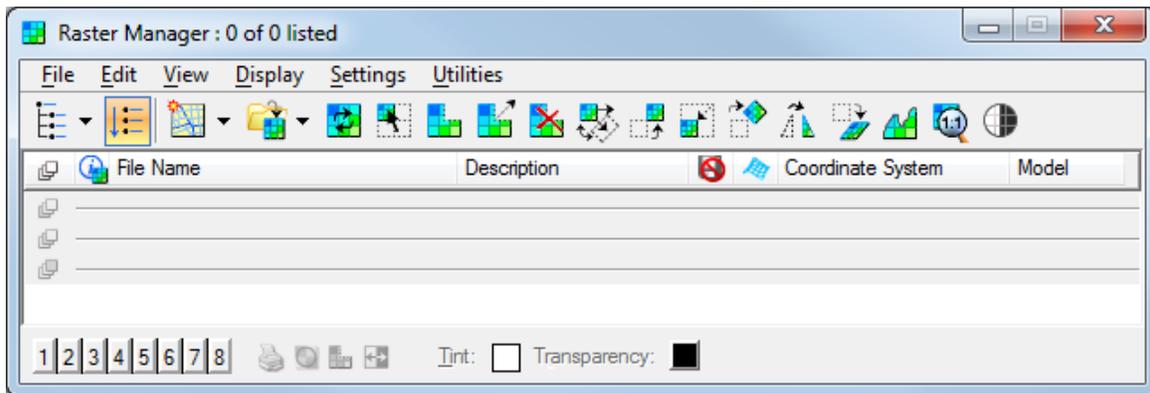


Workflow MS 14 - Raster Manager

This document guides you through *MicroStation Raster Management* including Attaching Rasters, Clipping Rasters, Masking Rasters, and setting Raster Transparency. For additional settings on raster images including text clarity see [CDOT Printing Raster Images.pdf](#).

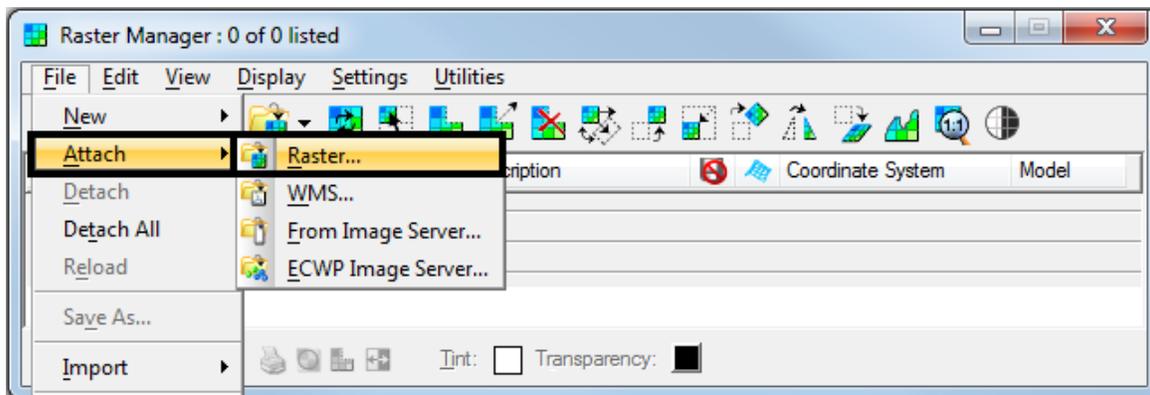
Raster Manager Dialog Box

1. The **Raster Manager** is used to display images as a reference to a DGN file. To access Raster Manager select **File > Raster Manager** or <D> the **Raster Manager** icon from MicroStation's Primary Tool Bar.



Attaching a Raster Image

1. In the Raster Manager dialog box, select **File > Attach > Raster** (This Workflow uses **C:\Projects\12345\Design\Drawings\12345DES_PnP10.dgn** as the master design file.)



2. In the **Attach Raster Reference** dialog box, navigate to the folder containing the image that will be referenced.
3. Highlight the file to be attached.

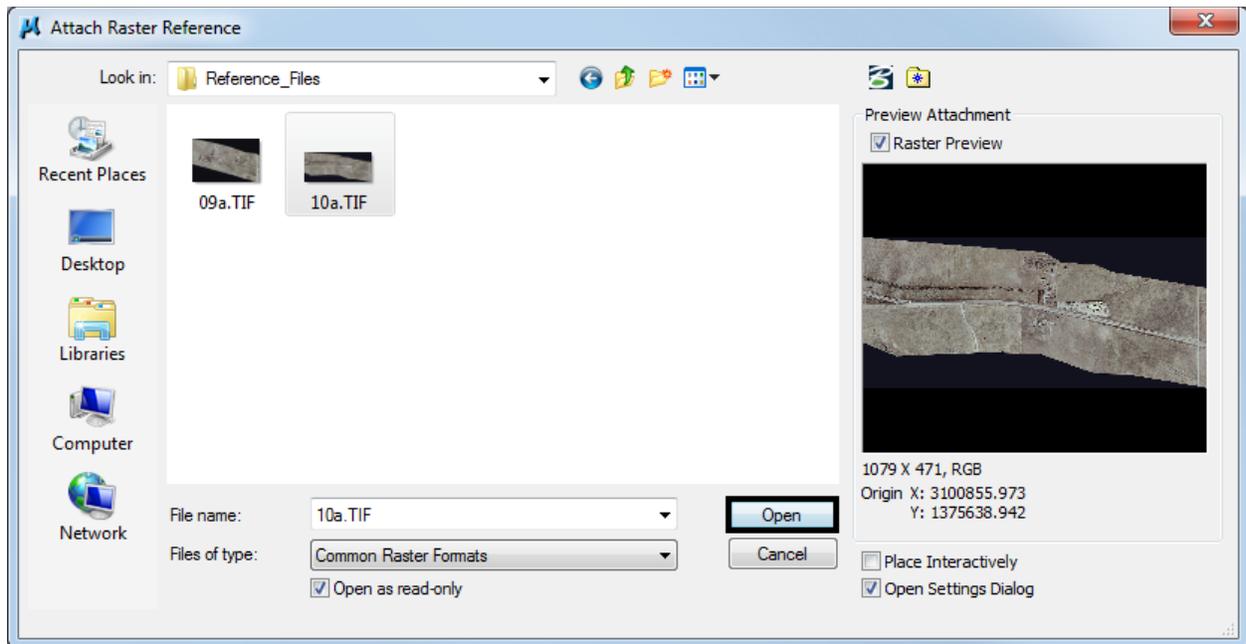
- Toggle On or Off **Place Interactively** as desired.

Note: If the file is Georeferenced, then **Place Interactively** should be toggled off.

Note: Placing a non-georeferenced file with the **Place Interactively** toggled off will cause the image to be placed at the **Global Origin**.

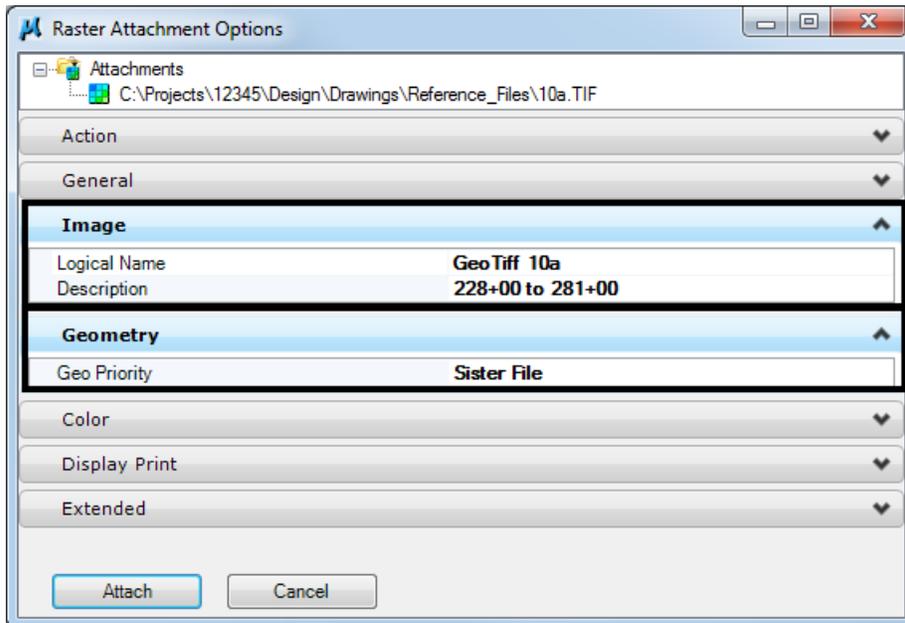
Toggle on **Open Settings Dialog**. This will display the **Raster Attachment Options** dialog box which is used below.

- <D> Open.**



- In the **Raster Attachment Options** dialog box, expand the **Image** leaf and key in a **Logical Name** and **Description**

- If the file attached is a georeferenced file, expand the **Geometry** task.

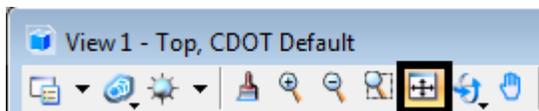


- Verify that the **GeoPriority** is set correctly for the file being attached.

Note: The the **Raster Attachment Options** dialog box may appear different based on the size the box has been set to and the options selected when starting the attachment. However, the **Image** leaf will always be available. The **Geometry** leaf is only available when **Place Interactively** is toggled off.

- Select **Attach**.

Note: A **Fit View** may be required to see the raster image.

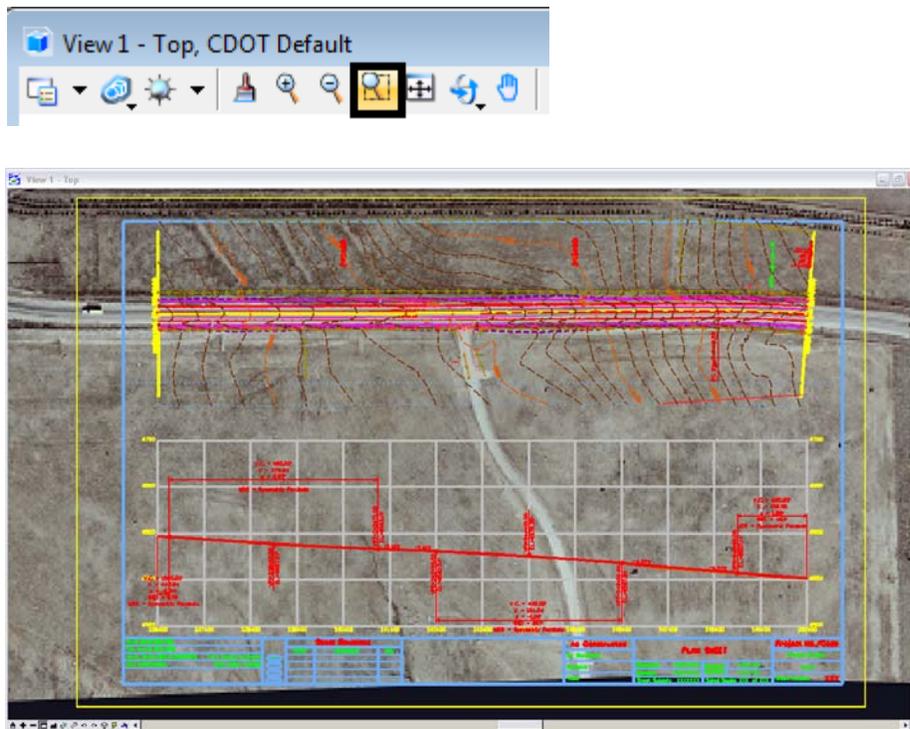


Note: The above screen capture was captured with a white MicroStation background for ease of viewing (the referenced image has a black background). To rid raster image of black borders see **Setting Raster Transparency** at the end of this document. Geo-Referenced Files typically will not need any modifying or relocating. These files have their coordinates and scaling embedded either within the tif itself or in an accompanying world file (.twf).

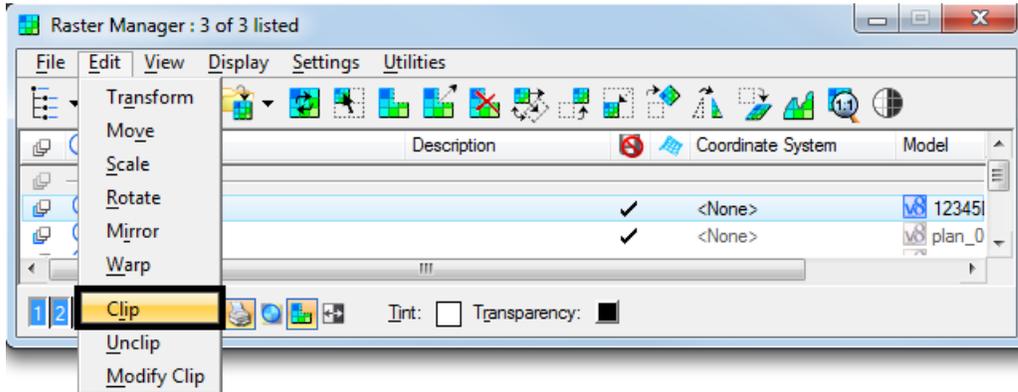
Clipping and Masking Raster Images

If for some reason there are portions of the raster image that you do not want to see, two commands are available to accomplish this: **Clip Raster** and **Mask Raster**. These parallel the options available for MicroStation reference files. **Clip Raster** hides the image outside the selected area while **Mask Raster** hides the image inside the selected area.

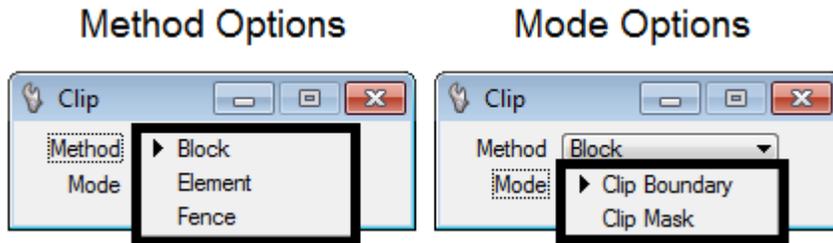
1. **Window Area** to show your area of interest.



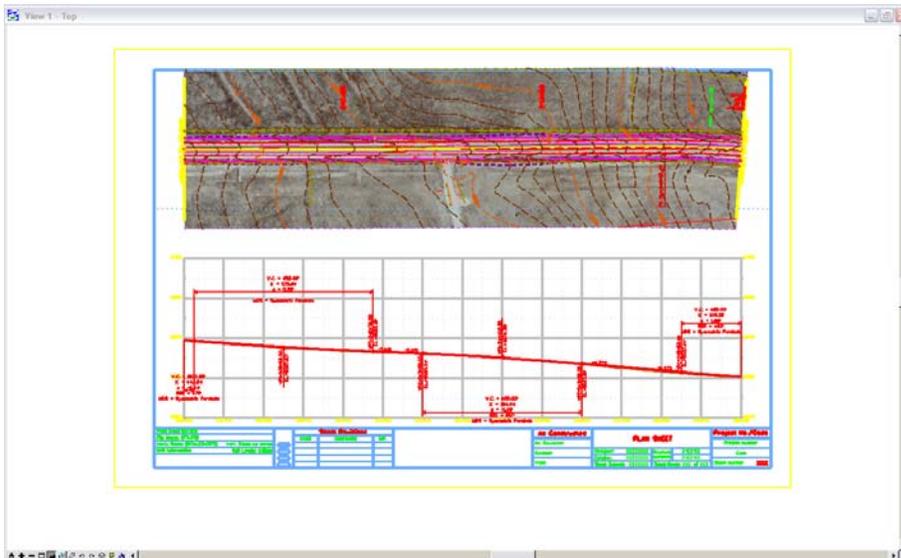
- From **Raster Manager**, select **Edit > Clip**.



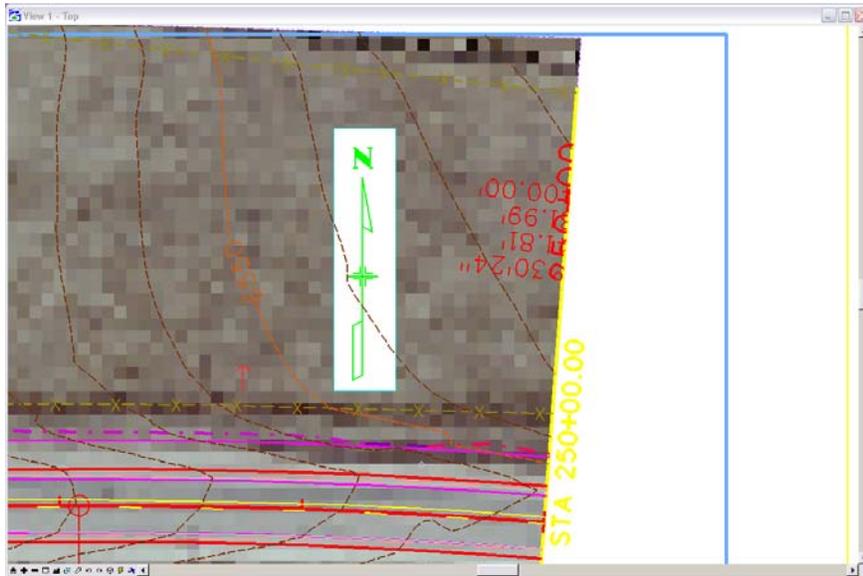
- The **Clip** dialog box presents the clipping options. Select the appropriate **Method** and **Mode** from the drop-down lists.



- Define the clip boundary.
- Note:** To use the **Fence** option, the fence must be in place before the **Clip** command is selected.
 - <D> to accept element selection.
 - <D> in the view to complete the command. The illustration below shows an example of a **Clip Boundary**.



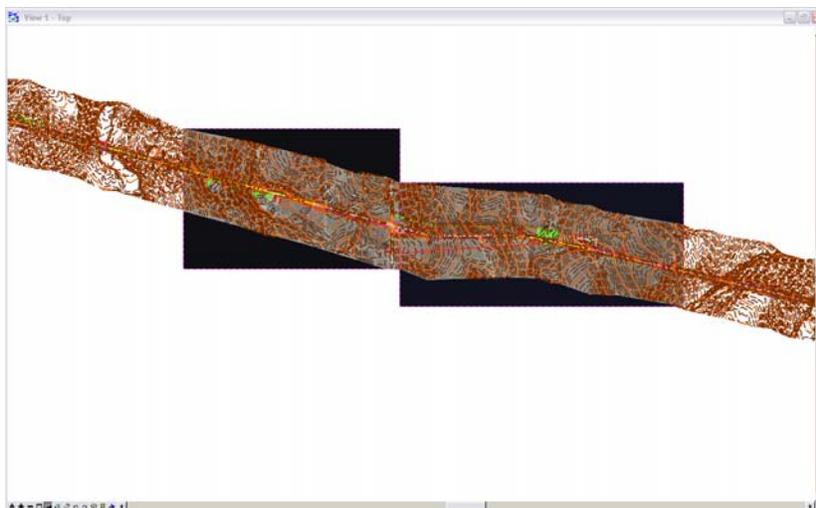
This illustration shows an example of a **Clip Mask**.



Note: Once defined, Clip Boundaries can be modified by selecting **Edit > Modify Clip** from the **Raster Manager** menu. Clipping can be defined by the methods **Blocks**, **Elements**, and **Fences**.

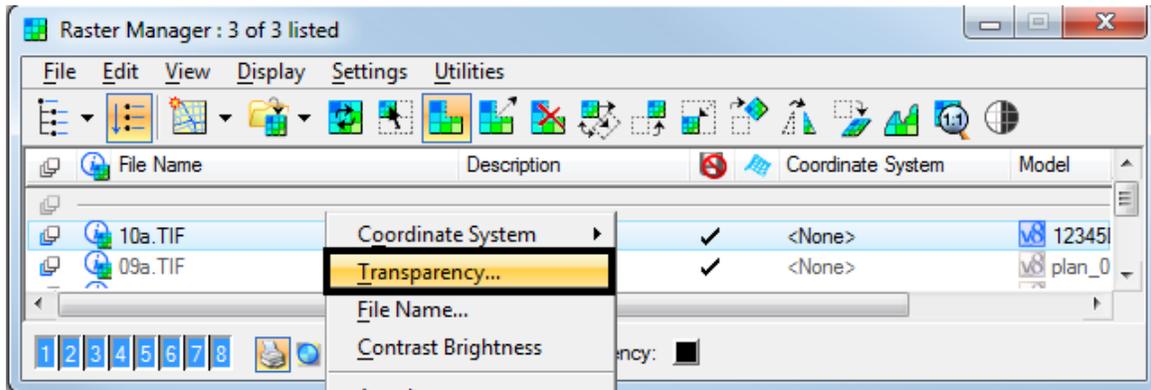
Setting Raster Transparency

The dark, unused portion of your raster image (see black image outlined below) can be set to transparent allowing the user an alternative to clipping that is easier. This is extremely useful when printing raster images as this portion of the drawing is omitted. (This workflow uses the file **C:\Project12345\Design\Drawing\ Reference_Files\ 12345DES_Model.dgn**)

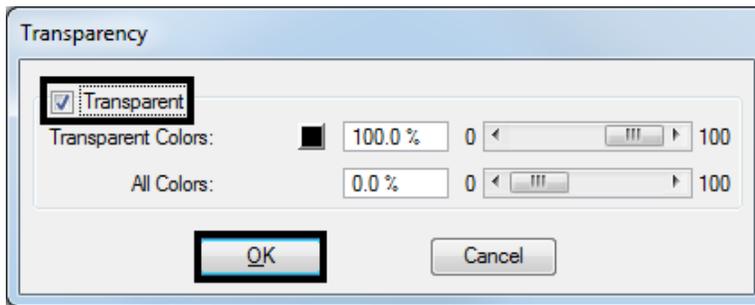


1. Open **Raster Manager**.

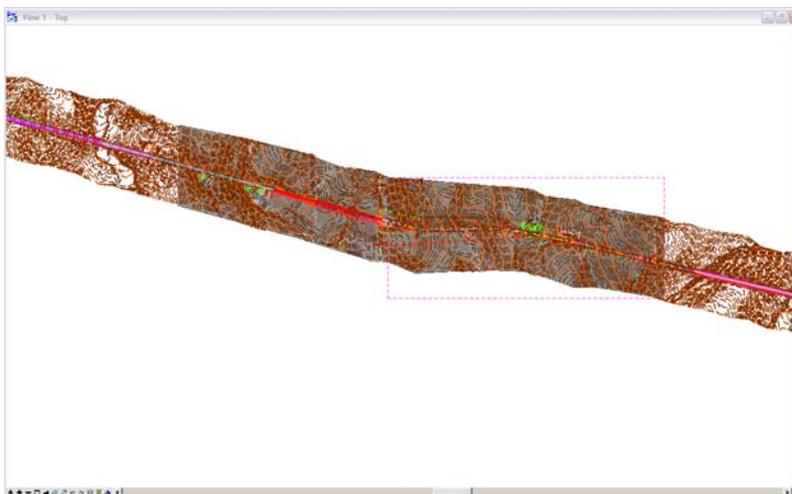
2. <R> on a raster attachment file and select **Transparency** from the fly-out menu.



3. In the **Attachment Settings** dialog box, place a check in the **Transparent** check box, make sure the **Transparent Color** is at **100%**, <D> OK.



4. Repeats step 2 and 3 for any additional attachments.



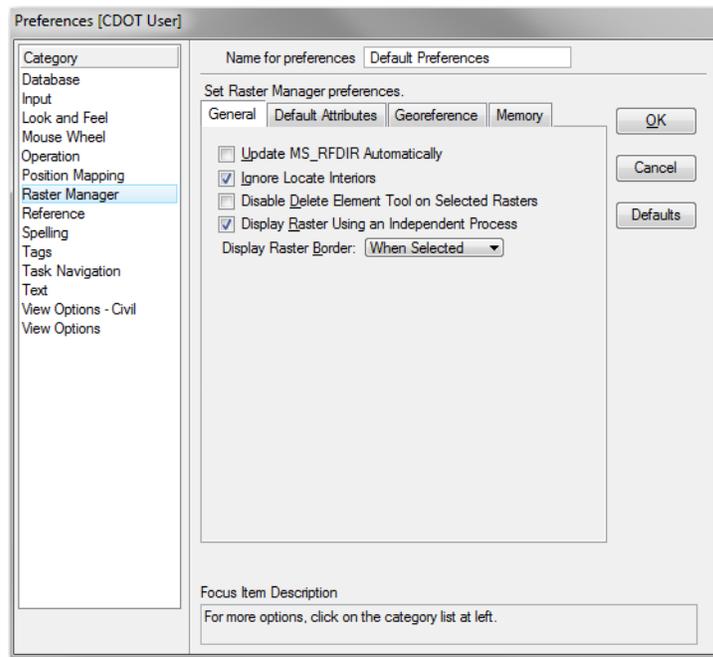
Note: Transparent color can be set to any color, but is black by default (Red:0, Blue:0, Green:0). Use graphics programs such as Adobe Photoshop to determine the RGB settings of your raster images.

Workflow MS 15 - Using Georeferenced Images in Raster Manager

This document guides you through the Raster Manager settings in MicroStation for accurate placement of georeferenced image files. The section **Setting the Default Preferences** only needs to be done once. If your Raster Manager preferences have been previously set correctly you may proceed directly to **Placing Georeferenced Images** section of this document.

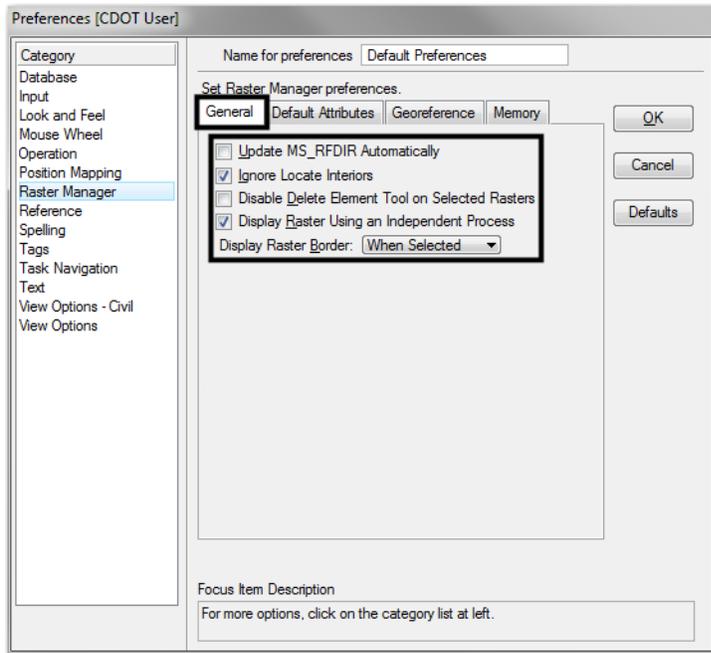
Setting the Default Preferences

1. From the MicroStation pull-down menu select **Workspace > Preferences**. The **Preferences** dialog will appear.
2. Select the **Raster Manager** option in the **Category** list in the left pane.



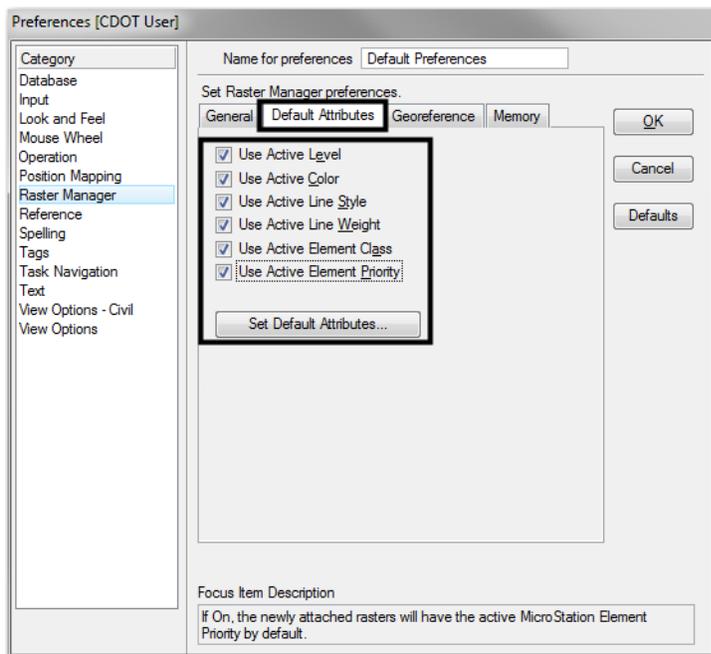
3. The User Preferences for Raster Manager have been broken out into four tabs:
 - ◆ General
 - ◆ Default Attributes
 - ◆ Georeference
 - ◆ Memory
4. Many of the setting are the same as they are in previous version and new functionality has been added to enable users to change the functionality of MicroStation.

5. In the **General** tab set the following toggles.



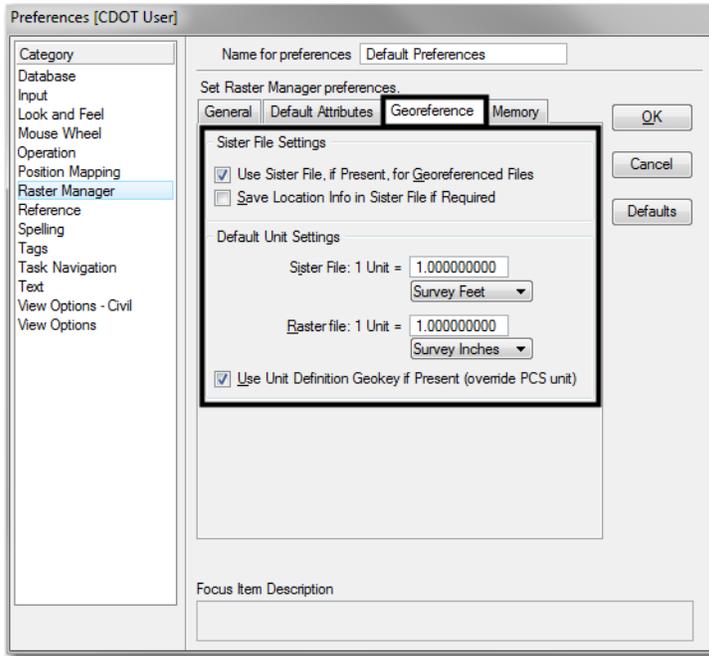
Note: The settings in this tab help MicroStation process imagery faster and select the rasters images.

6. In the Default Attributes tab, toggle on the following.

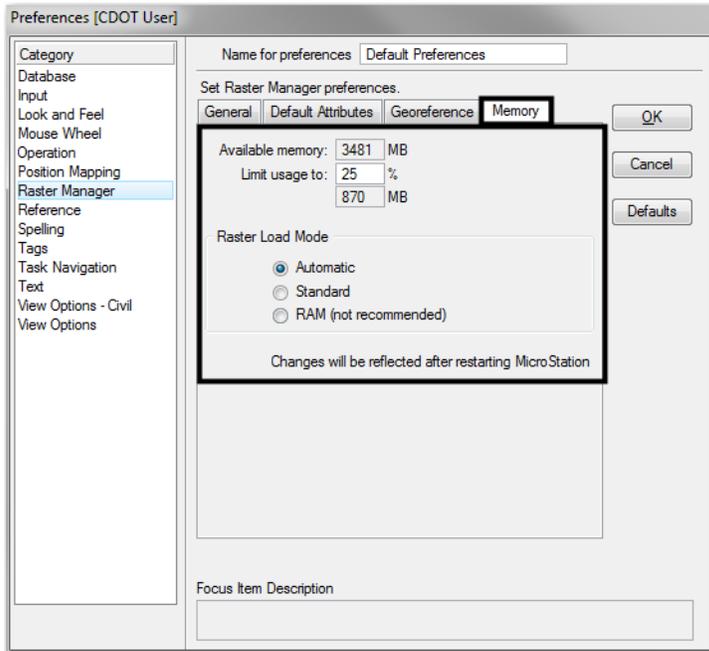


Note: These settings only apply to the level, symbology and element properties of the raster image borders when they are attached.

- The Georeference tab has the most important settings. Set the following settings for the Sister file and Unit Settings to ensure the proper placement of your raster images.



- The Memory tab has been added to the Raster Manager User Preferences. These settings were only possible in previous versions through a series of configuration variables. The default values are set as seen below, but if you are having problems seeing your raster images these settings should be adjusted.



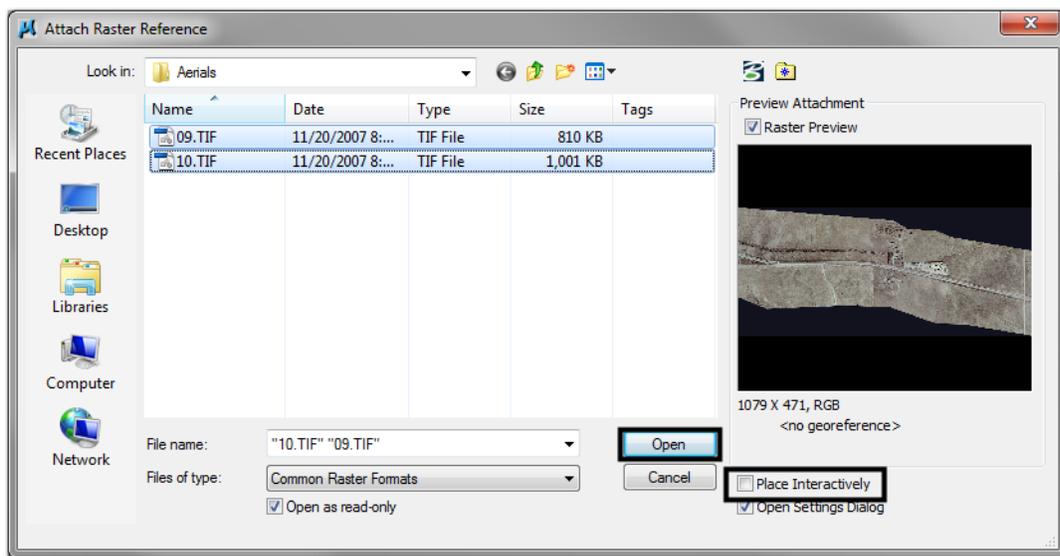
Note: When adjusting these settings take into account the computer’s hardware.

9. **<D> OK** button to save these preferences. Once these preferences have been saved they should not have to be changed again.

Note: Some settings will require you to restart MicroStation before they will take affect.

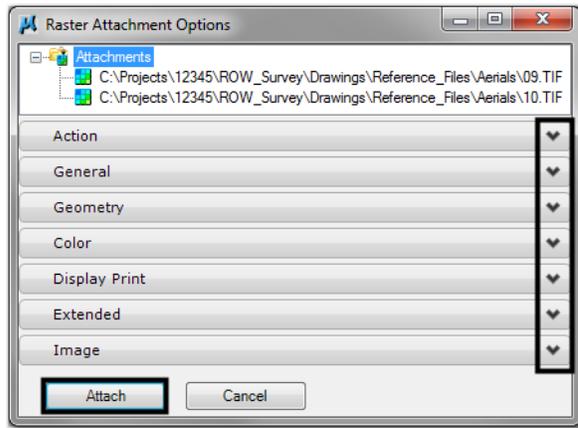
Placing Georeferenced Images

1. From the MicroStation pull-down menu select **File > Raster Manager**. The **Raster Manager** dialog will appear.
2. From the Raster Manager menu select **File > Attach > Raster...** The **Attach Raster Reference** dialog will appear.
3. **Navigate** to the location of the raster image files and select the file(s) to attach.
4. It is important that the **Place Interactively** check box is unchecked. **<D> Open** to attach the image(s).

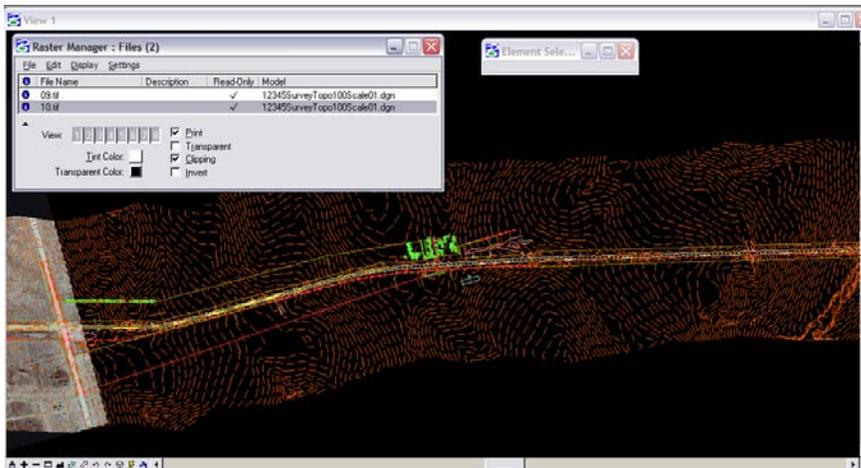


Note: Having the **Open Settings** dialog toggled on is optional. When toggled on you can review the Raster Attachment Options before attaching the rasters.

- Click on the arrows to expand the settings. **<D> Attach** when finished.

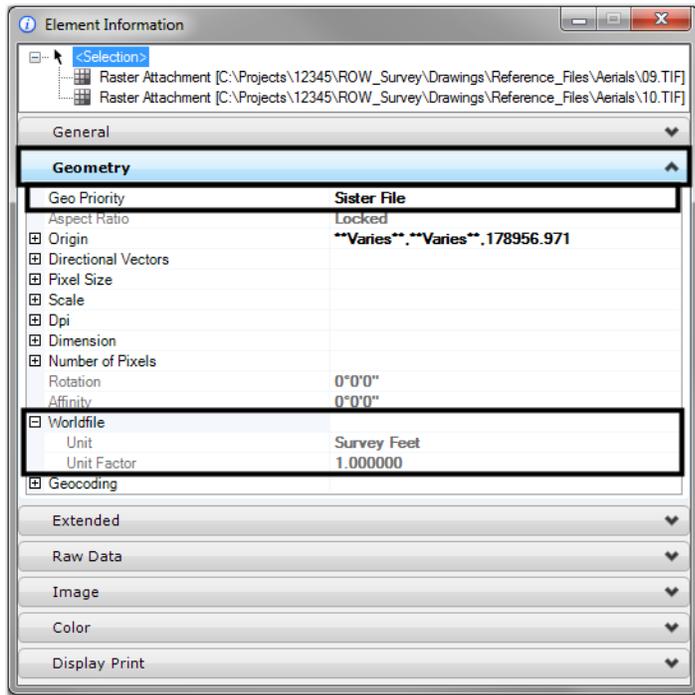


- After attaching the image a **Fit View** may be needed to display the image.
- If the image does not appear in the correct location adjust the placement location. Select the image from the **Raster Manager** dialog box.

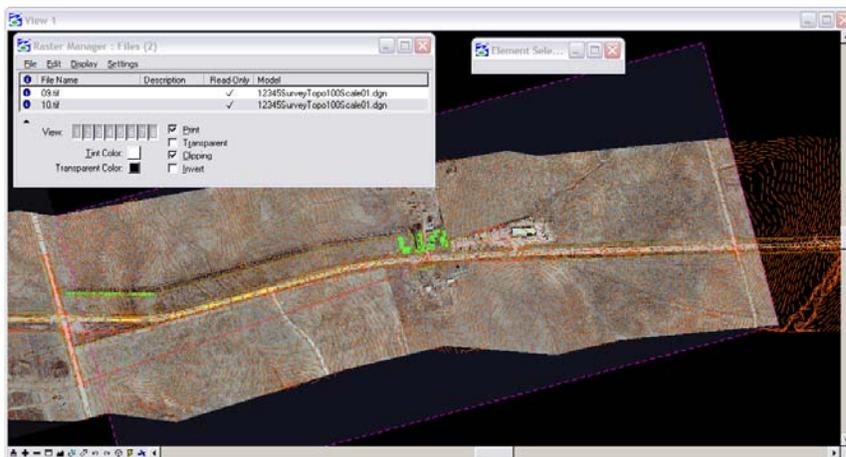


- From **Raster Manager** select all the images.
- Click on the **Element Information** icon on the Primary tool bar.

10. Expand the **Geometry** field and change the **Geo Priority** to **Sister File**.



11. **Fit View** to display the image. The image should now appear in the correct location.



Workflow MS 16 - Image Reprojection to Project Coordinate Datum

Images to Project Datum Coordinate System

Images at CDOT are typically oriented to Colorado State Plane coordinate systems. This workflow guides you through the steps required to attach an image in a Colorado State Plane Coordinate system and modify its location so the image will re-project to the Project Datum coordinate system.

In order for this to be completed, information from the Survey must be obtained. This information can be found on the Project Control Diagram sheet of the plan set.

Project Coordinate Datum

A modified coordinate system is computed for each CDOT project to provide horizontal values for mapping and surveying purposes. CDOT project modified coordinates are based on the Colorado State Plane Coordinate System of 1983(92) in unites of US Survey Feet.

Project Control Diagram sheets are included in CDOT plan sets and a note explaining the Project Coordinate Datum can be found on this sheet.

An example:

Project coordinates are modified Colorado State Plane XXXXXX Zone NAD '83/(XX) coordinates. The combined elevation/scale factor used to modify the coordinates from state plant to project coordinates is 1.XXXXXXXXXXX. The resulting project coordinates are truncated by 200,000m in the Northing and 400,000m in the Easting after converting from state plane coordinates to project coordinates. The CHARN is based on the NAD '83(XX) datum.

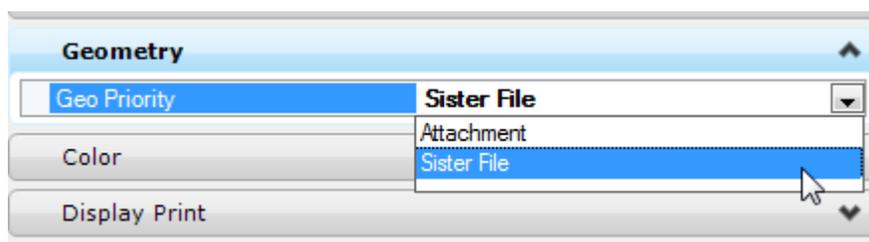
Project Coordinates Northing US Survey Feet = (State Plane Coordinate Northing * 1.XXXXXXXXXXX - 200,000) * (3937/1200).

Project Coordinates Easting US Survey Feet = (State Plane Coordinate Easting * 1.XXXXXXXXXXX - 400,000) * (3937/1200).

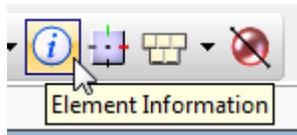
Relocate the Image

The workflow to relocate an image that is defined with Colorado State Plane Coordinates into a Project Coordinate Datum can be completed by editing the origin and pixel size of the referenced image.

1. Create a new design file and using Raster Manager, attach the project image. Be sure the **Place Interactive** option is **Not** selected.
2. The **Raster Attachments Options** dialog box opens.
3. Expand the **Geometry** tab and set the **Geo Priority** to **Sister File**.



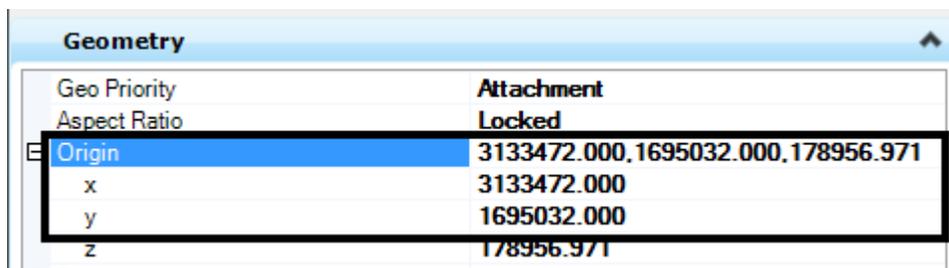
4. Click the **Attach** button.
5. Select the attached image by using the Element Selection tool.



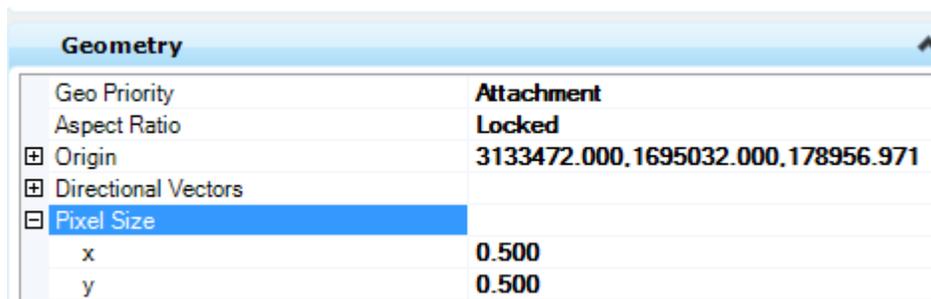
6. Expand the **Geometry** tab and change the **Geo Priority** to **Attachment**.



7. Modify the Origin X and Y using the procedures for the **Project Control Diagram**.



8. For example: (State Plane Coordinate Northing * 1.XXXXXXXXXXX - 200,000) * (3937/1200) and (State Plane Coordinate Easting * 1.XXXXXXXXXXX - 400,000) * (3937/1200).
9. Next, modify the pixel size X and Y.



10. For example: Pixel Size X * 1.XXXXXXXXXXX and Pixel Size Y * 1.XXXXXXXXXXX.

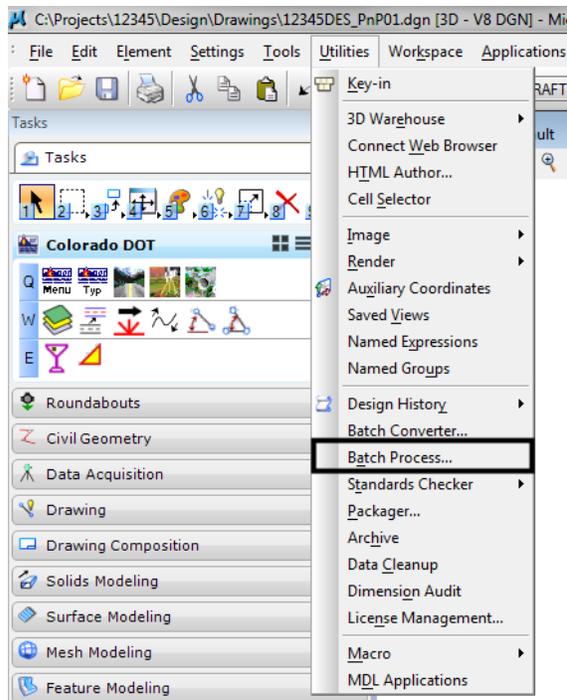
Note: The precision is set to 3 decimal places so the pixel size values may not appear to change.

11. Once values have been adjusted, close the Element Information dialog box.

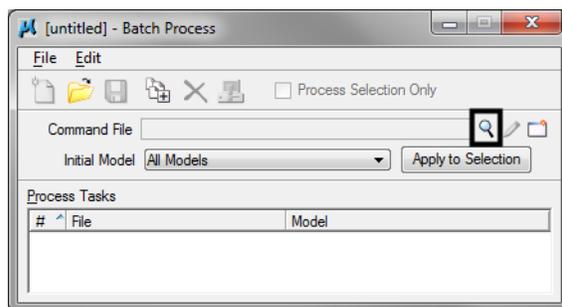
Workflow MS 17 - Batch Processing

This document guides you through using the Batch Process tool in MicroStation. Additional Batch Process files can be substituted into this workflow. This example uses a specific batch process file that changes the level of the North Arrow cell and the Match Lines. In 2.04 and prior versions of the configuration, Plan and Profile Generator placed the North Arrow cell and the Match Lines on the incorrect level. This process will correct this error in multiple sheets at the same time.

1. Select **Utilities > Batch Process** in MicroStation.

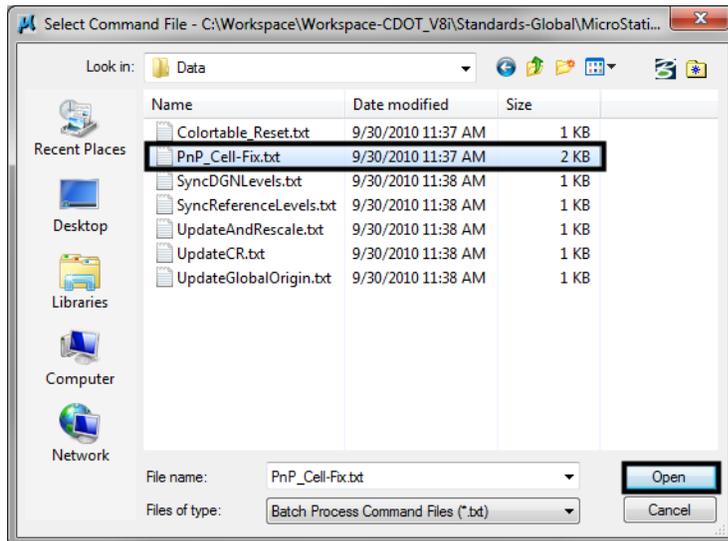


2. <D> on the **Search** icon to browse for the Batch Process command file.



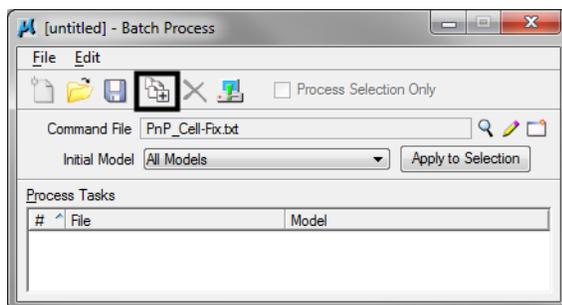
3. Navigate to **C:\Workspace\Workspace-CDOT_V8i\Standards-Global\MicroStation\Data**.

4. <D> the command file **PnP_Cell-Fix.txt** then <D> **Open**.

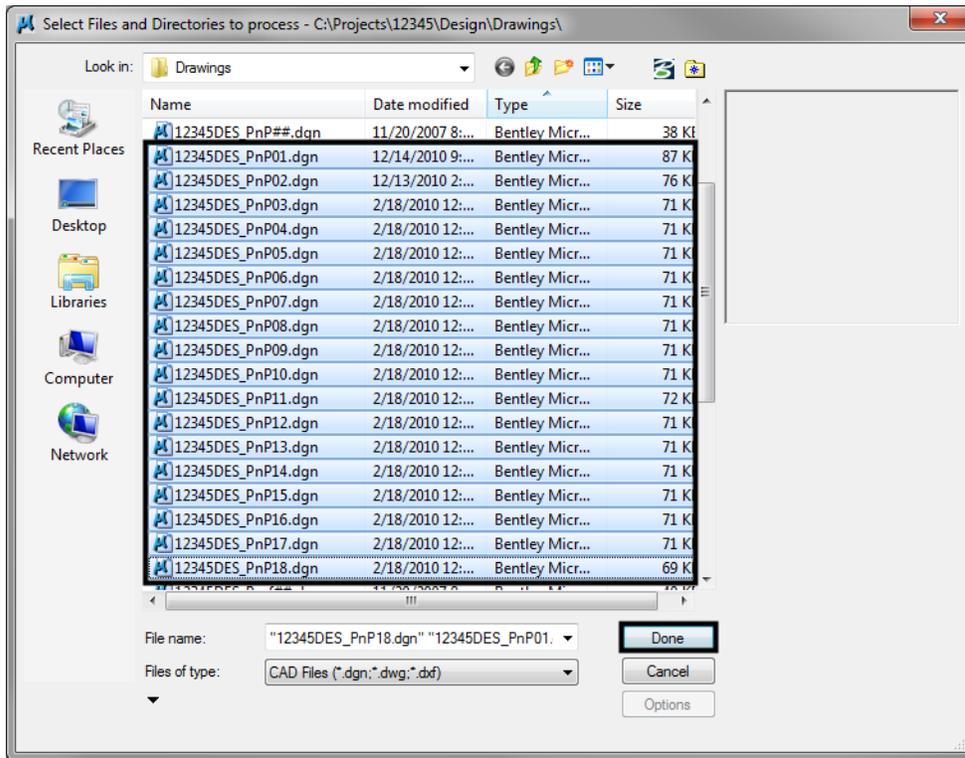


Note: The file, **PnP_Cell-Fix.txt**, changes the level of the North Arrow cell and the Match Lines from Default to the correct levels, GEN_SHEET_North-Arrow and GEN_SHEET_Match-Line.

5. <D> the **Add Files** icon.

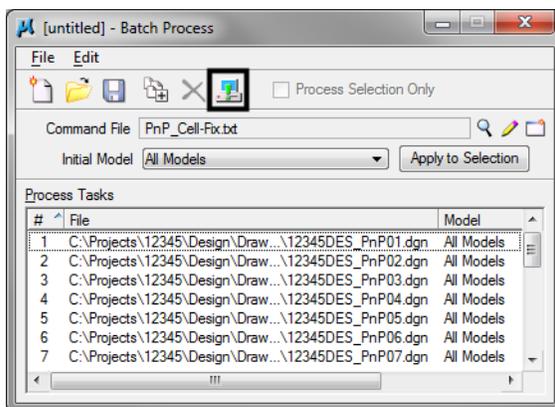


6. Select the sheet files created by the Plan and Profile Generator in InRoads. Then **<D> Done**

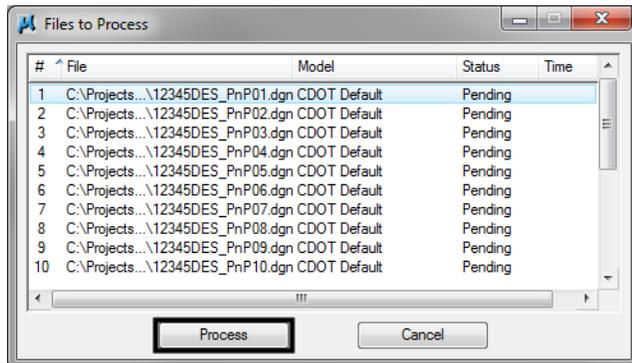


Note: You can hold down the **Ctrl** or **Shift** key to select multiple files.

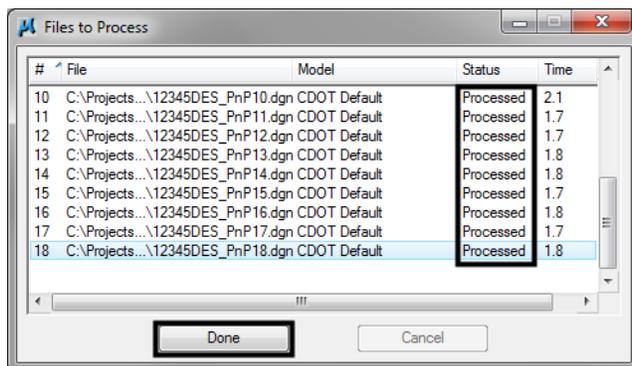
7. **<D>** the **Process Batch** icon. This will execute the Batch Process command file.



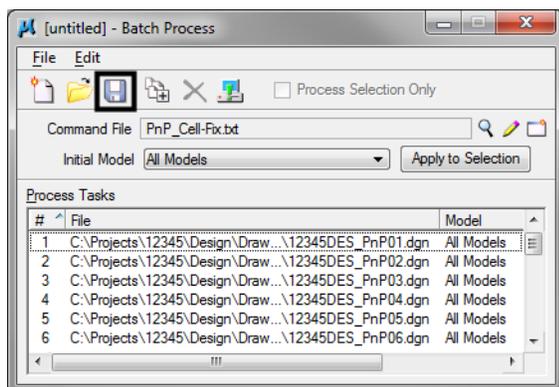
8. Review the file list before processing. If this is correct, **<D> Process**.



9. Review the **Status** field to make sure all files were processed without an error.
10. After verifying this, **<D> Done**.

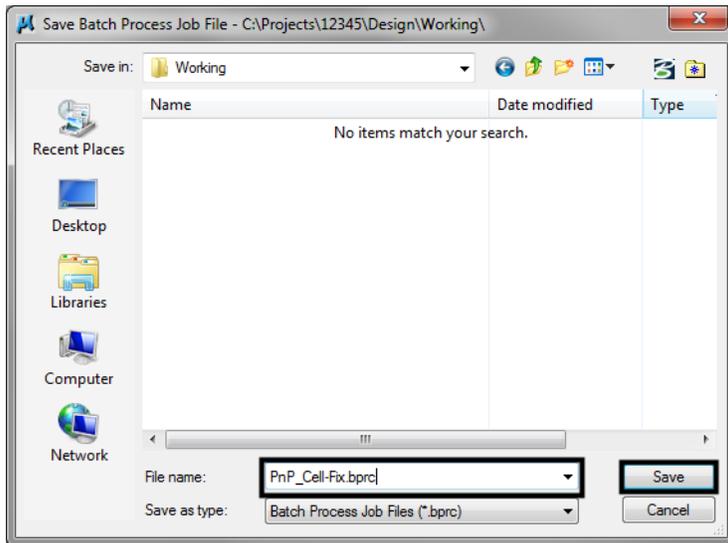


11. **<D>** the **Save** icon to save the files included in the Batch Process. Every time you rerun the Plan and Profile generator in InRoads, the changes to the North Arrow cell and the Match Lines will be lost. You can recall the *.bprc file to execute the batch process.

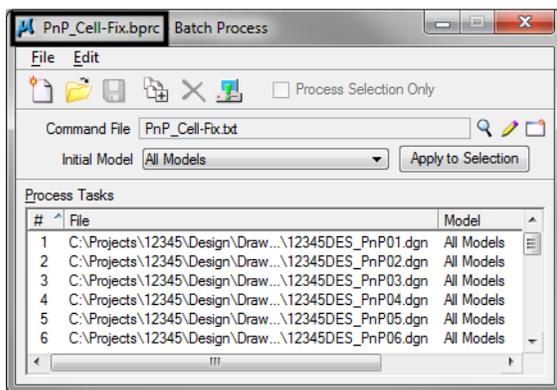


Note: If additional Plan and Profile sheets are created, be sure to update the file list.

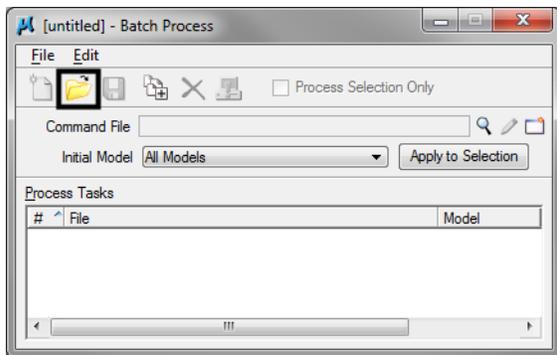
12. Give the saved file an extension of ***.bprc**. **Navigate** to **C:\Projects\.....\Design\Working** and **<D> OK**.



13. Verify the name in the dialog header.



14. To open a Batch Process file **<D>** the **Open** icon.



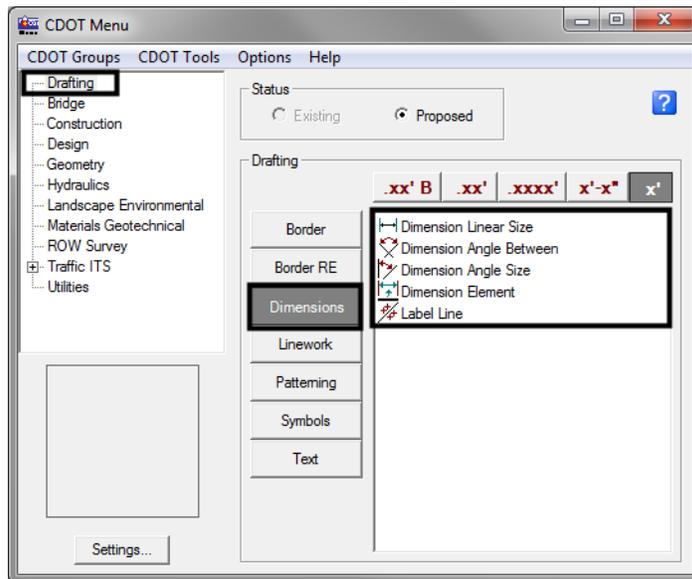
15. **Navigate** to the ***.bprc** file previously saved, **<D>** the filename then **<D> Open**. Follow steps 7-9 to execute the Batch Process command file.

Workflow MS 18 - Two Line Note Placement

This document guides you through placing a note with two lines of text with a leader line located between the lines of text.

Setting Symbology

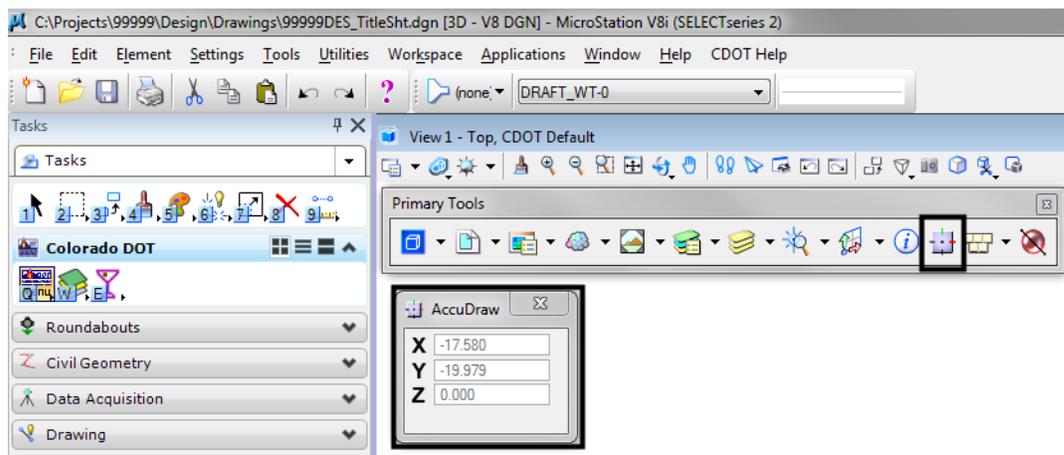
1. To set the proper symbology for the note, select **Drafting** from the **CDOT Menu Explorer**.
2. Select the **Dimension** category button from the **Drafting** area.
3. Select any one of the items displayed in the item list.



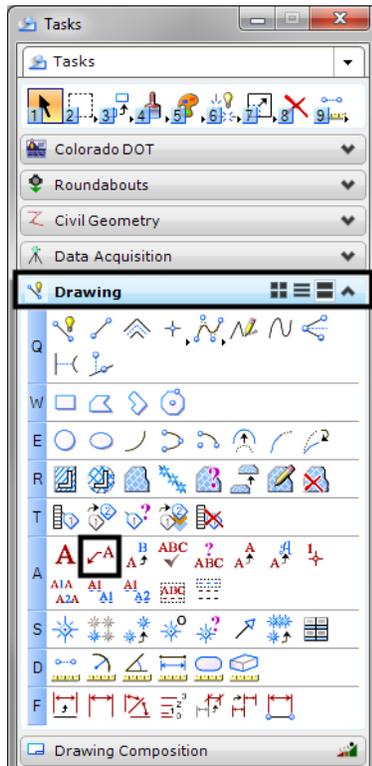
4. This sets the level to **DRAFT_Text-1** and the symbology to **By-Level**. The **CDOT Menu** can now be minimized.

Placing A Two Line Note

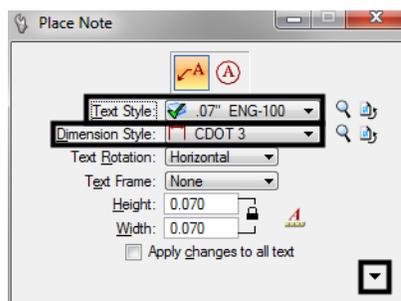
1. Turn **AccuDraw On** from the Primary Tool Bar. This will display the **AccuDraw window**.



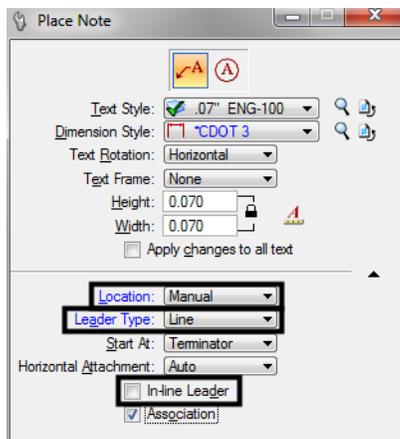
2. Select **Place Note** icon from the **Tasks > Drawing**.



3. In the **Place Note** dialog box:
 - a. Select the desired **Text Style** from the drop-down list.
 - b. Use the **Dimension Style** drop-down list to set the desired dimension style.
 - c. **<D>** on the **Expand** arrow.

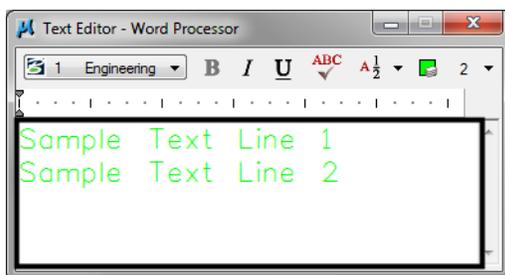


4. In the **Expanded Settings** area:
 - a. Set the **Location** to **Manual** using the drop-down list.
 - b. Set the **Leader Type** to **Line** using the drop-down list.
 - c. Remove the check from the **In-line Leader** check box.

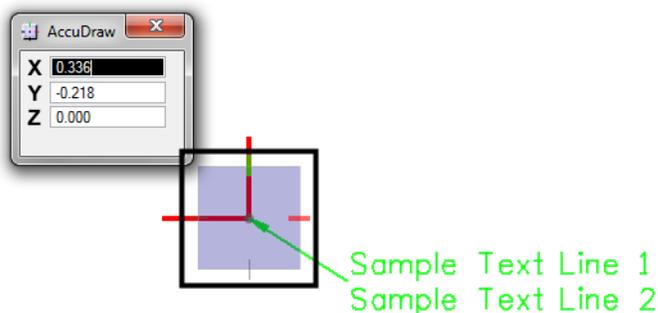


Note: Depending on the Dimension Style selected, some of the above settings may be set by default.

5. **Key-in** the desired text. Type the first line of text; press the **Enter** key then, type the second line of text.

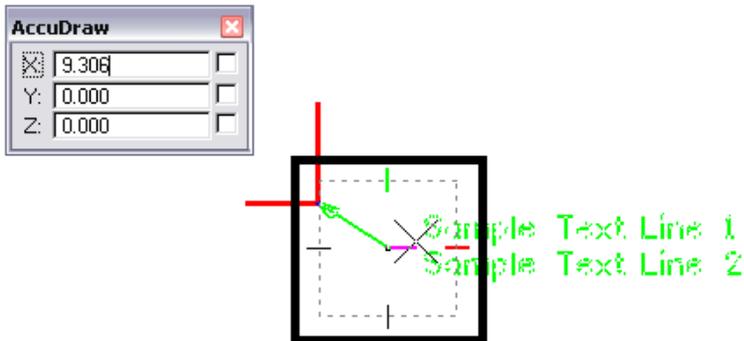


6. **<T>** (if desired) then **<D>** on the location of the note terminator.

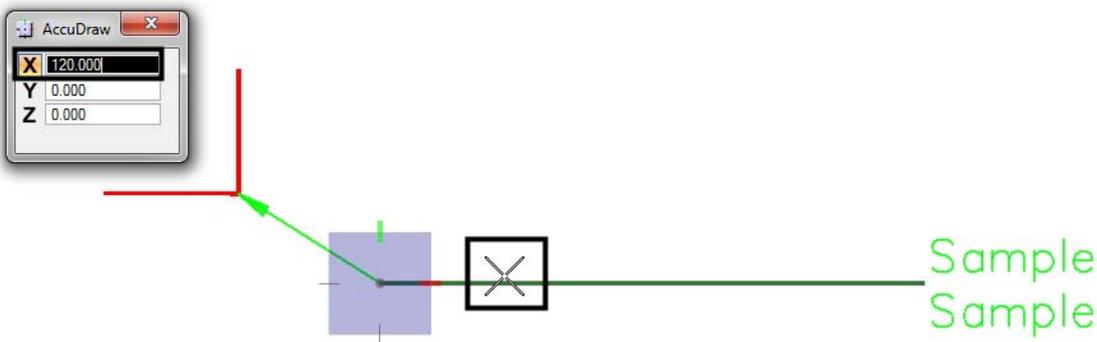


Note: In the example above a **<T>** then **<D>** was used to place the note terminator on the corner of the red linestring. If AccuSnap is on, it can be used to locate the terminator end of the leader.

7. **<D>** to place the end of the first leader segment. The AccuDraw compass will now be centered on this point.



8. Move the cursor on to the AccuDraw compass point that is in the direction the second segment is to be placed, then **key in** the desired length. The keyboard automatically defaults to the AccuDraw window and the proper field will be active. **<D>** to place the end of the second segment.

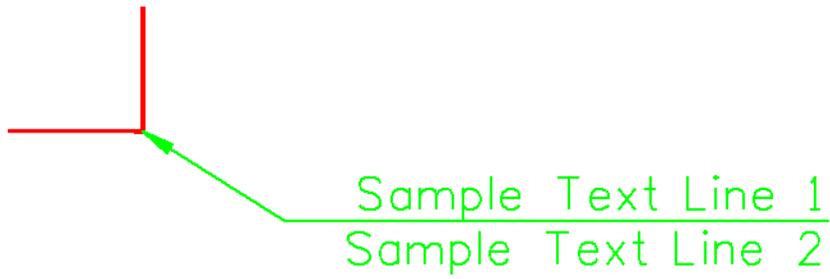


Note: Placing the cursor on the AccuDraw compass point “locks” in the angle of the line. Also, the second segment of the leader can be placed dynamically if desired.

9. Move the cursor on to the leader segment that was just drawn and **<R>**. This action will place the text on the leader line.



10. The finished note is shown in the illustration below.

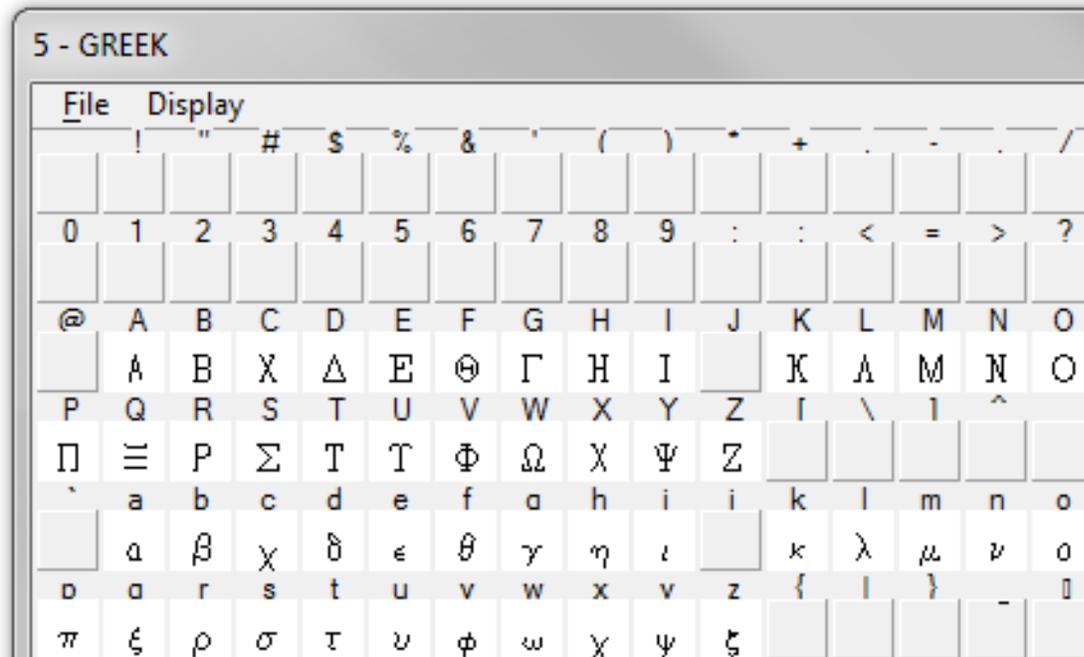


Workflow MS 19 - Greek Characters

This document guides you through placing Greek characters using the MicroStation **Text Editor**. Greek characters can be placed within the typed text string using this procedure.

Available Characters

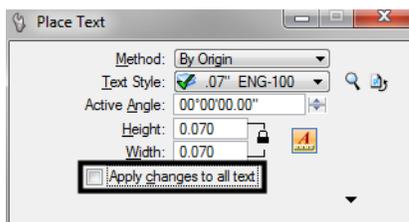
The following is a list of available characters in the **GREEK font (Font 5)**.



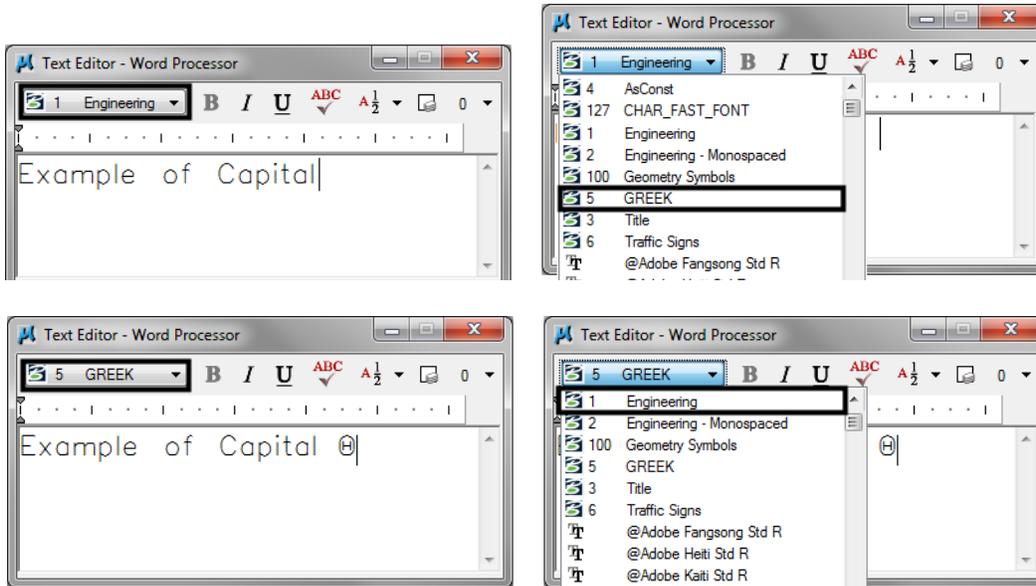
Note: This Graphic shows what Keyboard Characters will produce the desired Greek Character. The Keyboard characters will show up in the **Text Editor** Dialog Box when placing and editing these characters. The actual Greek Character will show up in MicroStation and print.

Placing Text with Greek Characters

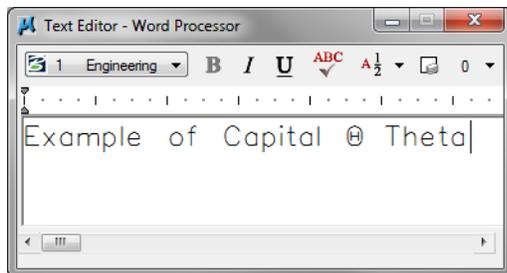
1. Before entering text into the Word Processor, uncheck the **Apply Changes To All Text** check box.



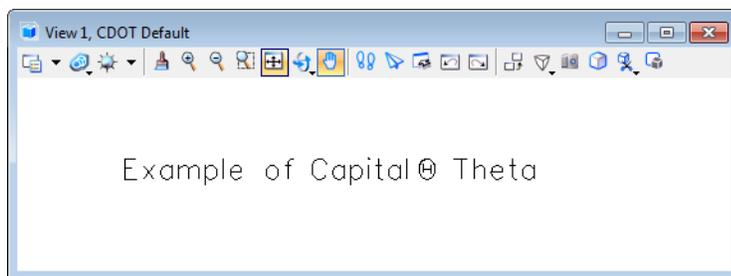
- When placing text using the MicroStation **Word Processor**, select **Font 5 (GREEK)** from the drop-down list as shown below, and type the appropriate character from above into the Word Processor. Switch back to the original font to continue typing text.



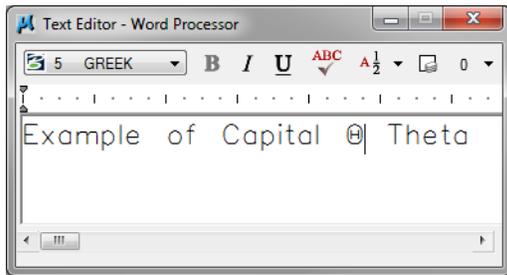
Note: The F is automatically changed to the Theta symbol in the Word Processor.



- Example of text placed in MicroStation.



4. Example of text being edited with MicroStation **Text Editor**



Note: The keyboard character does not display in the editor, the actual Greek Character does.

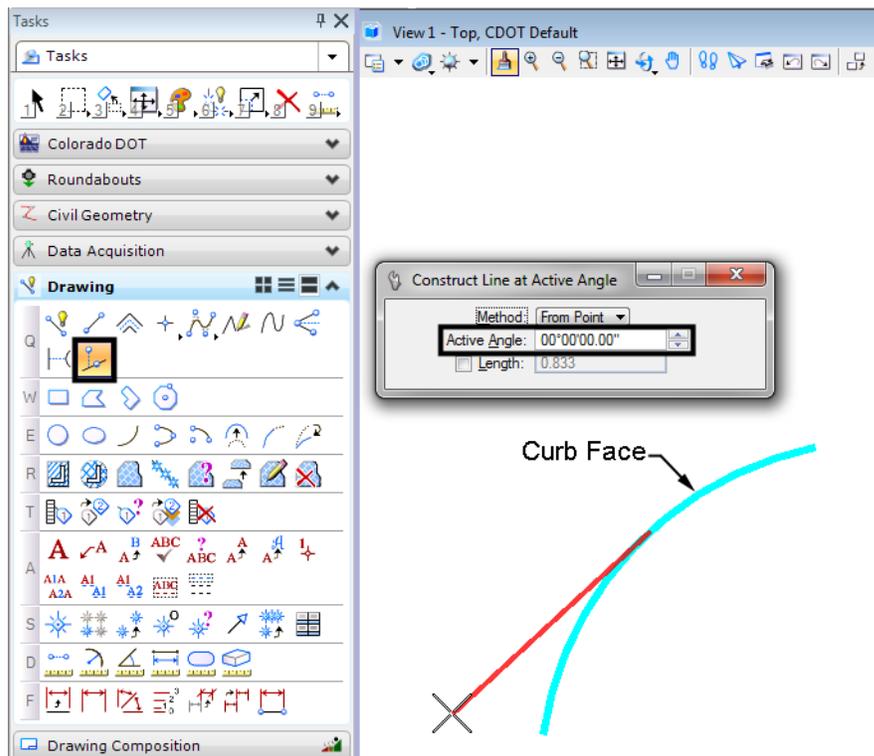
Workflow MS 20 - Using Curb Ramp Cells

This document guides you through the use of the pedestrian curb ramp cells. These are dynamic cells that can be modified “on the fly” using predefined parameter sets and user input.

The pedestrian curb ramp cells are designed to be placed at a 90° angle to the curb. The steps below describe the method used to set the Active Angle for the ramp.

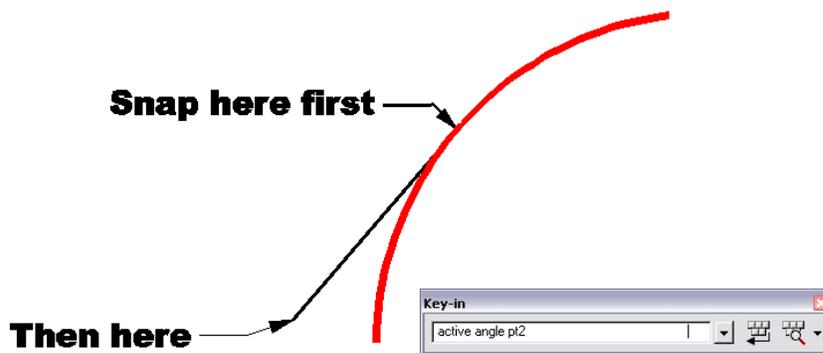
Preparation

1. Zoom in around the area on the curb where the ramp is to go. Select the **Construct Line At Active Angle** command from **Tasks > Drawing > Linear**.
2. Set the **Active Angle** to **0°**.
3. **<D>** on the curb face where the center of the ramp is to be located and extend the line in a direction tangent to the back of the ramp at the center.



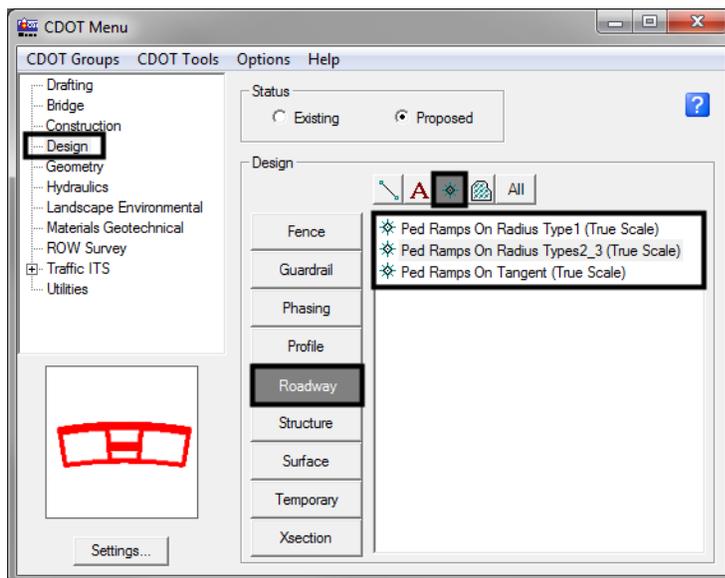
4. In the **MicroStation Key-In** window, type **active angle pt2** and press the **Enter** key. This is used to set the active angle to that of the line that was just drawn.

5. **<T>** to the end of the line on the curb face and **<D>**. Then, **<T>** to the other end of the line and **<D>**. The Active angle is now set to the angle of the line.

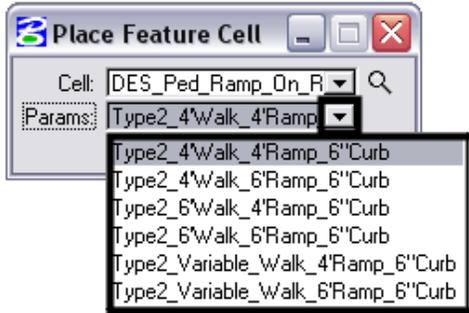


Placing A pedestrian Curb Ramp Cell

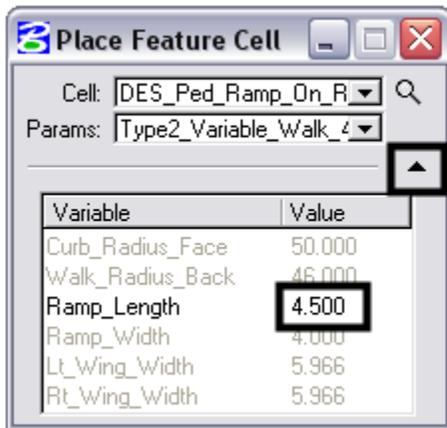
1. **<D>** Design from the *CDOT Menu explorer*.
2. **<D>** the Roadway category.
3. **<D>** the Cell filter.
4. **<D>** the desired pedestrian curb ramp cell from the list.



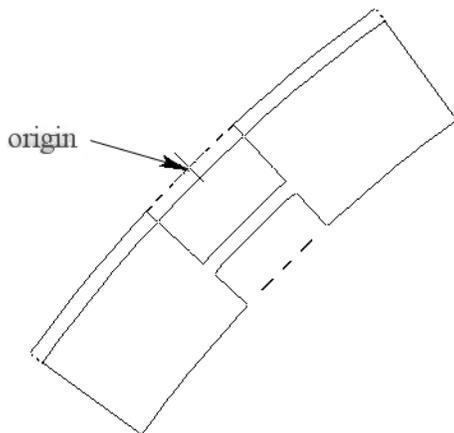
5. Select the desired parameter set from the **Params** drop-down list.



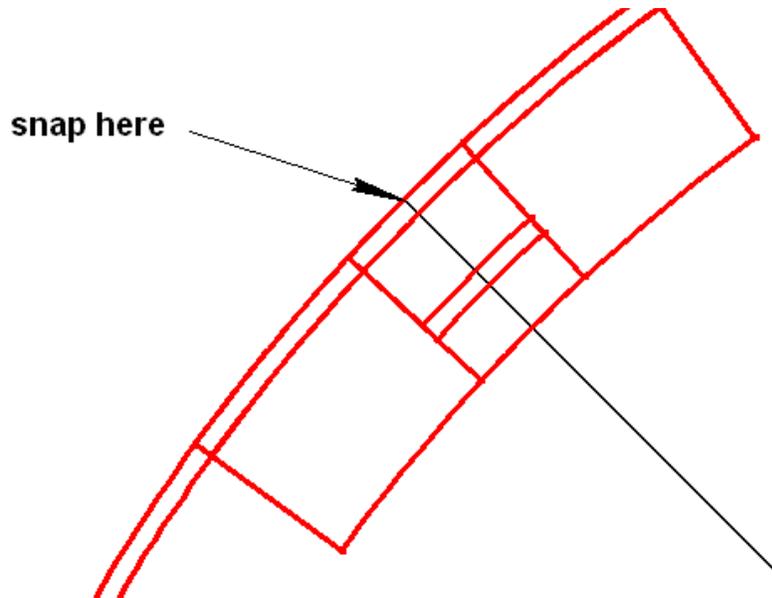
6. Some parameter sets have options for user defined values for some variables. These will typically have “variable” in the name. To modify a variable, select the expand icon in the lower right corner of the tool settings box.
7. In the list, locate the variable to be changed (grayed out settings can not be changed). Highlight the desired variable then **<R>** in the **Value field** and **key in** the desired number. Press the **Enter** key to accept the key in.



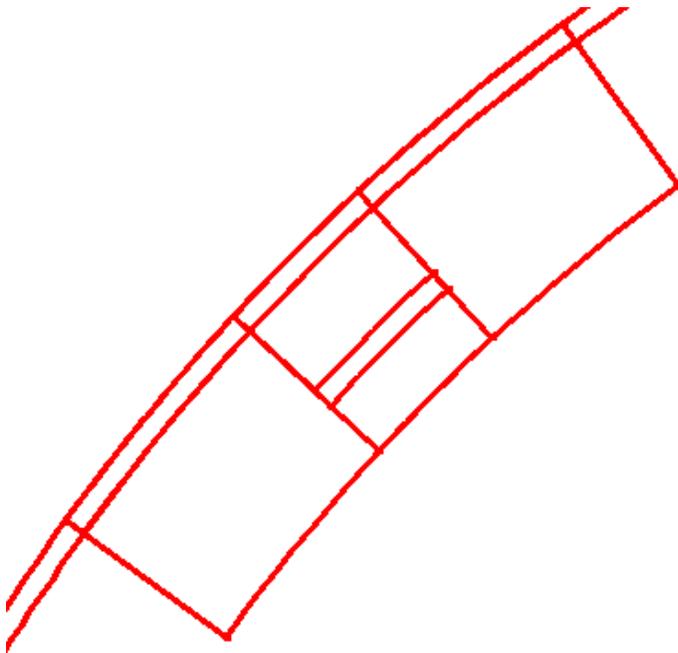
8. The cell is now ready for placement. The origin of the cell is at the curb face in the center of the ramp.



9. Follow the steps above to select a cell. Once the cell is selected and set up (if it has an undefined variable), **<T>** to the line at the curb face and **<D>** to place the cell.



10. Finally, **Delete** the construction line.



Workflow MS 21 - Using AutoTurn

This document guides you through the use of the AutoTrack software. AutoTrack is used to determine the space required to maneuver vehicles.

Workflow Outline

Opening AutoTurn - AutoTurn runs within MicroStation. Once MicroStation is running, AutoTurn can be launched.

- ◆ **Commands Used: CDOT Menu > Tools >AutoTURN** - Used to launch the AutoTURN program.

Setting up AutoTURN - Before a path can be laid out, there are a number of settings that should be made.

- ◆ **Selecting a Vehicle** - The first step in defining a vehicle path is selecting the vehicle to be used.
 - **Commands Used: Vehicles icon** - Used to open the Select Current Vehicle dialog box.
 - **Group Vehicles by** - Used to arrange the vehicles in the list.
 - **Select Vehicle** - Used to identify the vehicle to be used.
- ◆ **Drawing Settings** - These control things like units of measure and steering angles.
 - **Commands Used: Program Settings** - Used to launch the AutoTURN program.

Creating a Path - This is what the vehicle will follow to generate the turning data. There are a number of methods available for creating a path.

- ◆ **Generate Arc Path, Generate Corner Path, and Generate Oversteer Corner Path** - Each of these methods uses input into Smartpath Tools dialog box and user defined start and stop locations to define the vehicle path.
 - **Commands Used: Generate Arc Path** - Use to follow a bend in the road.
 - **Generate Corner Path** - Used when turning a corner from one road to another.
 - **Generate Oversteer Corner Path** - Used when large vehicles are turning a corner from one road to another.
- ◆ **Steer a Path** - This option tracks the cursor's motion to define the vehicle's path.
 - **Commands Used: Steer a Path** - Use to create an interactive path.

Modifying a Path - Once a path has been completed, modifications to that path can be made with a number of tools.

- ◆ **Commands Used: Restart Path** - Used to add additional segments to the path.
- ◆ **Delete Last Section** - Used to remove segments of the path.
- ◆ **Path Control** - Used to modify an existing segment.

Creating a Path from MicroStation Graphics - With this option the vehicle's path is drawn in advance, using MicroStation drawing commands. These elements are then identified as an AutoTURN path.

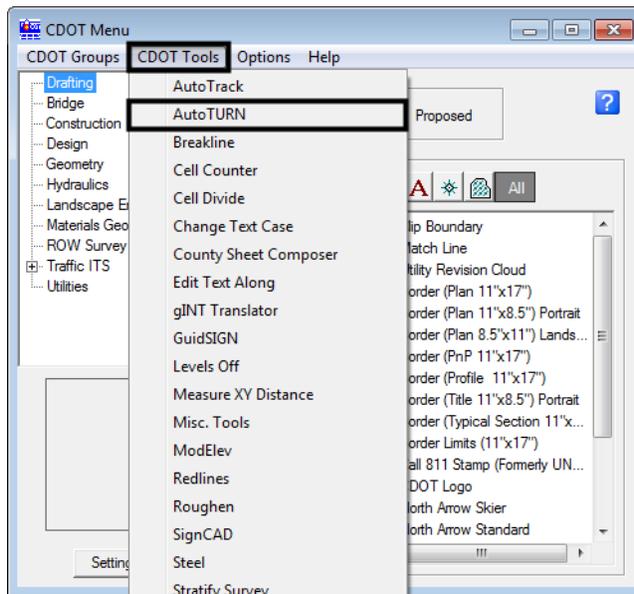
- ◆ **Commands Used: Select Active Path** - Used to identify the MicroStation elements to be used for the path.
- ◆ **Place Simulation** - Used to place a vehicle on the path.
- ◆ **Place Offset Simulation** - Used to create a parallel path offset to the left or right of the MicroStation elements.

Placing and Deleting Vehicles - Vehicle cells can be placed on the path without creating all of the envelope data. This can be used to check clearances at critical locations for example. Vehicle cells placed in this manner can also be deleted.

- ◆ Commands Used: **Select Active Path** - Used to identify the path
- ◆ **Place Vehicle** - Used to put a vehicle cell on a path.
- ◆ **Delete Vehicle** - Used to remove a vehicle cell from the path.

Opening AutoTURN

1. From the CDOT Menu, select **CDOT Tools > AutoTURN**.



2. The **AutoTURN** toolbar will also displayed along with the **Welcome to AutoTURN** wizard.



Setting Up AutoTURN

There are a number of settings that control the behavior of AutoTURN. These settings include: vehicle type, drawing units, display options, and vehicle defaults.

Selecting a Vehicle

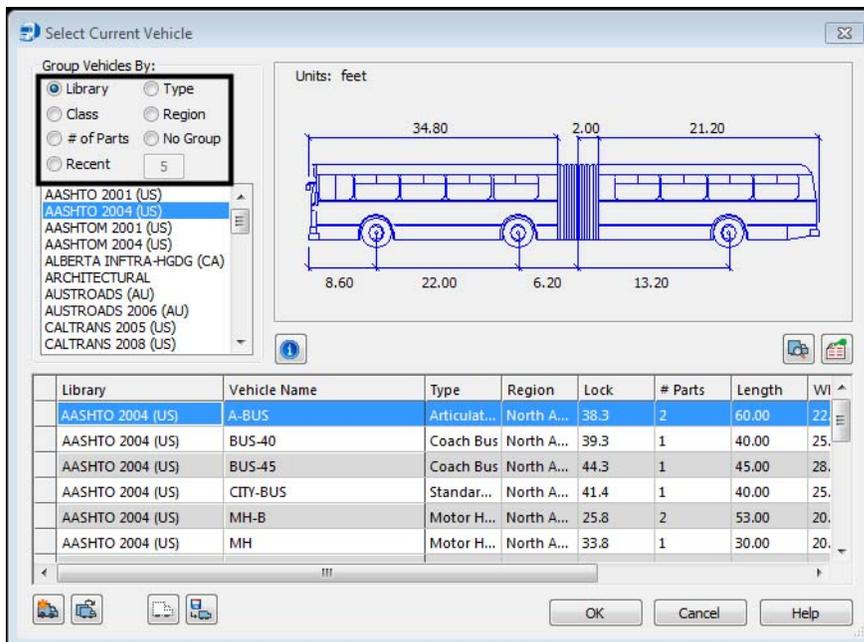
1. <D> the **Vehicles** button from the toolbar or the wizard to display the **Select Current Vehicle** dialog box.



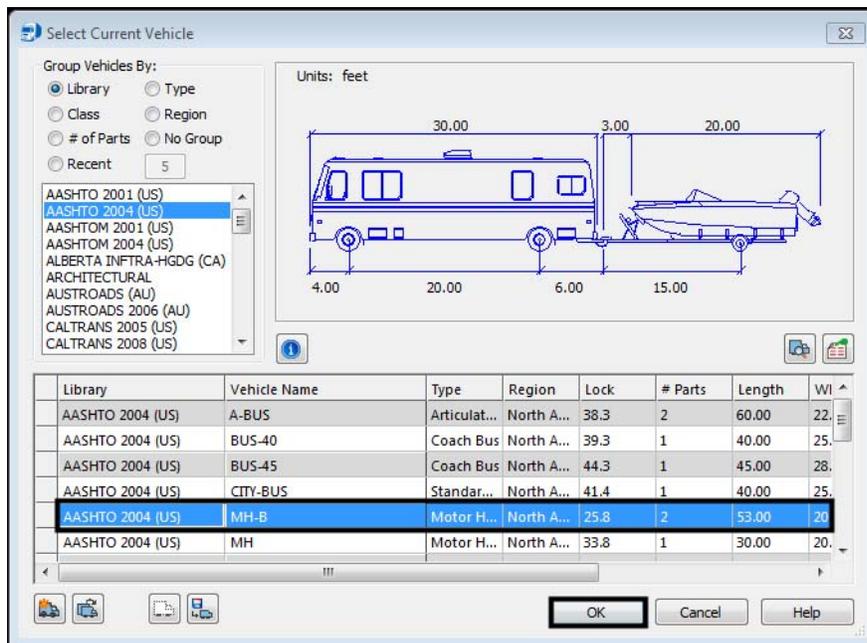
The vehicles in the library can be sorted by *Library*, *Class*, *number of parts*, *Recent selections*, *Style*, *Region*, or *No Group*.

Note: All options except Library show vehicles from all of the other libraries.

2. <D> one of the seven buttons to choose a sorting method.



- To select a vehicle, highlight the name from the list box at the bottom, and **<D> OK**. The **Select Current Vehicle** dialog box will be dismissed.



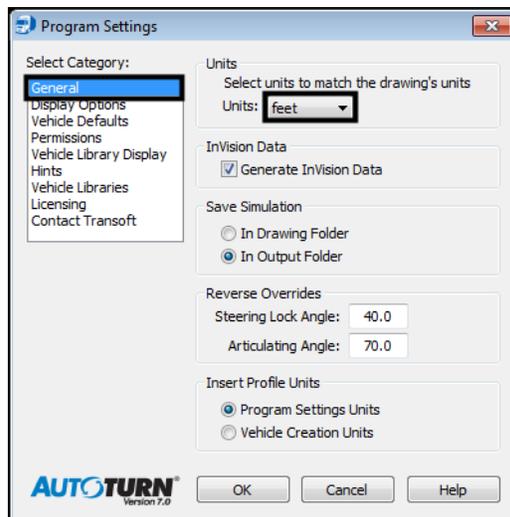
Drawing Settings

The remaining settings mentioned above are controlled through the **Program Settings** dialog box.

- <D>** the **AutoTURN Program Settings** button from the toolbar to display the **Program Settings** dialog box.



2. Select the **General** category to set the **Units**. This should be set to the **Master Units** used in the MicroStation dgn file. **Feet** is equivalent to **Survey Feet** for this purpose.



Creating a Path

Once the desired settings have been made, a path can be created for the vehicle to use. There are five commands that are used to create a path: Generate Arc Path, Generate Corner Path, Oversteer Corner Path, Steer a Path, and Place Offset Simulation.

Creating a Path with Generate Arc Path, Generate Corner Path, or Oversteer Corner Path

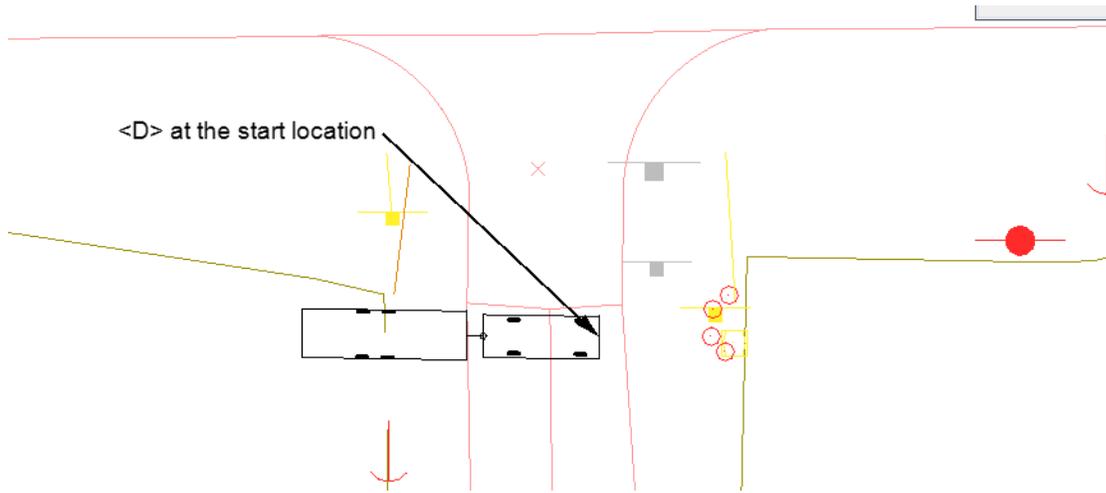
1. Zoom in on the area where the path is to begin.
2. Select one of the three **Generate Path** icons.



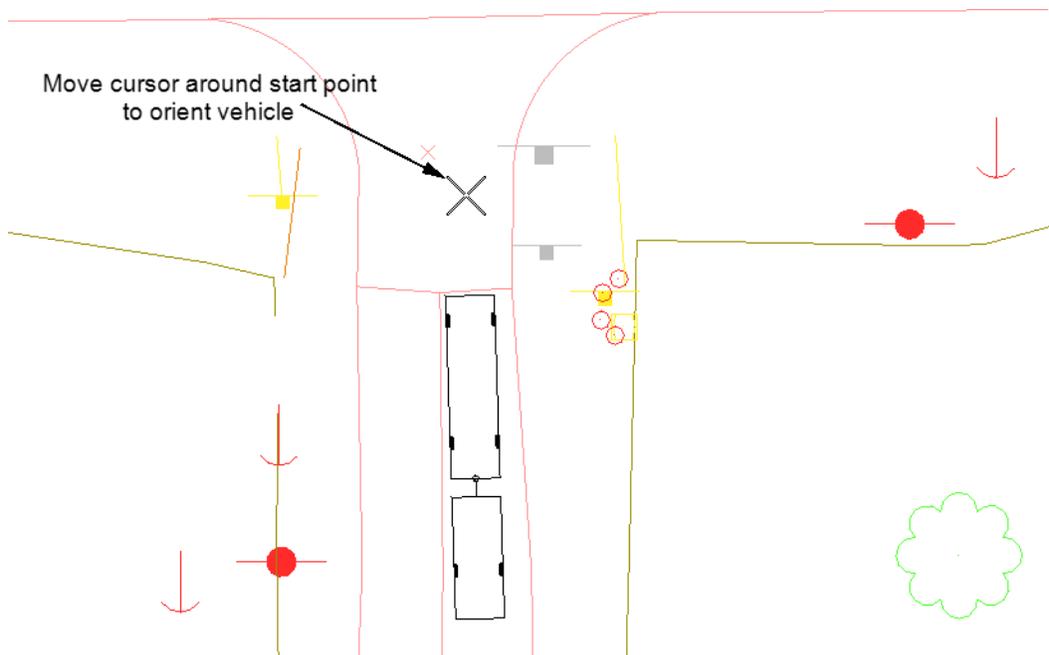
A cell of the vehicle is attached to the cursor.

Note: If you cannot see the vehicle, left click twice in the view in the area where you would like to place the vehicle. This will place the vehicle. Do a Fit View this will make the vehicle visible. Zoom in on the vehicle, delete the cell, and reinitiate the command.

3. Move the cursor to the desired start point and **<D>** to identify the vehicle's starting location.



4. The vehicle cell will pivot around the selected location. Rotate the cell to the desired orientation and **<D>**.

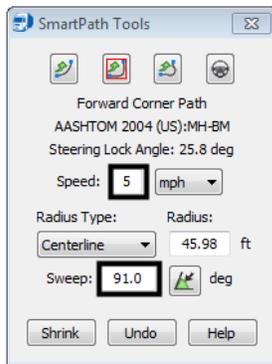


5. If desired, the **SmartPath Tools** dialog box can be used to set the angle. To use this option, key in the desired angle in the **Vehicle Starting Angle** field, then **<D>** the **Apply** button. Be aware that the angle is based on the MicroStation compass, with 0.00 facing right.

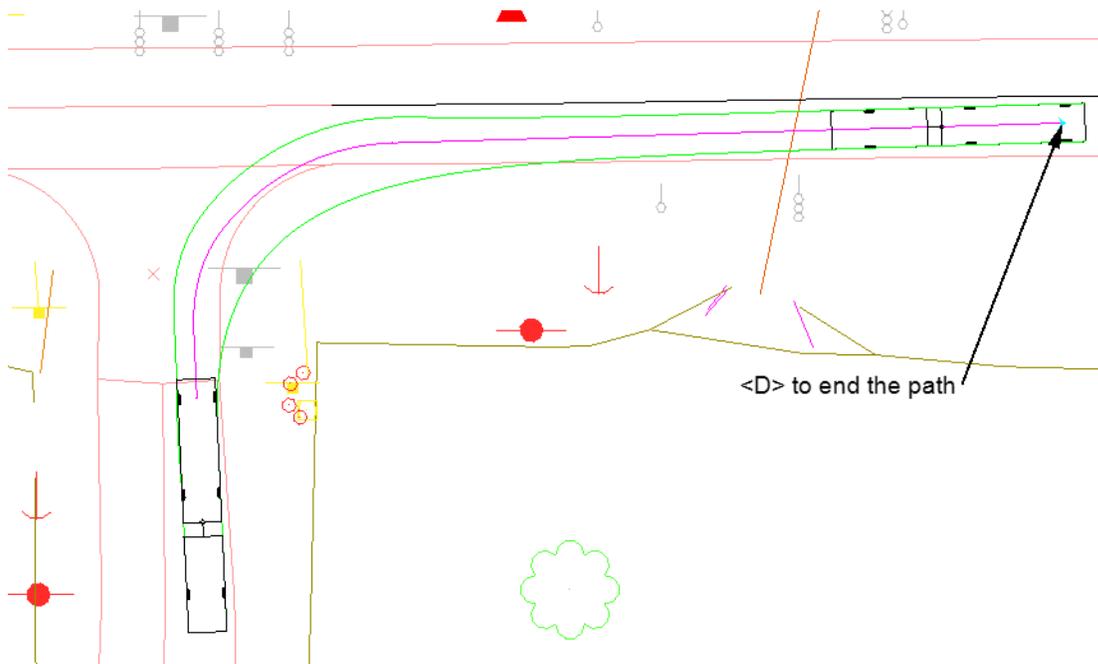


Once the starting angle is defined, the first leg of the path can be defined.

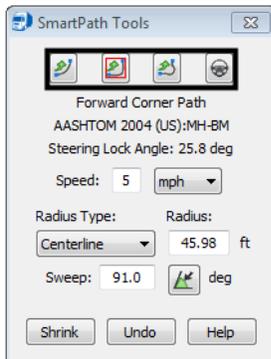
6. Set the desired **Speed** in the **SmartPath Tools** dialog box.
7. Set the **Sweep** in the **SmartPath Tools** dialog box.



8. To identify the end of the first leg <D> at the desired location.



- If additional legs for the vehicle path are required, the type of path is selected from the SmartPath Tools dialog box. The second leg is extended from the end of the first.



- <R>** to end the Path.

Creating a Path with Steer a Path

The Steer a Path command tracks the cursor location to define the vehicle path. To create a path using this option:

- Zoom in on the area where the path is to begin.
- Select the **Steer a Path** icon.



A cell of the vehicle is attached to the cursor.

- Move the cursor to the desired start point and **<D>** to identify the vehicle's starting location.
- The vehicle cell will pivot around the selected location. Rotate the cell to the desired orientation and **<D>**. If desired, the **SmartPath Tools** dialog box can be used to set the angle. To use this option, key in the desired angle in the **Vehicle Starting Angle** field, then **<D>** the **Apply** button. Be aware that the angle is based on the MicroStation compass, with 0.00 facing right.
- Move the cursor along the desired path and the vehicle will follow.

Note: The vehicle moves toward the location of the cursor only while the cursor is in motion.

Note: It can be helpful to toggle off AccuSnap while using the Steer a Path command.
- <D>** to stop the vehicle and display the vehicle envelope.
- <D>** again to restart the vehicle along the path.
- To end the path, **<D>** then **<R>**.

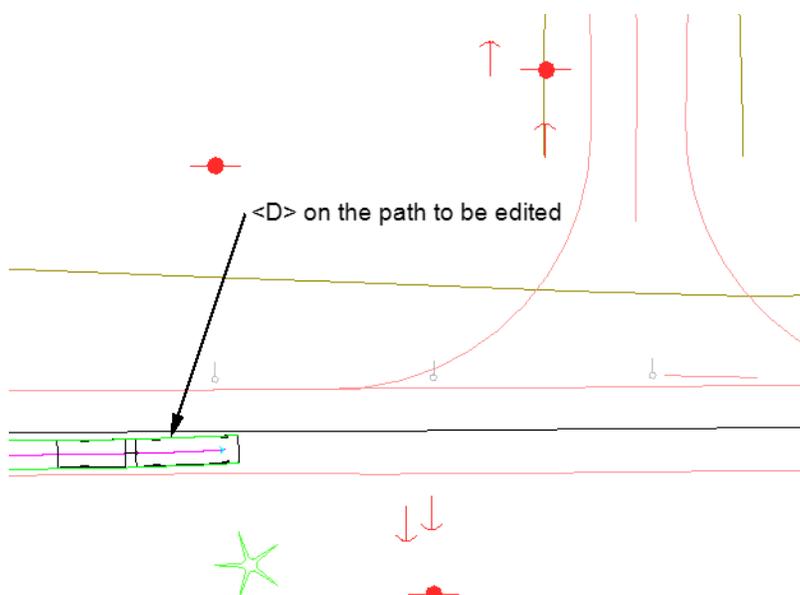
Restarting a Path

To add to a completed path:

1. <D> the **Continue Simulation** button on the **AutoTURN** toolbar.



2. <D> on the vehicle at the end of the desired path. The additional leg will use the last selected mode. A different mode can be selected from the **SmartPath** Tools dialog box. Additional legs are added in the same manner described above.



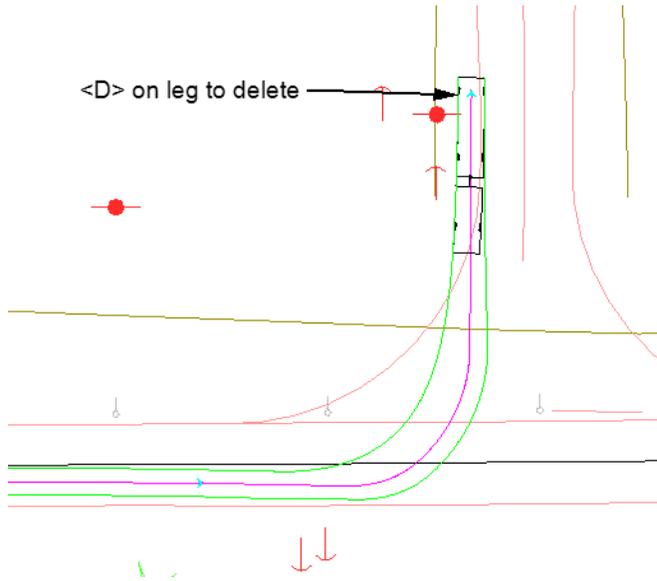
Deleting the Leg of a Path

To delete the last leg of a path:

1. <D> the **Delete Last Section** button on the **AutoTURN** toolbar.



2. **<D>** on the vehicle cell at the end of the desired path. The last leg of the path is removed.



Modifying a Path

Minor changes can be made to Arc, Corner, and Oversteer Corner path legs. To make a change in one of these legs:

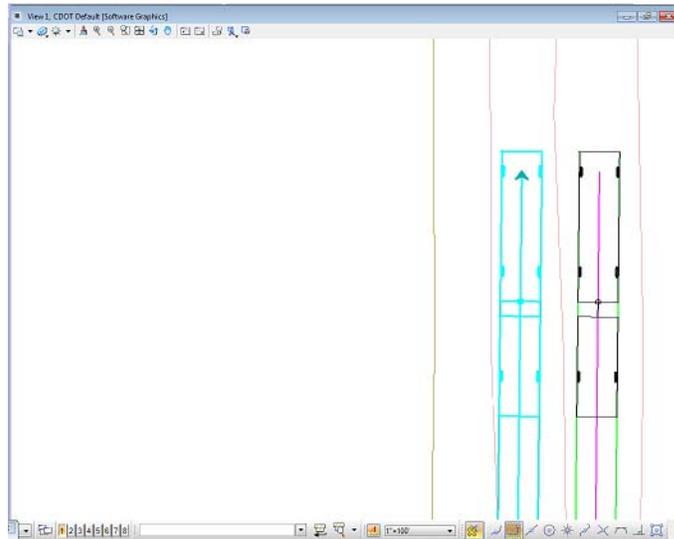
1. **<D>** the **Path Control** button on the **AutoTURN** toolbar.



2. **<D>** on an element that makes up the path to be edited. This can be the vehicle cell or one of the lines that make up the envelope.



3. **<D> and hold** on a circle in the path, then move the circle to the desired location.



4. Release the button in the desired location, then **<R>** to exit the command.

Creating A Path To Follow A Graphic Element

There are two methods of creating an AutoTURN path that follows a MicroStation graphic element or elements. One method identifies the element as an AutoTURN path then applies a vehicle to that path. The second method works similarly, but allows the user to apply an offset from the selected element.

1. Select the desired vehicle as described above.
2. **<D> Select Active Path** from the **AutoTURN** toolbar.



3. **<D>** on the element(s) that describe the path, then **<D>** to accept. The path is indicated with a circle at the beginning and an arrowhead at the end.

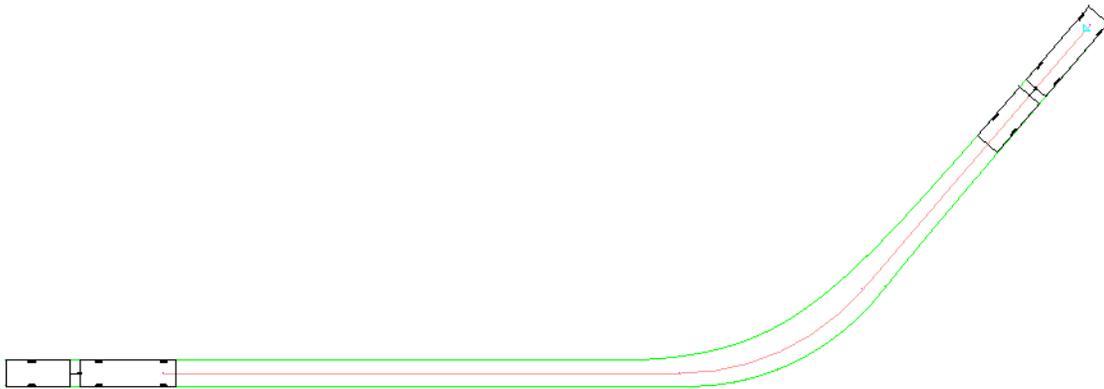


Note: If the element selected is a complex chain, **<D>** the element near the starting end for the path. If the path is a series of individual elements, identify the elements in order, from the beginning of the path.

4. **<D> Place Simulation** from the **AutoTURN** toolbar.



The vehicle and envelope are placed on the path.

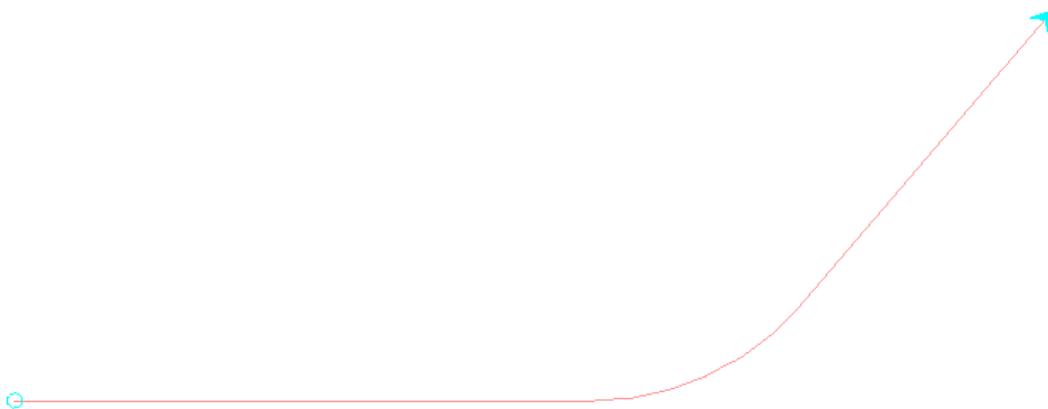


Place Offset Simulation

1. <D> **Place Offset Simulation** from the *AutoTURN* toolbar.



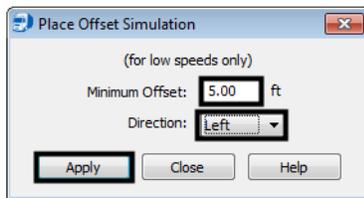
2. <D> the element(s) that describe the path, then <D> to accept. The path is indicated with a circle at the beginning and an arrowhead at the end.



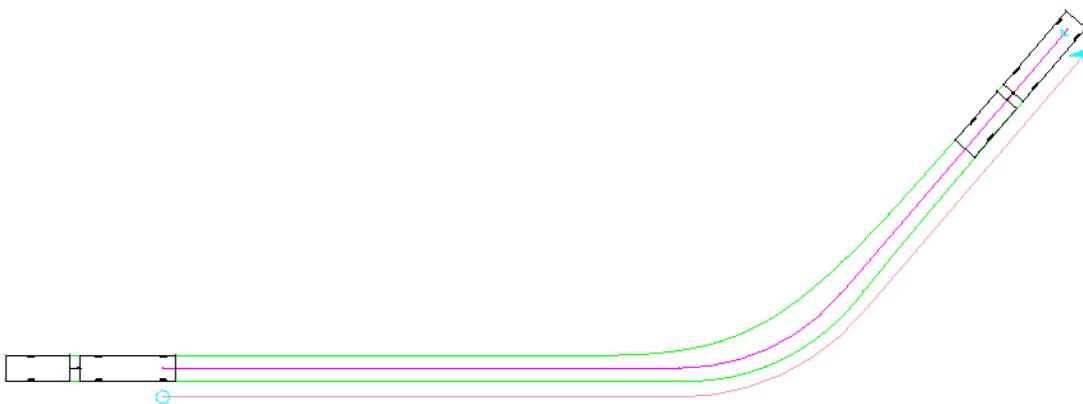
Note: If the element selected is a complex chain, <D> the element near the starting end for the path. If the path is a series of individual elements, identify the elements in order, from the beginning of the path.

3. The **Place Offset Simulation** dialog box is displayed. In the **Place Offset Simulation** dialog box, key in the desired offset value in the **Minimum Offsets** field. This is the distance from the path to the near edge of the envelope.

- Use the **Direction** drop down menu to identify which side of the path the offset is applied to.
- <D> the **Apply** button.



The vehicle and envelope are placed in the drawing.



Placing and Deleting Vehicles

Vehicles may be placed along a path without generating the envelope. Vehicles placed in this manner can also be deleted.

Place Vehicle

- Select the desired vehicle as described above.

Note: If there is an existing simulation on the desired path, the vehicle cell used in that simulation will be used by this command.

- <D> **Select Active Path** from the **AutoTURN** toolbar.

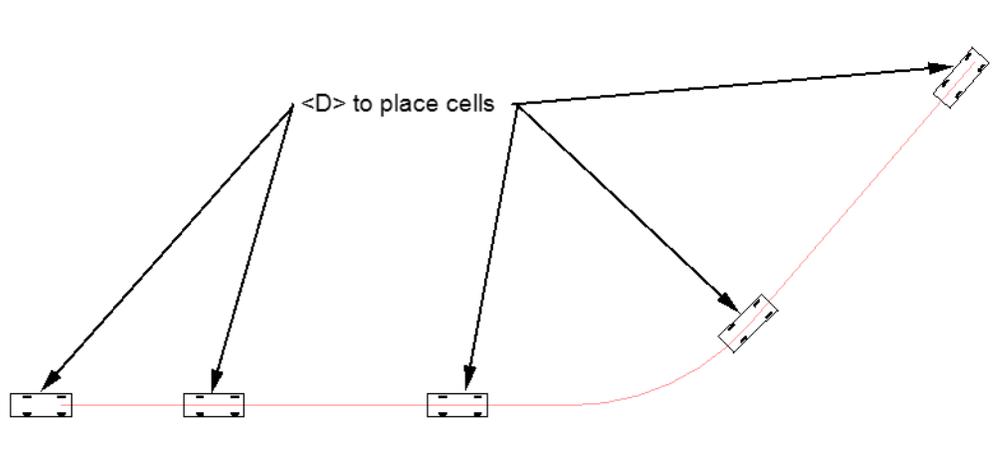


- <D> the element(s) that describe the path. The <D> to accept.

4. **<D> Place Vehicle** from the *AutoTURN* toolbar.



5. The Vehicle cell is shown on the path. The cell is moved along the path by moving the mouse.
6. **<D>** in the desired location to permanently place the cell in that location. Additional vehicle cells can be placed in this manner.
7. **<R>** to exit the command.



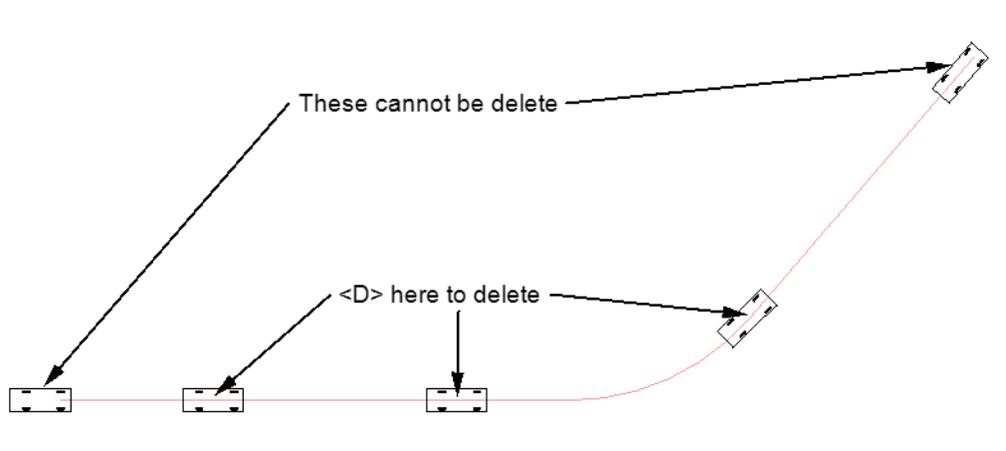
Delete Vehicle

Vehicle cells displayed using the Place Vehicle command can be removed from the path using the Delete Vehicle command.

1. **<D> Delete Vehicle** from the *AutoTURN* toolbar.



2. <D> inside the vehicle cell to be removed.



Note: Cells placed at the beginning, the end, or at a direction change (from forward to reverse, for example) cannot be deleted.

Workflow MS 22 - Basic Rendering Techniques

This document guides you through the use of the MicroStation rendering tools. In this example, a roadway design project is rendered so that images can be created that are suitable for exhibits at a public meeting. These images give the general public a better idea of what the finished project will look like. This workflow uses both MicroStation and InRoads data, as well as aerial photos and other raster images.

When creating a rendering of a project, the existing surface outside of the construction area should be rendered along with the design surfaces. Because the design surface may be below the existing ground in some locations, the existing surface should be removed in the area of the project.

Once the surfaces are modified, the surface data is displayed in the drawing and materials are applied to give the surfaces a more natural appearance. Then, to enhance the appearance of the model, 3 dimensional cells that represent a variety of landscape and other features.

Workflow Outline

The following outline describes the steps needed to complete a rendered drawing along with a brief explanation of what each step does.

Modifying the Existing Ground - The first section describes how to create a modified existing ground surface that can be modified for the rendering.

- ◆ **Copy the Existing Ground DTM** - This workflow requires the existing ground surface to be modified. So that the surveyed dtm is not altered (which could adversely affect the design) a copy of the existing ground is made.
 - Command Used: **Copy Surface**.
- ◆ **Clip Out the Area Of the Design Ground** - Parts of the design surface may lie underneath the existing ground. These areas will not be visible in the rendering if the existing ground triangles are left intact. The design surface's perimeter is used to define an untriangulated area within the existing ground surface, thus exposing the entire design surface.
 - Commands Used: **View Perimeter** - Used to display the surface design perimeter.
 - **Import Surface From Graphics** - Used to incorporate the design perimeter into the existing ground surface and an Interior breakline.
 - **Triangulate Surface** - Used to recalculate the triangles of the existing ground surface so that triangles within the design perimeter are excluded.

Assigning Material to the Existing Ground - By themselves, rendered triangles look rather plain. by applying a natural looking material or an aerial photo to the triangles a more visually appealing appearance can be achieved. In this example an aerial photo is used.

- Commands Used - **View Triangles** - Used to display the triangles of the modified existing ground surface.
- **Raster Manager** - Used to attach the photo to the dgn file.
- **Assign Material** - Used to drape the aerial photo over the modified existing ground triangles.

Assigning Material to the Design Surface - There are a wide variety of materials that can be used to render a drawing. There are options that allow you to assign different materials to parts of your design model. For the majority of the design model surface components can be displayed and rendered. However, because of the way that side slope components are built in InRoads, these areas are better suited to having the triangles rendered.

- ◆ **Creating Side Slope Surfaces** - The components for cut and fill are not suitable for rendering because the components are not created in areas where the slope changes. (This does not affect volume calculations because the surface is still triangulated in these areas). Therefore a separate surface for these areas is created.
 - Commands Used: **View Features** - Used to display the POSS, Top of Cut, and Toe of Fill features that will be used to create the side slope surfaces.
 - **Place Smartline** - Used to connect the toe of slope features to the POSS feature. This defines the boundary for the new surface
 - **Create Complex Shape** - Used to create a single closed shape element from the toe of slope features to the POSS features. This will be used as the data and exterior boundary for the side slope surface.
 - **Import Surface From Graphics** - Used to create the new side slope surface and to add the data to it.
- ◆ **Displaying the Design Components and Surfaces** - The design components and side slope surfaces are displayed so that materials can be assigned to their levels.
 - Commands Used: **View Surface Components** - Used to display the surfacing and Z-Slope components.
 - **View Triangles** - Used to display the side slope surfaces. Remember to use a different preference than was used for displaying the existing ground triangles.
- ◆ **Assigning Material to the Design Surface** - This is done to make the rendered components and surfaces appear more lifelike.
 - Commands Used: **Assign Material** - Used to apply different materials to the components and side slope surfaces.

Adding Additional Details - Items other than the surfaces can be added to the rendering in order to better illustrate the impact of the proposed design.

- ◆ **3D Cells** - These are like other MicroStation cells except they are as 3 dimensional elements that can be rendered. An assortment of 3D cells is available from the landscape3d.cel library, delivered with MicroStation. Others can be found on-line.
 - Commands Used: **Attach Cell Library** - Used to make the cells in the library file available for placement in the drawing.
 - **3D Warehouse Import Model** - Used to obtain additional 3d cells from the internet.
 - **Place Cell** - Used to place the cell into the dgn file.
- ◆ **Using A Background Image** - A background image is used to replace whitespace with a more realistic looking image.
 - Command Used: **Design File Settings > Views** - Used to identify the raster image to be used for the background.
- ◆ **Lighting Adjustments** - These are used to make the rendering more visually appealing by adjusting brightness, lighting direction, and the definition of shadows. All of these adjustments are made in the Lighting Manager.
 - Commands Used: **Lighting Manager - Brightness** - Used to adjust the overall lighting for the rendering.
 - **Lighting Manager - Ambient** - Used to adjust the environmental lighting for the rendering. It is used to reduce the harshness of shadows.

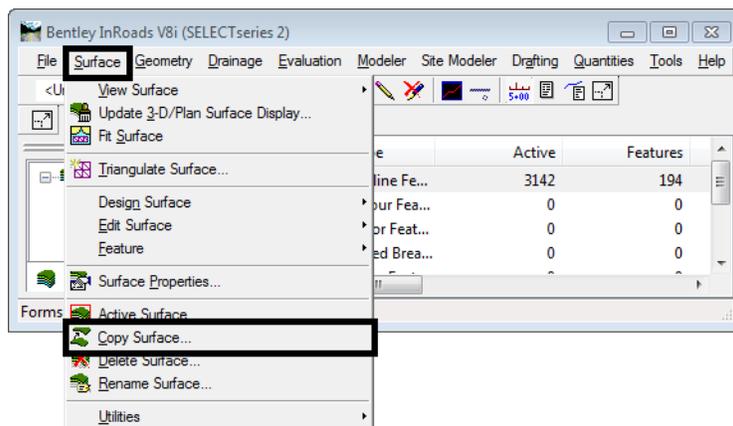
- **Lighting Manager - Solar** - Used to adjust the direction from which the light comes.

Modifying the Existing Ground

Copy the Existing Ground DTM

The first step in the rendering process is to clip out the existing ground in the area of the project. For this, a copy of the existing ground surface is made. Then the perimeter of the design surface is imported into this copy as an Interior Breakline. This will insure a seamless edge between the existing and design surfaces.

1. Open MicroStation and InRoads.
2. Load the appropriate InRoads data files. DTM the .alg file are required. (The .alg file is required below to display the design components.)
3. From the InRoads main menu, select **Surface > Copy Surface**.

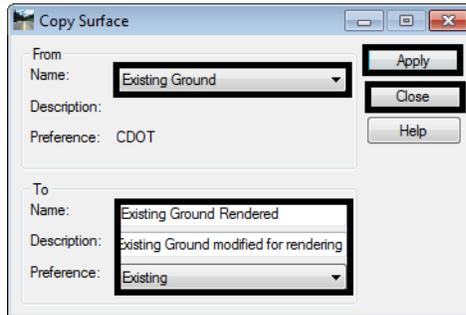


4. In the **Copy Surface** dialog box, verify that the existing ground surface is selected for the **Name** field in the **From** area.
5. In the **Name** field of the **To** area, key in the desired name. Existing Ground Rendered is used in this example.
6. In the **Description** field, key in the desired description.
7. Using the drop down menu, select the desired **Preference** for the surface.

Note: Be sure to make the name and description for this copy unique and specific to its use so that it isn't confused with the original existing ground surface when doing design work on the project.

8. <D> the **Apply** button. This writes the copy to memory and displays the surface in the InRoads Explorer.

9. **<D> Close** to dismiss the **Copy Surface** dialog box.

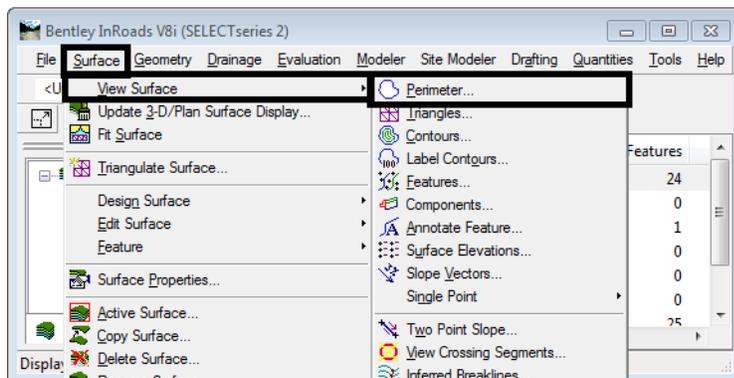


Note: You can close the original existing ground file if desired, to avoid accidentally modifying the wrong surface.

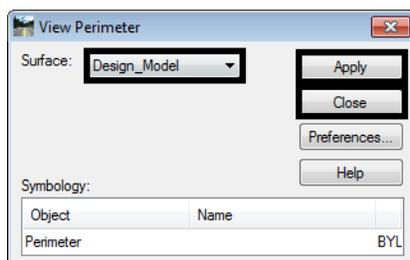
Clip Out the Area Of the Design Ground

Now that there is a working copy of the existing ground, it can be modified to exclude data within the limits of the design surface. The perimeter of the design surface is used to define the clipping area.

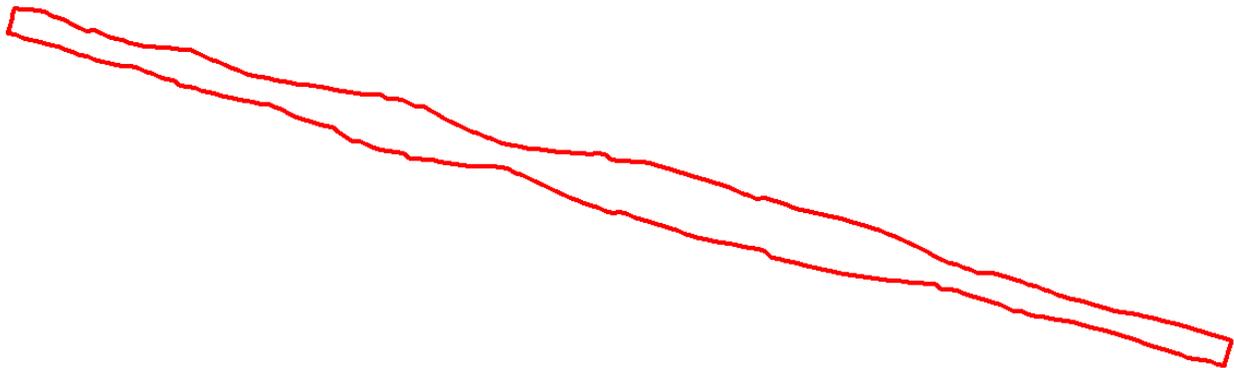
1. Set the **Design Surface** active. In this workflow Design_Model is used as the design surface.
2. From the InRoads Main menu, select **Surface > View Surface > Perimeter**. This displays the **View Perimeter** dialog box.



3. Verify that the Design Surface is selected as the **Surface**.
4. **<D>** the **Apply** button. This displays the perimeter in the dgn file.
5. **<D> Close** to dismiss the **View Perimeter** dialog box.

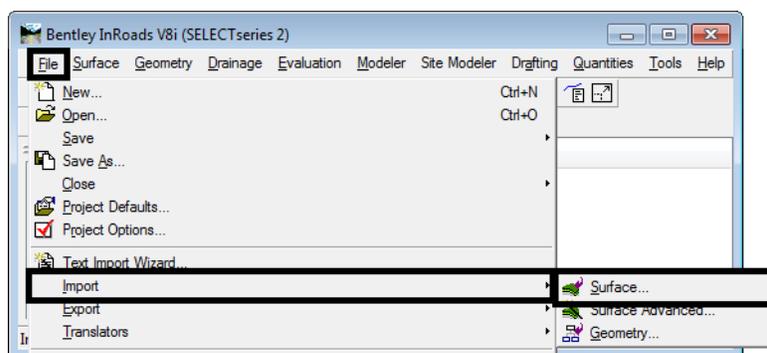


Below is an illustration of the results.



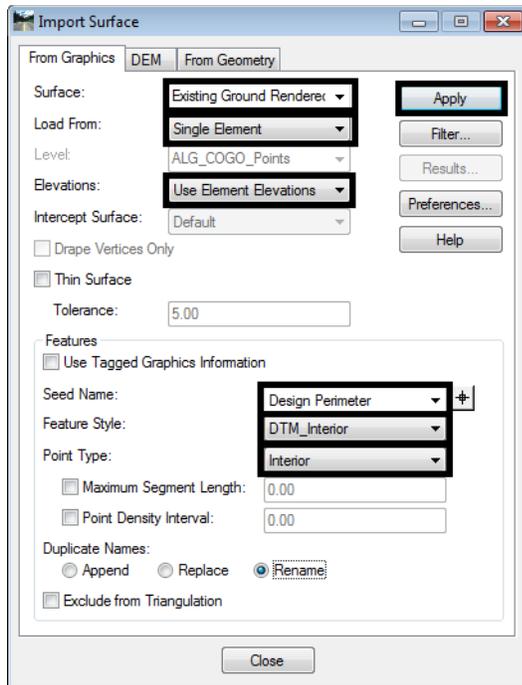
Next, the design surface's perimeter graphic is imported into the working existing ground dtm as an Interior breakline.

6. From the InRoads main menu, select **File > Import > Surface**. The *Import Surface* dialog box is displayed.



7. In the *Import Surface* dialog box, Set the **Surface to** the working existing ground dtm. (Existing Ground Rendered in this example)
8. Set **Load From** to **Single Element**.
9. Set **Elevations** to Use **Element Elevations**.
10. In the **Features** area, key in a **Seed Name**. In this example *Design Perimeter* is used. Use a name that describes what the feature represents. This will make it easier to identify the feature if it needs to be modified in the future.
11. Set the **Feature Style** to **DTM_Interior**. This matches the **Point Type** for the line being imported.
12. Set the **Point Type** to **Interior**. The Interior point type excludes data from being triangulated within the boundary of the feature. This will prevent existing ground data from covering over design data in cut areas.

13. <D> the **Apply** button then <D> on the design perimeter line. <D> again in a blank area of the view to accept the element.



14. <D> **Close** to dismiss the *Import Surface* dialog box.

The working existing ground surface now has the cutout for the design surface. It needs to be retriangulated and have the triangles displayed.

15. Delete the perimeter that is currently displayed in the view. When the MicroStation *Display Style* is changed to show shading, the perimeter will be displayed filled, which can obstruct the view of the other design data.

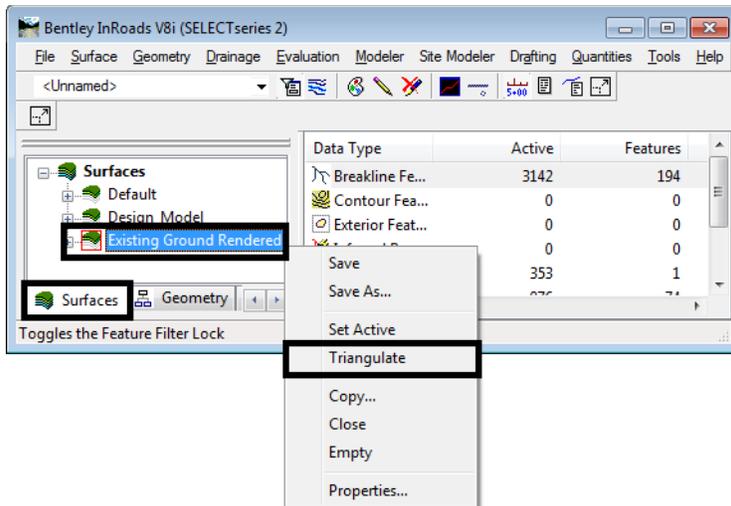
Applying Materials to the Surfaces

Materials are associated to levels and closed element on that level will take on that material. The process for assigning materials is the same for the existing ground surface as it is for the design surface. In this example, the existing ground surface uses an aerial photo as its material. For the Design surface, each component type will be assigned a different material from the available material libraries.

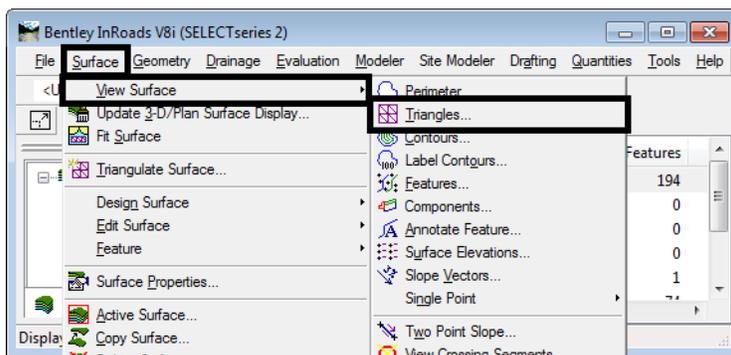
Assigning Material to the Existing Ground

1. In the InRoads Explorer pane, select the **Surfaces** tab.

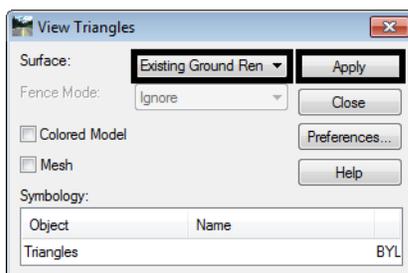
2. **<R>** on the working existing ground dtm and select **Triangulate** from the right click menu. This updates the triangles of the surface to incorporate design perimeter.



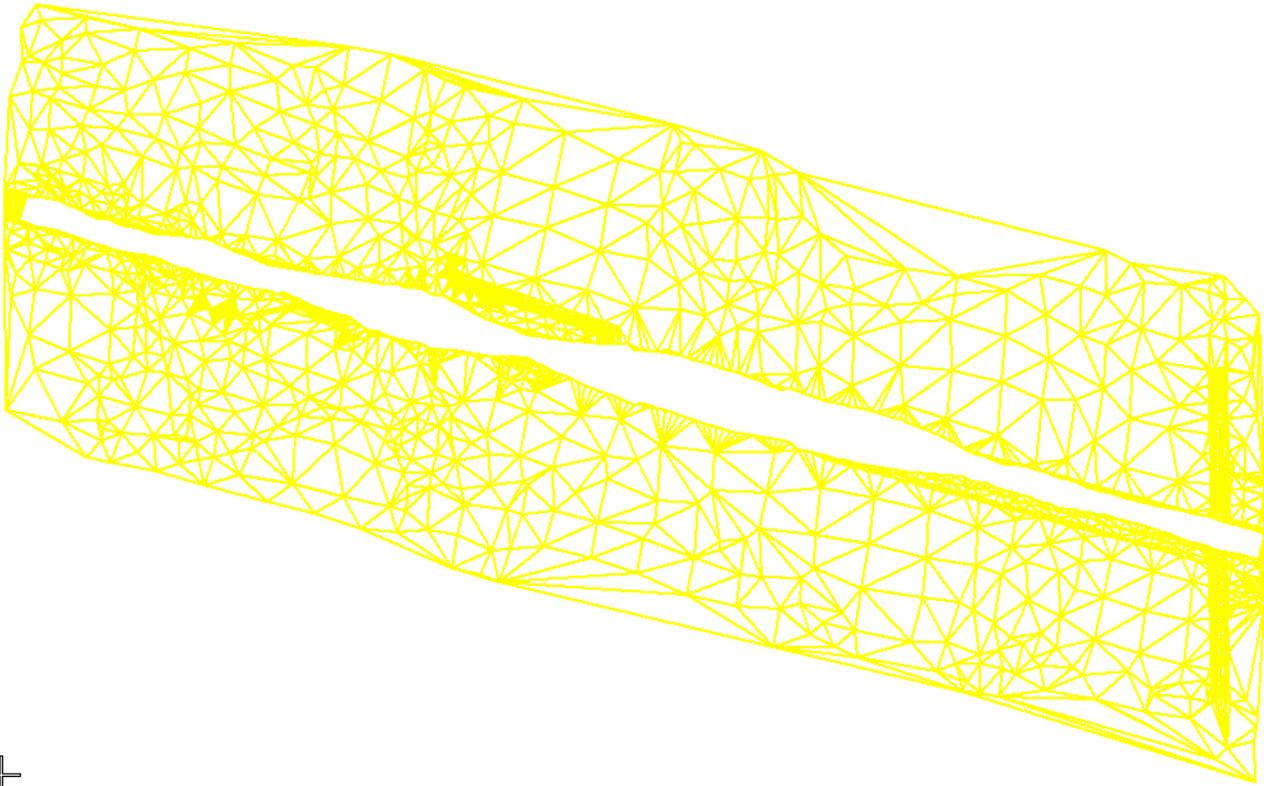
3. From the InRoads main menu, select **Surface > View Surface > Triangles**. This displays the **View Triangles** dialog box.



4. In the **View Triangles** dialog box, set the **Preference** to **Existing**.
5. Select the working existing ground dtm for the **Surface** and **<D>** the **Apply** button.



6. **<D> Close** to dismiss the **View Triangles** dialog box. Below is an illustration of the modified surface.



7. Follow the instructions in the CDOT Workflow Image Draping to apply the aerial photo to the existing ground surface. Other helpful workflows are: CDOT Workflow 5 - Raster Manager and CDOT Workflow 13 - Using Georeferenced Images in Raster Manager.

At the completion of the Image Draping workflow, the existing ground surface is shaded with the aerial photo. Notice that the area of the design surface is not shaded with the aerial photo.



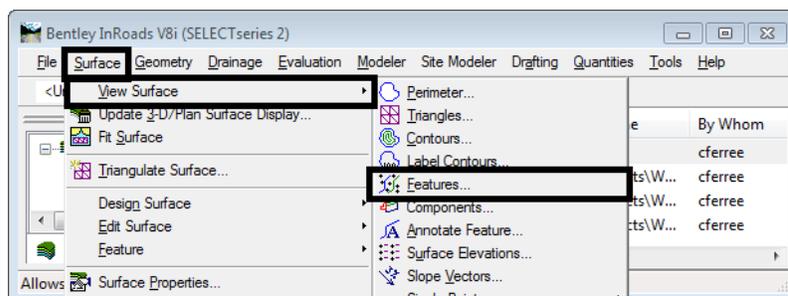
Assigning Materials to the Design Surface

In this section the components of the design surface are displayed and given a material. Because of the way Roadway Designer creates side slopes, those will have to be created a separate surfaces.

Creating Side Slope Surfaces

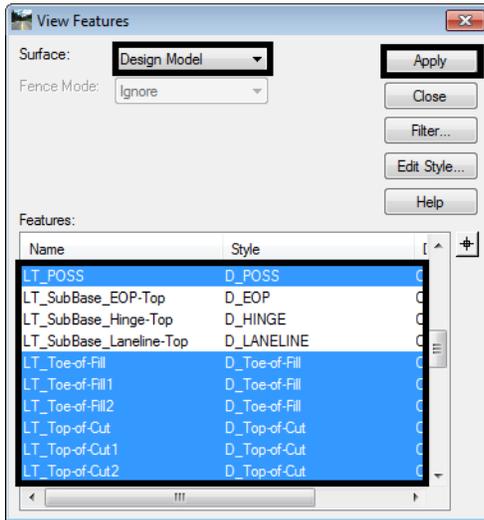
Side slope surfaces can be created from the Top of Cut, Toe of Fill, and POSS features from the design model.

1. From the InRoads main menu, select **Surface > View Surface > Features**.

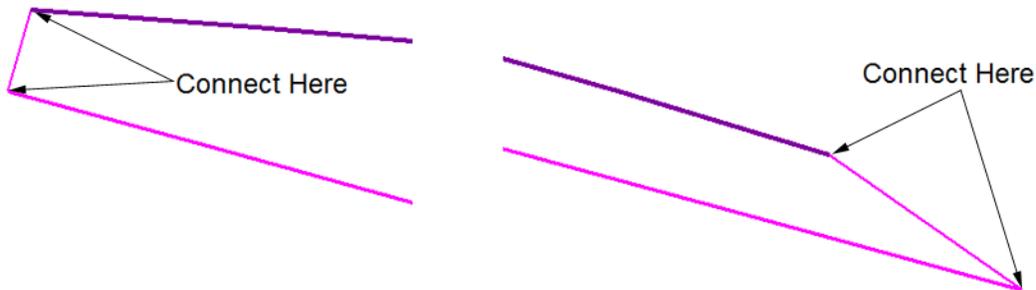


2. In the **View Features** dialog box, select the design surface from the **Surface** drop down menu.
3. In the **Features** list box, highlight all of the POSS and cut and fill features.

4. <D> the **Apply** button to display the features.

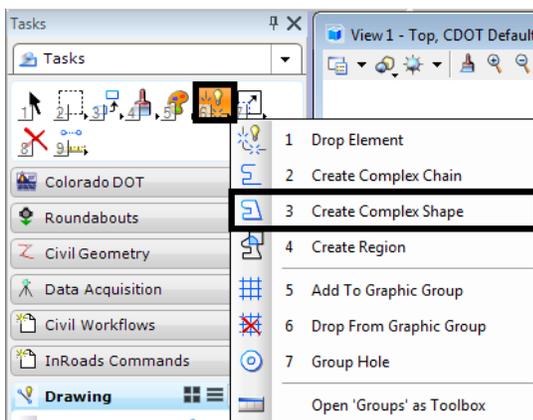


5. <D> **Close** to dismiss the *View Features* dialog box.
6. Using the MicroStation Place Smartline command, connect the POSS line to the toe of slope line on each end.



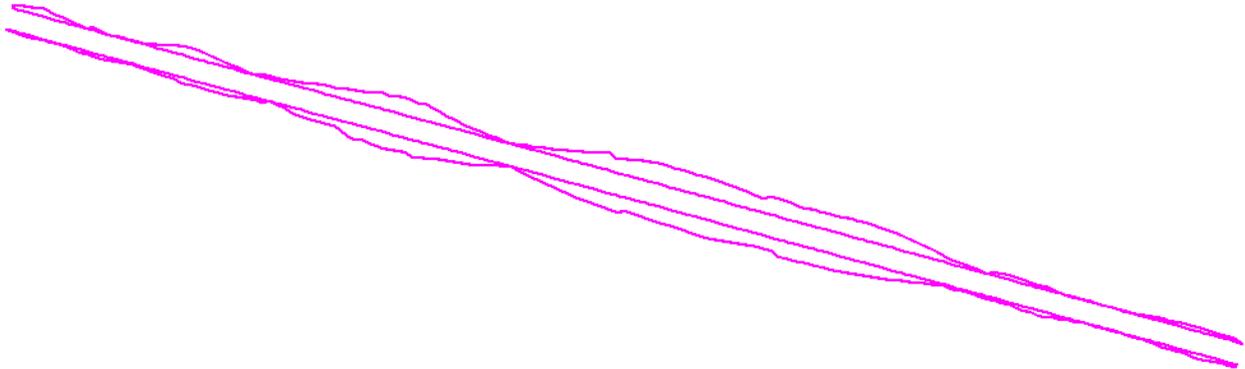
Next, these features are chained together to create a Complex Shape.

7. Select **Create Complex Shape** from the MicroStation Task menu.



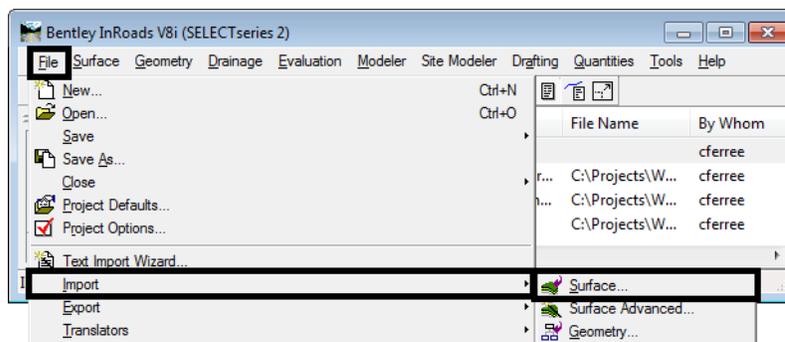
8. In the *Create Complex Shape* tool settings dialog box, set the *Method* to **Automatic**.

9. <D> on one of the elements then <D> in a blank area to create the chain.
10. Repeat steps 6 through 9 for the other side slope. An example of the result is shown below.



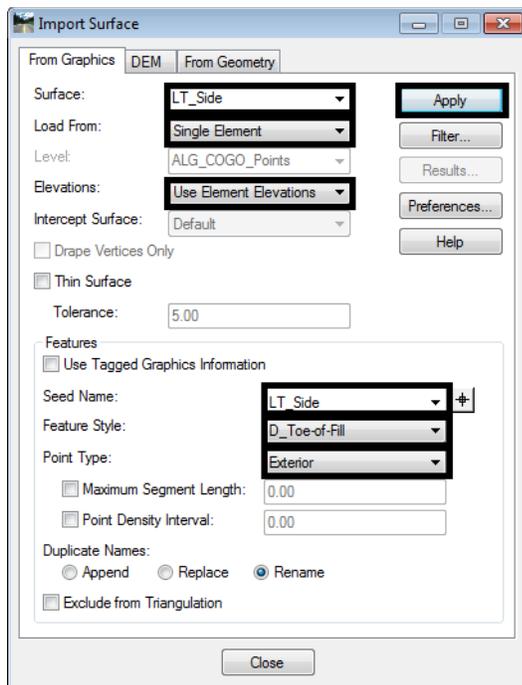
Finally, Each shape will be imported into a new surface.

11. From the InRoads main menu, select **File > Import > Surface**. This displays the *Import Surface* dialog box.



12. In the *Import Surface* dialog box, key in the desired name in the **Surface** field. *LT_Side* is used in this example.
13. Set **Load From** to **Single Element**.
14. Set **Elevations** to **Use Element Elevations**.
15. In the **Features** area, key in the desired name in the **Seed Name** field. *LT_Side* is used in this example.
16. Set the desired **Feature Style**. *D_Toe-of-Fill* is used in this example.

17. Set the **Point Type** to **Exterior**. This feature type will allow all of the data to be triangulated but prevent triangles from being formed outside the data area.

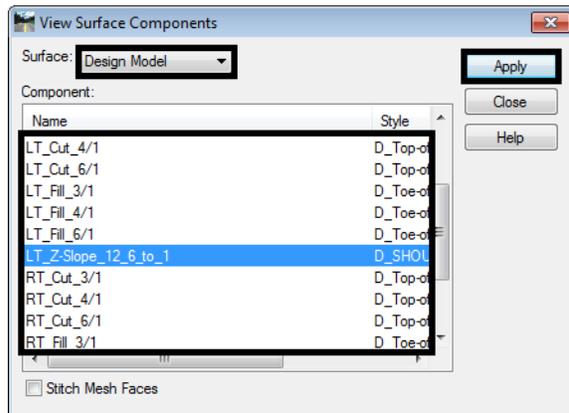


18. <D> the **Apply** button then <D> on the appropriate shape. This creates the surface and imports the shape as data.
19. Change the **Surface** name and **Seed Name** for the other side slope and import the other shape.
20. <D> **Close** to dismiss the **Import Surface** dialog box.
21. Delete the shapes that were just imported.

Displaying the Design Components and Surfaces

1. Display the triangles for the two new surfaces. Be sure to use a different preference (this example uses the **Proposed** preference) than that used to display the existing triangles. If they are displayed on the level with the existing ground triangles, they will be rendered with the aerial photo.
2. From the InRoads main menu, select **Surface > View Surface > Components**. This displays the **View Surface Components** dialog box.
3. Set the **Surface** to the desired design model. (Design Model is used in this example)
4. In the **View Surface Components** dialog box, select the desired design surface using the **Surface** drop down menu.
5. In the **Component** area, highlight the desired components. These should be the topmost pavement components, curb and gutter components, Z-Slope components, etc. In this example **HMA_Lift 1**, **LT_Z-Slope_12_6_to_1**, and **RT_Z-Slope_12_6_to_1** are used.

6. **<D> Apply**. The components of the design surface are displayed in the hole in the existing ground.

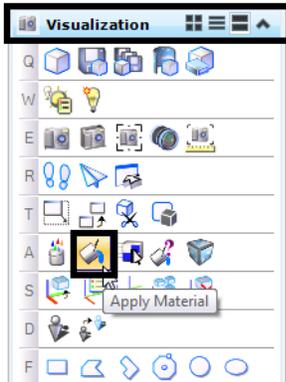


7. **<D> Close** to dismiss the the *View Surface Components* dialog box. Below is an example of the displayed components.

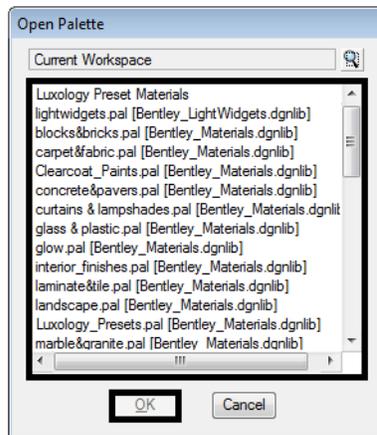
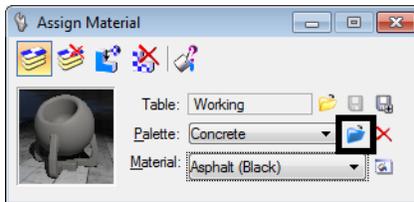


8. From the MicroStation task menu, select the *Visualization* tab.

9. <D> the **Apply Material** button. This will display the **Assign Material** dialog box.



10. In the **Assign Material** dialog box, <D> the **Open Palette** button and select the desired palette from the **Open Palette** dialog box. In this example, the concrete.pal is selected.
11. <D> **OK** to dismiss the **Open Palette** dialog box.



12. From the **Material** drop down menu, select the desired material. In this example Asphalt (Black) is used.
13. <D> the **Assign by Level/Color** button then <D> on the desired element. <D> in an open area to accept the assignment. In this example a surfacing component is selected.
14. Repeat steps 8 through 11 for the remaining components and the side slope surfaces.

The illustration below shows the design surface rendered.



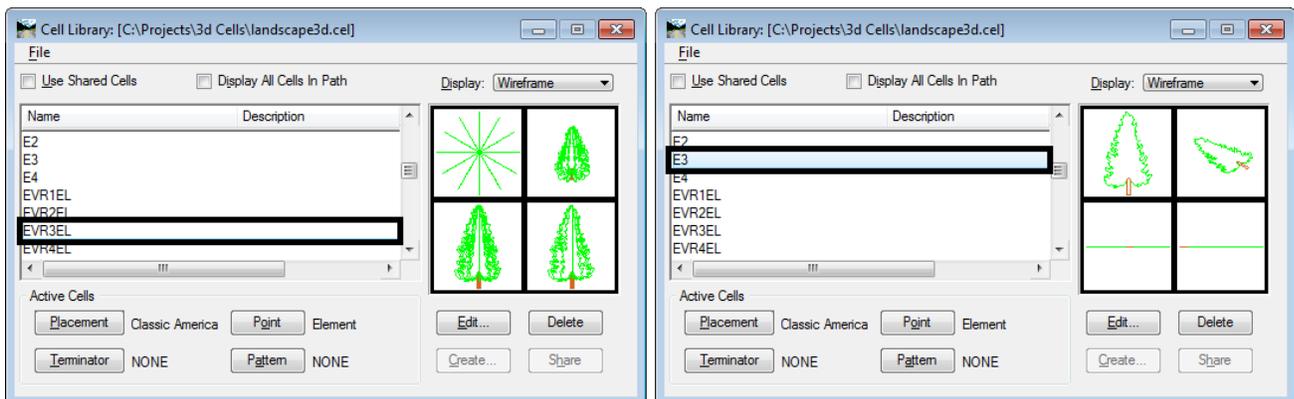
Adding Additional Details

3D Cells

There are a variety of cells that can be used to add interest to your rendering. MicroStation comes with a 3D landscape cell library (*landscape3d.cel*). This library has been copied to the following directory:

C:\Workspace\Workspace-CDOT_V8i\Standards-Global\MicroStation\Cell

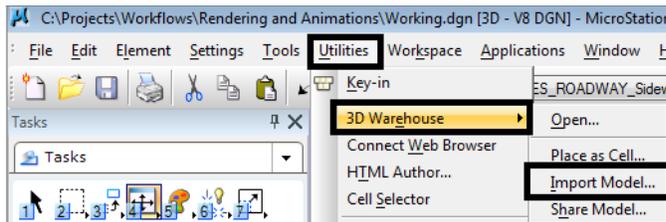
When selecting a cell, check the preview to be sure that the cell is a full 3D cell. The illustration below shows an example of two cells from the *landscape3d.cel* library; the cell on the left is a full 3D cell, the one on the right is not.



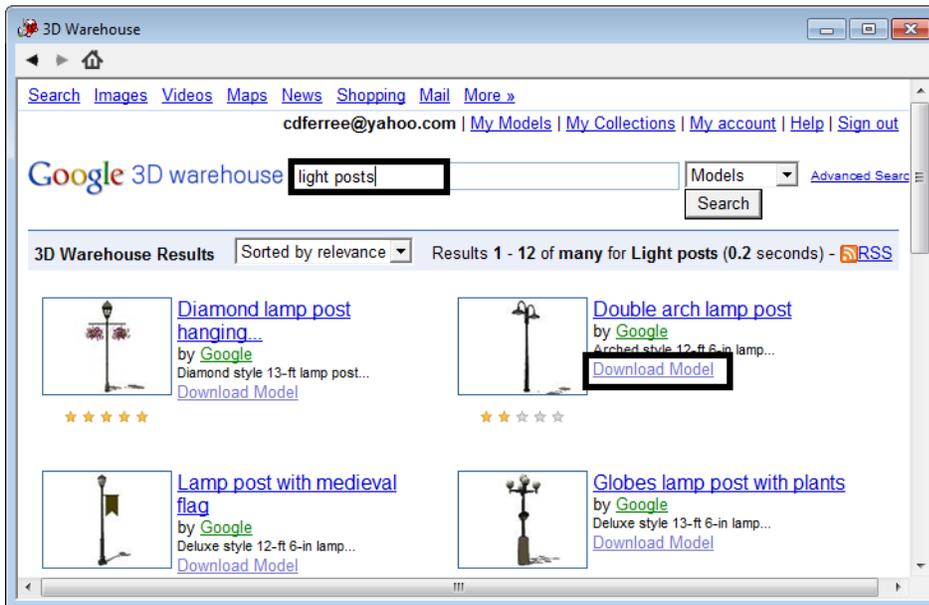
The origin of these cells is at the bottom center of the object. Therefore, they can be easily placed on the surface by tentative snapping to a triangle or component.

Another location for finding 3D cells to spruce up your rendering is the 3D Warehouse. To access the 3D Warehouse:

1. Open a blank drawing.
2. From the MicroStation main menu, select **Utilities > 3D Warehouse > Import Model**. This opens Internet Explorer to the Google 3D Warehouse web site.



3. In the search field, key in the item you are looking for. In this example, "light posts" was used.
4. When the desired item is found, <D> the **Download Model** link.

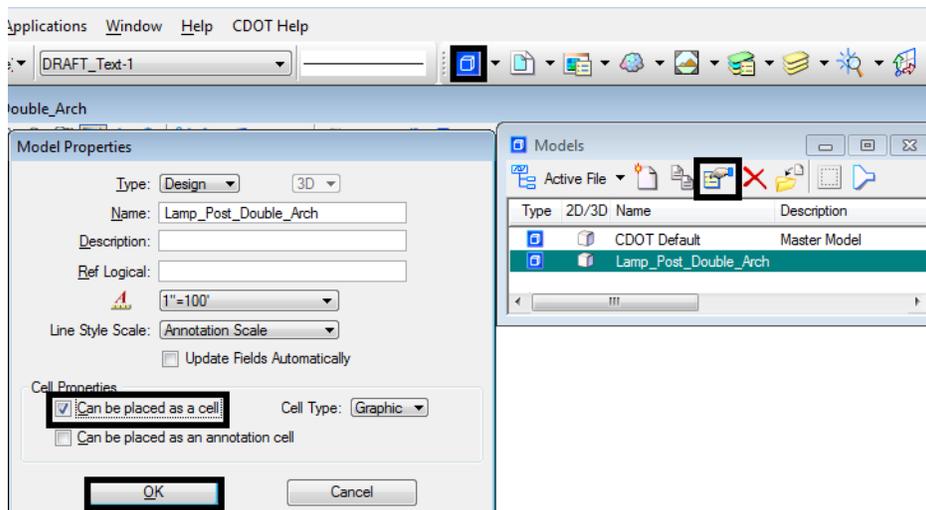


5. The item is added to the dgn as a new models or you can add additional models if desired.
6. Close the Internet Explorer when you have finished downloading models.

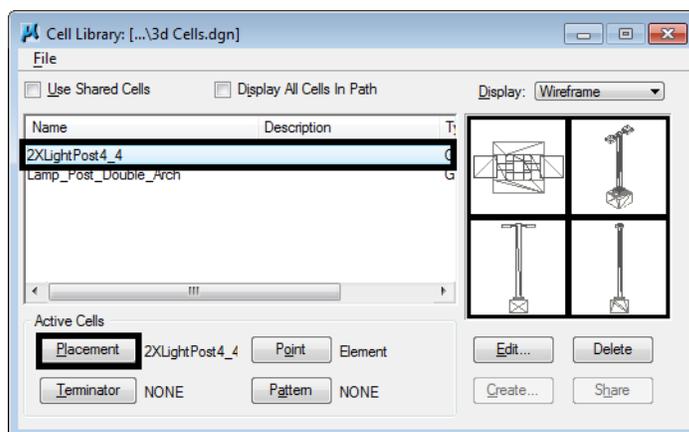
Note: Some of these models may require additional work after they are downloaded. A common problem with these cells is that their origin is not at 0,0,0.

7. While in the new model, open the **Model Properties** dialog box.

- Toggle on **Can be placed as a cell**. <D> **OK** to accept the change and dismiss the Model Properties dialog box.



- Open your rendering dgn file.
- From the MicroStation menu, select **Element > Cells**. This displays the **Cell Library** dialog box.
- In the **Cell Library** dialog box, select **File > Attach File**.
- Navigate to the location of the 3D cell library created above highlight the filename and <D> **Open**. The cells are now ready for use.
- To use a cell, highlight the cell name then <D> the **Placement** button in the **Cell Library** dialog box.

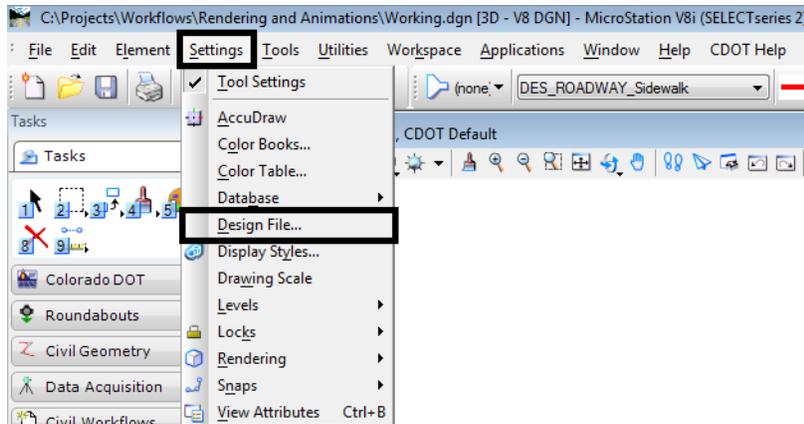


- The **Cell Library** dialog box can be dismissed. Select the Place Cell command from the task menu and place the cell at the desired locations.

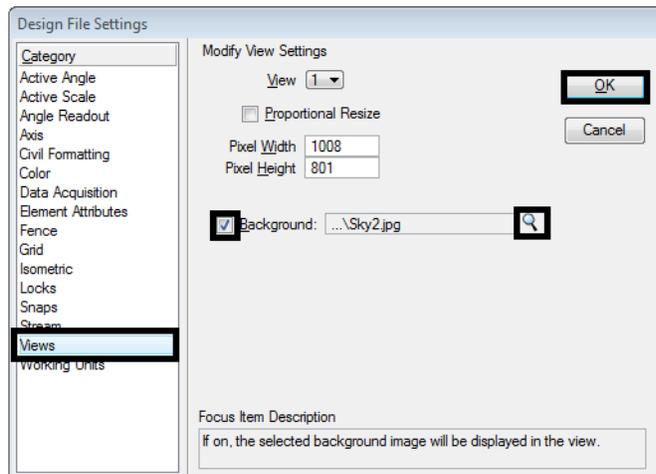
Using a Background Image

Adding a background image to your rendering can help bring the image to life. To add a background image:

1. From the MicroStation main menu, select **Settings > Design File**. This displays the *Design File Settings* dialog box.

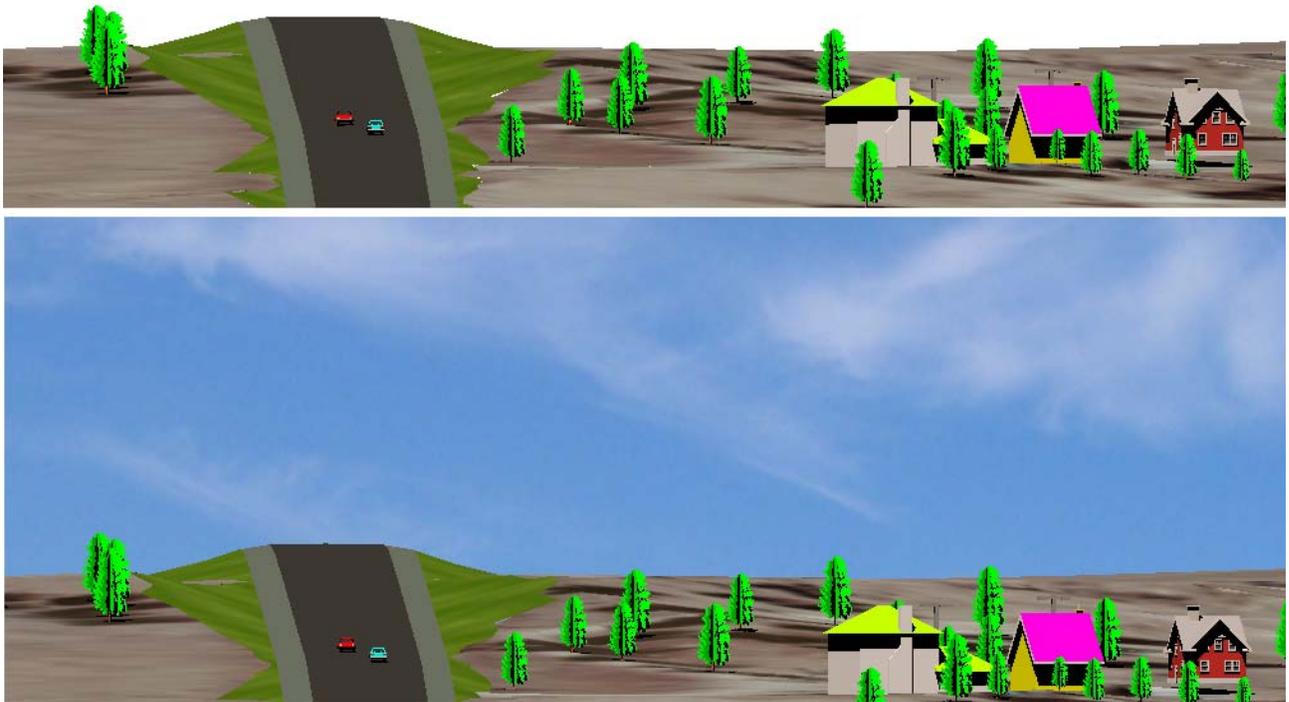


2. In the *Category* pane of the *Design File Settings* dialog box, **<D> Views**.
3. In the *Modify View Settings* area, toggle on **Background**.
4. Use the search icon  to locate and select the desired background image.



5. **<D>** the **OK** button to accept the changes. The background image is now displayed and the *Design File Settings* dialog box is dismissed.

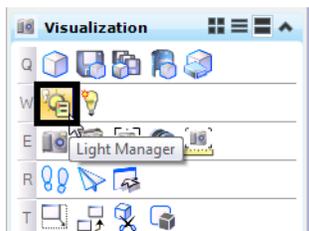
Below is an example of a rendering without the background on top and with the background on bottom.



Lighting Adjustments

Lighting is used to highlight your rendering and make it more visible. To adjust the lighting:

1. Select the **Light Manager** from the **Visualization** task tab. This displays the **Light Manager** dialog box.

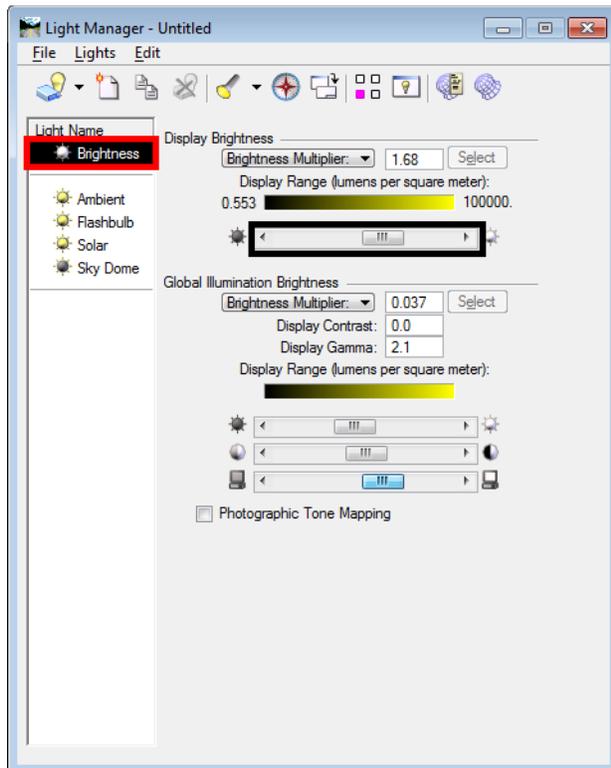


There are three areas that are generally used to adjust the lighting for the rendering. These are Brightness, Ambient, and Solar.

Brightness

This setting adjusts the overall lighting of the drawing.

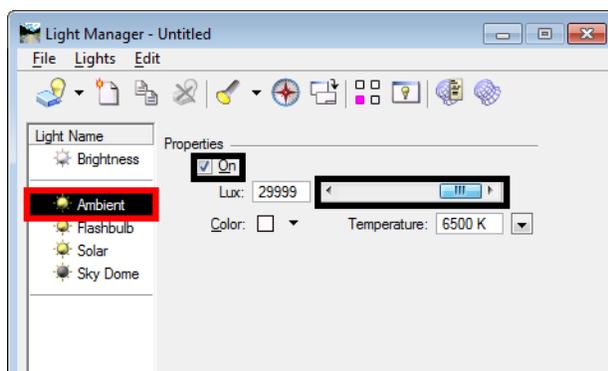
1. Highlight **Brightness** in the *Light Name* list.
2. Use the slider in the *Display Brightness* area to modify this setting.



Ambient

The Ambient settings can be used to reduce on increase the harshness of shadows.

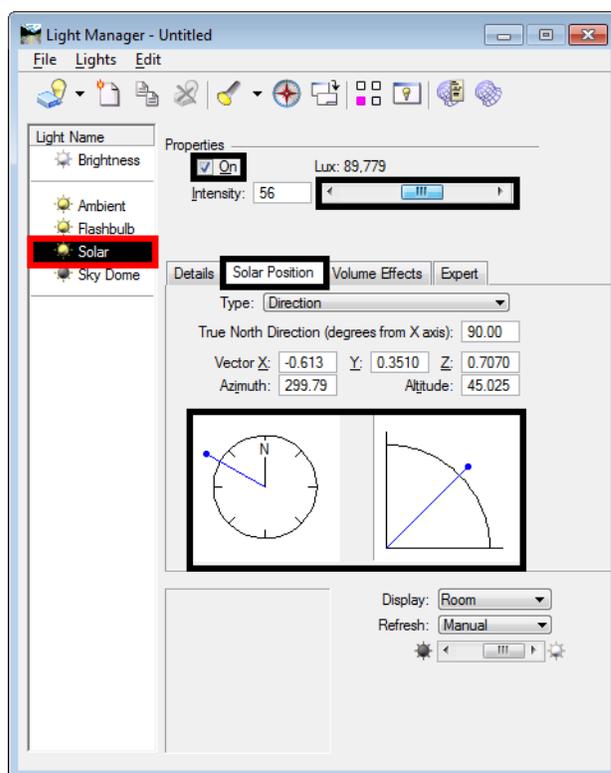
1. Highlight **Ambient** in the *Light Name* list.
2. In the *Properties* area toggle on the **On** check box.
3. Use the **Lux** slider to modify this setting.



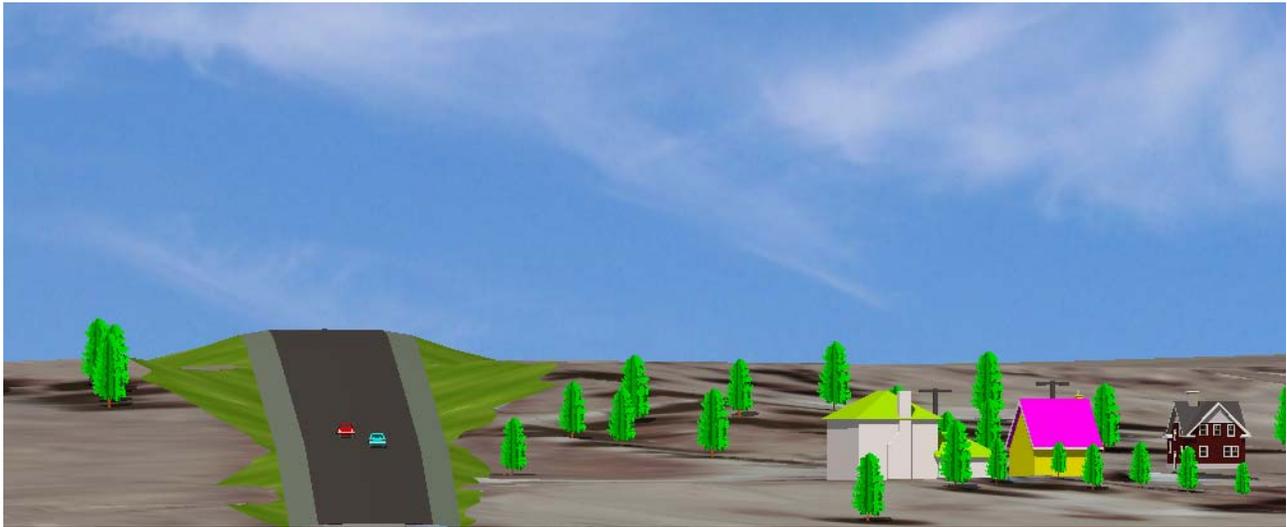
Solar

The Solar settings can also adjust the overall brightness of the rendering. It is also used to orient the sun in relation to the drawing.

1. Highlight **Solar** in the **Light Name** list.
2. In the **Properties** area toggle on the **On** check box.
3. Use the **Intensity** slider to modify this setting. This adjusts the brightness of the rendering.
4. **<D>** on the **Solar Position** tab.
5. Use the **Azimuth** and **Altitude** dials to adjust the sun's orientation.



Below is an example of the finished rendering.



MicroStation Printing

Workflow MP 1- MicroStation Printing

This document guides you through the basic functions of MicroStation printing. It is used for printing single sheets on a sheet by sheet basis. See workflow document *CDOT Workflow Print Organizer* for guidance on printing multiple sheets at one time.

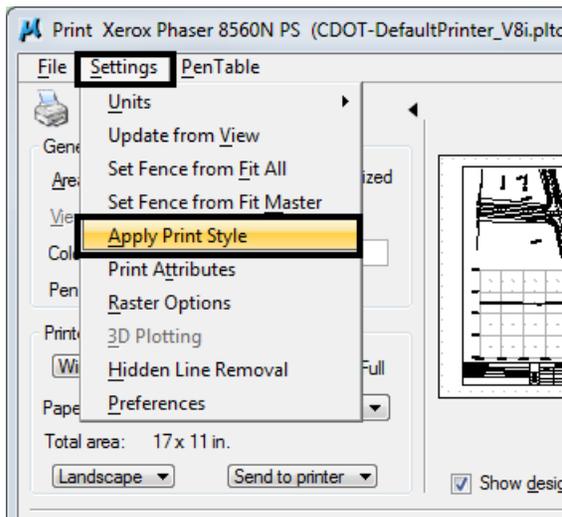
There are two procedures that can be used to set printing properties. The first is using a **Print Style** (new in MicroStation V8i SS2) and the second is using a **Print Driver** (similar to past versions of MicroStation).

Note: Mixing the two printing procedures is known to create some inconsistencies. If you find that something does not look correct, it is best to cancel out of the Print dialog box and start over using only one of the procedures.

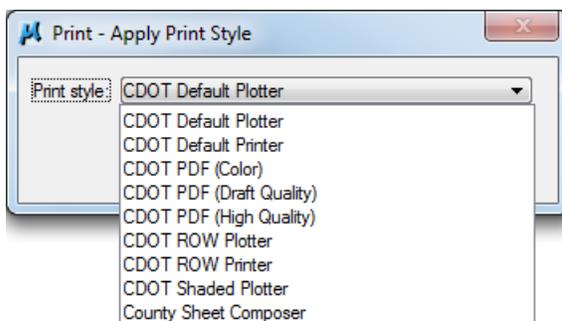
Using Print Styles

A Print Style is a collection of frequently used print properties that have been saved for later use. Default CDOT Print Styles have been created for common settings and are included in the CDOT workspace. These Print Styles automatically set a Printer Driver, Pen Table, scale, page size of 11x17 landscape orientation, toggles on line styles and line weights, and sets the printer.

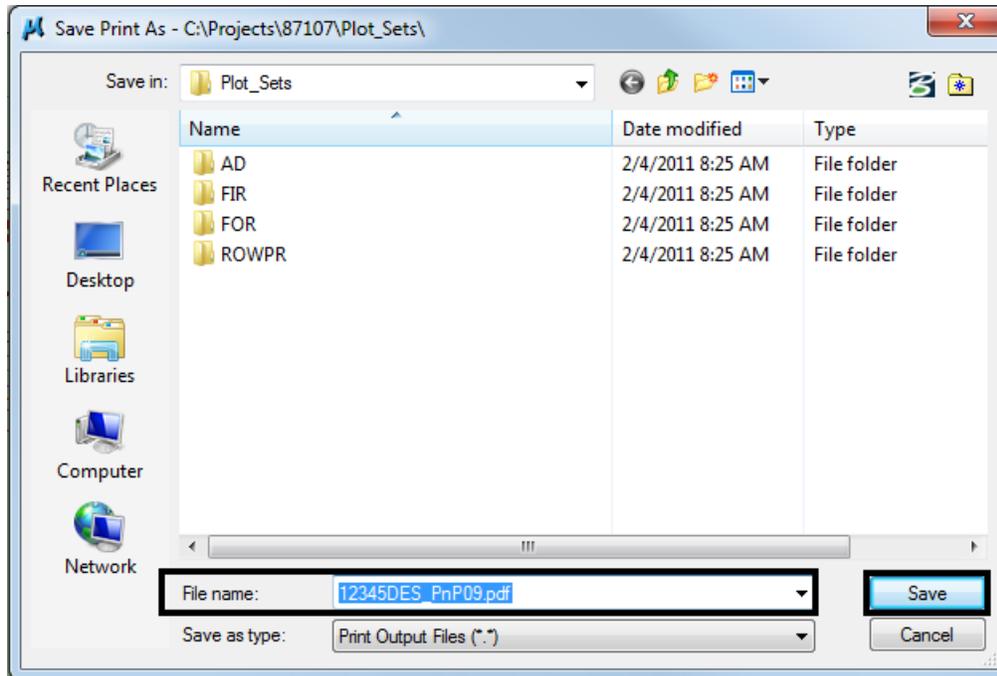
1. Print Style settings are accessed from the **Print** dialog box.
2. From the **Settings** pull down menu, select **Apply Print Style**.



3. Nine Print Styles have been created. Two drivers have been created for default Adobe PDF file creation; one for draft quality and one for high quality outputs.



4. Select a Print Style and **<D> OK**. This will automatically set the appropriate print settings.
5. **<D>** the *printer icon* or use **File > Print** to print the document.
6. If a Print Style was selected for a printer or plotter, the file will be sent to the device.
7. If a Print Style was selected for Adobe PDF creation, the user will be asked to name the file and save it. Navigate to the correct directory and enter a file name to save the file. Select **Save**.

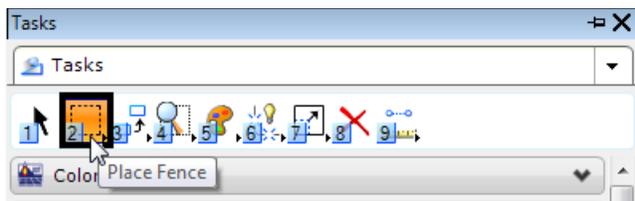


Note: For tips on printing raster references (e.g. aerial photos), see the workflow **Printing Raster Images**.

Using Default Printer Driver Settings

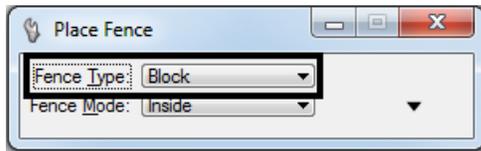
Note: When using this method of printing, it is important to check the line weight setting under the print attributes to make sure it is toggled on before creating a plot.

1. In MicroStation V8i, place a fence to define the print area.

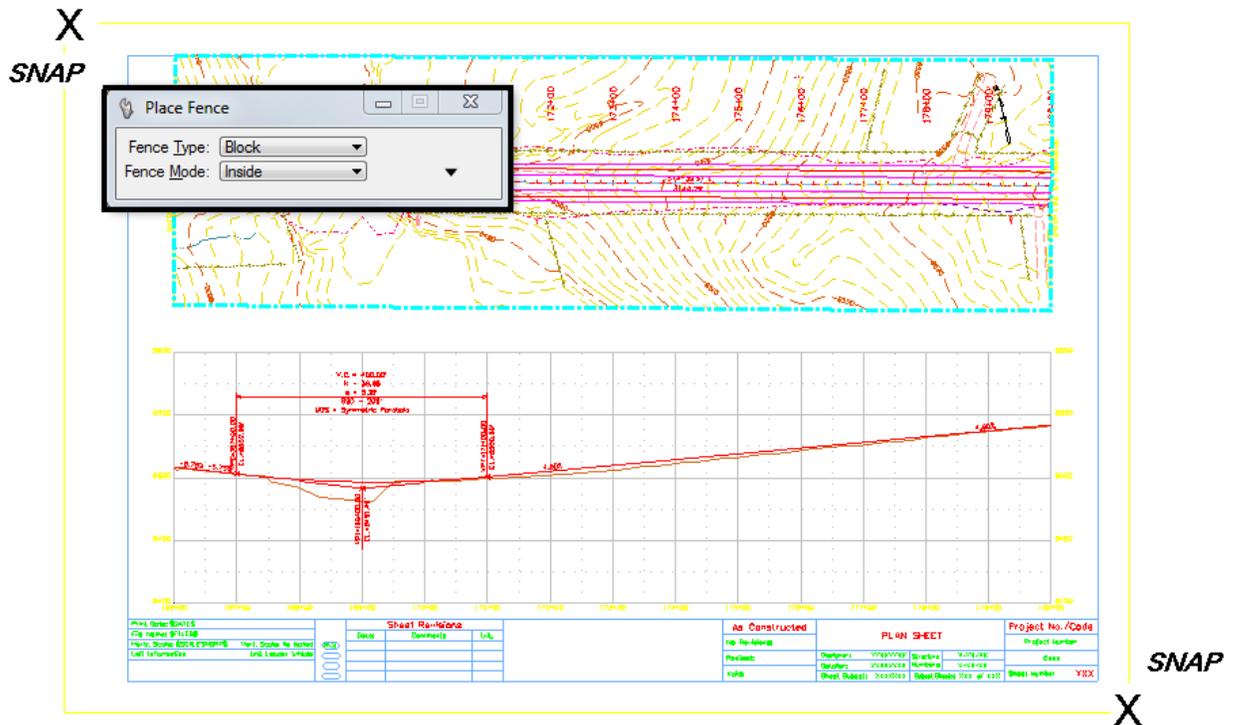


Note: As of this printing if you place the fence BEFORE activating the Print command, the line weight toggle will be turned off. This will be fixed in the next service pack (SS3) from Bentley due out in the fall of 2011.

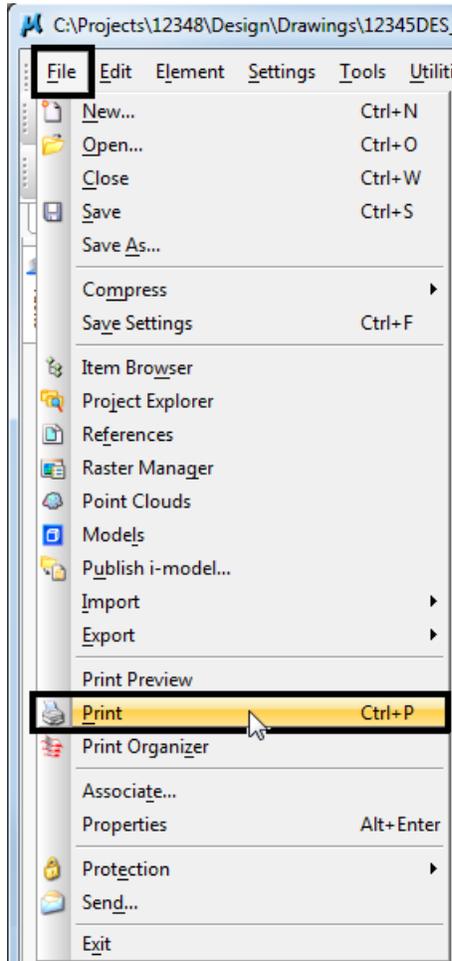
- Set the **Fence Type** to **Block**. This **Fence Type** will work for both sheet borders placed as reference files and as cells.



- Place the fence by snapping to the outer corners of the plot boundary. The shape defining the outer edge of the border (in this example) is called SHEET_Plot-Boundary.



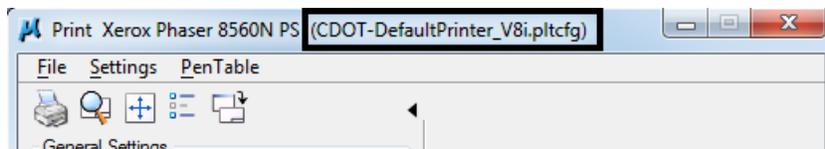
- Open the **Print** dialog box by selecting **File > Print**.



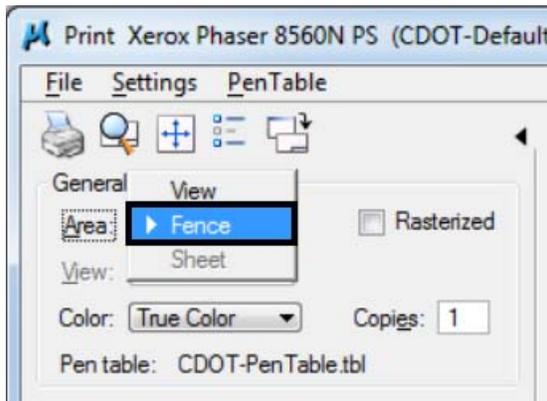
- Optionally, <D> the **Printer** icon on the **Standard Tool Box**.



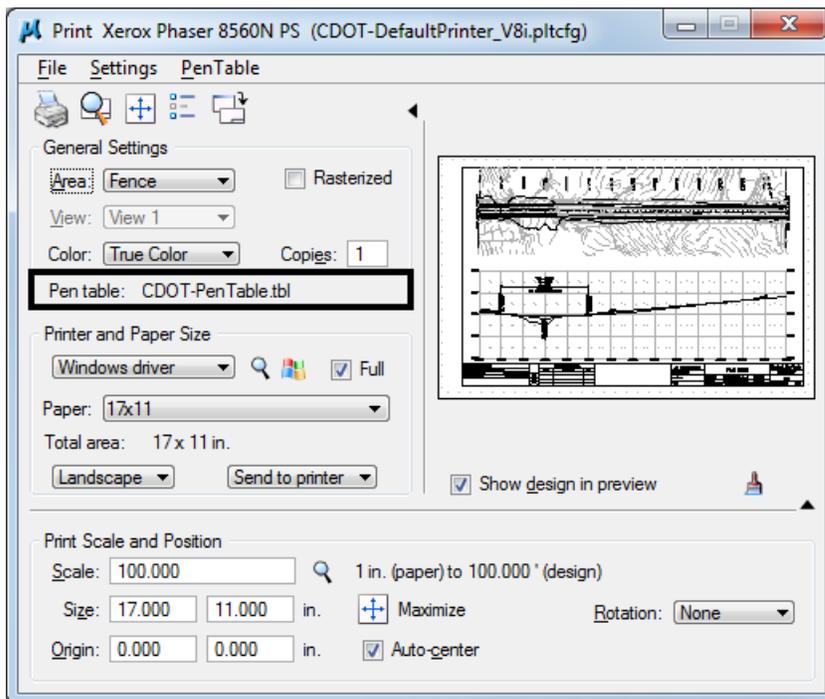
- The current **Printer Driver** will display in the title bar at the top of the **Print** dialog box.



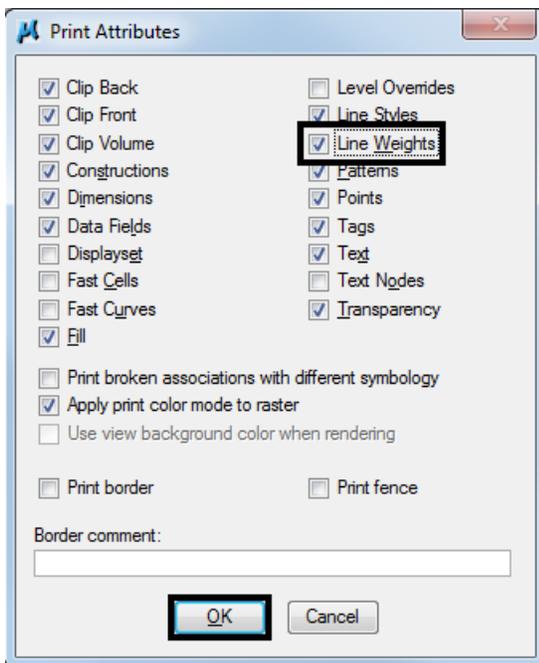
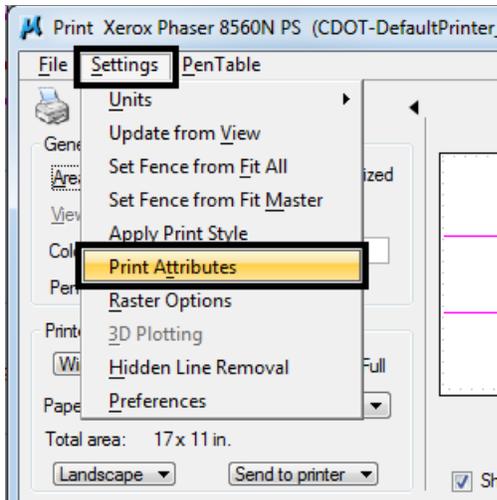
7. Make sure the **Fence** option is selected under **General Settings**.



8. The current **Pen Table** will display under the **General Settings** area of the dialog box.



9. If these settings are correct (default printer using CDOT-PenTable.tbl), check to make sure pen weights have been toggled on under the **Settings > Print Attributes** pull down.

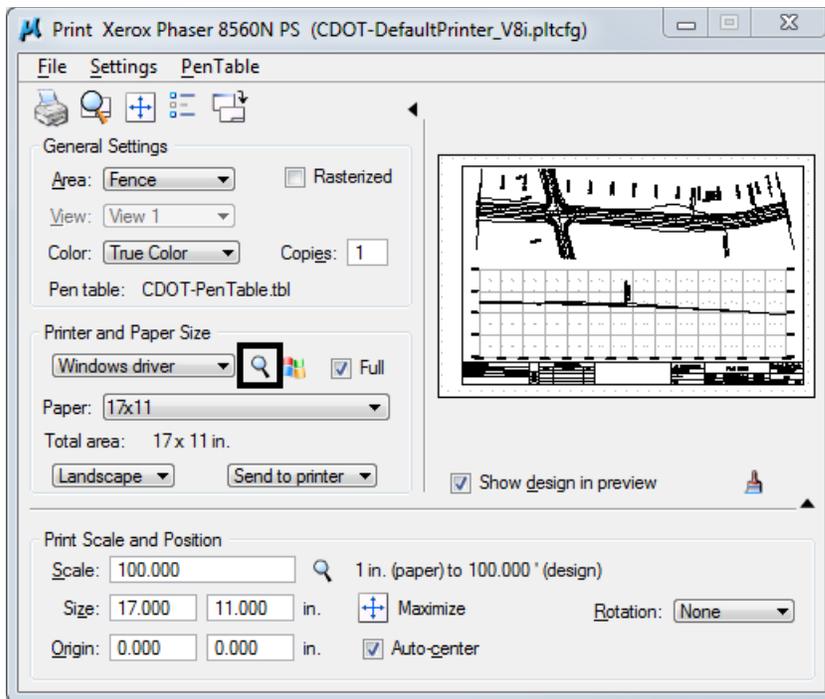


10. Once toggled on, **<D> OK** to close the Print Attributes dialog box.
11. **<D>** the **printer icon** or use **File > Print** to print the document to the default printer.

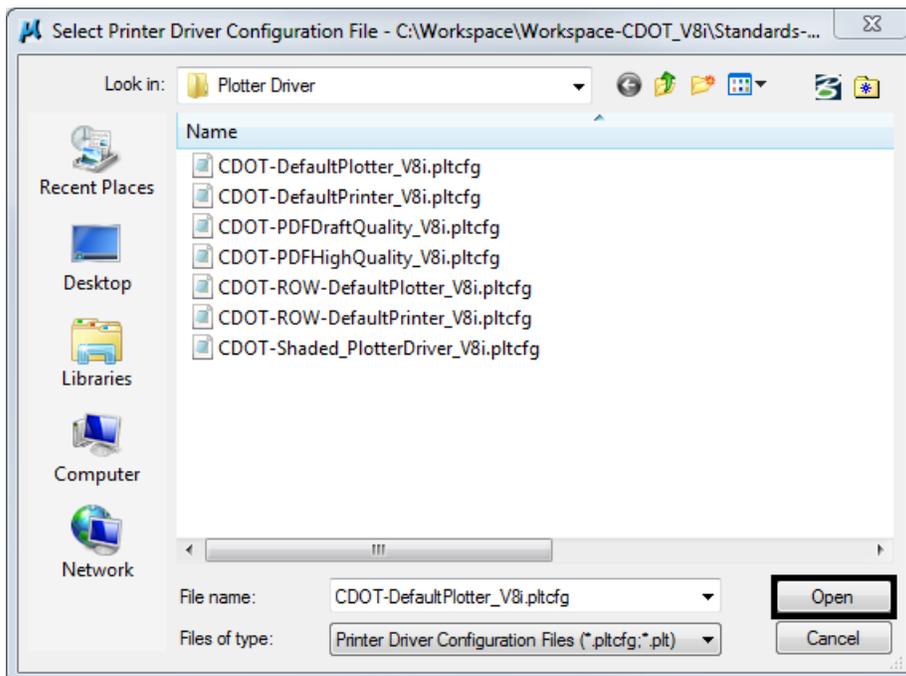
Changing the Default Printer Driver Settings

Seven default CDOT printer drivers have been created for common settings and are included in the CDOT workspace. Settings like Pen Table can be changed by the user. Follow the same steps in the above section **Using Default Printer Driver Settings** to start the printing workflow.

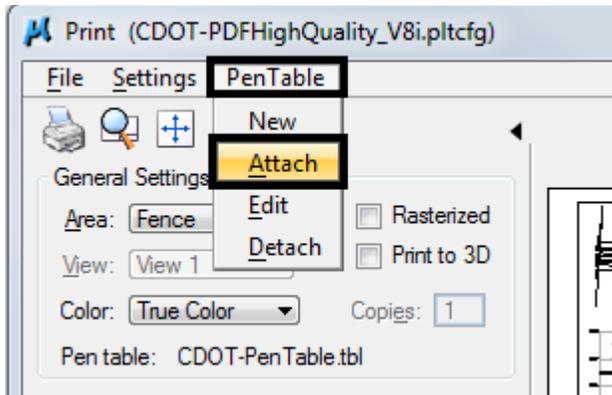
1. The default printer driver sets the *CDOT-DefaultPrinter_V8i* printer driver. To change this, <D> the magnify glass icon under the Printer and Paper Size section in the print dialog box.



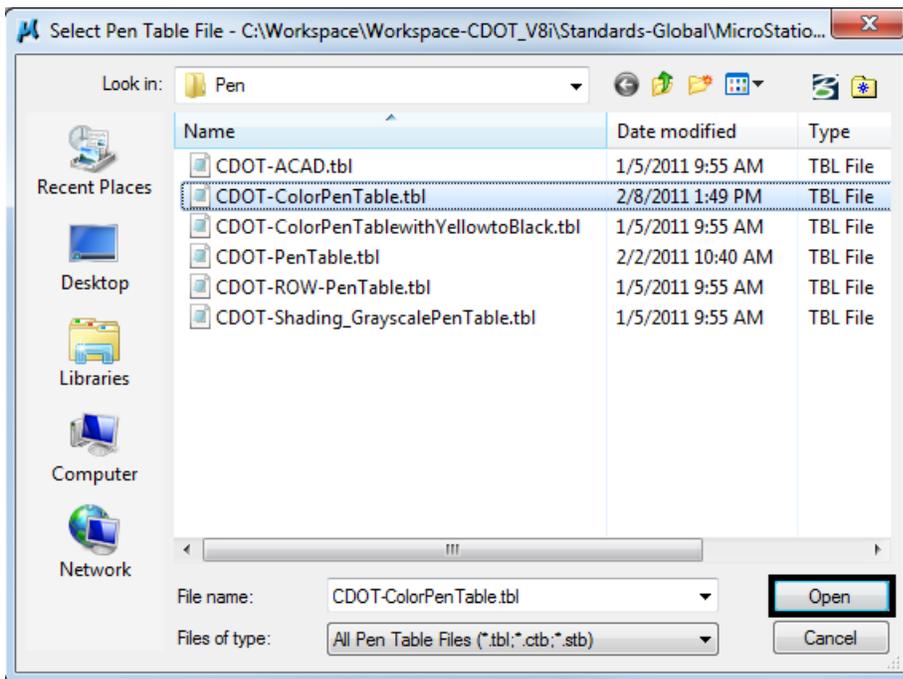
2. Select the appropriate **Printer Driver** (for example, *CDOT-PDFHighQuality_V8i.pltcfg*) and <D> **Open**.



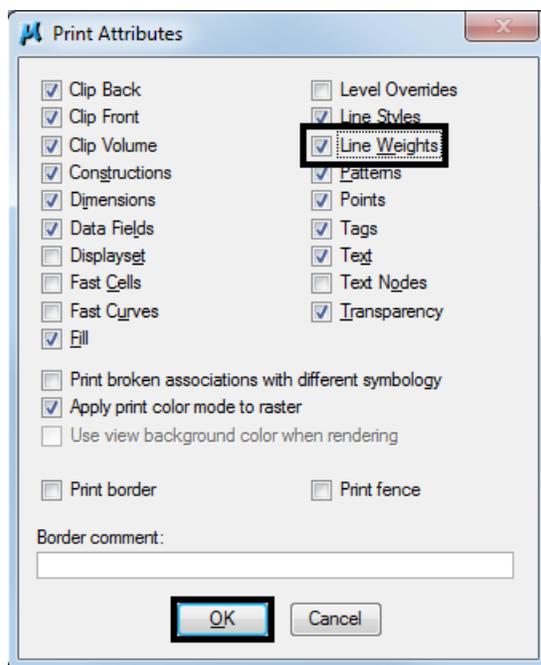
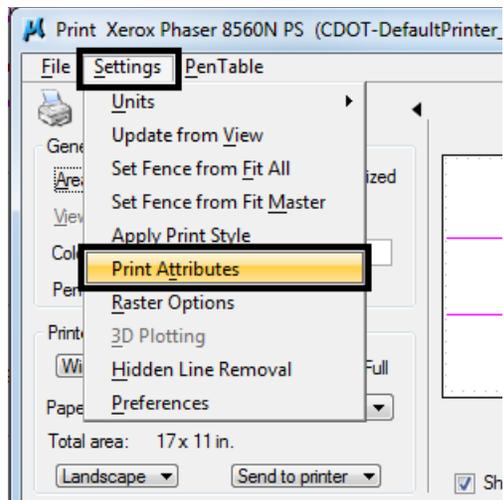
3. Check the **Pen Table** setting. If it needs to be changed (for example to the color pen table), select the **PenTable** pulldown and **<D> Attach**.



4. Select the appropriate pen table and **<D> Open**.



- Once the settings are correct, check to be sure pen weights have been toggled on under the **Settings > Print Attributes** pull down.



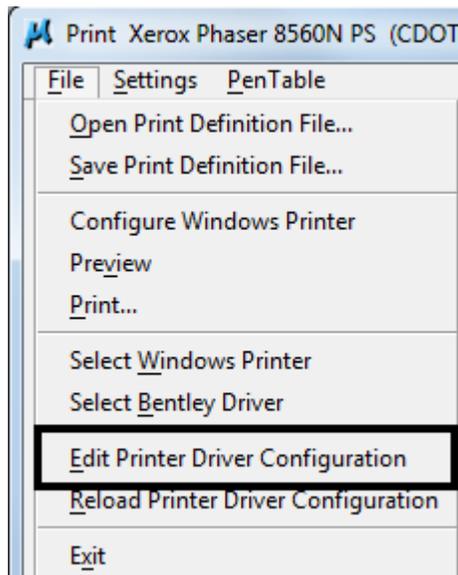
- Once toggled on, **<D> OK** to close the Print Attributes dialog box.
- <D>** the **printer icon** or use **File > Print** to print the document to the default printer.

Workflow MP 2 - Printer Driver Adjustments

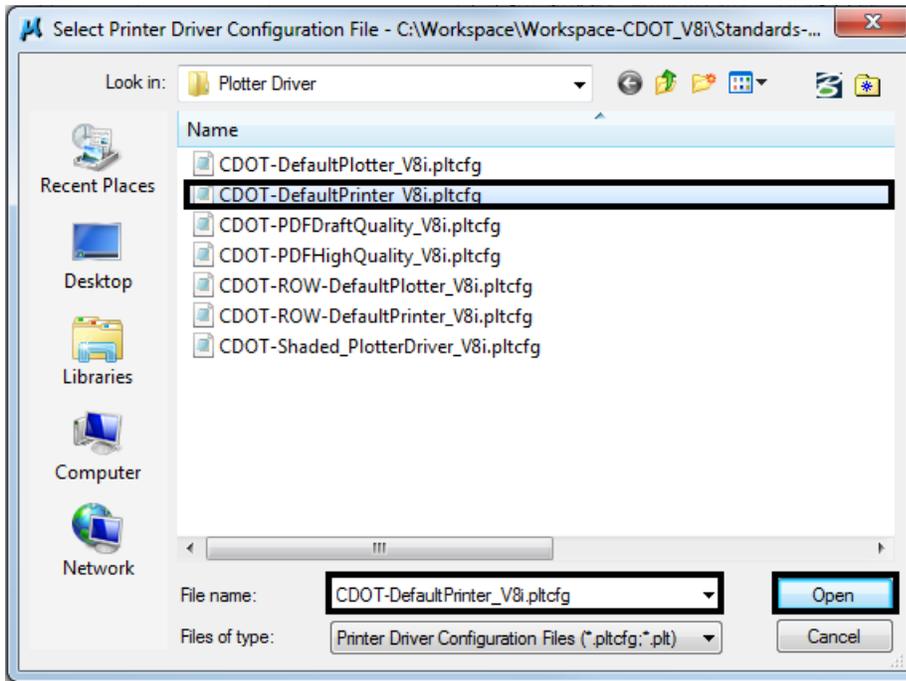
This document guides you through the basic steps you will need to edit a CDOT Printer Driver.

The Print Driver configuration file format was changed with MicroStation XM and is now stored in XML format. Each of the new print driver configuration files now has an extension **.pltcfg**. Each default Print Driver configuration file has default settings that should not have to be edited. However, printers can vary in the naming convention for 11x17 inch sized paper and default plotters are usually not set as user default printers. If the default paper size does not set automatically, you can make the necessary adjustments. Also, if you have a default plotter, you can set the network path in the printer driver configuration path. The CDOT default printer driver configuration file is located under: *C:\Workspace\Workspace-CDOT_V8i\Standards-Global\MicroStation\Plotter Driver*.

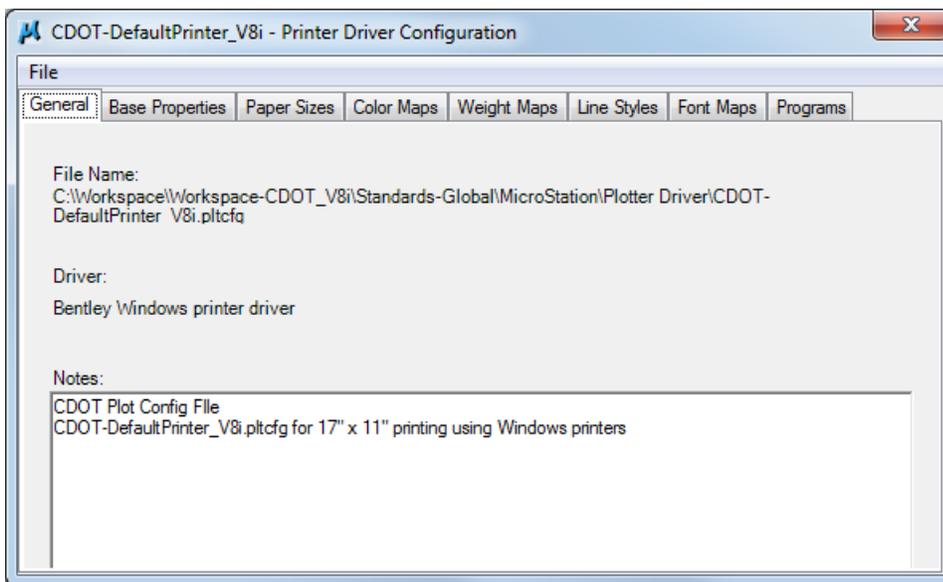
1. The name of the file is *CDOT_DefaultPrinter_V8i.pltcfg*. **Open** the file from within MicroStation V8i using the **Print Driver Configuration Editor**. It can be invoked from the **MicroStation Print** dialog's **File/Edit Printer Driver Configuration** menu.



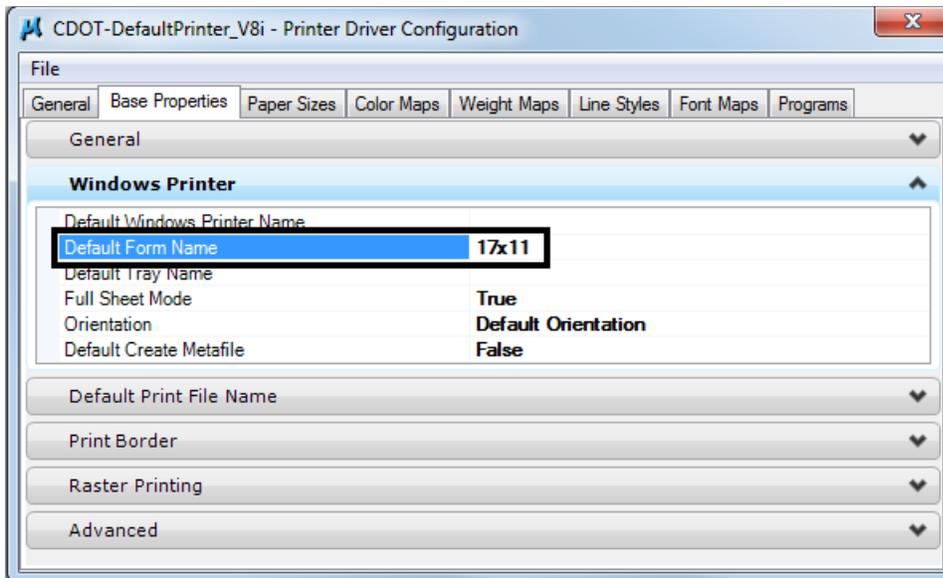
- Navigate to *C:\Workspace\Workspace-CDOT_V8i\Standards-Global\MicroStation\Plotter Driver* and **open** the printer driver.



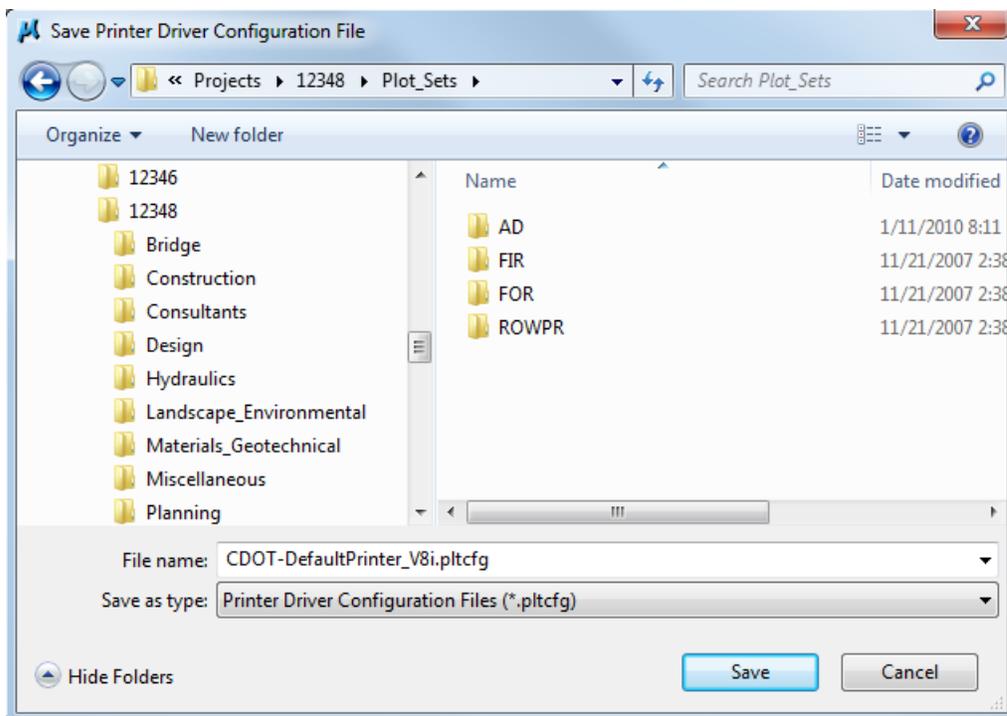
- You will see this display after the file is opened.



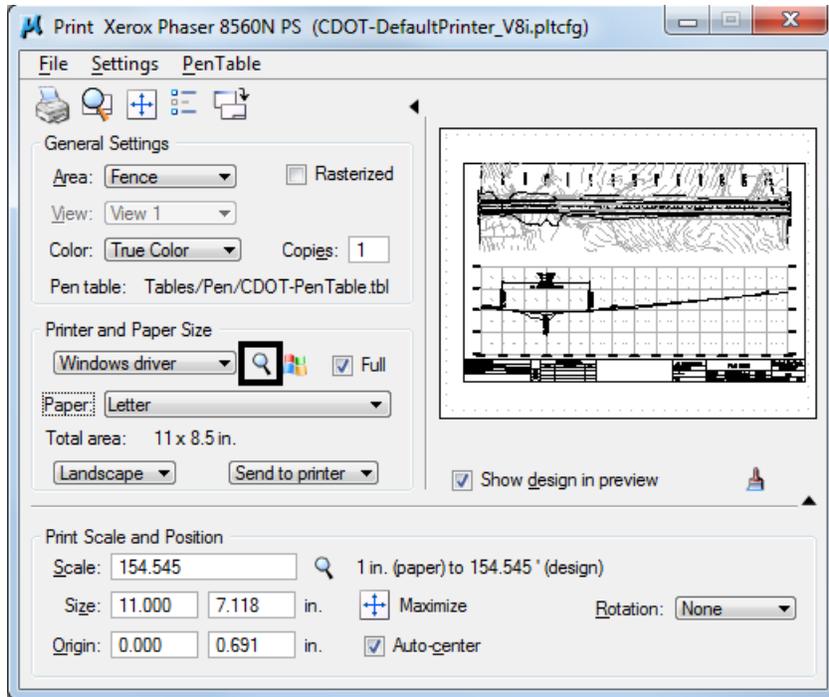
Setting the Default Form Size



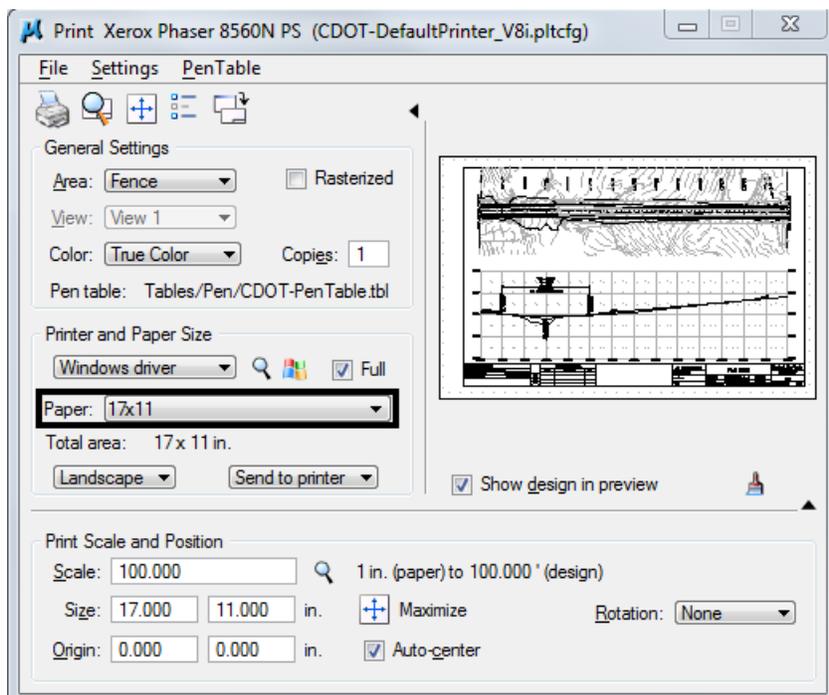
1. The line item highlighted in the above screen capture needs to be edited with the proper sheet size definition for the default printer. Check your printer preferences for the sheet size definition. Typically the sizes will be one of the three: **11x17**, **Tabloid** or **“11x17”**.
2. Once the file has been edited, save a copy of *CDOT-DefaultPrinter_V8i.pltcfg* in your project’s **Plot_Sets** folder. If you save the changes back to the original file located at *C:\Workspace\Workspace-CDOT_V8i\Standards-Global\MicroStation\Plotter Driver*, the file will be overwritten the next time you log into your workstation.



- In the Print dialog box, <D> the **Search** icon next to the **Bentley driver**. Navigate to your project's **Plot_Sets** directory and select the edited **pltcfg** file. This will now become the default settings until you select a different **pltcfg** file.



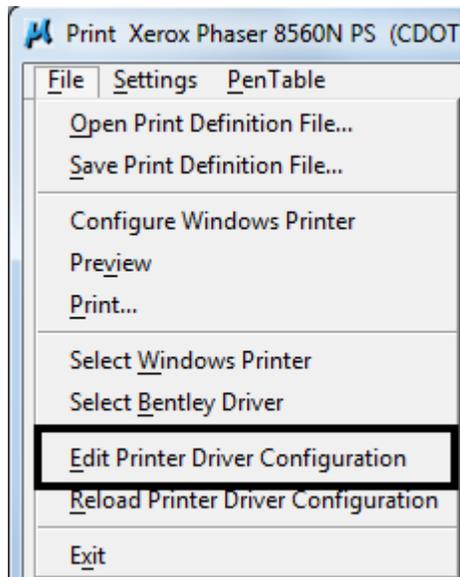
- Once you have selected the correct **pltcfg** file, you will notice the **Paper** size is defaulting to the new settings and the print view is now correct.



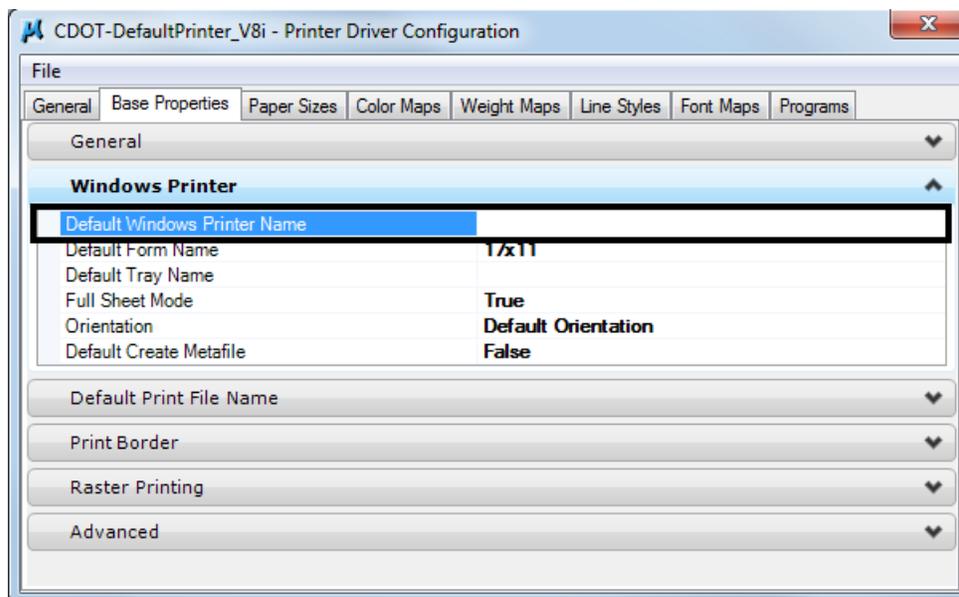
Setting the Default Plotter Path

The default path for a plotter or non default printer can be edited and set inside the **Print Configuration** file.

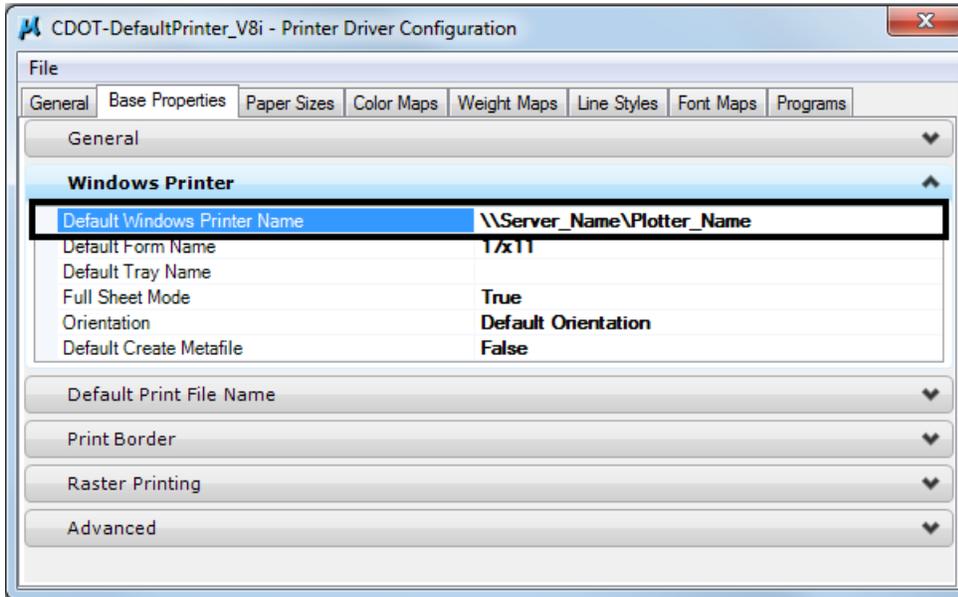
1. The name of the file that should be edited for a default plotter is **CDOT_DefaultPlotter_V8i.pltcfg**. **Open** the file from within MicroStation V8i using the Print Driver Configuration Editor. It can be invoked from the MicroStation Print dialog's **File > Edit Printer Driver Configuration** menu.



2. Navigate to **C:\Workspace\Workspace-CDOT_V8i\Standards-Global\MicroStation\Plotter Driver** and open the printer driver.

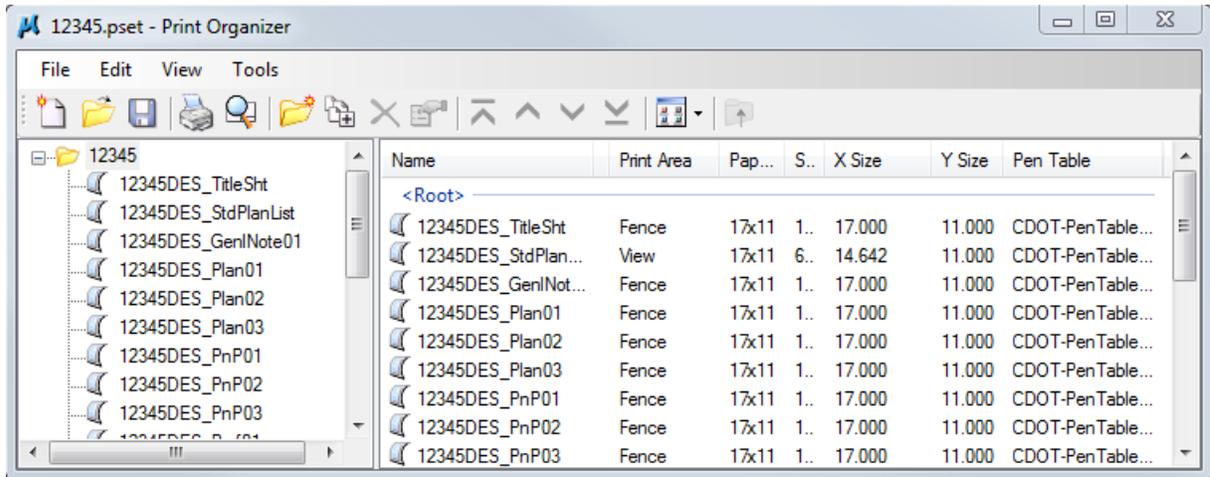


- The line item in the above screen capture needs to be edited with the proper default plotter path. Typically the path will be: `\\Server_Name\Plotter_Name`.

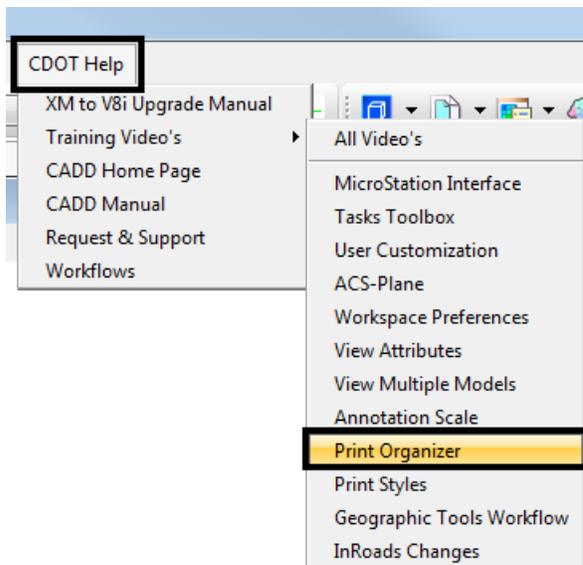


Workflow MP 3 - Print Organizer

This document guides you through the basic functions for using **Print Organizer**. **Print Organizer** is a new utility in MicroStation that replaces the **Batch Print** utility in MicroStation and MicroStation PDF composer. Any past **Batch Print** job set (.job) files can be opened and converted to the new format.

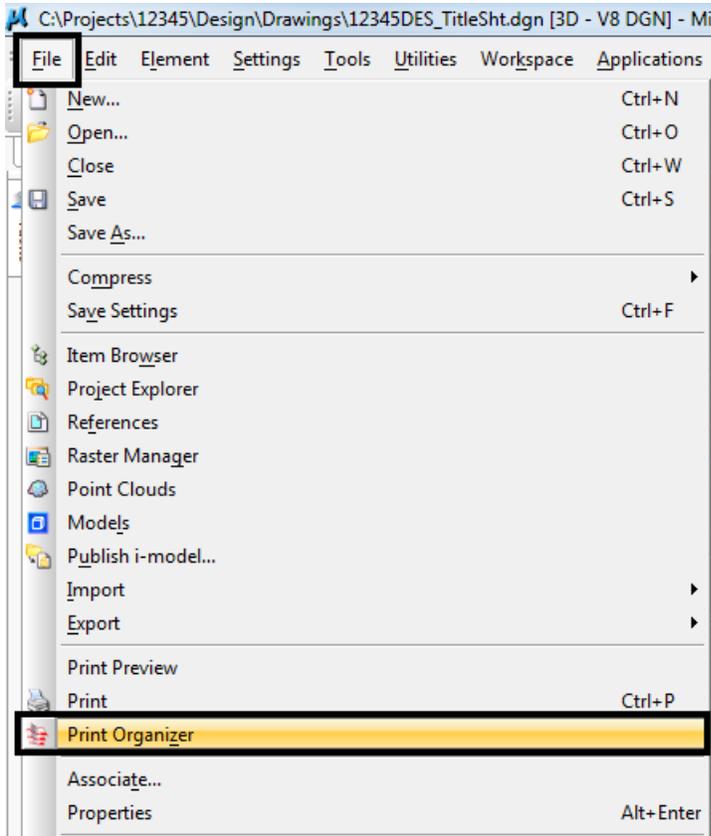


For more information on using **Print Organizer** for Batch Printing, watch the training video “**Using Print Organizer for Batch Printing**”. This can be accessed from within MicroStation by using the **CDOT Help** pull down menu and selecting **Print Organizer**.



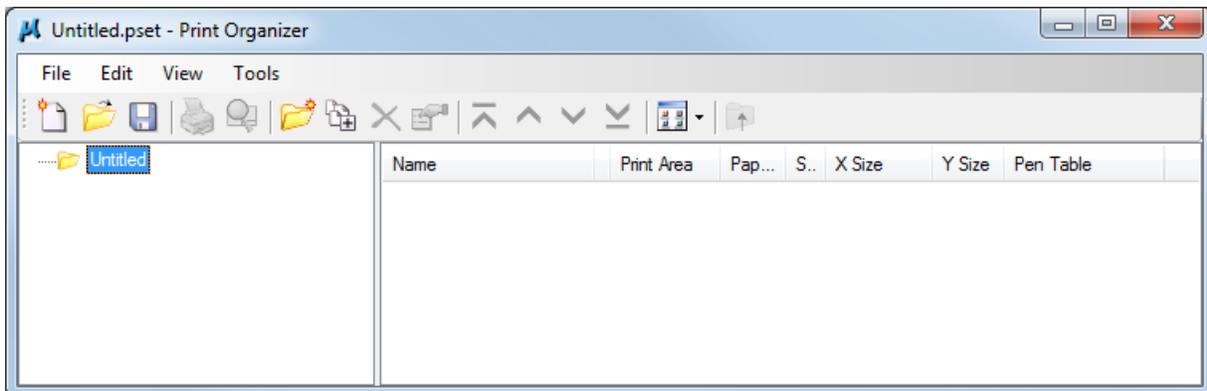
Basic Print Organizer Workflow

1. Select **File > Print Organizer** from the MicroStation pull down menu.

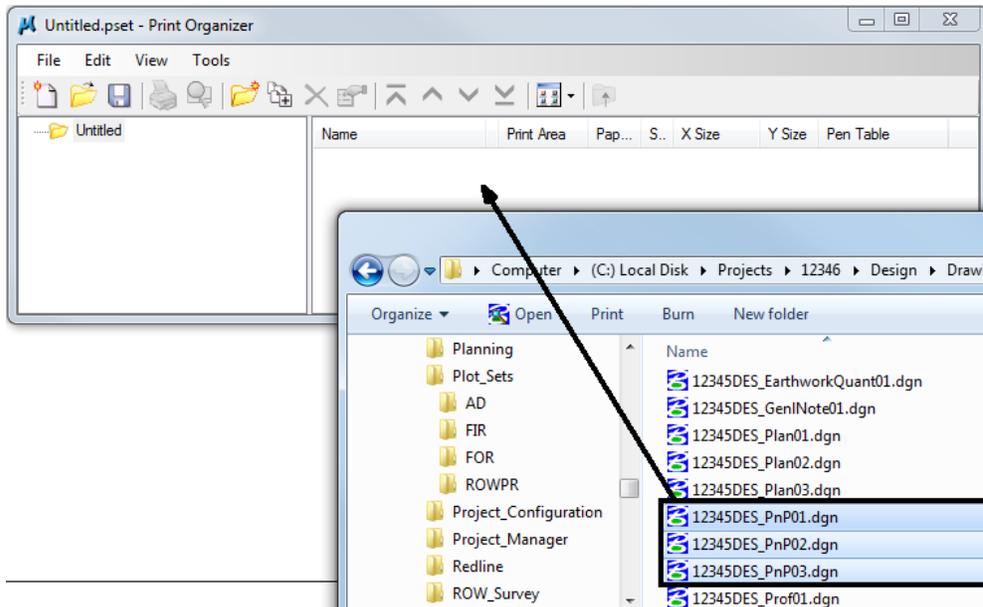
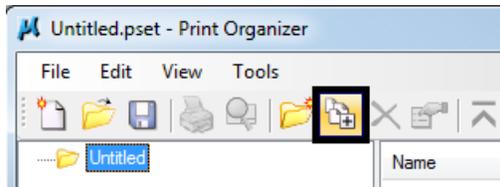


Note: You can be in any MicroStation file when you run **Print Organizer**.

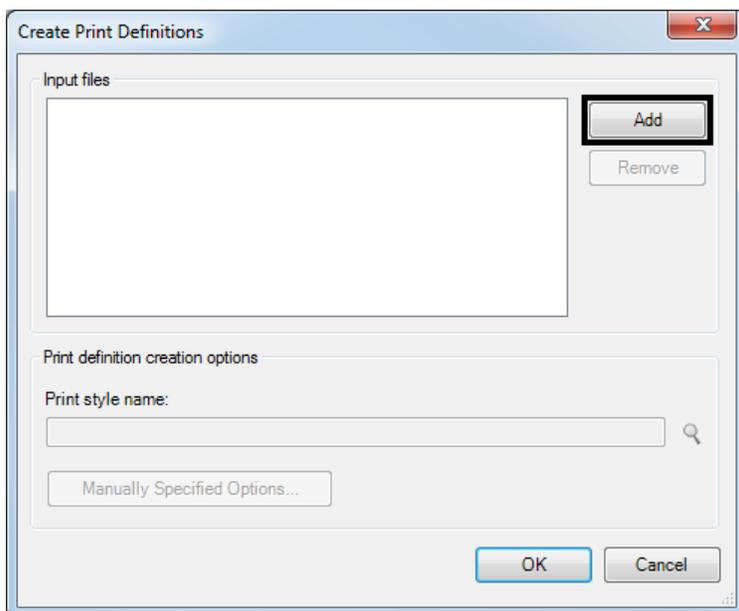
2. The **Print Organizer** dialog box will display. The print set name is Untitled. When you save the print set with a project related name, the root folder in the left hand column will change along with the file name. The saved file will have an extension of PSET.



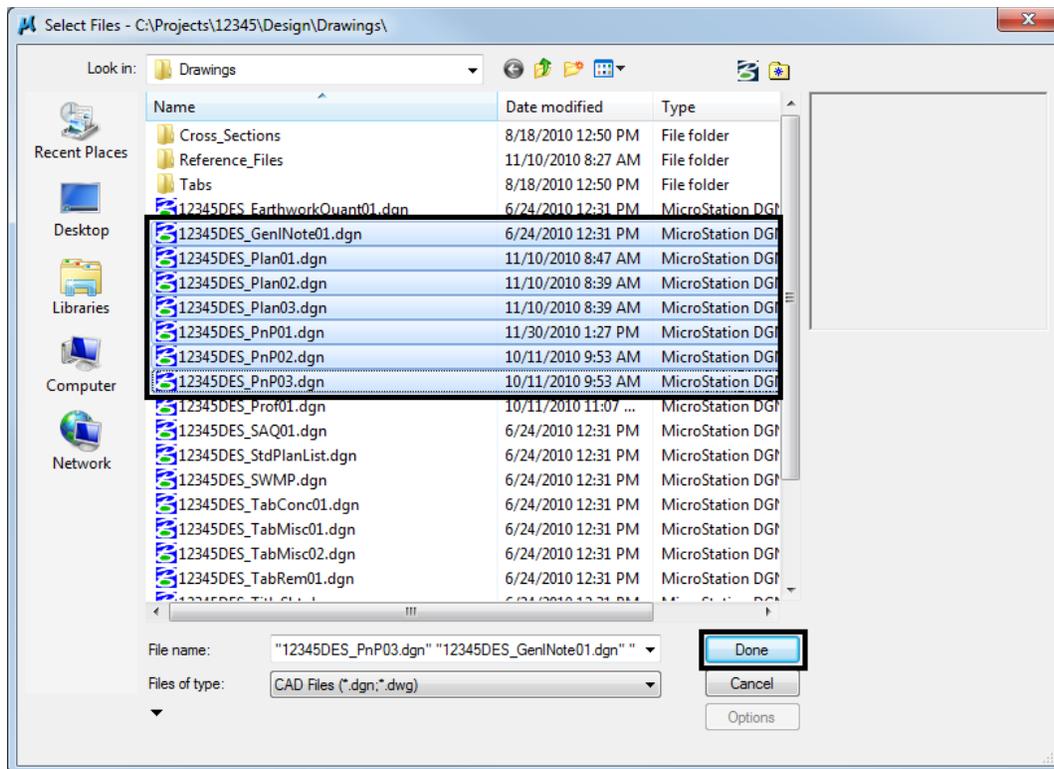
- Files can be added either by <D> the **Add Files to Set** icon, or by dragging and dropping files from **Windows Explorer**.



- When the **Add Files to Set** icon method is used, the **Create Print Definitions** dialog will appear. Here you can add files and set a print style. Begin by <D> the **Add** button to add files.

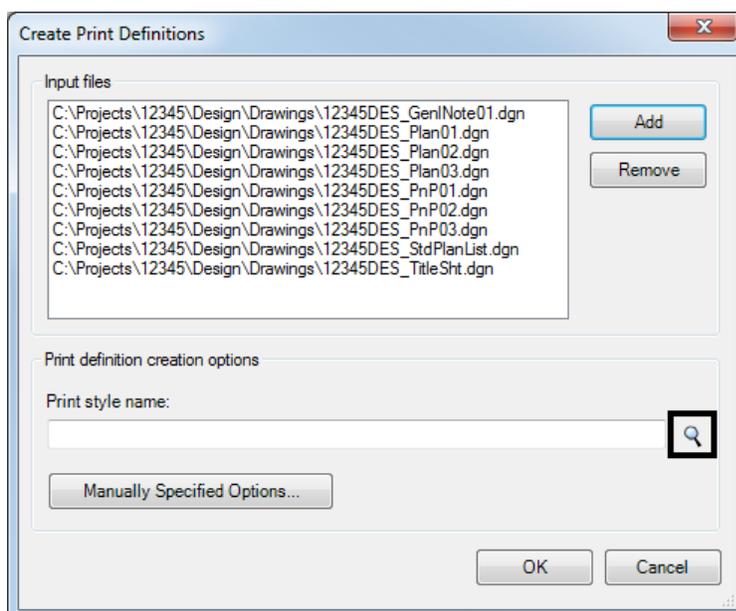


- Navigate to your project directory and select the files you want to add to **Print Organizer**. **<D> Done** to add the files.

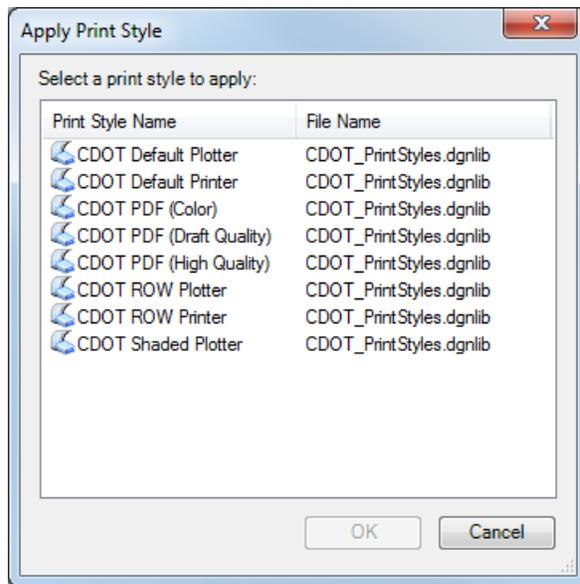


Note: You can hold down the **Ctrl** or **Shift** key to select multiple files.

- Print Styles** have been created to control print settings such as print area, paper size, workspace, color, raster quality, and fence area. **<D>** the **Browse** icon (magnify glass) to select the appropriate print style.



- The default print style names match the CDOT Print Driver naming conventions. For more on **Print Styles**, watch the “*Using Print Styles*” training video.

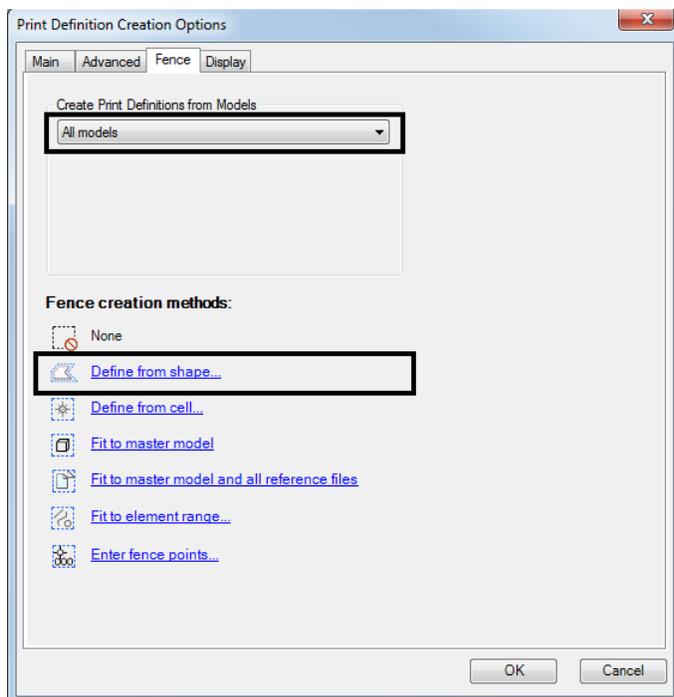


- After selecting the appropriate print style, **<D> OK** in the Apply Print Style dialog box.

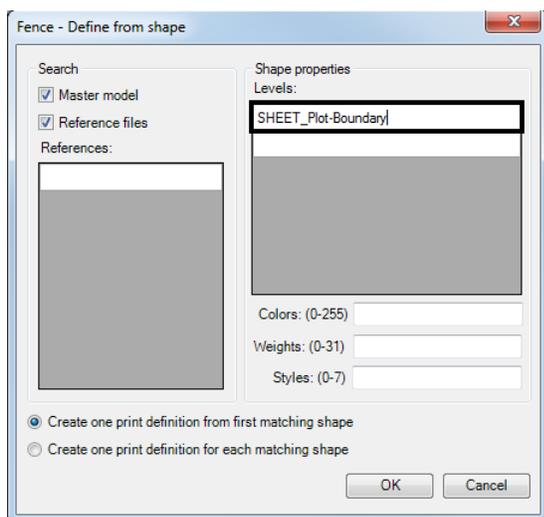
Note: Any additional files that are added in the future will take on the definitions of these first files unless you select otherwise.

- Next **<D> Manually Specified Options** to bring up the **Print Definition Creation Option** dialog box. Here is where you define the printing area.
- When adding sheet files, there is a layer defined for the printing border called SHEET_Plot-Boundary. This can be used as the fence definition.

- From the *Fence* tab, there are two settings. First set the *Create Print Definitions from Models* to **All models**.



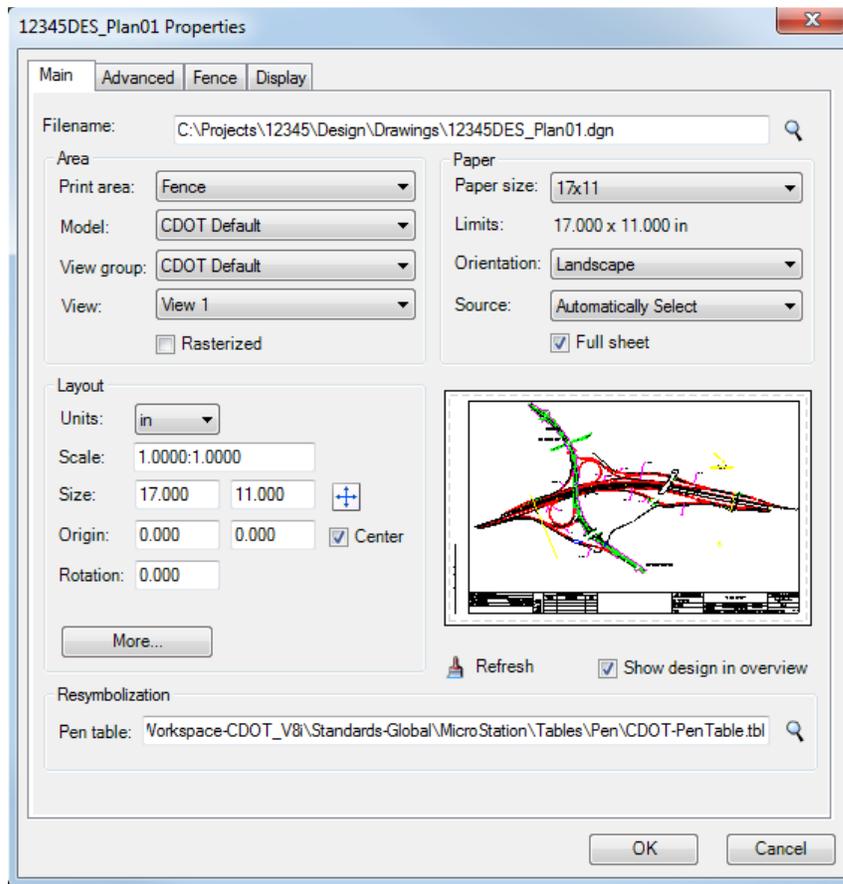
- Next select *Define from shape* and enter the shape properties. For example *SHEET_Plot-Boundary*. <D> **OK**.



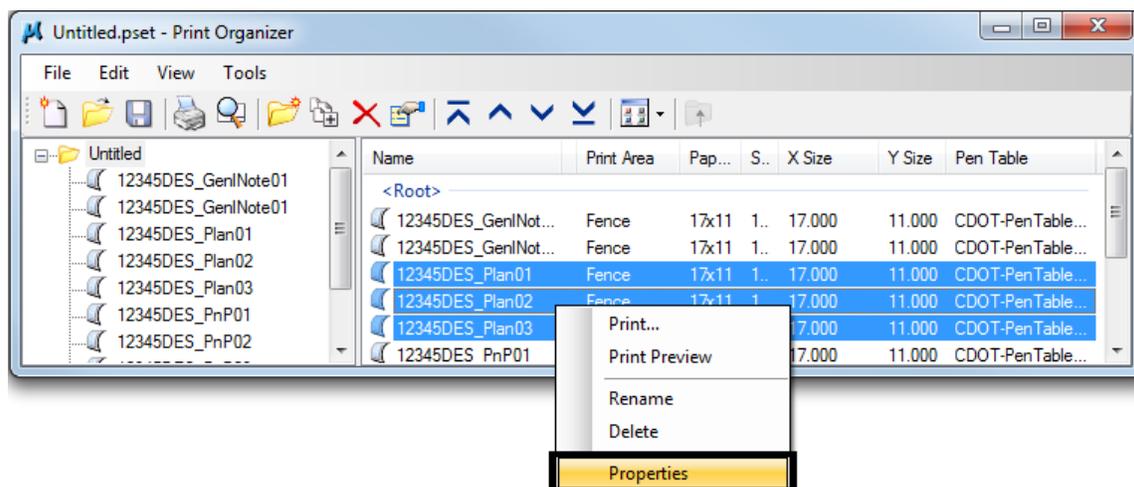
Note: When adding cross sections, toggle on *Create one definition for each matching shape*. This will create a separate file for each cross section in the model.

- <D> **OK** in the Print Definition Creation Option dialog box.
- <D> **OK** in the Create Print Definitions box. This will add the file(s) to your print organizer.

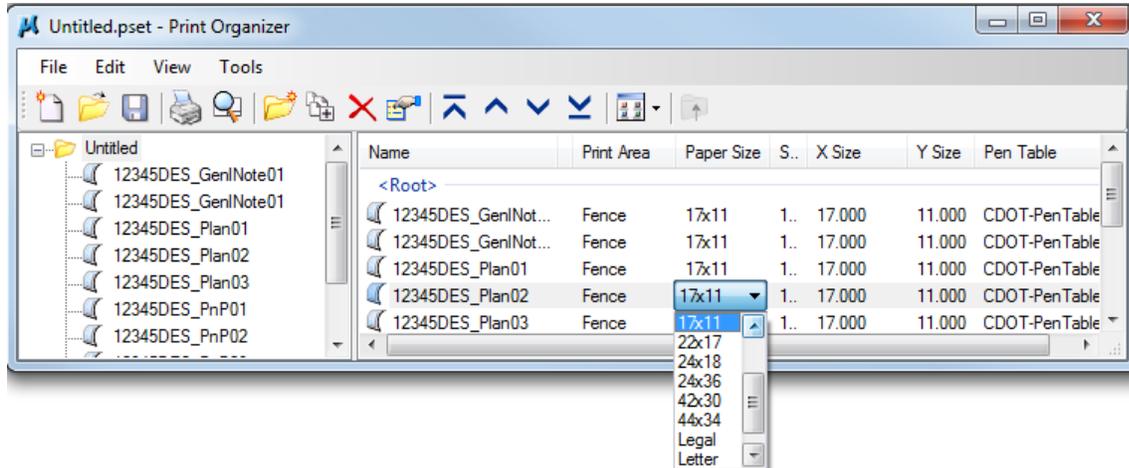
- To view the print style assignments or override them, double click on the file name. This will open the **Properties** dialog box for that file.



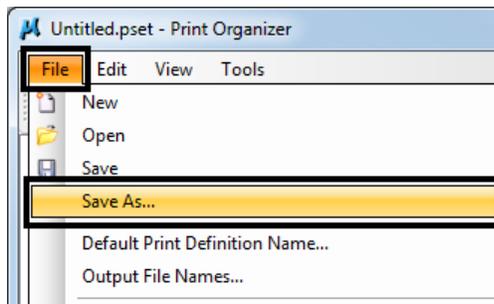
- Print definitions can be edited on more than one file at a time. If you select more than one file and then **right click** and select **Properties**, the **Modify Properties** dialog box becomes available.



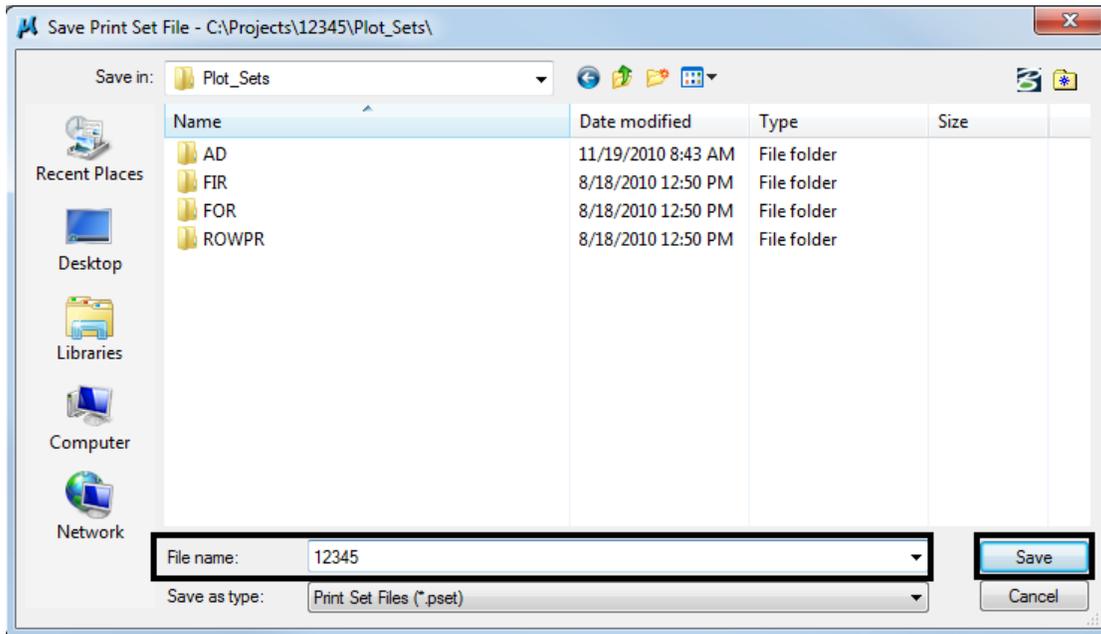
- Changes can also be made to a single file by using ***in-place print definition editing***. This can be done by selecting the file you wish to edit in the right hand pane and double-clicking on the property in a specific column.



- Once all the settings have been assigned, select **File > Save As**.



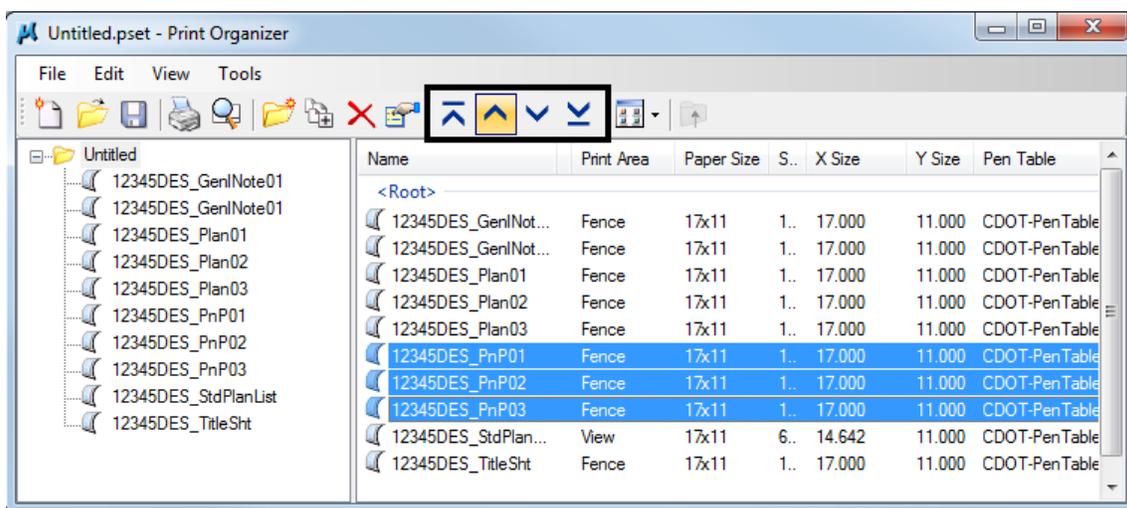
19. Navigate to the appropriate project folder and assign a new name to the file. <D> **Save** when complete.



Printing From Print Organizer

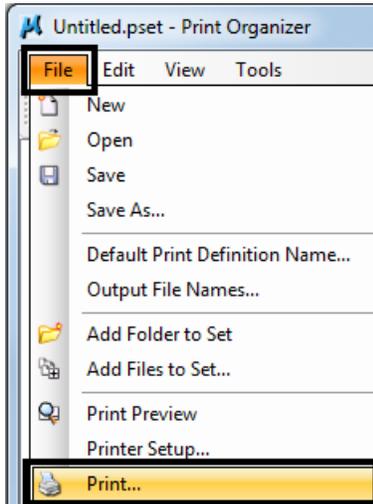
The files in the *Print Organizer* file will be printed in the order the sheets appear in the display. If they are displayed in the incorrect order this will have to be changed.

1. Select the sheets to change. Using the **Move** buttons, move the selected sheets to the desired location.

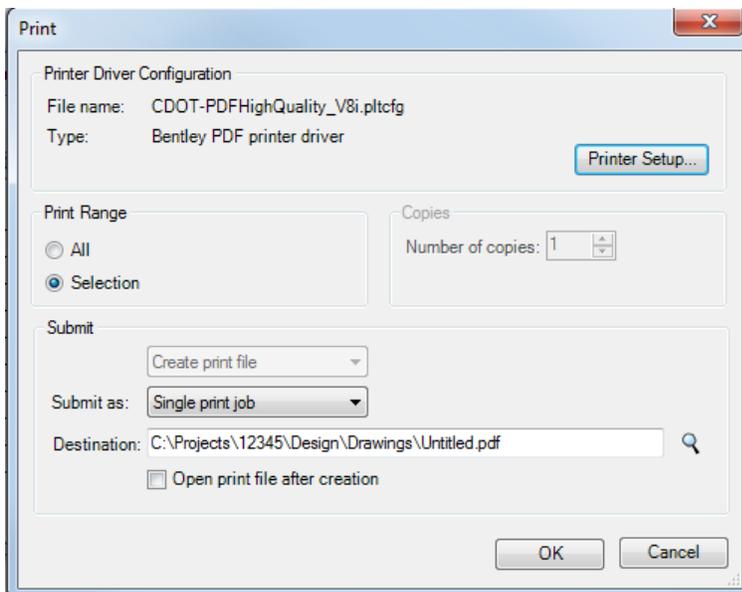


2. Be sure to **save** the changes.

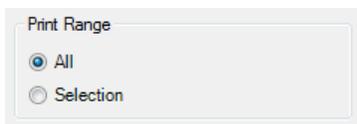
- Once all settings have been completed, select **File > Print** or **<D>** the printer icon to print the files.



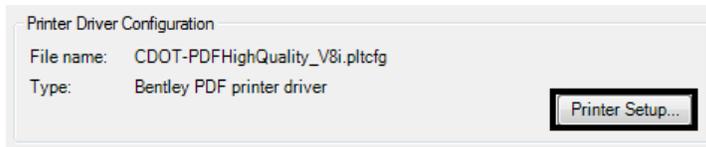
- The print dialog box will appear.



- The entire plot set can be printed or individual files. Select **All** or **Selection** for the print range.



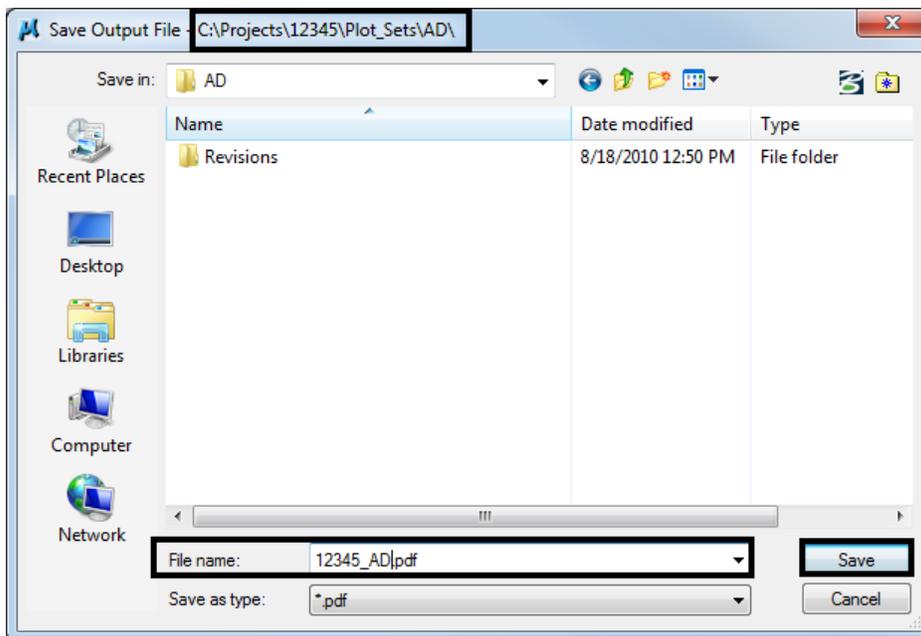
6. **Printer Driver** settings can be changed at this time if needed. Select the **Printer Setup** to select a different printer driver.



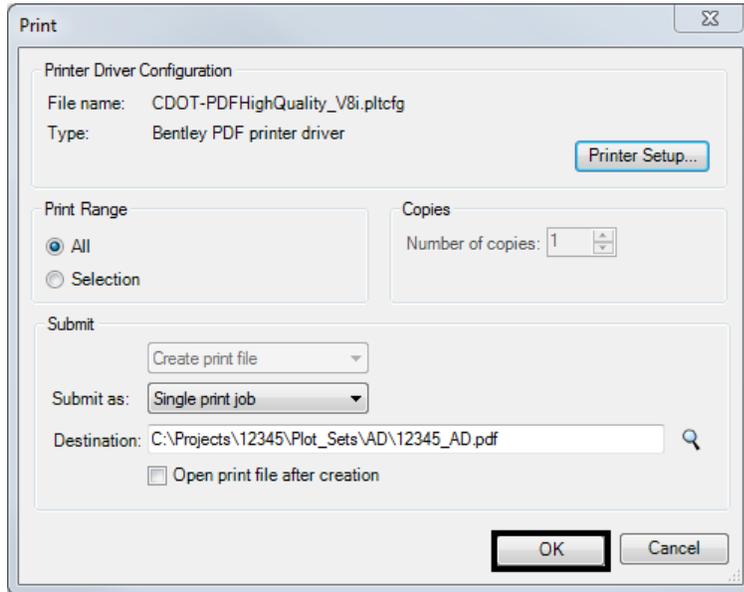
7. Finally, if you are creating an Adobe PDF file using a PDF driver, select the location where the file will be saved by **<D>** the **Browse** button



8. Navigate to the appropriate project folder. Enter a file name and **<D>** **Save**.

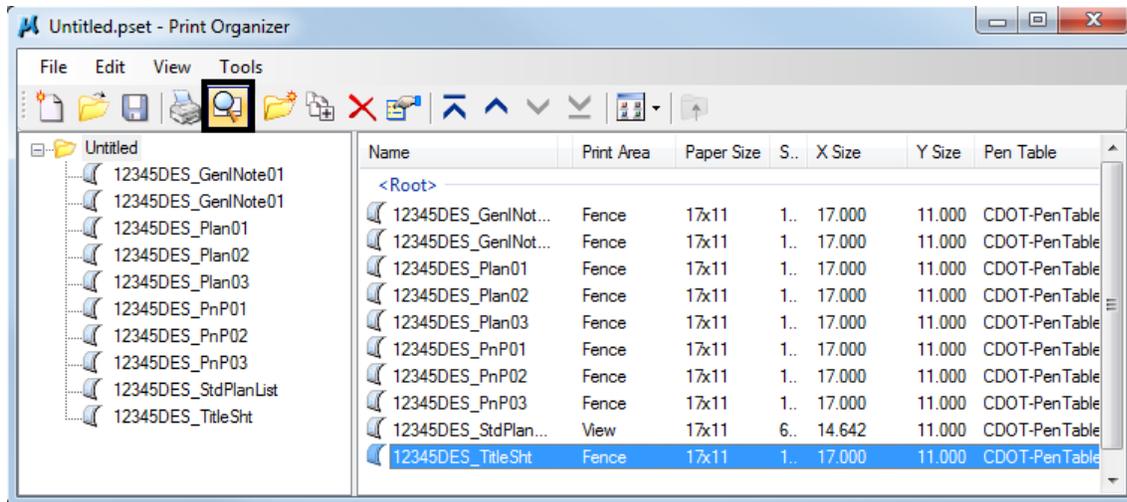


9. <D> **Ok** to activate the **Print** command.



Print Preview Files

1. Select the **Print Preview** icon to review files



- If more than one sheet has been selected, use the navigation buttons to page through the sheets.

Preview - 12345DES_TitleSht (5/5)

12345DES_TitleSht

Design / H/S	DEPARTMENT OF TRANSPORTATION STATE OF COLORADO	Related Projects
FINA PLEN WILL DEVELOPMENT? <input type="checkbox"/> NO <input type="checkbox"/> YES	HIGHWAY CONSTRUCTION AND PLANS OF PROPOSED FEDERAL AID PROJECT NO. XXXXXXX STATE HIGHWAY NO. XXX XXXXXXX COUNTY CONSTRUCTION PROJECT CODE NO. XXXXX	P.L. PROJECT NUMBER: XXXXXXXX PROJECT CODE: XXXXX
INITIAL DESIGN STATUS? <input type="checkbox"/> NO <input type="checkbox"/> YES		R.O.M. PROJECT NUMBER: XXXXXXXX

TABULATION OF LENGTH & DESIGN DATA			
STATION	FEET	MILES	
		ROUTE	PERCENT
APPROACH TO PROJECT			
STN. 0+00.00	300.00	0.0000	0.0000
SECTION 0000-0000			
STN. 0+00.00 TO 0+000.00, R.P. 0.00	300.00		
STN. 0+00.00 WITH STRUCTURE			300.00
STN. 0+00.00 END STRUCTURE	300.00		
END 0000-0000			
STN. 0+00.00 TO 0+000.00, R.P. 0.00	300.00		
APPROACH TO PROJECT			
STN. 0+00.00			
TOTAL	0	0	0
NUMBER OF PROJECT SECTIONS	000	000	0.0000
TOTAL PROJECT LENGTH	300.00	0.0000	0.0000

DESIGN DATA			
	S.H. 100'	S.H. 100'	S.H. 100'
HIGHWAY WIDTH OF CURVE	300.00 FT	300.00 FT	300.00 FT
HIGHWAY GRADE	0.0%	0.0%	0.0%
HIGHWAY S & S. HORIZONTAL	300 FT	300 FT	300 FT
HIGHWAY S & S. VERTICAL	300 FT	300 FT	300 FT
HIGHWAY DESIGN SPEED	50 MPH	50 MPH	50 MPH
MIN. DESIGN TRUCKS	20	20	20
MIN. TRUCK S	20	20	20
CLEAR ZONE DISTANCE (TARGET)	0.00 FT	0.00 FT	0.00 FT
CLEAR ZONE DISTANCE (MIN. ROUTE)	0.0 FT	0.0 FT	0.0 FT
CONSTRUCTION CLEAR ZONE (MIN 14')	0 FT	0 FT	0 FT

SHEET REVISIONS		CONTRACT INFORMATION		PROJECT NO./CODE	
NO.	DATE	DESCRIPTION	CONTRACTOR	PROJECT NUMBER	PROJECT CODE

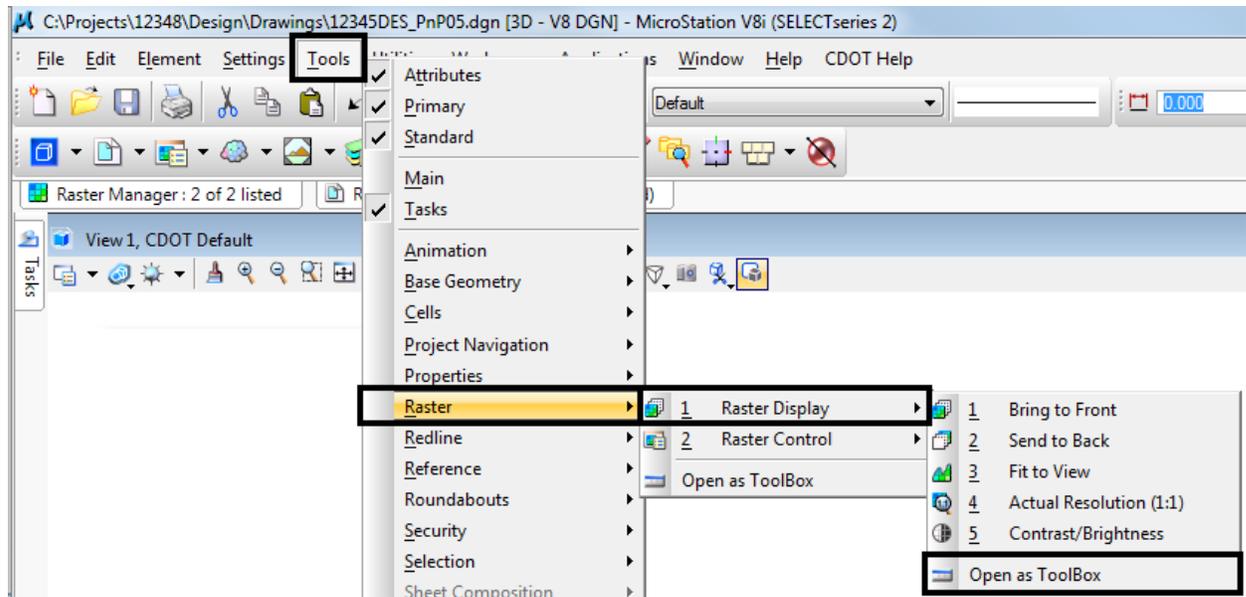
As Constructed		Contract Information		Project No./Code	
NO. REVISIONS	DATE	CONTRACTOR	PROJECT NUMBER	PROJECT NUMBER	PROJECT CODE

Workflow MP 4 - Printing Raster Images

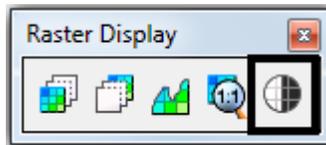
This document guides you through the display settings of raster images and modifying text for better clarity.

Adjusting Raster Display Settings

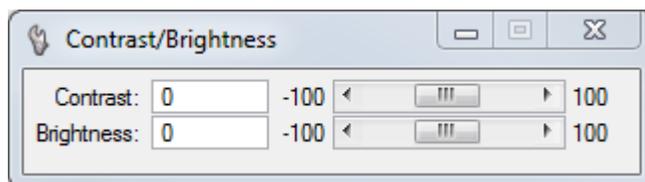
1. Contrast and Brightness controls are used to adjust the display characteristics of raster images. Select **Tools > Raster > Raster Display > Open as Toolbox**.



2. The Raster toolbox will appear. <D> the **Contrast/Brightness** icon.



3. If more than one raster image is displayed in the drawing, the image you want to adjust may not be active. To select a different image, <R> then select the desired image (<D>) from the view.
4. Determine how you want to adjust the selected raster image. To make an image appear lighter, move the **Brightness** slider to the right or key in a positive value. To increase the contrast of the image (setting apart the display of different entities within the raster file), move the **Contrast** slider to the right or key in a positive value. Using a negative value for contrast will result in a darkened image.



5. Continue adjusting **Brightness** and **Contrast** until the desired result is achieved then dismiss the setting dialog.

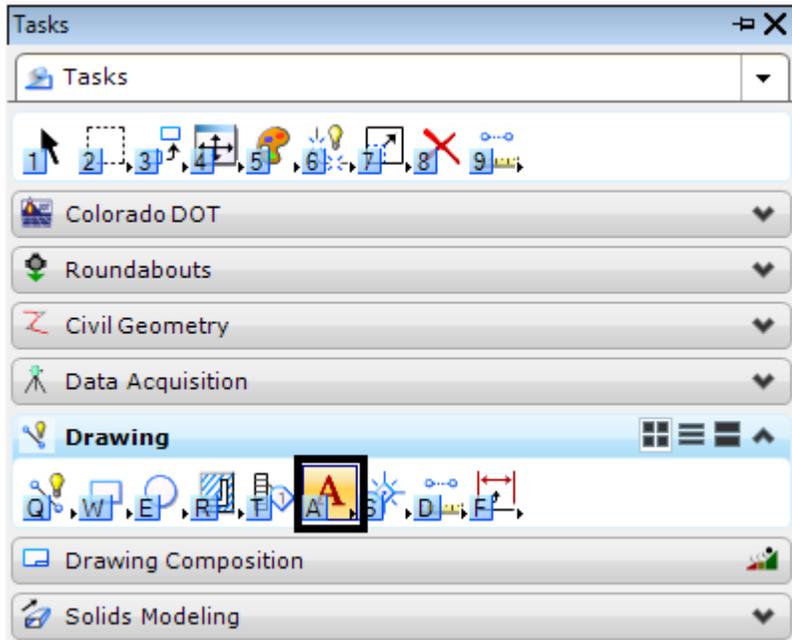
Using a Text Style with a Background

If a raster image is dominated by dark colors, it may be necessary to use a text style with a background.

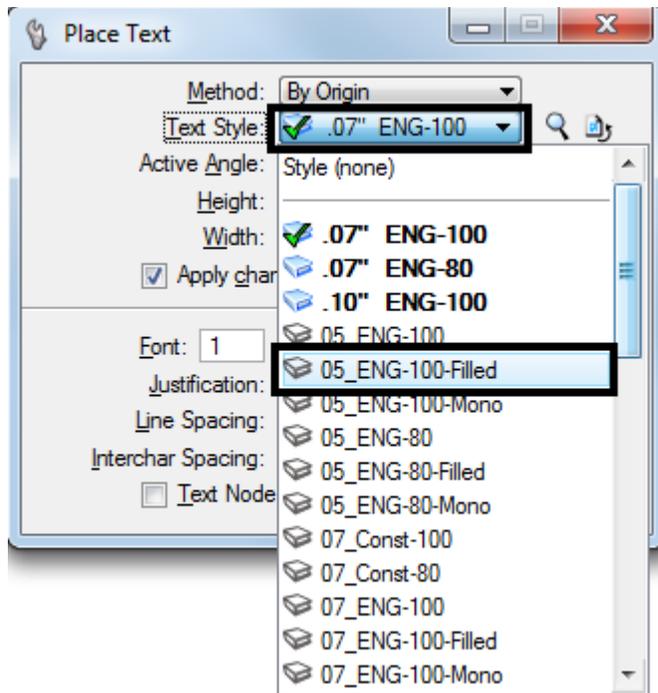
Placing Text with a Background

The only change required for placing text with a background is to select one of the “Filled” Text Styles.

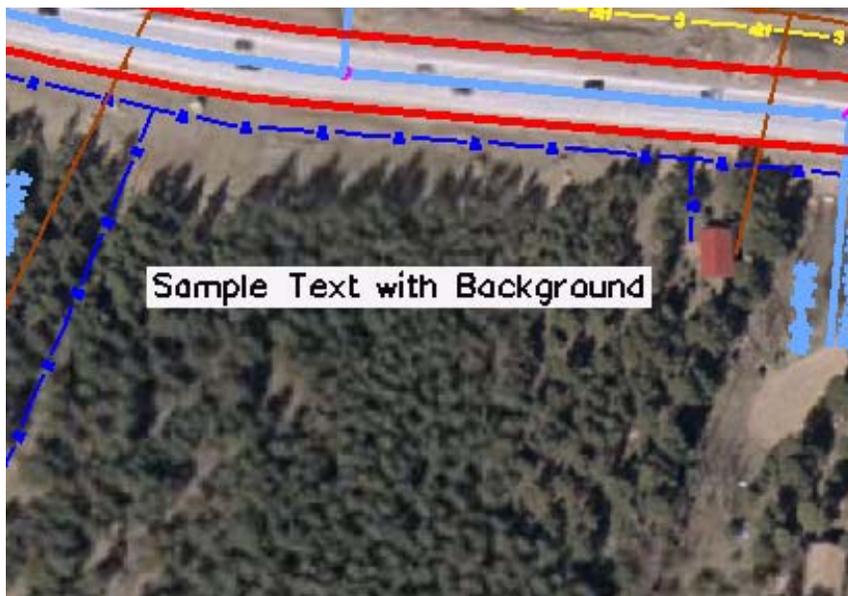
1. Select the **Place Text** icon from the **Main** toolbar.



2. In the **Place Text** settings dialog box, use the **Text Style** pull down menu and select the desired **"Filled"** Text Style.



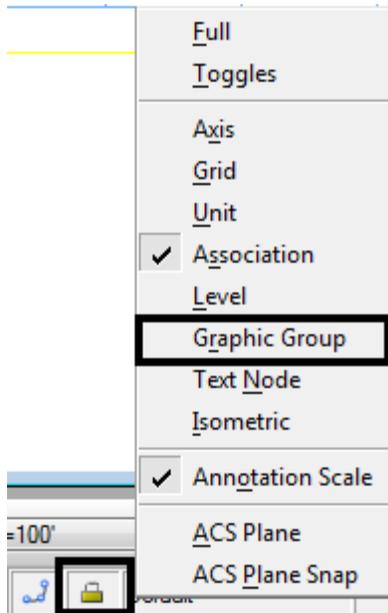
3. In the **Text Editor**, key in the desired text and place as normal. The result will look like the example below:



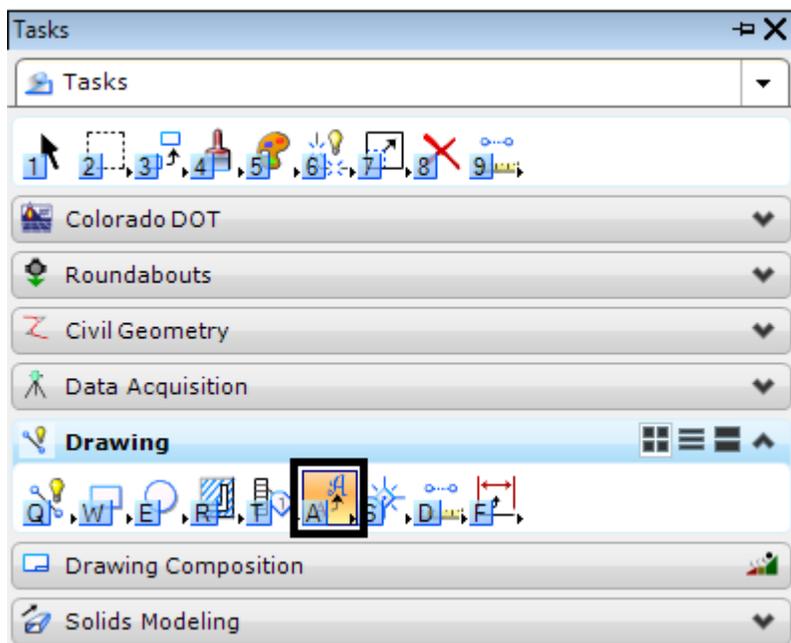
Note: The color of the text in this example has been changed for clarity.

Modifying InRoads Text to Have a Background

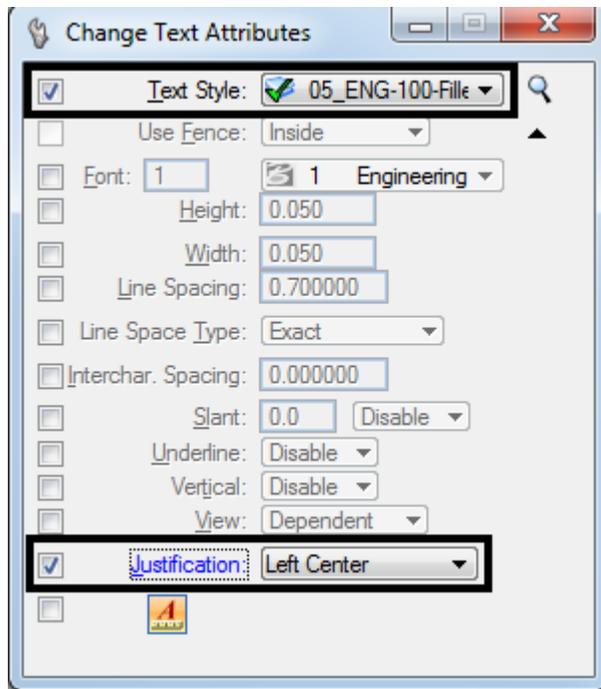
1. InRoads does not use Text Styles or Annotation Scale. Therefore, text displayed by this program will have to be modified to display a background.
2. Turn *off* the **Graphic Group Lock**. All Cardinal Point text and all P.I. text are contained in graphic groups. Turning off the **Graphic Group** lock will allow the justification to be set for each piece of text as needed.



3. Select **Change Text Attributes** from the *Main* toolbar.



- In the **Change Text Attributes** dialog box, set the **Text Style**. Use **10" ENG-100 Filled** for Major Stations and **07" ENG—100 Filled** for PC, PT, and PI stationing Points. Also, set the desired **Justification**.



Note: Note: the following justifications are used by InRoads:

- Major Stations - Left Center
 - P.I. Left of Centerline - Right Center
 - P.I. Right of Centerline - Left Center
 - Cardinal Left of Centerline - Right Bottom
 - Cardinal Right of Centerline - Left Bottom
- Select the desired text from the MicroStation view. Text may be selected individually or use the MicroStation element selection tools to select multiple text entities. Use the element selection tools to select a large number of elements that have the same Text Style and Justification (like Major Stations, for example). For Cardinal Points and P.I. stations, selecting them individually may be a better option as their justification is dependent on the direction of the curve.

Note: The text will change to a very small size. Do not worry about that for now. An **Annotation Scale** will be added to all of the text that was modified at one time. This will restore the text to its proper size. As shown below, the text size in the image on the left is correct, but the text styles are wrong. The text in the image on the right has the correct text style applied, but no adjustment to the text size has been made.



6. Repeat steps 10 and 11 for all of the text placed by InRoads.
7. Highlight all of the InRoads placed text that has been changed to a “Filled” text style.
8. If no text is highlighted when the “*annotationscale add*” keyin is run, then the annotation scale is applied to all text. This will enlarge InRoads geometry symbols (which come from symbol fonts) by the annotation scale factor.
9. In the **Key-in** window, type “*annotationscale add*” and <D> the **Run Key-in** icon or press the **Enter** key. This will restore the text to its proper size.



10. Below is an example of InRoads text with a filled background and correct annotation scale.



Workflow MP 5 - Shaded Color and Grayscale Printing

This document guides you through the set-up and printing process for shaded and grayscale Sheet Files. This workflow may be used any time the user wants to highlight specific areas for things such as phasing plans, public meetings, ROW exhibits, etc. Please note that the use of raster images (jpg, bmp, tif, etc.) will dramatically increase the processing time during printing

Reference File Management

Adjustments must be made to some of the reference file settings in order to achieve the desired print quality. The settings that may need changing are the **Slot Numbers** and **Update Sequence**. **Slot Numbers** are unique identifiers assigned to reference files and can be called out individually or in groups within a pen table for special processing during printing. **Update Sequence** determines the order in which files are refreshed on the screen and printed on paper.

Reference File Slot Number Categories:

0= Sheet File (black) - this is the active dgn file

1-99 = Proposed Primary Discipline (Black)

100-199= Existing Topo (light gray)

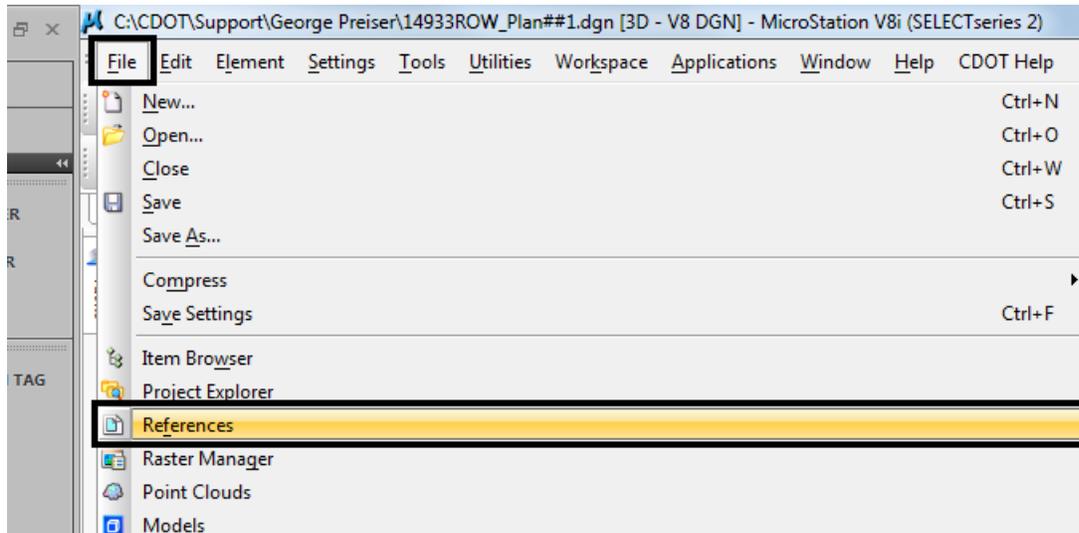
200-299= Proposed Other Discipline (dark gray)

300-399= Color Shaded Areas

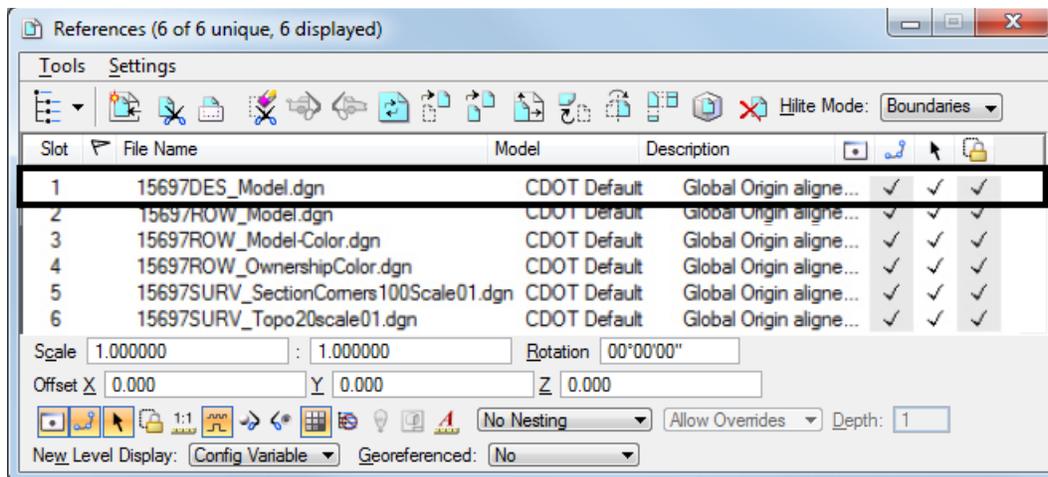
Note: All data placed in the Sheet File will be printed black. Items to be printed in color should be contained in their own file. Create a new file using the standard CDOT seed file and reference design elements to create color areas. If printing to a black and white printer all colors will be printed grayscale. Files can still be printed using the default printer drivers and pen tables, however shaded areas will lose their transparency and may print black depending on their level.

Assigning Slot Numbers

1. Open the **Reference Files** dialog by selecting **File > Reference** or **<D>** the **Reference** icon on the **Primary** toolbar.

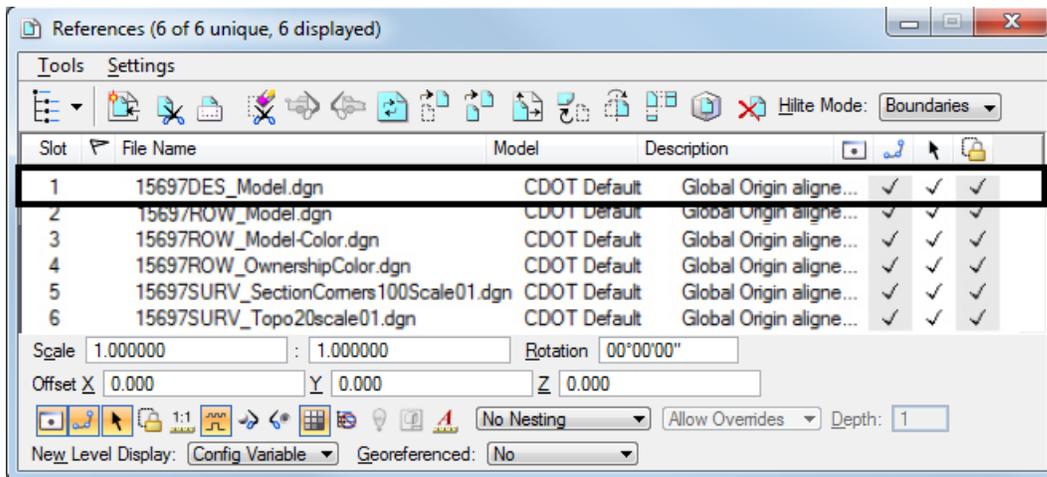


2. **Highlight** the desired reference file that you want to apply shaded color, grayscale or a combination of both to for printing purposes.

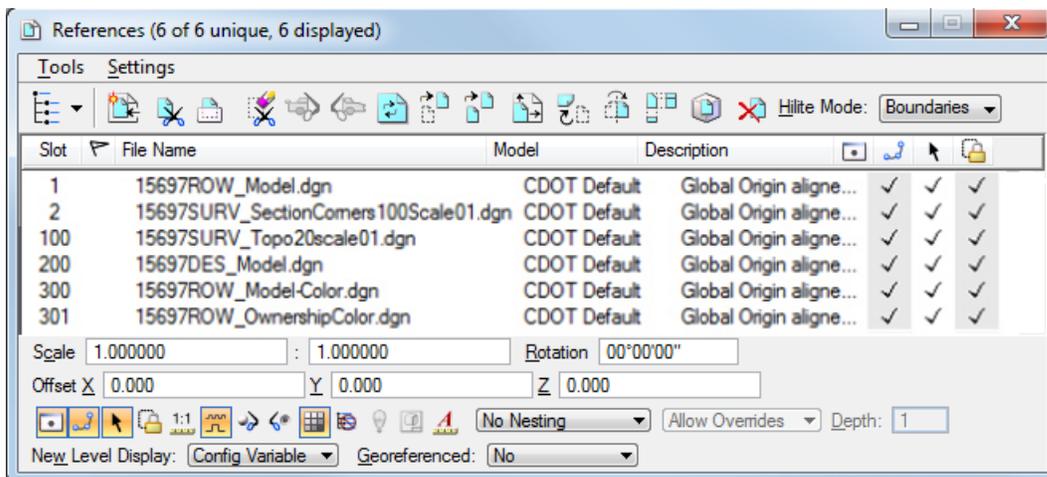


3. Once a reference file is highlighted, **<D>** in the **Slot Number** field.

4. **Key-in** the desired number and press the **Enter** key. Refer to the Reference File Slot Number Categories on Page 1. In this example, **200** is entered, which will result in reference file information be plotted Dark Gray, indicating Other Discipline. The reference files will be re-ordered in the window based on their slot numbers after you have updated the Slot Numbers for all reference files.



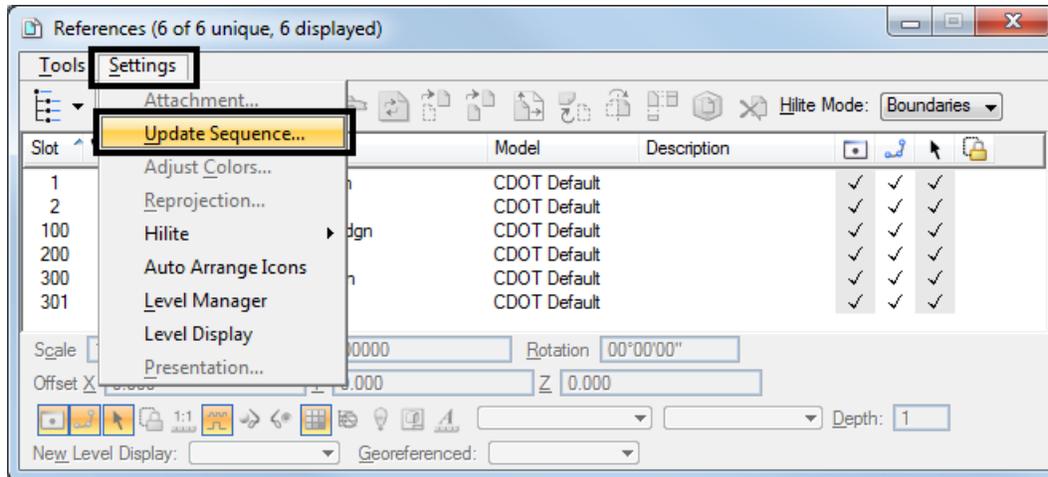
5. Repeat this process for each of the reference file attached. The illustration below shows a group of files with updated slot numbers.



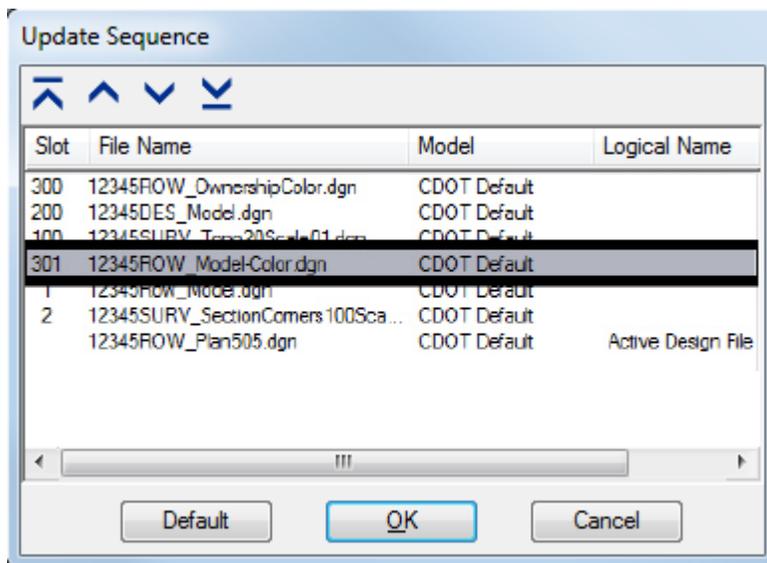
Note: Reference files whose slot numbers are not changed will print black because they will be in the 1-99 range.

Re-Ordering Sequence

1. Select **Settings > Update Sequence**. This displays the *Update Sequence* dialog box.



2. If a reference file in the list contains shaded areas, move it directly below **Raster References**. If there are no raster references, move it to the top.
3. Move the **Active Design File** to the bottom of the list. When updating the sequence of reference files, highlight the desired file then **<D>** the **Move Up** or **Move Down** icon until it is in its desired location. The **Move Up** icon is outlined below.



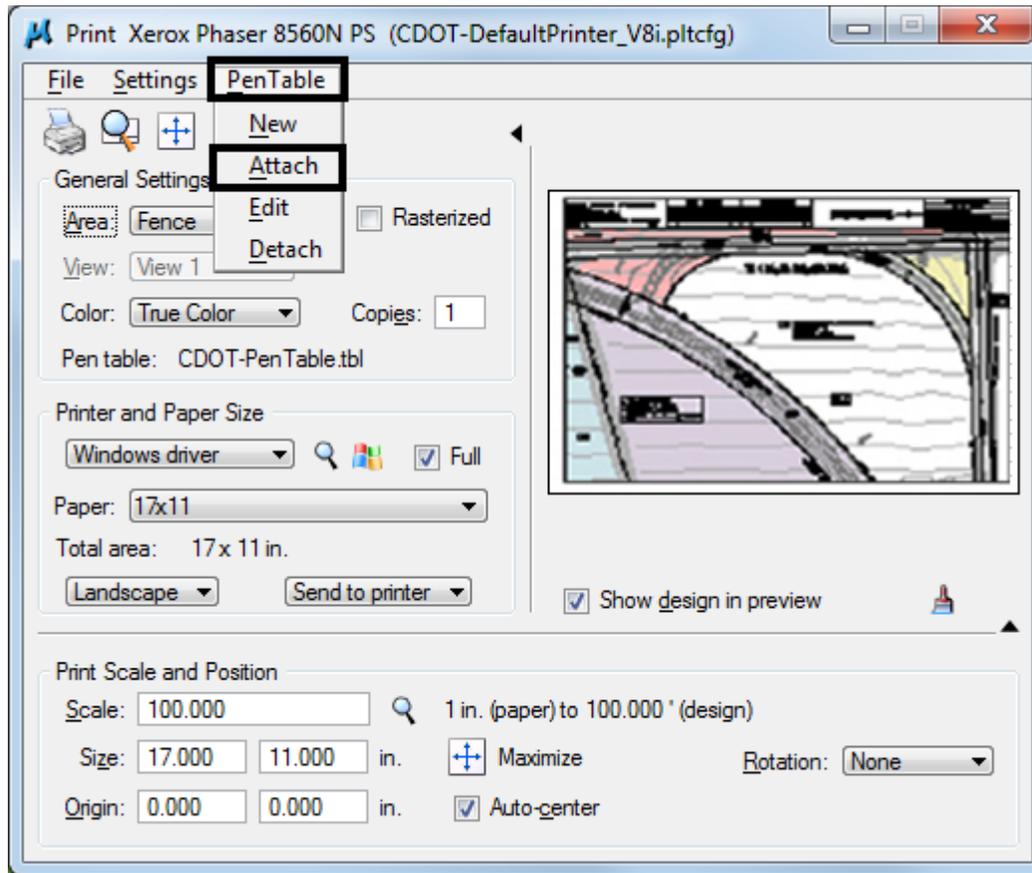
4. Any file containing Area Patterns should be moved under the files containing shaded areas. Highlight the desired file then **<D>** the **Move Up** icon until it is in its desired location. **<D>** **OK** to proceed with plotting.

Note: If area patterns are to be printed in color they should reside in the file containing shaded areas to be printed in color, or in their own file.

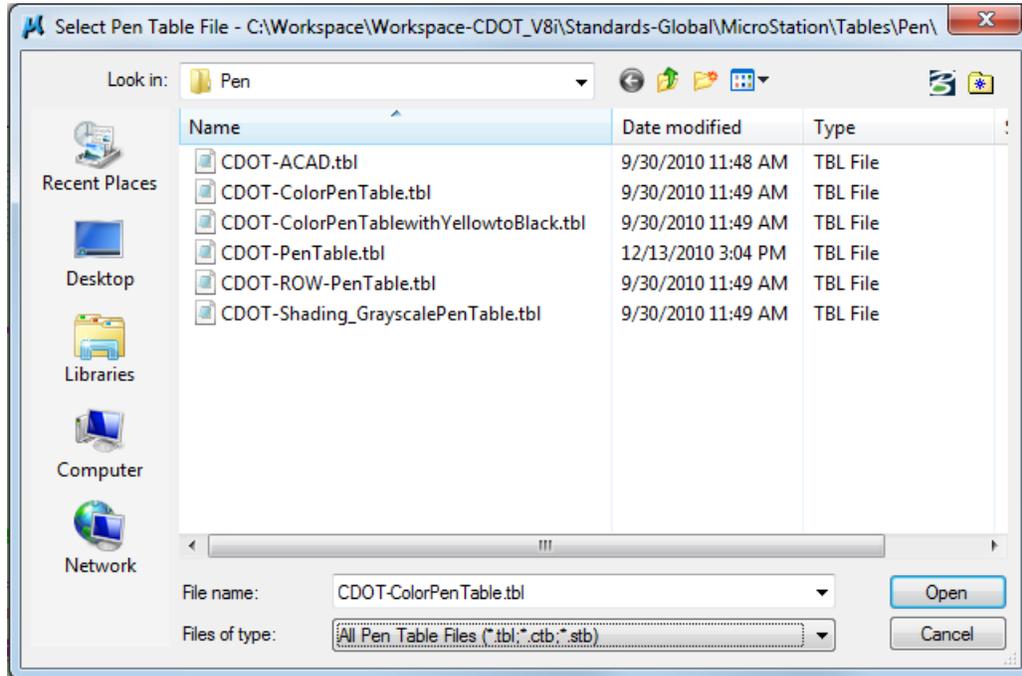
5. Select **File > Save Settings** from the MicroStation main menu after reordering slot numbers so these changes will remain each time this file is plotted.

Selecting the Pen Table

1. Select **PenTable > Attach** from the **Print** dialog pull-down menu.



- From the **Select Pen Table File** dialog, select the *CDOT-Shading_GrayscalePenTable.tbl* then <D> **OK**.

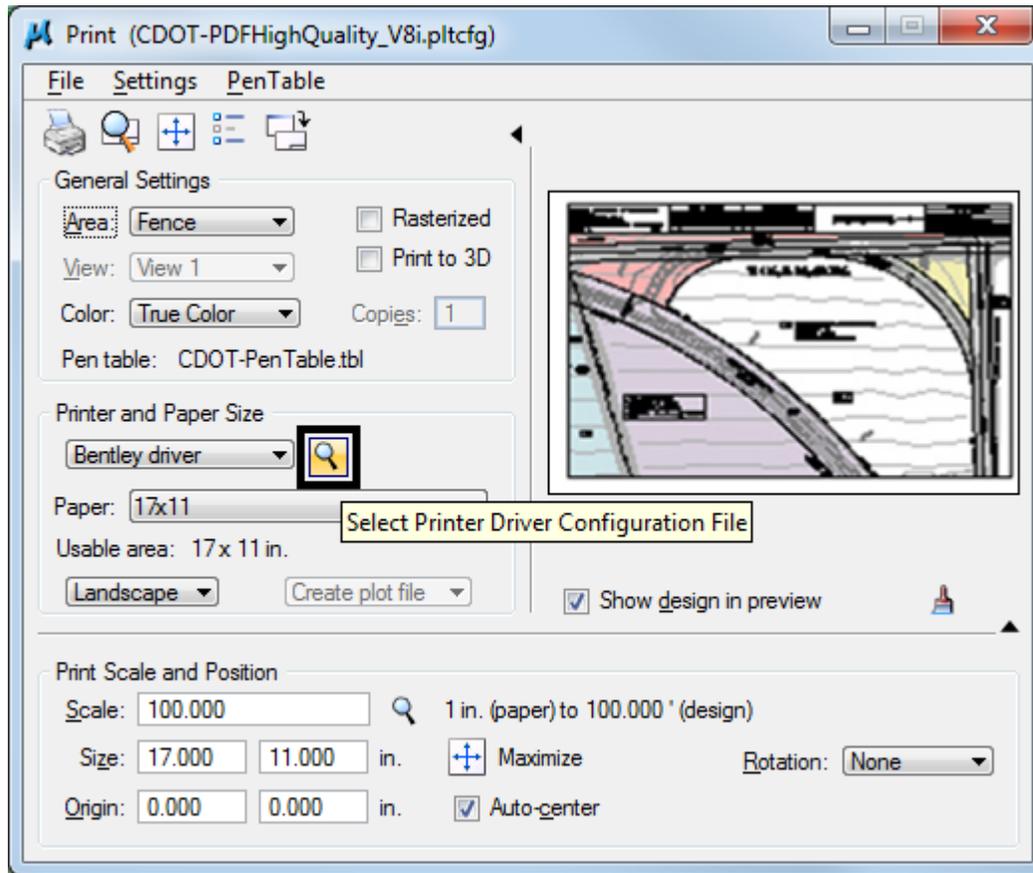


- Select **File > Save Settings** from the MicroStation main menu before exiting the file.
- The remainder of the printing process does not change. For additional information refer to the workflow document *CDOT Workflow MicroStation Printing*.

Creating A PDF File

To create a PDF file of the shaded print follow the steps above, then continue by completing the steps below.

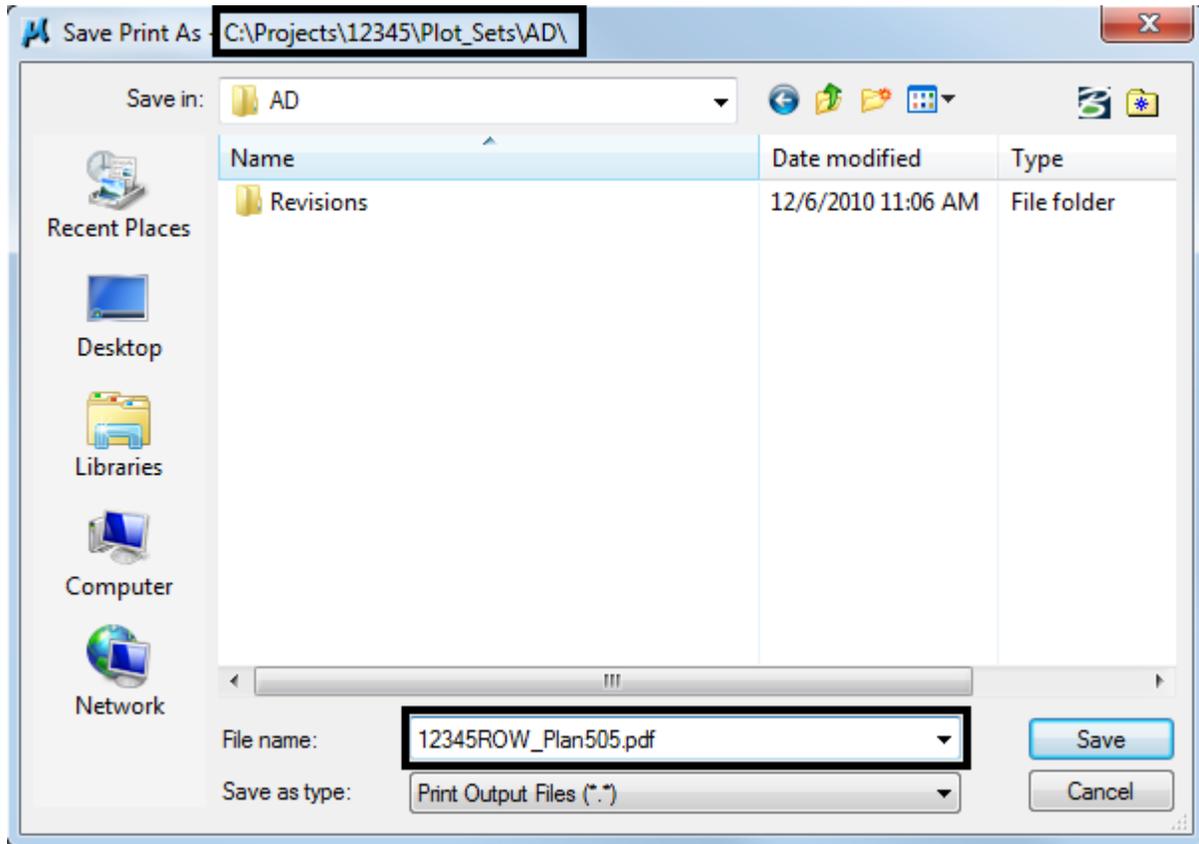
1. <D> the **Select Print Driver** icon from the **Print** dialog.



2. From the **Select Printer Driver File** dialog, select the correct Printer Driver file. <D> **OK** to accept the change and dismiss the window.
3. <D> the **Print** icon in the **Print** dialog box. The **Save Print As** dialog box will be displayed.
4. Set the desired directory path for the file in the **Directories** area.
5. Key in the desired name for your file in the **Files** field and <D> **Save**.

Note: A default name (the DGN file name with the pdf extension) is supplied by the computer.

- 6. <D> **OK** to accept the changes and create the PDF file.



Workflow MP 6 - Printing AutoCAD Files in MicroStation

This document guides you through printing AutoCAD files in MicroStation.

Workflow Outline

Open an AutoCAD File in MicroStation - To ensure that the printed AutoCAD file matches printed MicroStation files, the AutoCAD file is printed from MicroStation.

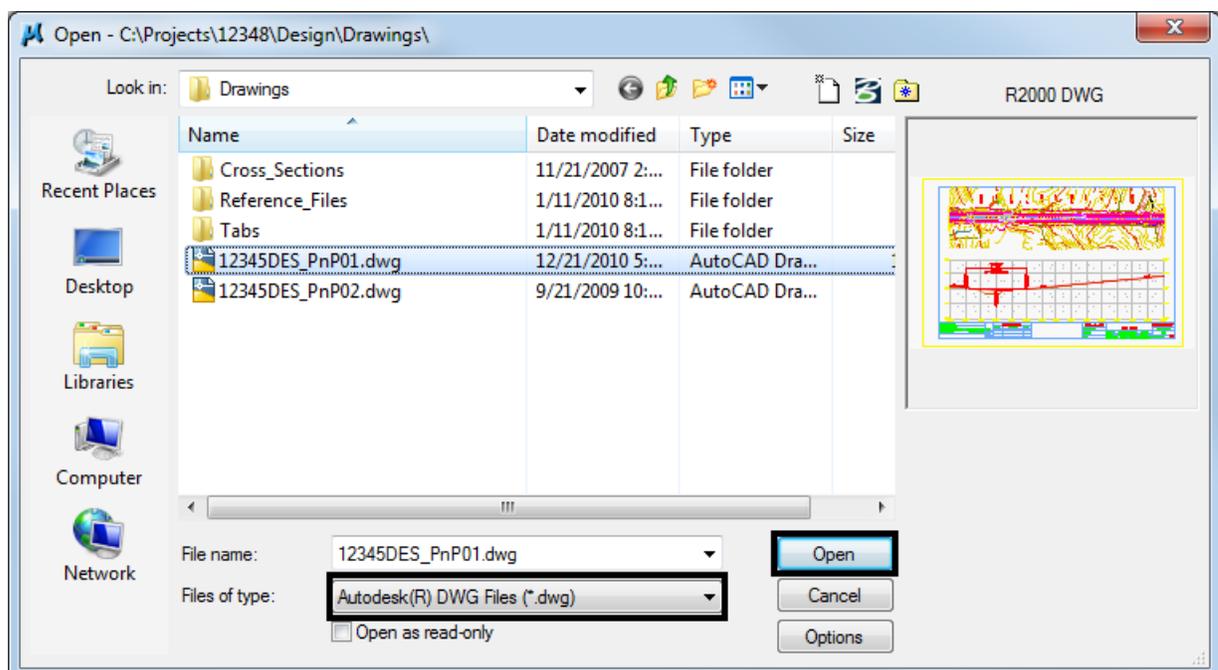
- ◆ **Commands Used: File > Open** - Used to access the MicroStation Manager dialog box. From there, the AutoCAD file is opened.
- ◆ **DWG/DXF Units** - This sets the units for the AutoCAD file to match MicroStation units.

Print the File - There are two items that need to be set before sending the file to the printer; the printer driver and the pen table.

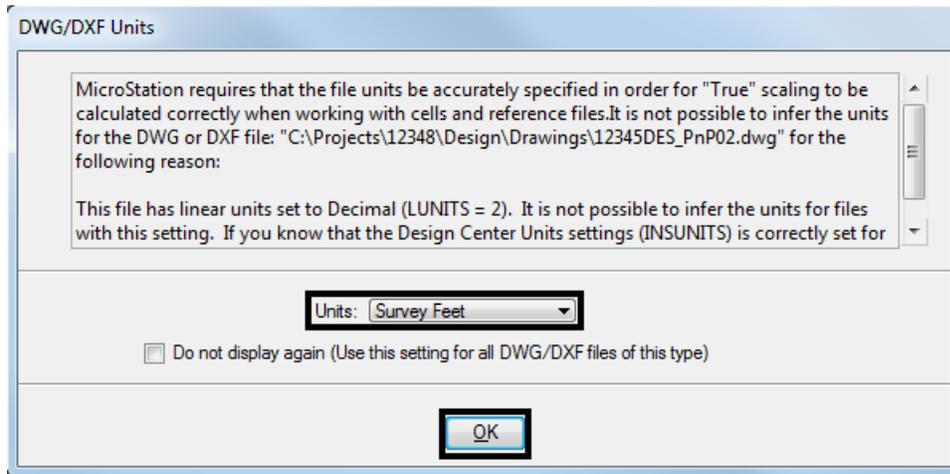
- ◆ **Commands Used: Print** - Used to access the Print dialog box.
- ◆ **Printer Driver** - Used to select the proper driver for the desired print type.
- ◆ **Pen Table > Attach** - Used to attach the CDOT_ACAD.tbl pen table.
- ◆ **Send Print** - Used to submit the file to the drawing to the printer (or file for a pdf).

Opening an AutoCAD file in MicroStation

1. From the **Open** dialog, select an AutoCAD (*.dwg) drawing file. Change **Files of Type** to **Autodesk(R) DWG Files (*.dwg)** to view all the AutoCAD files residing in the specified directory. Select a file and **<D> Open**.

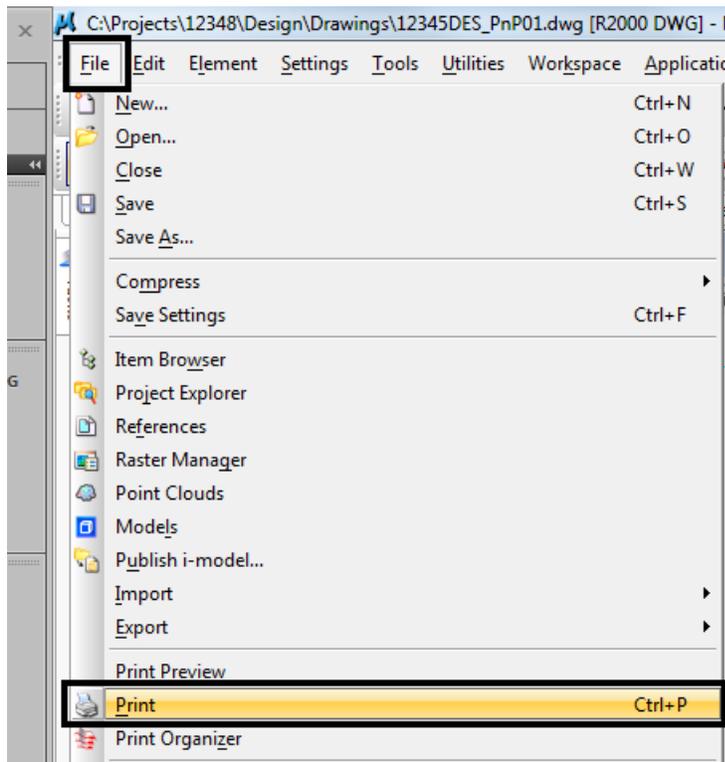


- The **DWG/DXF Units** dialog box will appear. Verify the **Units** are set to **Survey Feet** and **<D> OK**.



Note: If the AutoCAD drawing file contains the **WWW** PICS linestyle then change these elements and place them on the standard CDOT MicroStation Level called **ROW_MONUMENT_City-Limit-Line-Text** and update to use bylevel symbology.

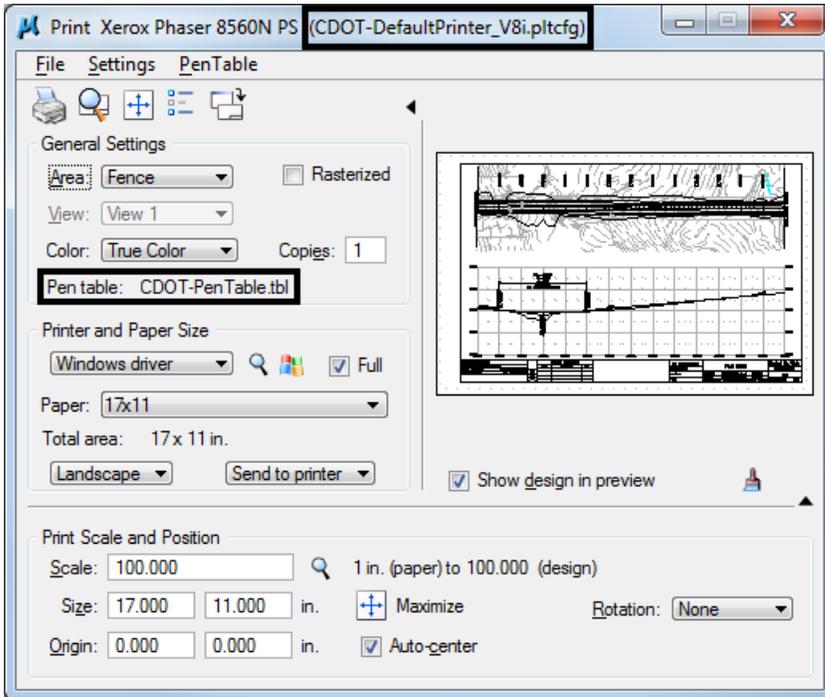
- Select **File > Print** to open the **Print** dialog box.



- Optionally, <D> the printer icon on the **Standard Tool Bar**.

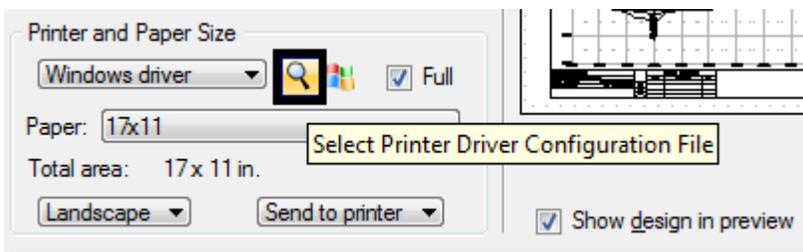


- The current **Printer Driver** will display in the title bar at the top of the **Print** dialog box and the current **Pen Table** is displayed under the **General Settings** area.



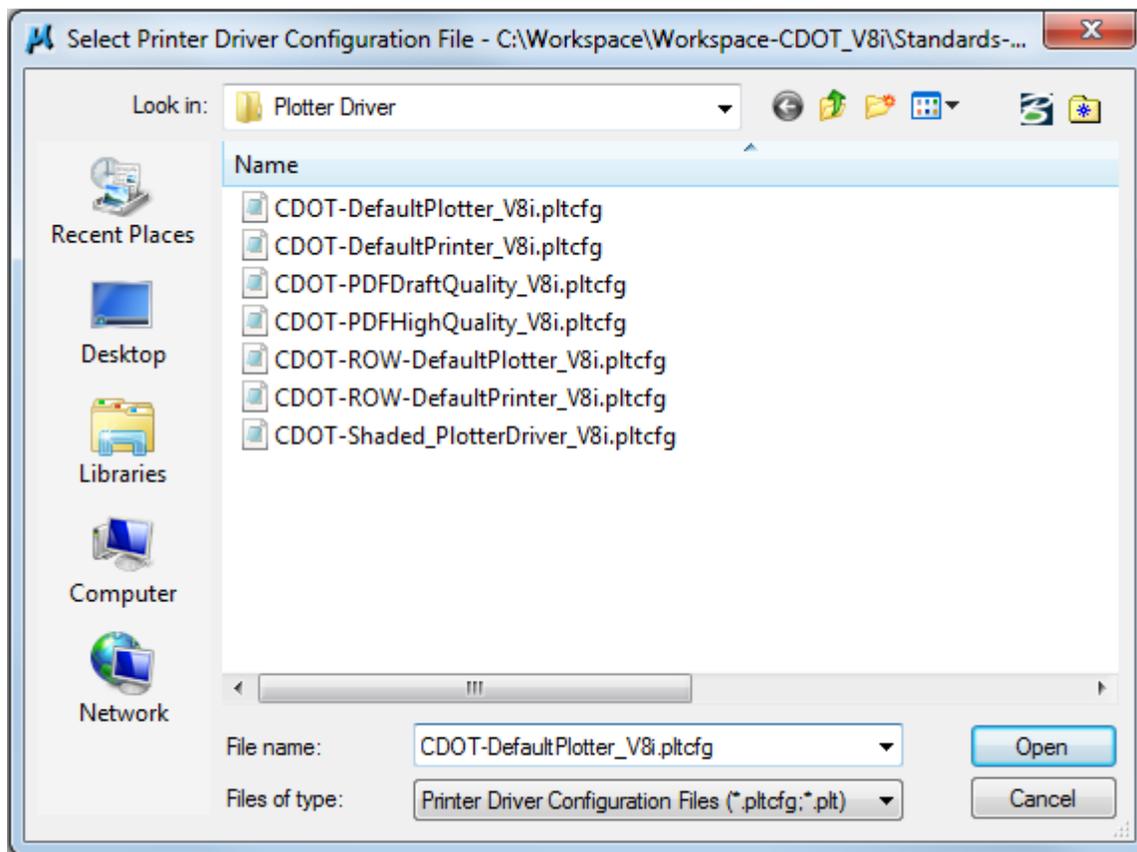
Note: If you are printing Sheet Layouts, *Print Scale and Size* settings will update automatically. If you are printing from a Model Layout set the scale as desired. For more information or additional printing questions, see the workflow document *CDOT Workflow MicroStation Printing*.

- The default Printer Driver is *CDOT-DefaultPrinter_V8i.pltcfg* and the default Pen Table is *CDOT-PenTable.tbl*. To change the Printer Driver, <D> the magnifying glass located under **Printer and Paper Size**.

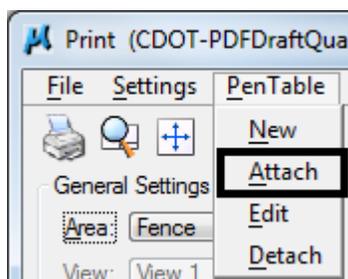


- Seven printer drivers are available in the... **\Microstation\Plotter Driver** directory.
 - CDOT-DefaultPrinter_V8i.pltcfg* should be used to send plots to the default printer.

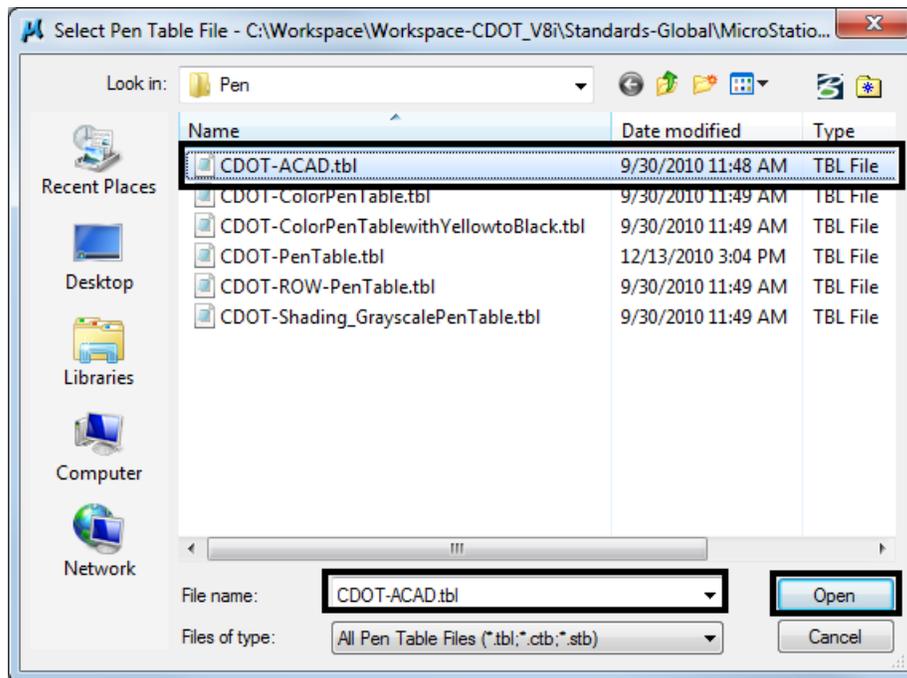
- *CDOT-DefaultPlotter_V8i.pltcfg* should be used to send plots to the default plotter.
- *CDOT-PDFDraftQuality_V8i.pltcfg* should be used for the creation of draft quality (300psi) Adobe PDF files.
- *CDOT-DPDFHighQuality_V8i.pltcfg* should be used for the creation of high quality (600psi) Adobe PDF files.
- *CDOT-Shaded_PrinterDriver_V8i.pltcfg* should be used for MicroStation drawings only.
- *CDOT-ROW-DefaultPlotter_V8i.pltcfg* should be used to send ROW plots to the default plotter.
- *CDOT-ROW-DefaultPrinter_V8i.pltcfg* should be used to send ROW plots to the default printer.



8. For printing AutoCAD files, change the Pen Table. Select **PenTable > Attach** from the pull-down menu.



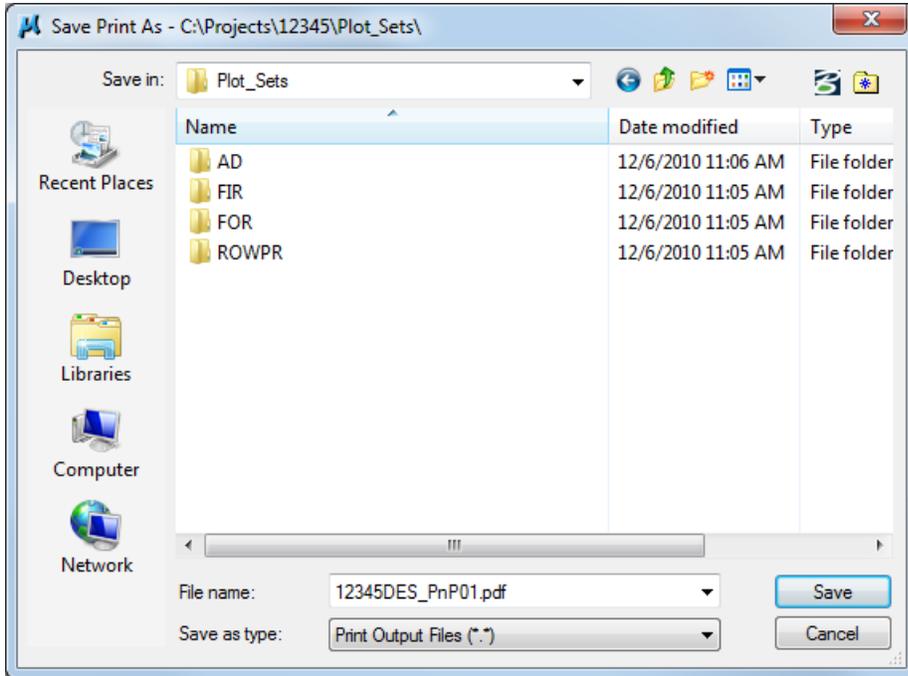
9. Select the **CDOT_ACAD.tbl** Pen Table. The other options are for printing MicroStation Files only. <D> Open.



Note: The **CDOT-ACAD.tbl** includes the standard colors and pen weights represented in the **CDOT Design Manual - Volume IV, Section 6.2.8**. If the standard colors were not used, the printout will contain actual colors or a grey scale representation of that color. To get a correct print out, the user must update the file to match the **CDOT Design Manual**.

10. Once everything has been set, <D> the print  icon. This will send your plot to the designated printer.

11. If you selected the *CDOT_PDFDraftQuality_V8i.pltcf* or *CDOT_PDFHighQuality_V8i.pltcf* printer driver to create an Adobe PDF file, you will be prompted to define a file name and a location to save the PDF file.



MicroStation Information and Administration

Workflow MA 1 - Directory Structure

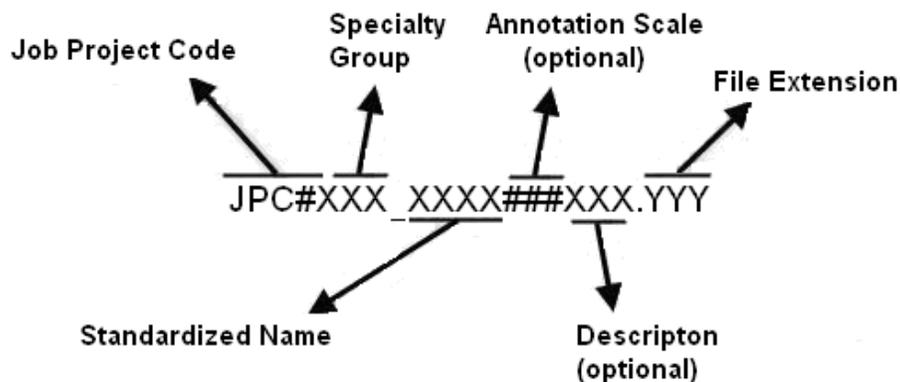
PROJECT DESIGN FILES

The CDOT workflow of projects requires that graphic and design data be created into multiple design files during the course of project development. These design files need standard, informative, and unique file names.

File Naming Conventions

The CDOT naming standard uses a formula that restricts the character placement, ensures unique file names, and identifies the information contained in the file. All CDOT projects must follow these file naming conventions. Standardizing file names is necessary for effective management of the large numbers of files needed to produce a set of design plans.

CDOT files are named in a standard format that identifies the file's project, the data contained within it, and the product used for its creation. The naming convention is illustrated as follows:



- ◆ **Job Project Code (JPC)** is the CDOT project code, formerly known as the project subaccount number.
- ◆ **Specialty Group** is the standardized abbreviation for the specialty group that the owner of the file is with.
- ◆ **Standardized Name** denotes the type of data that is contained in the file.
- ◆ **Annotation Scale** including the annotation scale in the file name is optional. However, it should be included in file names for projects that use multiple annotation scales.
- ◆ **Description** A brief description can be used to further identify a model file. For sheet files, this field is used as a counter to differentiate between multiple files of a specific type.
- ◆ **File Extensions** define the product used for its creation. Examples would be dgn for MicroStation, DTM for an InRoads surface, etc.

An example of a MicroStation design file would look like the following.

12345DES_Model100US285.dgn

12345 indicating the CDOT Project Number, **DES** indicates it is Roadway Design's model file and **100** indicating it uses a 1"=100' annotation scale, **US285** is a description identifying the highway this model depicts. **DGN** is the default extension for MicroStation design files.

Note: A seventh segment is used on Working Files. This segment should be the initials of the designer or engineer who is working on the file. For example, **CU12345DES_Model100.dgn** where CU, are the initials of the designer or engineer (in this example, CU stands for “CDOT User”).

DIRECTORY STRUCTURE

Project files follow a standardized scheme. This section describes the location of project files and the standard directory structure for each group within CDOT.

Project Directory

At the beginning of each project, the Project Manager will create a project directory structure using the **CreatePrjDir.exe**. This executable will create a directory that is the single storage location for all information pertaining to a given project. The Project Manager is required to assign access permissions to every person on the design team and is also responsible for maintaining the access list to keep it current.

Top Level Directory

Each project includes a unique top-level directory and a set of standardized sub-directories. The job project code (JPC) indicates the top-level directory name.

Group Sub-Directories

Below the top-level directory, you will find sub-directories for each group. Each group at CDOT which works on the project is required to store its data in the appropriate sub-directory for that group.

Group Sub-Directory Structure

The following tables show the project directories for each group and the file types that go into these directories.

Bridge Project Folder (\Bridge)

Sub-directories	Description
\Calculations	
	\Construction_Engineering
	\Computer_Files
	\Hand_Calcs
	\Submittals
	\FIR_Design
	\Computer_Files
	\Hand_Calcs
	\FOR_Design
	\Computer_Files
	\Hand_Calcs
\Correspondence	

	\Email
	\Memos
\Drawings	Sheet Files - Plan set sheets and detail sheets
	\Reference_Files
	All final Model files to be referenced to the sheets
	JPC#BRDG_Model.dgn
	JPC#BRDG_Prof.dgn
\Tabs	
\Geometry	Bridge Geometry Files and output
	#####.dat Structure Number and File Extension
	#####.cmd
	#####.dxf
	#####.lis
	#####.pcf
	#####.scr
	#####.dgn
\InRoads	All InRoads data: dtm, alg, tml, rwl, rwk and reports.
\Photos	Electronic photo files or scanned photos concerning the project and surroundings
\Reports	
\Schedules	
\Working	Design iterations and miscellaneous drafting without impacting final Model Files found in the Reference_Files subdirectory. The designers' initials should pre-fix all files in this directory so multiple designers can work in this directory. No working files should be used as Reference Models. When a working design is complete, copy it into the Reference_Files Folder and rename it to the standard naming convention. This directory will be deleted at project close-out.

Construction Project Folder (\Construction)

Sub-directories	Description
\Construction	
\Calculations	
\Change_Orders	
\Claims	
\Correspondence	

\Diaries	
\Drawings	Sheet Files - Plan set sheets and detail sheets
\Cross_Sections	All cross section Models and Cross Section *.job files
\Reference_Files	All final Model files to be referenced to the sheets
\Tabs	
\EEO	
\Estimates	
\Final_Documentation	
\Photos	Electronic photo files or scanned photos concerning the project and surroundings
\Public_Relations	
\Speed_Memos	
\Working	Design iterations and miscellaneous drafting without impacting final Model Files found in the Reference_Files subdirectory. The designers' initials should pre-fix all files in this directory so multiple designers can work in this directory. No working files should be used as Reference Models. When a working design is complete, copy it into the Reference_Files Folder and rename it to the standard naming convention. This directory will be deleted at project close-out.

Consultants Project Folder (\Consultants)

The Consultant Project Folder does not contain any folders or files. This will be the location of the CDOT approved directory structure delivered from the consultant. The project manager is responsible for ensuring the folder and file structure conforms to the CDOT standard directory structure.

Roadway Design Project Folder (\Design)

Sub-directories	Description
\Calculations	
\Correspondence	
\Drawings	Sheet Files – Plan set sheets and detail sheets JPC#DES_EarthworkQuant##.dgn JPC#DES_GenlNote.dgn JPC#DES_Plan##.dgn JPC#DES_PnP##.dgn JPC#DES_Prof##.dgn JPC#DES_SAQ##.dgn JPC#DES_StdPlanList.dgn JPC#DES_SWMP.dgn

	JPC#DES_TabConc##.dgn
	JPC#DES_TabMisc##.dgn
	JPC#DES_TabRem##.dgn
	JPC#DES_TitleSht.dgn
	JPC#DES_TyplSect##.dgn
	JPC#SURV_Tab##.dgn
	JPC#SURV_WUTab.dgn
	M&S Standard Plans List Index.dgn
\Cross_Sections	All cross section Models and Cross Section *.job files
\Reference_Files	All final Model files to be referenced to the sheets
	JPC#DES_Interchange.dgnJPC#DES_Intersec.dgn
	JPC#DES_Model.dgn
	JPC#DES_Phasing.dgn
	JPC#DES_Prof.dgn
\Tabs	All tabulation support data: xls, doc, and pdf files
	JPC#DES_GenNote.doc
	JPC#DES_SWMP.doc
	JPC#DES_TabEarthwork.xls
	JPC#DES_TabMisc.xls
	JPC#DES_TitleSht.xls
\InRoads	All InRoads data: dtm, alg, tml, rwl, rwk and reports
\Photos	Electronic photo files or scanned photos concerning the project and surroundings
\Reports	
\Working	Design iterations and miscellaneous drafting without impacting final Model Files found in the Reference_Files subdirectory. The designers' initials should pre-fix all files in this directory so multiple designers can work in this directory. No working files should be used as Reference Models. When a working design is complete, copy it into the Reference_Files Folder and rename it to the standard naming convention. This directory will be deleted at project close-out.

Hydraulics Project Folder (\Hydraulics)

Sub-directories	Description
\Calculations	
	\Cost_Estimates
	\Hydrology_Ponds

	\Spread_Width_Inlets
	\Storm_Sewer_Culverts_Channels
\Correspondence	
	\Email
	\Meeting_Minutes
	\Memos
\Drawings	
	Sheet Files – Plan set sheets and detail sheets
	JPC#HYDR_StrQuant##.dgn
	\Reference_Files All final Model files to be referenced to the sheets
	JPC#HYDR_Model.dgn
	JPC#HYDR_Prof.dgn
\Tabs	
	JPC#HYDR_TabStrmsewer.xls
\InRoads	All InRoads data: dtm, alg, tml, rwl, rwk and reports
\Manufacturers_Data	
\Photos	Electronic photo files or scanned photos concerning the project and surroundings
\Program_Data	
	\HEC-2
	\HEC-RAS
\Report	
	\Field_Notes
	\Final
	\Preliminary
	\Technical_Memorandum
\Working	Design iterations and miscellaneous drafting without impacting final Model Files found in the Reference_Files subdirectory. The designers' initials should pre-fix all files in this directory so multiple designers can work in this directory. No working files should be used as Reference Models. When a working design is complete, copy it into the Reference_Files Folder and rename it to the standard naming convention. This directory will be deleted at project close-out.

Landscape Project Folder (\Landscape_Environmental)

Sub-directories	Description
\Calculations	
\Correspondence	

\Drawings	Sheet Files – Plan set sheets and detail sheets
\Reference_Files	All final Model files to be referenced to the sheets JPC#LAND_ENVI_Model.dgn
\Tabs	\Form_128
\InRoads	All InRoads data: dtm, alg, tml, rwl, rwk and reports
\Natural_Resouces	\4(f)_6(f) \Air_Noise_Farmland \Cultural \Hazmat \T&E \Wetlands_Delineation_Findings
\Permits	
\Photos	Electronic photo files or scanned photos concerning the project and surroundings
\Public Involvement	
\Reports	
\NEPA	
\Technical	
\Social_Resources	
\Working	Design iterations and miscellaneous drafting without impacting final Model Files found in the Reference_Files subdirectory. The designers' initials should pre-fix all files in this directory so multiple designers can work in this directory. No working files should be used as Reference Models. When a working design is complete, copy it into the Reference_Files Folder and rename it to the standard naming convention. This directory will be deleted at project close-out.

Materials Project Folder (\Materials_Geotechnical)

Sub-directories	Description
\Calculations	
\Correspondence	
\Drawings	Sheet Files - Plan set sheets and detail sheets
\Reference_Files	All final Model files to be referenced to the sheets
\Tabs	
\InRoads	All InRoads data: dtm, alg, tml, rwl, rwk and reports

\Photos	Electronic photo files or scanned photos concerning the project and surroundings
\As-Built	
\Construction	
\Existing_Condition	
\Reports	
\Working	Design iterations and miscellaneous drafting without impacting final Model Files found in the Reference_Files subdirectory. The designers' initials should pre-fix all files in this directory so multiple designers can work in this directory. No working files should be used as Reference Models. When a working design is complete, copy it into the Reference_Files Folder and rename it to the standard naming convention. This directory will be deleted at project close-out.

Miscellaneous Project Folder (\Miscellaneous)

Typical Section Program Data input files, JPC#.csv (used for converting nonstandard levels to CDOT standards.), and other project specific files that do not have a designated folder.

Planning Project Folder (\Planning)

Sub-directories	Description
\Correspondence	
\RTP_TIP_STIP	
\Working	Design iterations and miscellaneous drafting without impacting final Model Files found in the Reference_Files subdirectory. The designers' initials should pre-fix all files in this directory so multiple designers can work in this directory. No working files should be used as Reference Models. When a working design is complete, copy it into the Reference_Files Folder and rename it to the standard naming convention. This directory will be deleted at project close-out.

Plot Sets Project Folder (\Plot_Sets)

The files located in this folder are project specific General Plan Set Sheets. The files located in the subfolders will be files reflecting plan set sheets captured at time of submittal. Final Plan Sets should be in Adobe Acrobat PDF file format for the Reproduction Department. The Reproduction Department will access the PDF from this location for submittals.

Sub-directories	Description
\Plot_Sets	
\AD	Advertisement \Revisions
\FIR	Field Inspections
\FOR	Final Office Revisions

\ROWPR

Project Specific Configuration (\Project_Configuration)

This folder contains copies of the CDOT Workspace InRoads Preference files only when a project is archived and will be brought back at a later date. Software changes and Configuration upgrades affect InRoads preference files. It is important to have copies of the preference files used when the project was created. The files will be useful for reviewing how InRoads Features, Styles and Survey Data displayed for the duration of a specific configuration release. However, software and configuration upgrades may not work seamlessly with these preference files because levels and features are renamed and linestyles are redefined.

The following files should be saved in this folder:

- C:\Program Files\Workspace-CDOT\Standards-Global\InRoads\Preferences\CDOT-Preferences.ini
- C:\Program Files\Workspace-CDOT\Standards-Global\InRoads\Preferences\CDOT-Styles.ini
- C:\Program Files\Workspace-CDOT\Standards-Global\InRoads\Preferences\CDOT-Survey_Features.fwf
- C:\Program Files\Workspace-CDOT\Standards-Global\InRoads\Preferences\CDOT-Survey_Preferences.fxp
- C:\Program Files\Workspace-CDOT\Standards-Global\InRoads\Notes\CDOT-Notes.dft.

All other InRoads data files should be stored in the appropriate Project InRoads folders.

Project Manager Project Folder (\Project_Manager)

Sub-directories	Description
\Budget	
\Clearances	
\Contract_&_Task_Order	
\Correspondence	
\Bridge	
\Construction	
\Design	
\EEO	
\Environmental_Landscape	
\Governmental_Agencies	
\Hydraulics	
\Letters	
\Materials_Geotechnical	
\Public_Relations	

- \ROW
- \Senior_Management
- \Traffic
- \Utilities
- \Meeting_Minutes
- \Schedules

Redline Project Directory (\Redline)

Right Of Way and Survey Project Folder (\ROW_Survey)

Sub-directories	Description
\Correspondence	
\Acquisition	
\Appraisal	
\Permission_To_Enter	
\Property_Management	
\ROW	
\Survey	
\Drawings	Sheet Files - Plan set sheets and detail sheets
	JPC#ROW_Cnty-24x18_##.dgn
	JPC#ROW_Cnty-24x36_##.dgn
	JPC#ROW_Mon##.dgn
	JPC#ROW_Ownership##.dgn
	JPC#ROW_Plan##.dgn
	JPC#ROW_TabProp01.dgn
	JPC#ROW_TabProp02.dgn
	JPC#ROW_TabProp03.dgn
	JPC#ROW_TabProp04.dgn
	JPC#ROW_TabProp##.dgn
	JPC#ROW_TitleSht.dgn
	JPC#ROW_MonRcrd##.dgn
	JPC#SURV_PlanLSCD##.dgn
	JPC#SURV_PlanPCD##.dgn
	JPC#SURV_TitleLSCD.dgn
	JPC#SURV_TitlePCD.dgn

\Reference_Files	All final Model files to be referenced to the sheets JPC#ROW_Model.dgn JPC#SURV_Model.dgn JPC#SURV_Topo##Scale##.dgn JPC#SURV_TopoCodes##Scale##.dgn JPC#SURV_TopoContour##Scale##.dgn JPC#SURV_TopoElevations##Scale##.dgn JPC#SURV_TopoNames##Scale##.dgn JPC#SURV_TopoNotes##Scale##.dgn JPC#SURV_TopoSymbols##Scale##.dgn \Tabs JPC#ROW_TabMon.xls JPC#ROW_TabProp.xls
\InRoads	All InRoads data: dtm, alg, tml, rwl, rwk and reports
\DTM	DTM files
\Field_Books	Field Books
\Geometry	Geometry Files
\Legals	
\Reports	ROW Report Files
\Research	
\Government	
\Miscellaneous	
\Plans	
\Title	
\Survey	
\Level	
\Monument_Information	
\Photogrammetry	
\Photos	Electronic photo files or scanned photos concerning the project and surroundings
\Raw_Data	
\TGO	Trimble Geomatics files in a zipped format.

\Working Design iterations and miscellaneous drafting without impacting final Model Files found in the Reference_Files subdirectory. The designers' initials should pre-fix all files in this directory so multiple designers can work in this directory. No working files should be used as Reference Models. When a working design is complete, copy it into the Reference_Files Folder and rename it to the standard naming convention. This directory will be deleted at project close-out.

Specifications Project Folder (\Specifications)

Project Specifications (DOC and PDF formats only). Post the Project Specifications for the Reproduction Department in one Adobe Acrobat PDF file. The Reproduction Department will access the PDF file from this location.

Traffic Project Folder (\Traffic_ITS)

Sub-directories	Description
\Calculations	
\Traffic_Modeling	
\Correspondence	
\Access	
\Email	
\Drawings	Sheet Files – Plan set sheets and detail sheets JPC#TRAF_Schedule##.dgn JPC#TRAF_TabPvmtMrk##.dgn JPC#TRAF_TabSigns##.dgn
\Reference_Files	All final Model files to be referenced to the sheets JPC#TRAF_Light.dgn JPC#TRAF_Model.dgn JPC#TRAF_Signal.dgn
\Tabs	All tabulation support data: xls, doc, and pdf files JPC#TRAF_Tabs.xls
\InRoads	All InRoads data: dtm, alg, tml, rwl, rwk and reports
\Photos	Electronic photo files or scanned photos concerning the project and surroundings
\Reports	
\Signs	SignCAD drawing files & other Misc. sign files

\Working	Design iterations and miscellaneous drafting without impacting final Model Files found in the Reference_Files subdirectory. The designers' initials should pre-fix all files in this directory so multiple designers can work in this directory. No working files should be used as Reference Models. When a working design is complete, copy it into the Reference_Files Folder and rename it to the standard naming convention. This directory will be deleted at project close-out.
-----------------	--

Utilities Project Folder (\Utilities)

Sub-directories	Description
\Calculations	
\Correspondence	
\Drawings	Sheet Files – Plan set sheets and detail sheets
\Reference_Files	All final Model files to be referenced to the sheets JPC#UTIL_Model.dgn
\Tabs	
\InRoads	All InRoads data: dtm, tml, rwl, rwk and reports
\Photos	Electronic photo files or scanned photos concerning the project and surroundings
\Reports	
\Working	Design iterations and miscellaneous drafting without impacting final Model Files found in the Reference_Files subdirectory. The designers' initials should pre-fix all files in this directory so multiple designers can work in this directory. No working files should be used as Reference Models. When a working design is complete, copy it into the Reference_Files Folder and rename it to the standard naming convention. This directory will be deleted at project close-out.

Workflow MA 2 - PCF Management

This document explains how the Project Configuration File (PCF) is created, where it is saved, and how to update it. The PCF file defines a specific directory that MicroStation defaults to when opening up a DGN file or referencing model files. PCF files are extremely useful when multiple users are accessing the same project directory across the network, or when DGN files are moved from one directory to another.

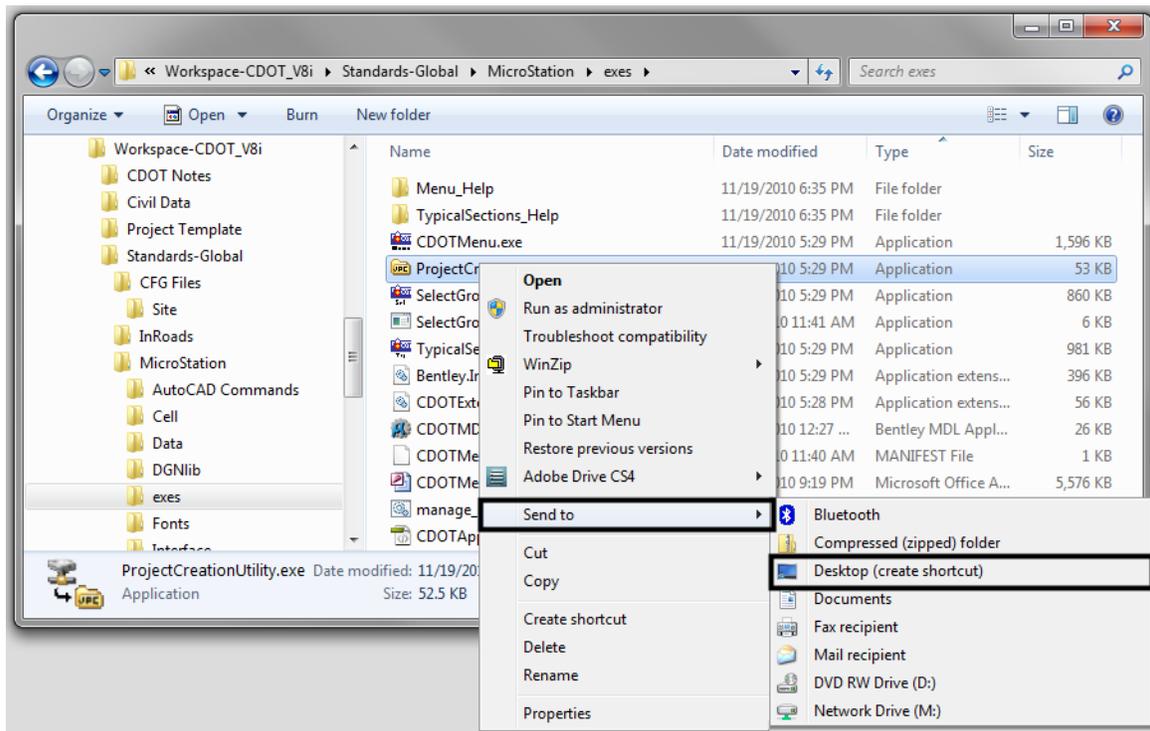
ProjectWise and PCF's

Projects that reside in ProjectWise do not require a MicroStation PCF file. The ProjectWise engineering document management system replaces the functionality of the MicroStation PCF files.

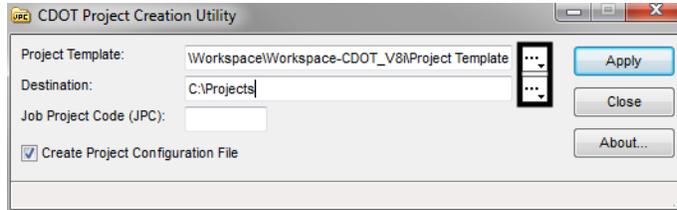
Creating the PCF File

For all projects outside of ProjectWise the following steps are required.

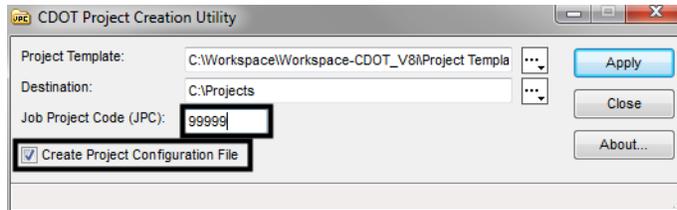
1. The PCF file is created when the **CDOT Project Creation Utility** program is run. This program is accessed from the CDOT Workspace **C:\Workspace-CDOT_V8i\Standards-Global\MicroStation\exes**.
2. If you typically create projects, adding this as a shortcut on your desktop is recommended.
3. Right click on the **ProjectCreationUtility.exe** and **select Send To > Desktop (create shortcut)**.



- After selecting the **ProjectCreationUtility** program, the **CDOT Project Creation Utility** dialog box will appear. The **Project Template Browse** button can be used to identify a different Project Template. The **Destination Browse** button can be used to specify a different location for the new project directory.



- Enter the 5 digit Job Project Code (JPC) in the **Job Project Code (JPC)** field. For this example we will use **99999**. Verify the **Create Project Configuration File** check box is checked **On**. This should be on by default. **<D> Apply**. After the program has executed, **<D> Close**.

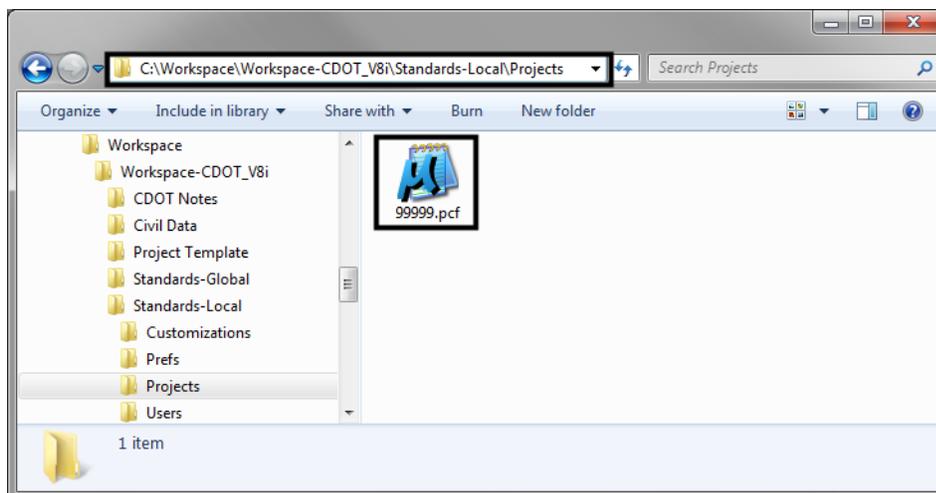


Note: The **CDOT Project Creation Utility** program now allows the creation of “M” projects. Use an M to start the JPC number.

- Open up Windows Explorer again and browse to **C:\Projects\99999** to verify the project folder and corresponding folder structure was created.

Opening the PCF File

- View the PCF file that was created when the **CDOT Project Creation Utility** program was executed. In Windows Explorer browse to **C:\Workspace\Workspace-CDOT_V8i\Standards-Local\Projects** and open the **99999.pcf** file using Notepad.



- Notice that the second line of text displays **MS_DEF=C:/Projects/99999/**. The **CDOT Project Creation Utility** program places the newly created project location on this line. MicroStation reads this line as a configuration variable and sets the primary Search Path to this location. When MicroStation reads the variable 'MS_DEF' it substitutes the default project location (**C:/Projects/99999/**). If we look under the **Reference Files** heading below, you will see that all of the paths are set with the (MS_DEF) substitution. This means, whenever you browse for a file to reference (or more specifically a 'model' file), MicroStation will automatically point to the desired directory.

```

99999.pcf - Notepad
File Edit Format View Help
#----- Project Directory -----
MS_DEF=C:/Projects/99999/
#----- Reference Files -----
MS_RFDIR=$(MS_DEF)
MS_RFDIR>$(MS_DEF)Bridge/Drawings/
MS_RFDIR>$(MS_DEF)Bridge/Drawings/Reference_Files/
MS_RFDIR>$(MS_DEF)Construction/Drawings/
MS_RFDIR>$(MS_DEF)Construction/Drawings/Reference_Files/
MS_RFDIR>$(MS_DEF)Landscape_Environmental/Drawings/
MS_RFDIR>$(MS_DEF)Landscape_Environmental/Drawings/Reference_Files/
MS_RFDIR>$(MS_DEF)Hydraulics/Drawings/
MS_RFDIR>$(MS_DEF)Hydraulics/Drawings/Reference_Files/
MS_RFDIR>$(MS_DEF)Materials_Geotechnical/Drawings/
MS_RFDIR>$(MS_DEF)Materials_Geotechnical/Drawings/Reference_Files/
MS_RFDIR>$(MS_DEF)Design/Drawings/
MS_RFDIR>$(MS_DEF)Design/Drawings/Reference_Files/
MS_RFDIR>$(MS_DEF)ROW_SURVEY/Drawings/
MS_RFDIR>$(MS_DEF)ROW_SURVEY/Drawings/Reference_Files/
MS_RFDIR>$(MS_DEF)Traffic_ITS/Drawings/
MS_RFDIR>$(MS_DEF)Traffic_ITS/Drawings/Reference_Files/
MS_RFDIR>$(MS_DEF)Utilities/Drawings/
MS_RFDIR>$(MS_DEF)Utilities/Drawings/Reference_Files/
MS_PLTFILES=$(MS_DEF)Plot_Sets/
MS_DGNOUT=$(MS_DEF)
MS_IMAGEOUT=$(MS_DEF)
MS_RASTER_DEF_DIR=$(MS_DEF)ROW_SURVEY/Drawings/Reference_Files/Aerials/

#
CDOT_WKSP=C:/workspace/workspace-CDOT_V8i/
CDOT_PREF=$(CDOT_WKSP)Standards-Global/InRoads/Preferences/

```

Editing the PCF File

- If multiple users are accessing the same project directory, the PCF file will need to be distributed to everyone on the team accessing the project directory. Each member of the team should have their own copy of the PCF file and it should be saved to the same location, **C:\Program Files\Workspace-CDOT\Standards-Local\Projects**.
- When team members are sharing the project manager's machine, the path **MS_DEF=C:/Projects/99999/** will need to be updated to reflect the path of the computer that is being shared i.e., **MS_DEF=//CDOTUSER/Projects/99999/** (Be sure to note the double // as in **MS_DEF=//SMITHS/Projects/99999/**). After the edit has been made to the PCF file, select **File > Save** in Notepad.

```

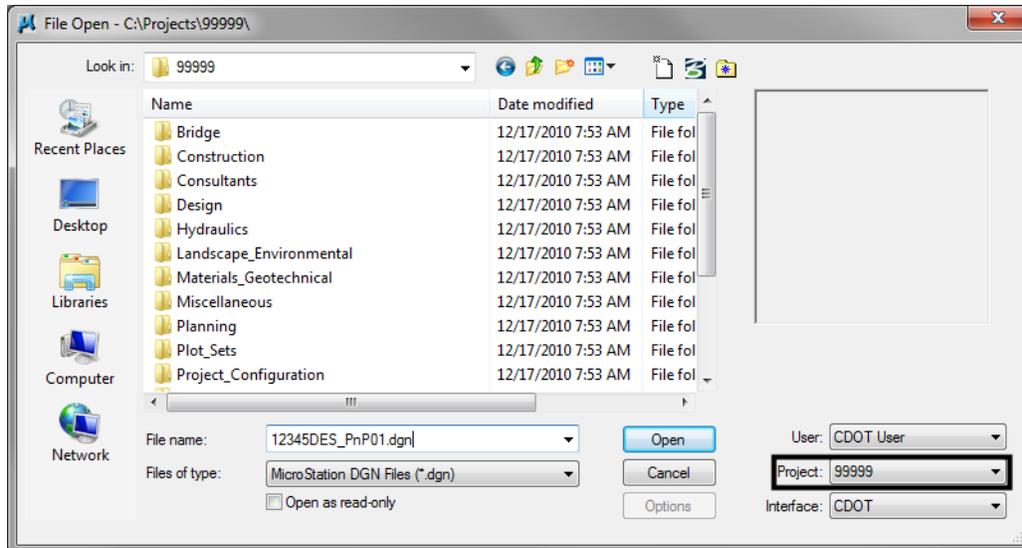
99999.pcf - Notepad
File Edit Format View Help
#----- Project Directory -----
MS_DEF=//SMITHS/Projects/99999/
#----- Reference Files -----
MS_RFDIR=$(MS_DEF)
MS_RFDIR>$(MS_DEF)Bridge/Drawings/
MS_RFDIR>$(MS_DEF)Bridge/Drawings/Reference_Files/
MS_RFDIR>$(MS_DEF)Construction/Drawings/
MS_RFDIR>$(MS_DEF)Construction/Drawings/Reference_Files/
MS_RFDIR>$(MS_DEF)Landscape_Environmental/Drawings/
MS_RFDIR>$(MS_DEF)Landscape_Environmental/Drawings/Reference_Files/
MS_RFDIR>$(MS_DEF)Hydraulics/Drawings/
MS_RFDIR>$(MS_DEF)Hydraulics/Drawings/Reference_Files/
MS_RFDIR>$(MS_DEF)Materials_Geotechnical/Drawings/
MS_RFDIR>$(MS_DEF)Materials_Geotechnical/Drawings/Reference_Files/

```

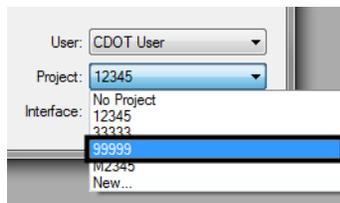
Note: Each person wanting to work on the project must be given appropriate access to the folders they will be working with. The Project Manager should determine the level of access. Contact the help desk for additional assistance on sharing files and changing security settings.

Using the PCF File with MicroStation

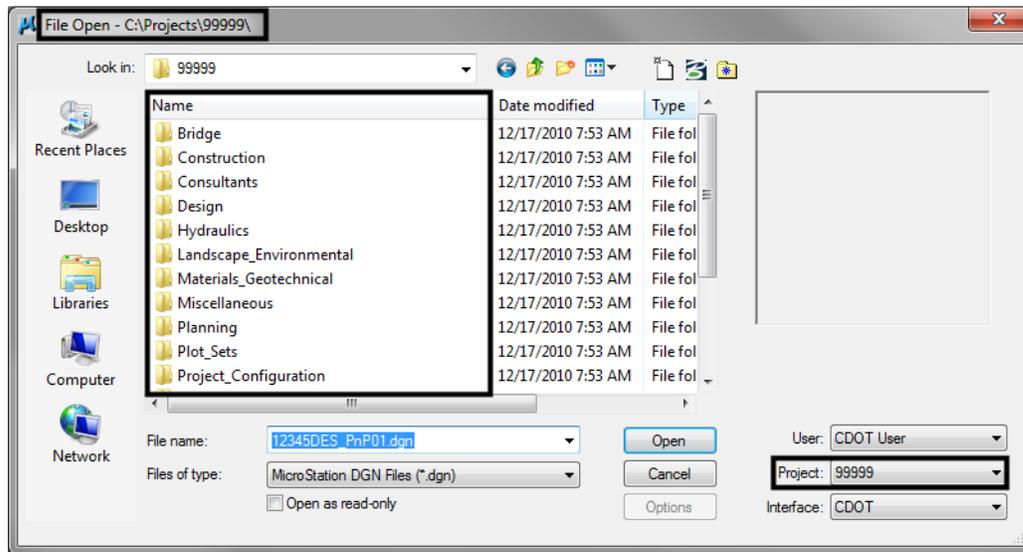
1. In the MicroStation Manager, the PCF file can be selected from the **Project** field drop-down list found in the **Workspace** portion of the **MicroStation Manager**.



2. If you are working on multiple projects, you will have more than one PCF file to choose from. You can easily switch between projects using this drop-down list. <D> the arrow to display the list, than choose the project to work on.



- The file path in MicroStation will be redirected to the project folder after the desired project has been selected. All dialog boxes within MicroStation that require a path to be defined will default to the root directory chosen at the **Workspace > Projects** location.



- If your folder structure changes and/or files are moved to different locations than initially path to, you can update your reference file attachment location here without having to reattach the files in MicroStation. Simply edit the reference file paths in the PCF file and open MicroStation. You will notice that the files are now being found.

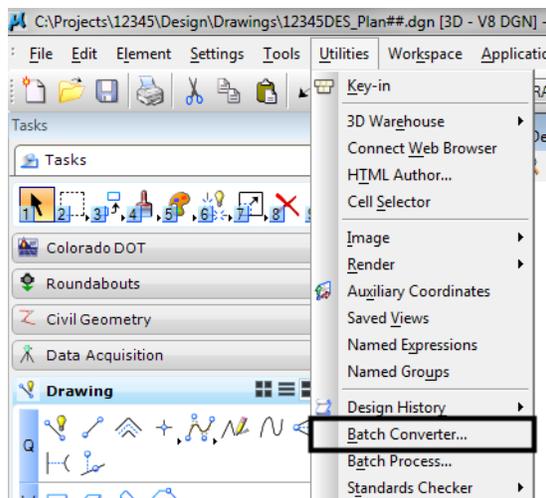
Note: It should be noted that **Save Full Path** when referencing files within MicroStation should never be used if you want the PCF file changes to take affect.

Workflow MA 3 - Level Update for V05.04.00

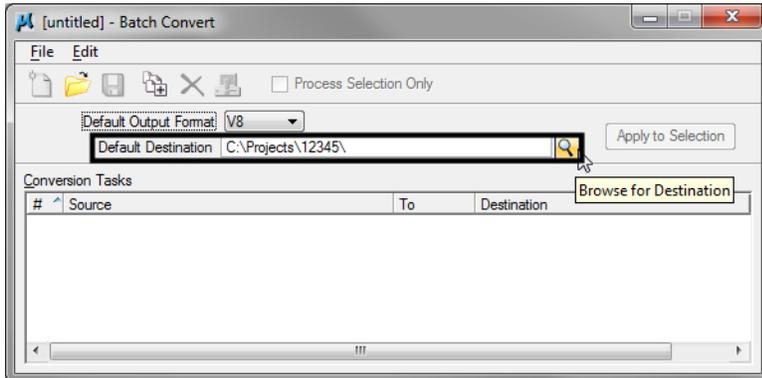
This document guides you through updating the MicroStation levels that were changed, deleted, and renamed from the Configuration Releases prior to V05.00.00. All drawing files created in prior Configuration Releases will need to be updated to the current CDOT standard levels. See CDOT Configuration Readme.pdf file located in the level library section.

Converting Levels in MicroStation as a Batch Routine

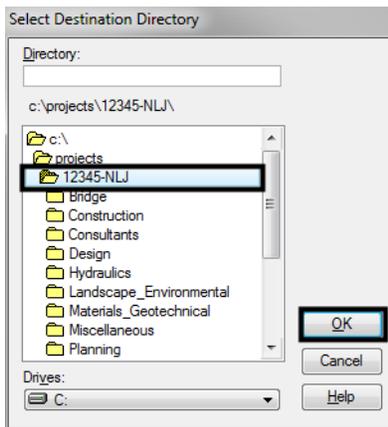
1. From the **MicroStation Manager**, **Open** a drawing file
2. It is recommended that a new project folder is created for the translated data to insure the original project data is not lost. Using the same JPC# number appended with a “-(initials)”. Once the data is verified the original data can be backed up to disc and deleted. The “-(initials)” then can be dropped from the project folder. The example used for this workflow will be **12345-NLJ**.
3. It is recommended to change a User Preference before proceeding that sets the open dialog box settings. Open the User preferences by clicking **Workspace > Preferences**
4. Select the **Look and Feel Category**
5. Toggle off the option for **Use Windows File Open Dialogs**. Turn this feature off will allow a toggle later to open all files in a directory.
6. Select **Utilities > Batch Converter**



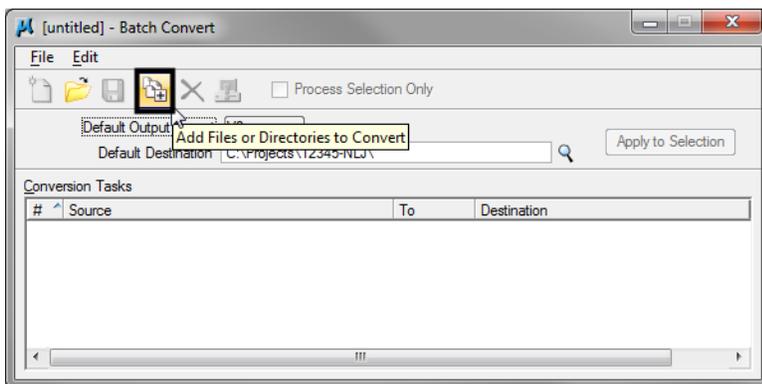
- Change the **Default Destination** to the temporary project folder



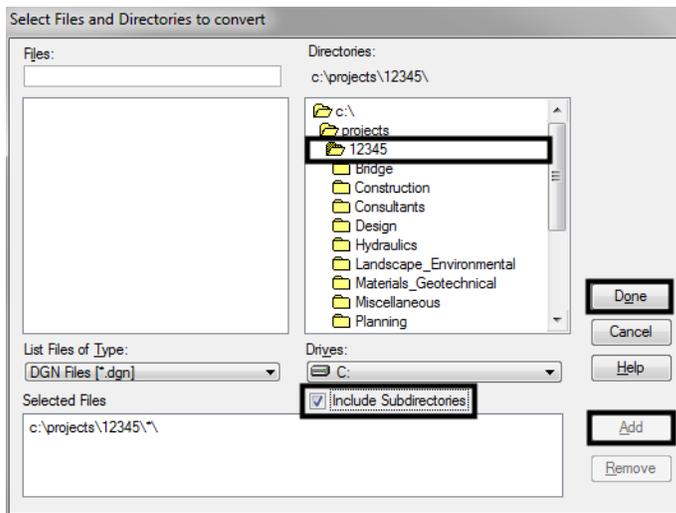
- Navigate** to the temporary project folder and **<D> OK**



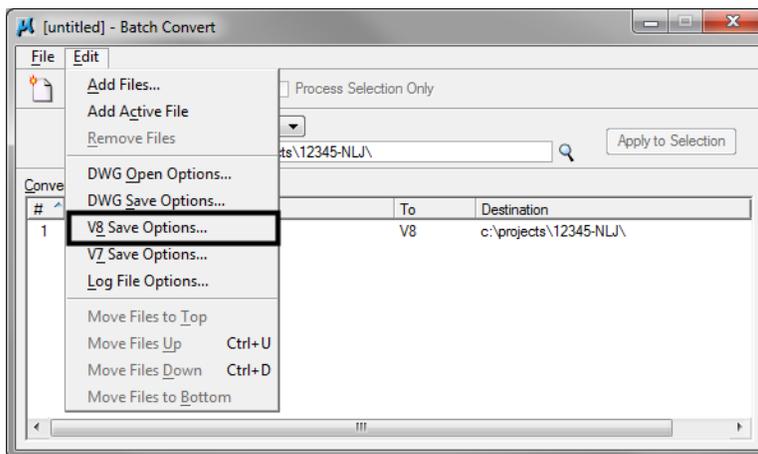
- <D>** the **Add Files or Directories to Convert** icon.



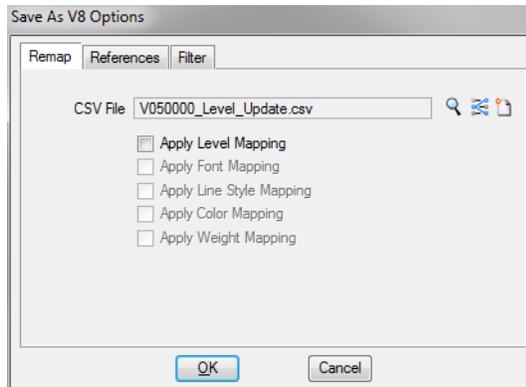
- Using the **Add Files or Directories** dialog box, files or entire directories can be added to the list of Selected Files to be processed. Check **On Include Subdirectories** prior to specifying entire folders to a convert process. **<D>** to highlight the folder name, then **<D> Add**. **<D> Done** when you are finished adding files and/or folders.



- Select **Edit > V8 Save Options...** from the **Batch Convert** dialog box

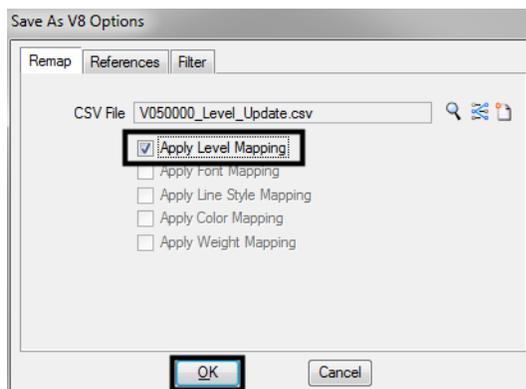


12. In the **Save As V8 Options** dialog box, a standard CSV file is located in the configuration which is already set up to remap all of the previous versions' levels to the standard CDOT MicroStation V05.00.00 levels.

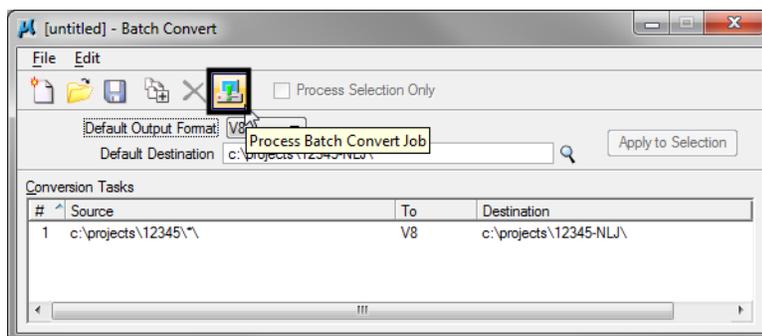


Note: If not already there, browse to **C:\Workspace\Workspace-CDOT_V8i\Standards-Global\MicroStation\Tables\Level_Translation**. Select the file **V050000_Level_Update.csv**. <D> OK.

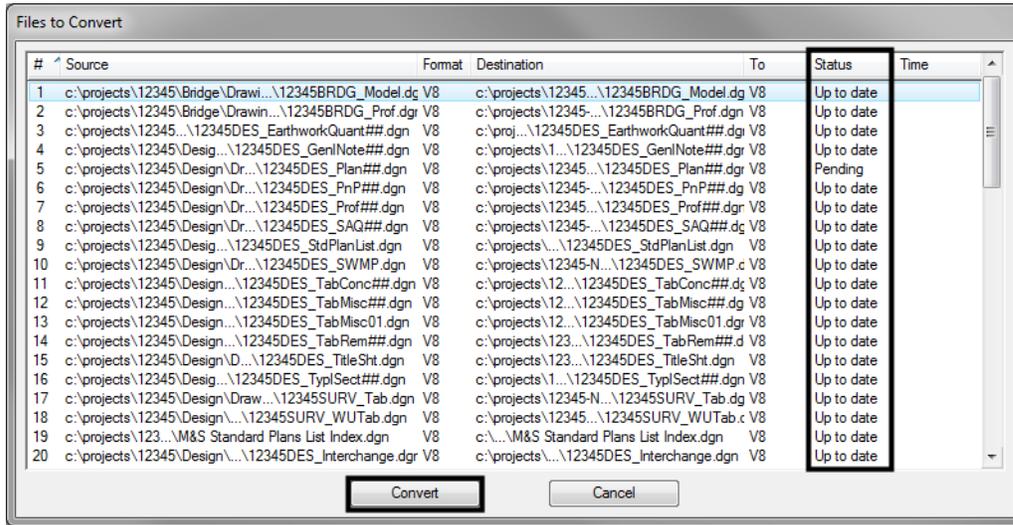
13. In the **Save As V8 Options** dialog box, check on the option to **Apply Level Mapping**. <D> OK.



14. <D> the **Process Batch Convert Job** icon when all files and directories have been added to the conversion tasks list.

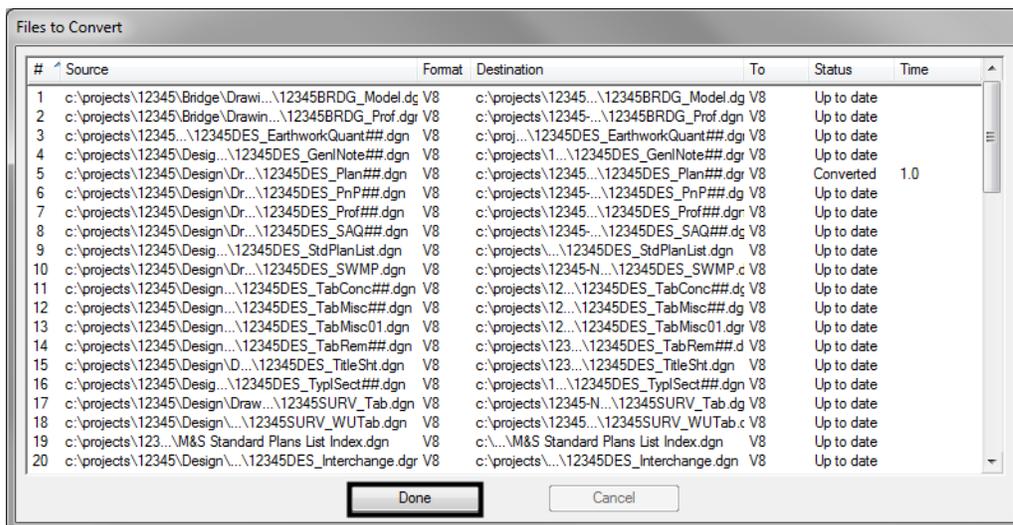


15. <D> Convert



16. The conversion process runs and the status column will be updated from **Pending to Converted** once completed. The **Up to date** items will not be processed.

17. When all the files have been converted <D> Done.

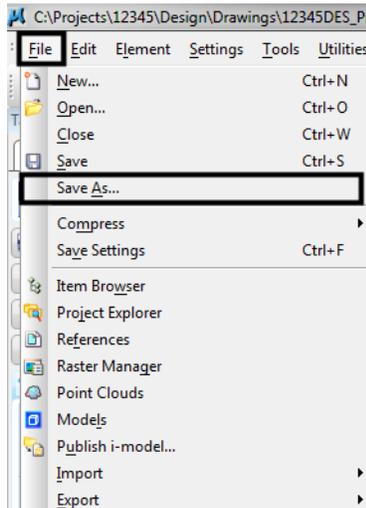


18. Take time to verify your data. The translation will only build folders and copy the translated data. You will need to copy all missing folders and data from you original project to the translated project folder. When folders and data have been verified, either delete or archive your original project folder and rename the translated project folder by removing your initials. This step will ensure that all references will display.

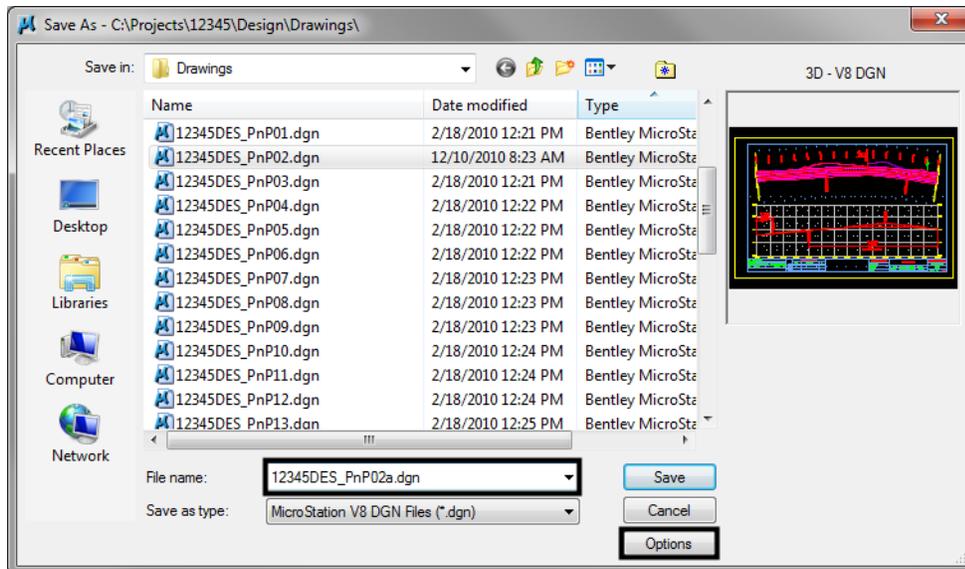
Converting Levels in MicroStation

1. From the **MicroStation Manager**, **Open** a drawing file.
2. Open the User preferences by clicking **Workspace > Preferences**

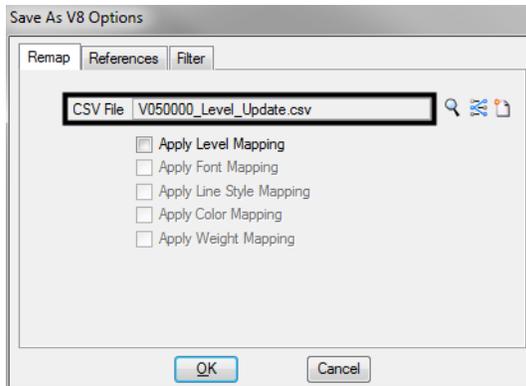
3. Select the **Look and Feel Category**
4. Toggle on the option for **Use Windows File Open Dialogs**. Turn this feature off will allow a toggle later to open all files in a directory.
5. Select **File > Save As**.



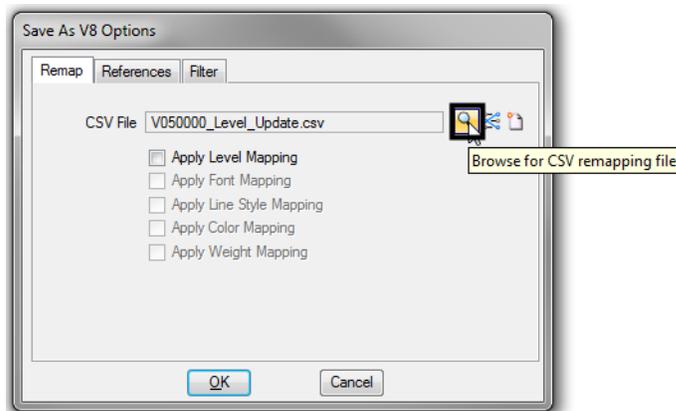
6. Enter a new name into the **File name:** field to rename the current open drawing file, then **<D> Options**.



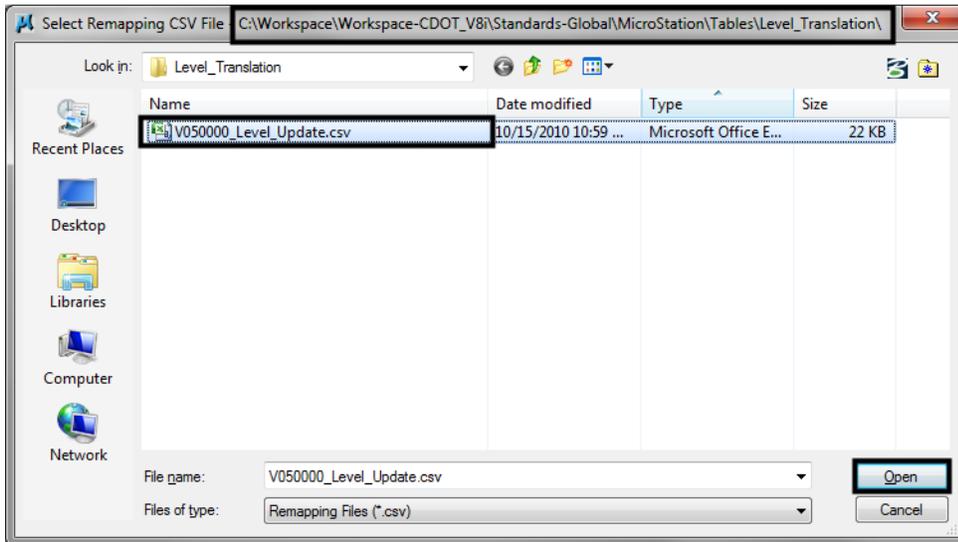
7. A standard CSV file is located in the configuration which is already set up to remap all of the previous versions' levels to the standard CDOT MicroStation V03.01 levels. The CDOT configuration automatically loads the remapping CSV file.



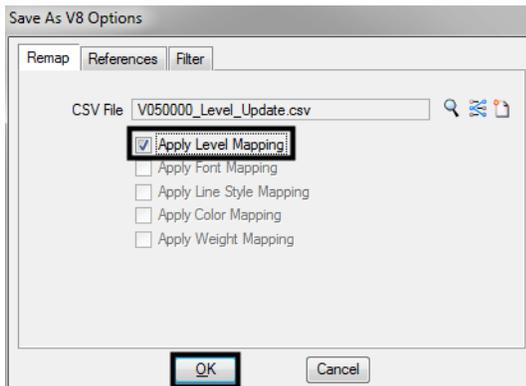
8. By chance the file is not found, in the **Save As V8 Options** dialog box, <D> the **Browse for CSV remapping file** icon.



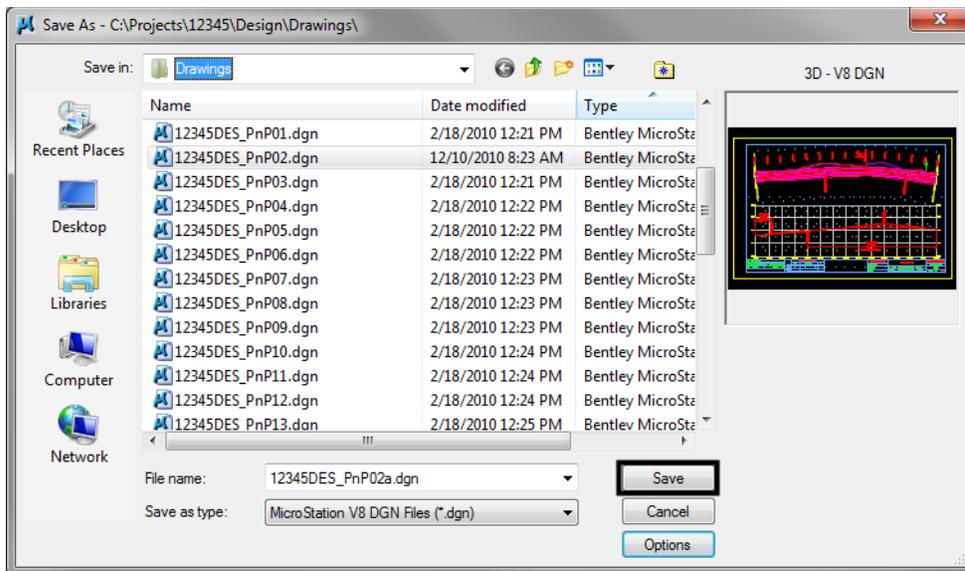
- Navigate to **C:\Workspace\Workspace-CDOT_V8i\Standards-Global\MicroStation\Tables\Level_Translation**. Select the file **V03.02_Level_Conversion.csv**. <D> OK.



- In the **Save As V8 Options** dialog box, check **On** the option to **Apply Level Mapping**. <D> OK.



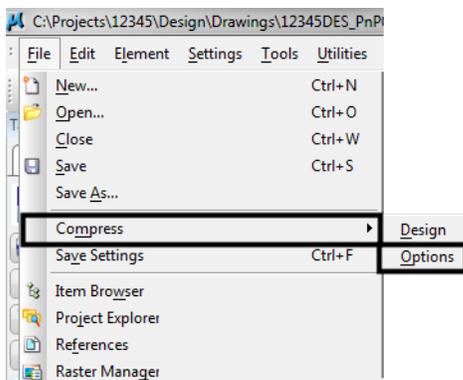
11. **<D> OK** in the **Save As** dialog box. The CSV file will execute and the previous levels will be converted to the updated levels in the V03.01 configuration release.



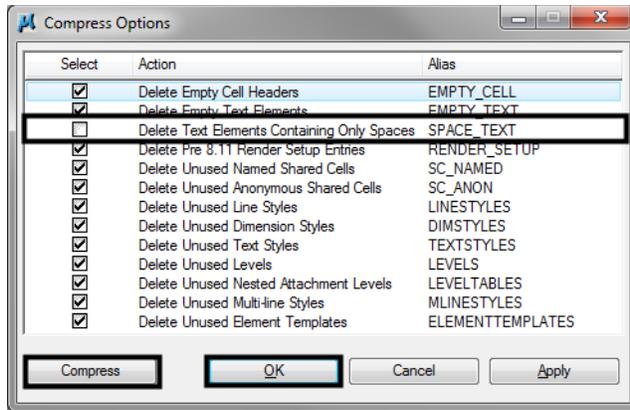
Note: Once the new file is created, there will be two files with the same data. From windows explorer delete the old file and rename the newly created file to the old name. This will allow all reference file calls to be correct and will eliminate having duplicate data

Compressing the Model File

1. After the level updates have been made to the drawing files created in previous versions, select **File > Compress Design > Options**.



2. In the **Compress Options** window, all options should be checked on **except Delete Text Elements Containing Only Spaces**. <D> the **Compress** button, then <D> **OK**.



Workflow MA 4 - Workspace Update

This document describes the steps to update an existing project when a new workspace is released.

1. Review the *CDOT Configuration ReadMe* file before processing any files.
2. To update the MicroStation files to the latest levels refer to workflow, *CDOT Level Update for VXX_XX*, where the *X*'s represent the version number. Using the batch process on the project directory is recommended to ensure all files are updated.
3. Next, the InRoads Feature Styles for the project's design surfaces need to be updated. Follow the workflow, *CDOT Update InRoads Features* to update these files.
4. The project directory structure and PCFs need to be verified. All changes to the directory structure are documented in the ReadMe file. For example, in V03.02 there was a folder added, **Redline**. Going forward this folder will have to be added to existing projects. All new projects will have this folder built. The same is true for the PCF file. If a folder is added to an existing project that contains dgn files, it will have to be added to the existing PCF file. If in doubt run a sample project and compare the PCF files.

Workflow MA 5 - Consultant Workspace

This document describes the setup of the CDOT Workspace if it is to reside on a server.

1. Read the CDOT MicroStation/InRoads Configuration requirements and installation instructions. This information is found at the following link on the CDOT website:

<http://www.coloradodot.info/business/designsupport/cadd/microstation-inroads-configuration>

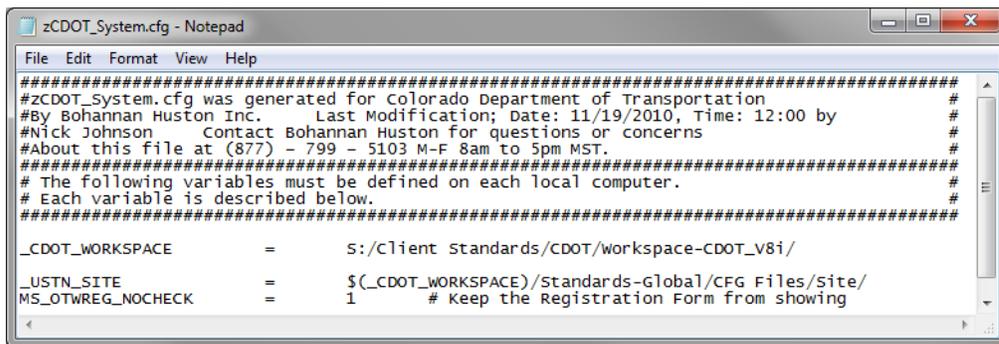
2. This will place the workspace on the server at the specified location.

Note: In the examples below, the following server location is used. “S:\Client Standards\CDOT\”

3. Open and review the CDOT Configuration ReadMe file. It is located in S:\Client Standards\CDOT\Workspace-CDOT_V8i\CDOT Notes.
4. Follow step 8 on the installation instructions to activate the server based workspace for MicroStation and InRoads. For MicroStation and InRoads, edit the following file:

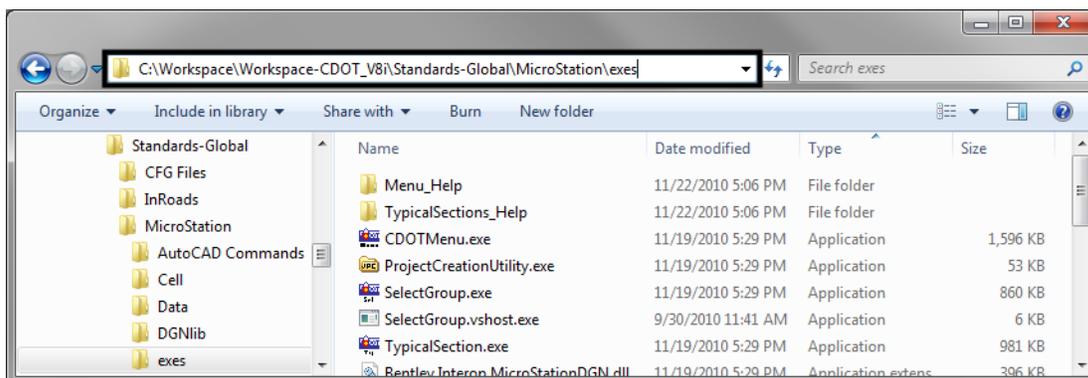
For 64-bit operating systems, C:\Program Files (x86)\MicroStation V8i (SELECTseries)\MicroStation\config\system\zCDOT_System.cfg

For 32-bit operating systems, C:\Program Files\MicroStation V8i (SELECTseries)\MicroStation\config\system\zCDOT_System.cfg

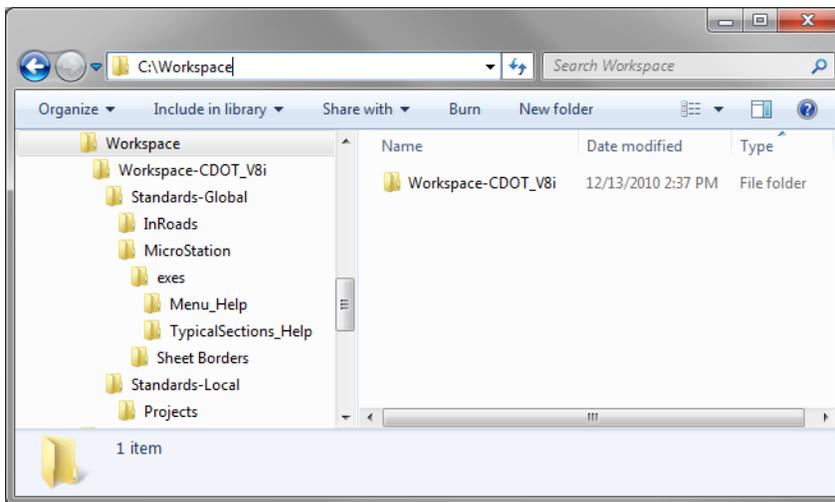


```
#####
#zCDOT_System.cfg was generated for Colorado Department of Transportation #
#By Bohannan Huston Inc. Last Modification; Date: 11/19/2010, Time: 12:00 by #
#Nick Johnson Contact Bohannan Huston for questions or concerns #
#About this file at (877) - 799 - 5103 M-F 8am to 5pm MST. #
#####
# The following variables must be defined on each local computer. #
# Each variable is described below. #
#####
_CDOT_WORKSPACE = S:/Client Standards/CDOT/workspace-CDOT_V8i/
_USTN_SITE = ${_CDOT_WORKSPACE}/Standards-Global/CFG Files/site/
MS_OTWREG_NOCHECK = 1 # Keep the Registration Form from showing
```

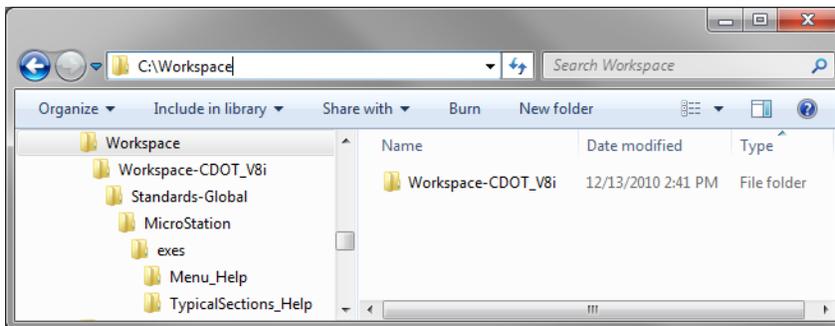
5. The exe folder in the configuration must be copied onto the user’s computer in order for the programs to function properly. The **exes** folder should be placed in the following location: C:\Workspace\Workspace-CDOT_V8i\Standards-Global\MicroStation\. This is required because the custom extensions are built on .NET framework and there are Windows securities that forbid running them on a server.



6. For those using the **CreatePrjDir.exe**, the following workspace folders (and their data) must be copied to the **C:\Workspace** directory:
 - ◆ **Workspace-CDOT_V8i\Standards-Local\Projects**
 - ◆ **Workspace-CDOT_V8i\Standards-Global\InRoads\Preferences**
 - ◆ **Workspace-CDOT_V8i\Standards-Global\MicroStation\Sheet Borders**
7. The pcf file created by the **CreatePrjDir.exe** program will be placed in the following location on the computer used to run the program:
 - ◆ **C:\Workspace\Workspace-CDOT_V8i\Standards-Local\Projects**
8. This pcf file should be copied to the **S:\Client Standards\CDOT\Workspace-CDOT_V8i\Standards-Local\Projects**. All users accessing this project will use the pcf file located on the server because the MicroStation configuration variables point to this directory.
9. Below is an example of the folder structure required on the local drive for those using the **CreatePrjDir.exe**:



10. The folder structure required on the local drive for those not using the **CreatePrjDir.exe** is:



11. These folders and files do not control the resources used by the program.
12. Follow step 14 on the installation instructions to deactivate the workspaces.

Workflows Using Microsoft Office Products

Workflow OP 1 - Linking Word Documents to MicroStation

This document guides you through the creation of CDOT Notes sheets. This includes general notes for each of the specialty groups, SWMP notes for Landscape and Environmental, as well as any other sheets with notes. The Design general notes will be illustrated in this workflow, but the process is the same for each type of notes sheet.

Workflow Outline

Updating Links to the Word Doc - The existing link in the notes file points to the seed Word document. This needs to be changed to point to the Word document in the project folder.

- ◆ **Commands Used: Edit > Links > Change Source** - Used to change the directory path to the linked Word document.

Editing the Notes - How the notes are edited will depend on the extent of the editing. If the edits do not change the line count of the document, the current link can be edited. If the edits will change the line count then the notes should be opened through Word and edited. After editing, the existing links in MicroStation must be deleted and re-created.

- ◆ **Commands Used: Double Click on Link** - Used to open Word from MicroStation so that the existing link can be edited.

Setting Up a Word Document for Linking - If you are building a notes file from scratch, the page layout must be set up.

- ◆ **Commands Used: Word > Page Layout** - Used set up the page formatting.
 - **Margins** - Used to set the margins.
 - **Size** - Used to define the paper size.
 - **Columns** - Used to format to two columns.
 - **Indents** - Used to set the indents.

Creating a New Link - If a new notes file was created or if extensive edits were done on an existing file, a new link will need to be made.

- **Commands Used: MicroStation > Delete** - Used to remove the old link.
- **Word > Copy** - Used to identify the text to be linked.
- **MicroStation > Paste Special** - Used to create the new link in MicroStation.

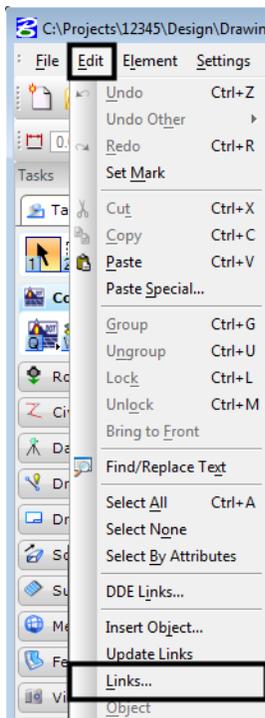
Updating Links to the Word Doc

The JPC#DES_GenlNote##.dgn is created in ...**Design\Drawings** project folder when the Create Project Utility is run. This file is linked to a Word document that contains generic notes. The links are pointing to the JPC#DES_GenlNote.doc that resides in the Project Template and must be redirected to the file in the specific folder.

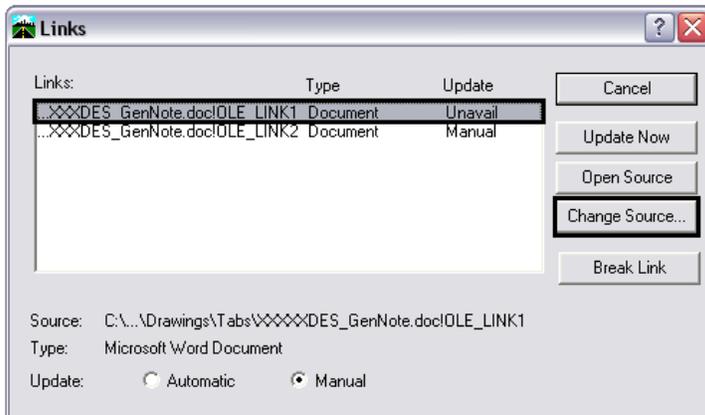
Note:

- A Word 2007 document has a maximum viewable width of 13” when linked to MicroStation.

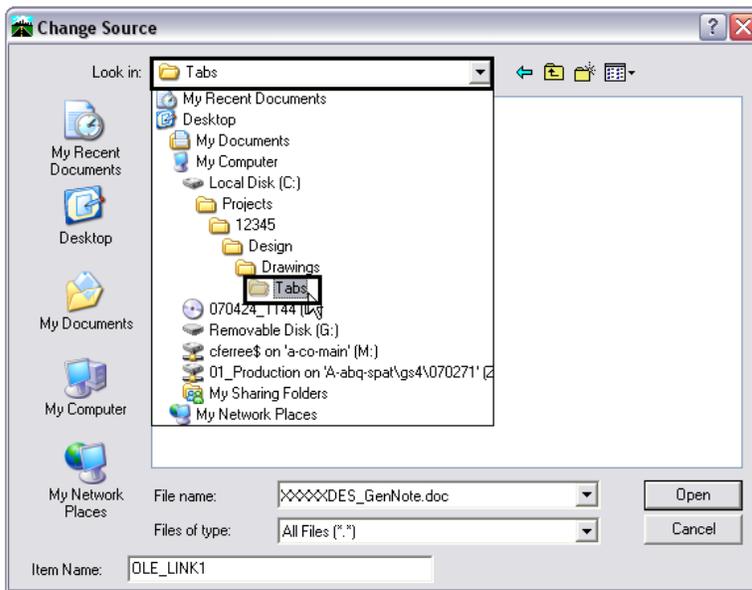
- A Word 2010 document has a maximum viewable width equal to the paper size when linked to MicroStation.
 - When changing the source of a linked Word document in MicroStation, the viewable area of the document will match the version of Word installed on the computer.
 - ◆ If a link containing a Word 2010 document has the source changed on a computer with Word 2007 installed, the reduction of the viewable area will result in approximately 3” of data on the right side of the document being hidden. It may also affect fonts used in the Word document.
 - ◆ If a link containing a Word 2007 document has the source changed on a computer with Word 2010 installed, the image of the document is reduced in size to fit the entire paper area into the area of the existing link. It may also affect fonts used in the Word document.
1. Open the **JPC#DES_GenlNote##.dgn** located in ProjectWise or, for locally stored projects, **C:\Projects\JPC#\Design\Drawings** directory.
 2. Select **Edit > Links** from the MicroStation Main Menu.



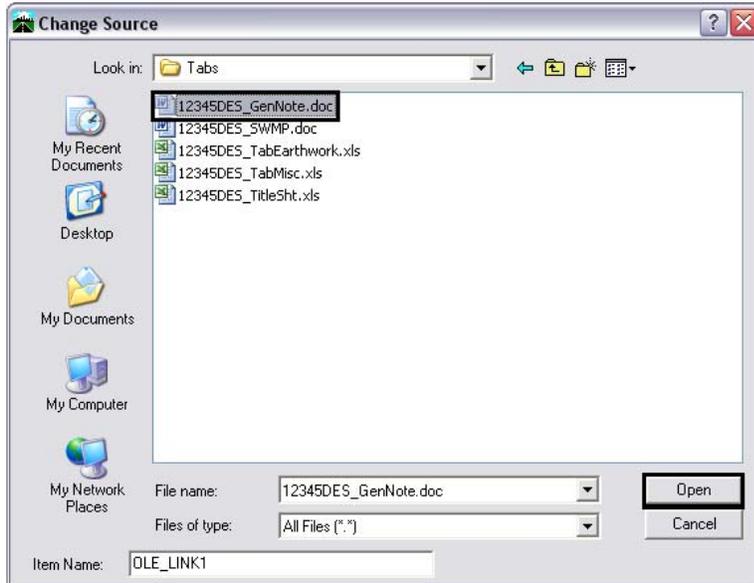
3. In the **Links** dialog box, highlight one of the documents shown, then **<D> Change Source**.



4. In the **Change Source** dialog box, use the drop-down list next to the **Look In** field to select the desired directory.



- Highlight the **JPC#DES_GenNote.doc** file and **<D> Open**.



- Repeat this process for the other link.
- <D> Cancel** to dismiss the **Change Source** dialog box.

Note: both links use the same **JPC#DES_GenNote.doc**.

Editing the Notes

- The General Note text document is located in the project directory under:
[C:\Projects\JPC#\Design\Drawings\Tabs\JPC#DES_GenNote.doc](#)
- This file is then linked twice to the **JPC#DES_GenINote##.dgn** sheet files, once for each sheet border in the file. These links act independently of each other, however. Adding or deleting text from one link will not scroll text to the other link.
- Editing that will not change the number of lines in the Word document can be done through the existing link in the **JPC#DES_GenINote##.dgn** file. For editing that will change the line count, open the **JPC#DES_GenNote.doc** and make the desired changes. After changes are made, delete the existing links in the **JPC#DES_GenINote##.dgn** file and create new ones from the edited Word document.

Editing an Existing Link

- Select the **Element Selector** tool from the **MicroStation Main** toolbar.



2. Move the cursor on to the edge of the linked text (the edge will highlight) and double click (<D> <D>). This will open the **JPC#DES_GenNote.doc** file in a session of Word.
3. Make the desired changes in the text, **Save**, and **Close** the Word document. The changes will be automatically displayed in the **JPC#DES_GenNote##.dgn** file.
4. Select **Edit > Update Links** so that the change will show in document.

Setting Up a Word Document for Linking

The following section contains guidelines for setting up a Word document for linking to MicroStation. Please be aware that MicroStation interprets Word 2007 documents and Word 2010 documents differently. Because of this, the setting for both Word 2007 and Word 2010 are given below. Other information, detailed below the page set-up section, pertains equally to both versions of Word.

Page Set-up for Word Documents

Settings for Word 2007

The following settings are used when creating a new Word 2007 document for General Notes or SWMP Plans.

Page Size	11x17 (11" x 17")
Orientation	Landscape
Top Margin	1.00"
Bottom Margin	1.40"
Left Margin	1.00"
Right Margin	3.00"
Columns	Two
Column 1 Width	6.25"
Column 2 Width	8.85"
Column Spacing	0.00"
Column 1 Left Indent	0.13"
Column 1 Right Indent	0.15"
Column 2 Left Indent	0.50" for General Notes 0.13" for SWMP Plans
Column 2 Right Indent	2.35" for General Notes 2.22" for SWMP Plans
Font	Arial Monospaced for SAP
Font Size	10

Settings for Word 2010

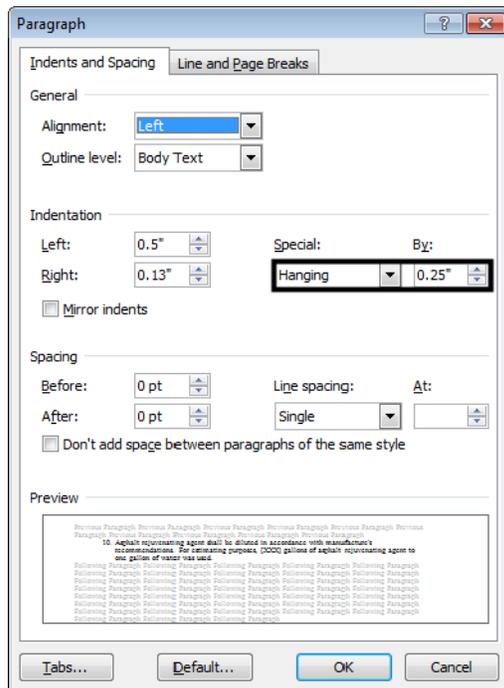
The following settings are used when creating a new Word 2010 document for General Notes or SWMP Plans.

Page Size	11x17 (11" x 17")
Orientation	Landscape
Top Margin	0.50"
Bottom Margin	0.50"
Left Margin	0.25"
Right Margin	0.25"
Columns	Two
Column 1 Width	8.00"
Column 2 Width	8.00"
Column Spacing	0.50"
Column 1 Left Indent	0.00"
Column 1 Right Indent	0.00"
Column 2 Left Indent	0.00"
Column 2 Right Indent	0.00"
Font	Arial Monospaced for SAP
Font Size	10

General Information for Creating Word Documents

- The Auto-numbering function in Word will not function properly. Once the copied text is pasted into MicroStation, the first item of the copied text is renumbered starting at 1. This occurs even if the auto-numbering is set to start with a number other than 1.

- If you wish to number the items, set the **Indentation Special** to **Hanging** with a **By** value of **0.25"**, then physically type in the numbers. Also, clear any tabs set, as these may cause problems with the formatting.



Note: The image above shows the indents for a 2007 Word document. The Left and Right Indentation settings are 0.00 for a 2010 Word document.

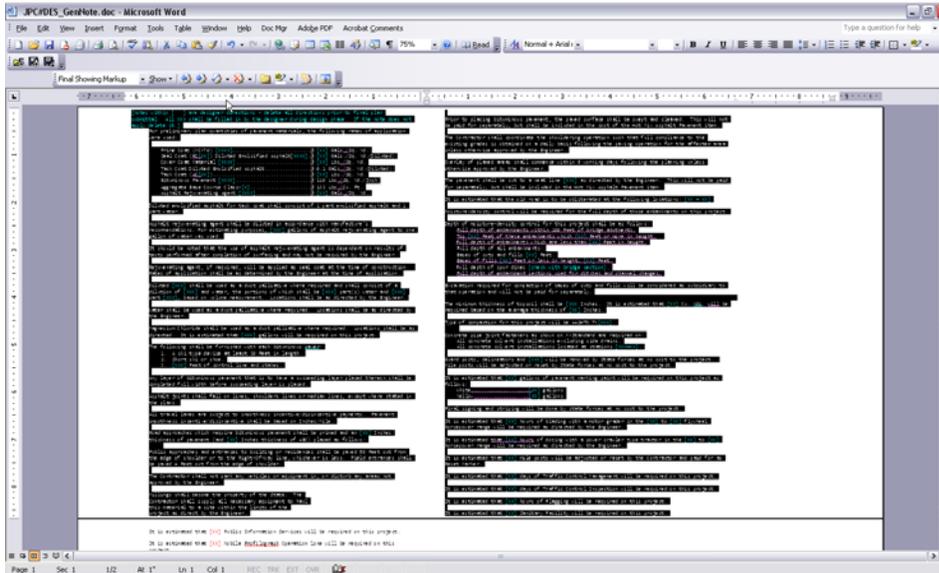
- Use a “hard” return (by pressing the Enter key) at the end of each page. This will ensure that there is no text wrapping between pages.
- A Word 2007 document has a maximum viewable width of 13” when linked to MicroStation.
- A Word 2010 document has a maximum viewable width equal to the paper size when linked to MicroStation.
- When changing the source of a linked Word document in MicroStation, the viewable area of the document will match the version of Word installed on the computer.
 - ◆ If a link containing a Word 2010 document has the source changed on a computer with Word 2007 installed, the reduction of the viewable area will result in approximately 3” of data on the right side of the document being hidden. It may also affect fonts used in the Word document.
 - ◆ If a link containing a Word 2007 document has the source changed on a computer with Word 2010 installed, the image of the document is reduced in size to fit the entire paper area into the area of the existing link. It may also affect fonts used in the Word document.

Creating a New Link

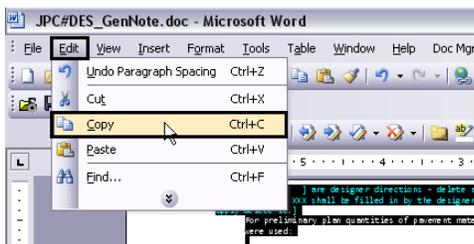
Use the following procedure when changes to the **JPC#DES_GenNote.doc** will increase or decrease the original number of lines in the document.

1. Select **Delete** from the **MicroStation Main** toolbar.
2. **<D>** on the linked text. **<D>** again to accept the command and delete the link.

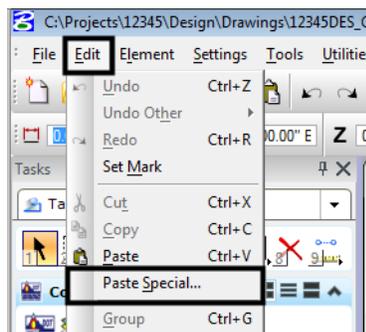
- Open the edited **JPC#DES_GenNote.doc** and highlight the entire page of text that is to be linked.



- Select **Edit > Copy** from the menu (or press **CTRL + C**) to copy the text to the clipboard.



- Go to the MicroStation session with the **JPC#DES_GenINote##.dgn** file open and select **Edit > Paste Special**.



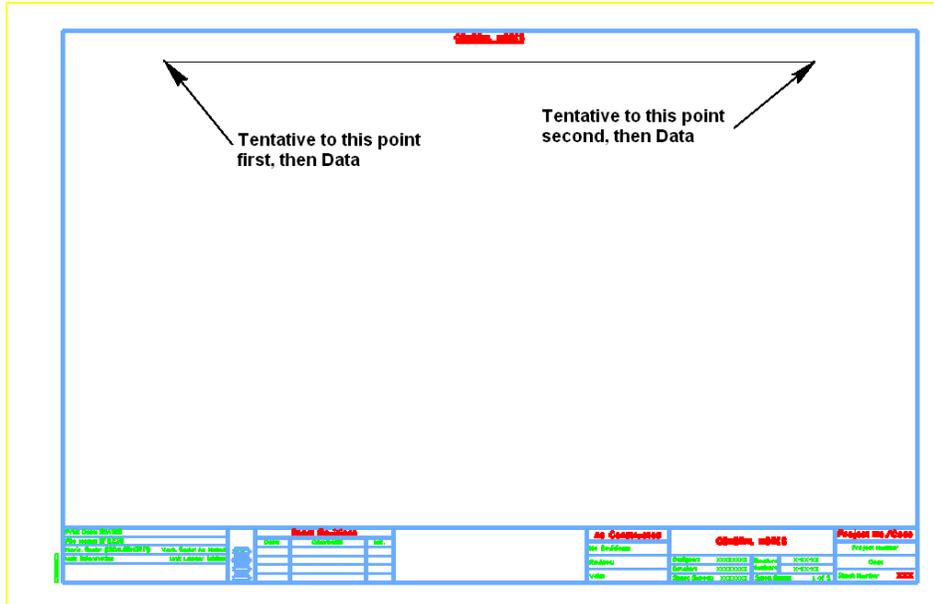
- From the **Paste Special** window, select **Linked Microsoft Office Word Document**, then **<D> Paste**.



- In the Paste OLE tool dialog box, set the **Method** to **By Corners**.



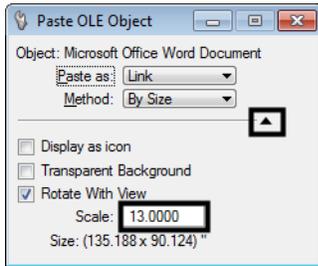
- <T>** to the left end of the guide line and **<D>**.
- <T>** to the right end of the guide line and **<D>** to complete the link.



An alternative method when attaching the linked document is to use the size option in the Paste OLE dialog box.

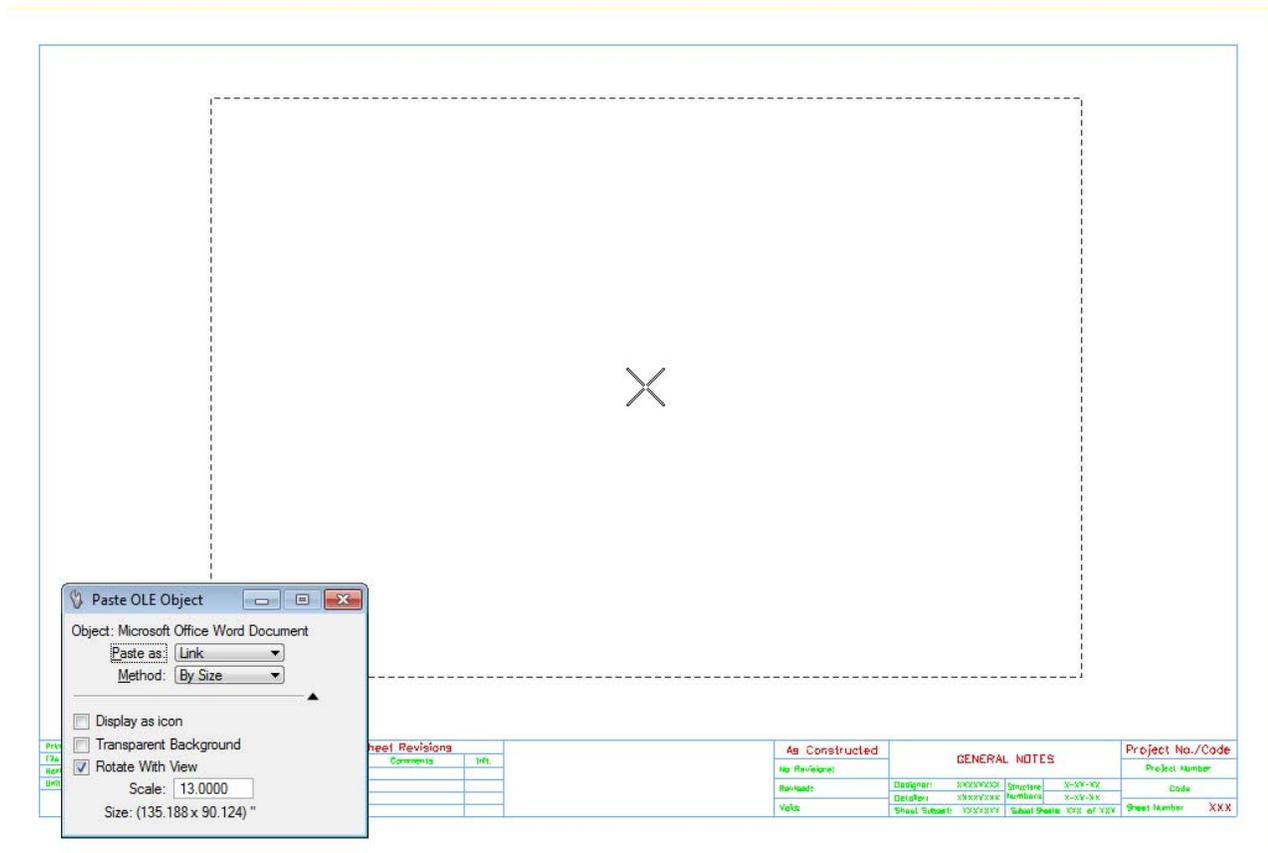
- Follow steps 1 through 6 described above.
- In the Paste OLE tool dialog box, set the **Method** to **By Size**.

- Expand the dialog box and set the *Scale* to **13.00**.



Note: Using the 13 scale factor will produce a text height of approximately .07”, which is the CDOT standard for a 1”=1’ annotation scale. This number can be adjusted if larger text is required.

- Center the outline of the link in the sheet border and **<D>** to place it.



Once the linked document has been placed, it can be repositioned using the MicroStation **Move** command.

Notes Placed From a PDF

A PDF file of the notes can be displayed within the MicroStation file to create General Notes and SWMP plan sheets. As with the other options, using a PDF file has advantages and disadvantages. Some of the advantages to using a PDF file are:

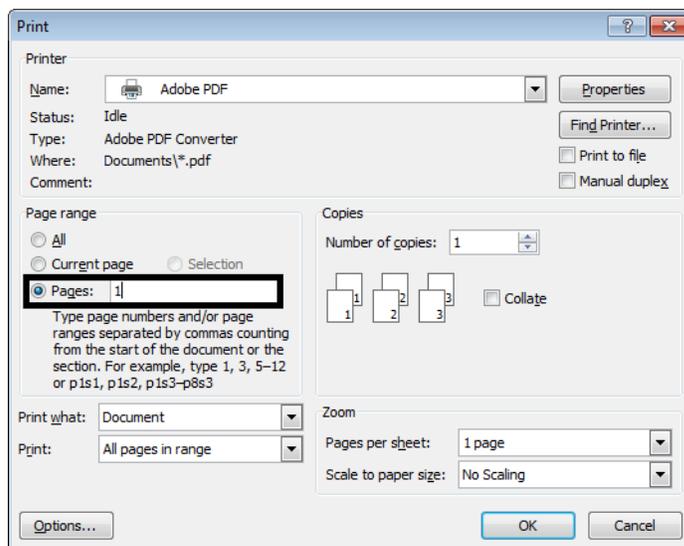
- ◆ The Word 2010 formatting can be used even on computers with Word 2007
- ◆ The autonumbering functions in Word can be used
- ◆ If the PDF is recreated, the new PDF in MicroStation is updated as well

Some of the disadvantages to using a PDF are:

- ◆ The Word file can be different from the PDF file. You will need to create a new PDF each time the document is edited
- ◆ A separate PDF is required for each page in the document
- ◆ A PDF that is attached in MicroStation cannot be overwritten while the DGN file is open.
 - Close MicroStation.
 - Create a new pdf. Give it the same name to overwrite the existing one.
 - Open up MicroStation and PDF will be updated

To link a PDF to MicroStation, follow the steps below:

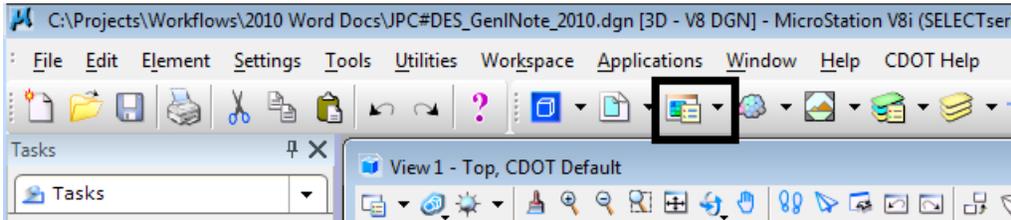
1. Open the Word document (the JPC#DES_GenNote_2010.doc is used in this example) and create a separate PDF print of each sheet to be linked.



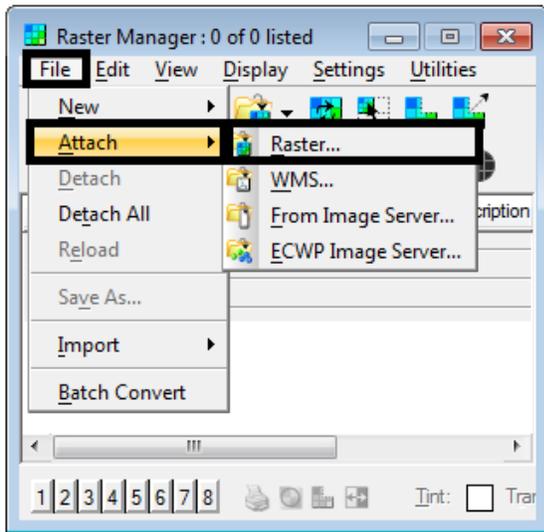
Note: Be sure to name the PDF something meaningful for the print (in this example the PDF was named *JPC#DES_GenNote_2010-pg1.pdf*).

2.).Open MicroStation using the drawing that will contain the PDF (in this example *JPC#DES_GenNote_2010.dgn* is used).

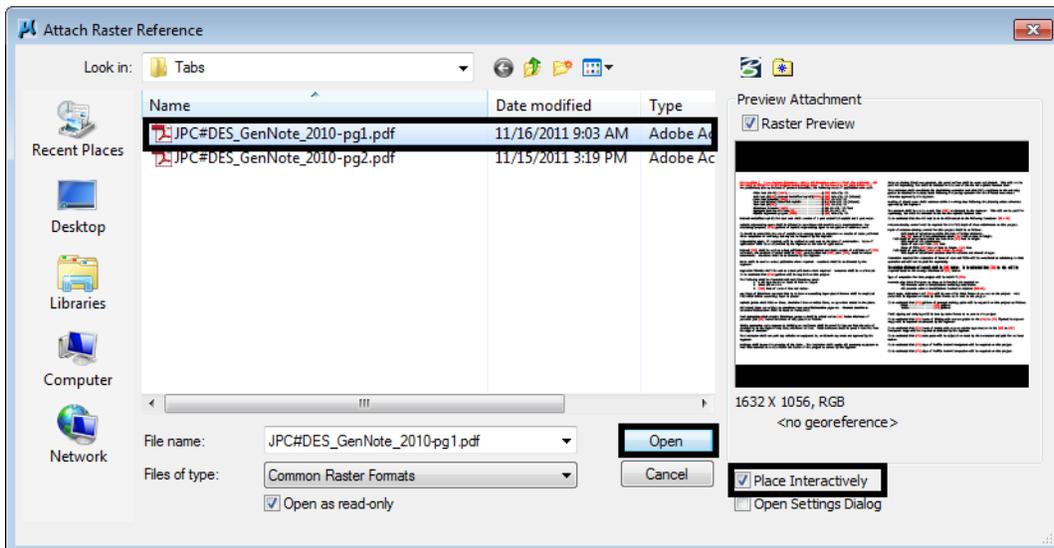
- Open the MicroStation **Raster Manager**.



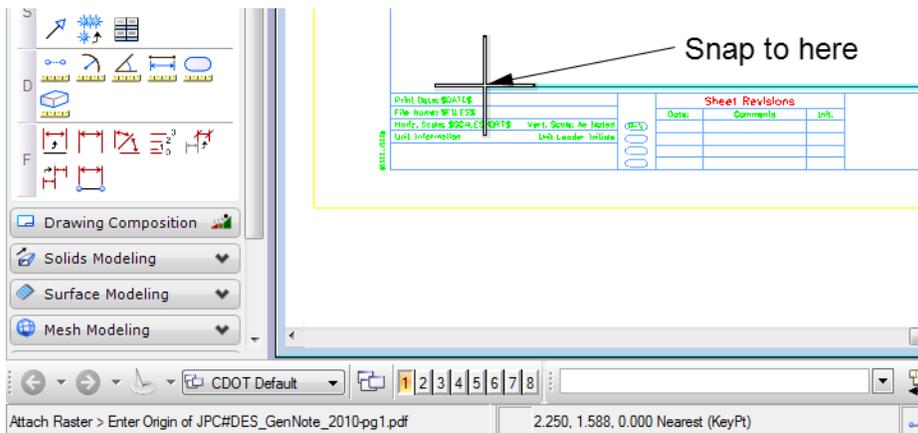
- In the Raster Manager dialog box, select **File > Attach > Raster**. This displays the **Attach Raster Reference** dialog box.



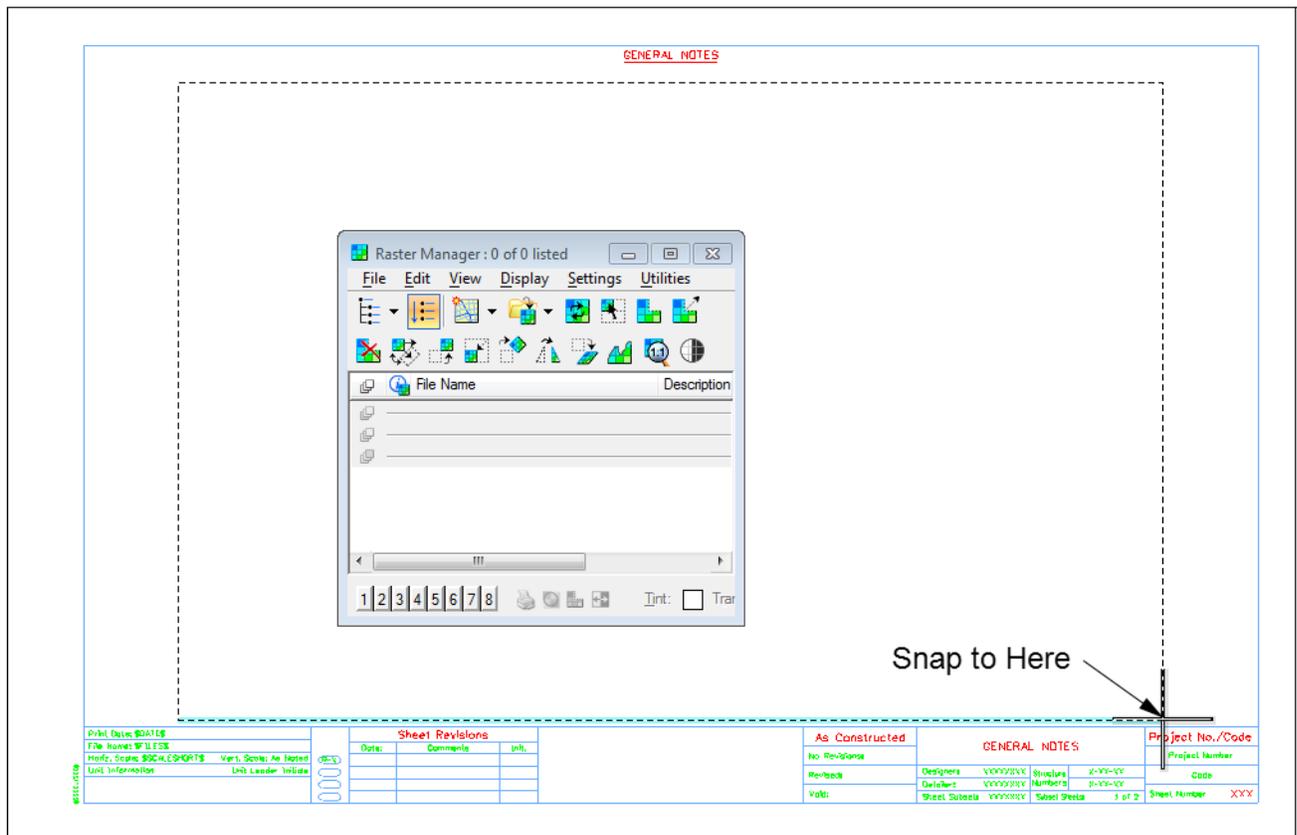
- In the **Attach Raster Reference** dialog box, navigate to the desired location, highlight the desired file, and toggle on **Place Interactively**.
- <D>** the **Open** button.



7. <T> to the left end of the bottom snap line within the sheet border then <D>.



8. <T> to the right end of the bottom snap line within the sheet border then <D>.



Notes Placed as MicroStation Elements

Included in the workspace are files called *JPC#DES_GenlNoteMsta##.dgn* and *JPC#DES_SWMP-Msta.dgn*. These are MicroStation files that have the respective notes placed as MicroStation text elements instead of using links to Word. These files do not have an external data source and all editing occurs solely within the MicroStation environment using the **Edit Text** command.

GENERAL NOTES

[Notes within [] are designer directions - delete all directions prior to final plan submittal. All XXX shall be filled in by the designer during design phase. If such notes do not apply delete it.]

For preliminary plan quantities of pavement materials, the following rates of application were used:

Prime Coat (MC-70) [XXXX]..... @ [XX] Gals./Sq. Yd.	
Seal Coat (RC[XX] Diluted Emulsified Asphalt) [XXXX] @ [XX] Gals./Sq. Yd. (Diluted)	
Cover Coat Material [XXXX]..... @ [XX] Lbs./Sq. Yd.	
Tack Coat Diluted Emulsified Asphalt..... @ 0.1 Gals./Sq. Yd. (Diluted)	
Tack Coat (AC[XX])..... @ [XX] Lbs./Sq. Yd.	
Bituminous Pavement [XXXX]..... @ 110 Lbs./Sq. Yd./Inch	
Aggregate Base Course Class-[X]..... @ 133 Lbs./Cu. Ft.	
Asphalt Rejuvenating Agent [XXXX]..... @ [XX] Gals./Sq. Yd.	

Diluted emulsified asphalt for tack coat shall consist of 1 part emulsified asphalt and 1 part water.

Asphalt rejuvenating agent shall be utilized in accordance with manufacturer's recommendations. For estimating purposes, [XXX] gallons of asphalt rejuvenating agent to one gallon of water was used.

It should be noted that the use of asphalt rejuvenating agent is dependent on results of tests performed after completion of surfacing and may not be required by the Engineer.

Rejuvenating agent, if required, will be applied as one coat at the time of construction. Rates of application shall be as determined by the Engineer at the time of application.

Diluted [XXX] shall be used as a dust palliative where required and shall consist of a solution of [XXX] and water, the portions of which shall be [XXX] parts water and [XXX] parts [XXX], based on volume measurements. Locations shall be as directed by the Engineer.

Water shall be used as a dust palliative where required. Locations shall be as directed by the Engineer.

Aggregate Course shall be used as a dust palliative where required. Locations shall be as directed. It is estimated that [XXX] gallons will be required on this project.

The following shall be furnished with each bituminous paving:

1. A 30" type device at least 20 Feet in length.
2. Short cut or wire.
3. [XXX] feet of gutter line and stakes.

Any layer of bituminous pavement that is to have a succeeding layer placed thereon shall be completed to width before succeeding layer is placed.

Asphalt joints shall be in lines, shoulders lines or median lines, except where stated in the plans.

All travel lanes are subject to construction (contingent) construction payments. Pavement construction (contingent) construction shall be based on (GALAS/FT/IN).

Road approaches which receive bituminous pavement shall be primed and an [XX] inches thickness of pavement (at [XX] inches thickness of ABC) placed as follows:

Paving approaches and entrances to building or residences shall be paved 50 Feet out from the edge of shoulder or to the right-of-way line, whichever is less. Field entrances shall be paved 4 Feet out from the edge of shoulder.

The Contractor shall not park any vehicles or equipment in, or disturb any areas not approved by the Engineer.

Utilities shall become the property of the State. The Contractor shall supply all necessary equipment to bury this material to a site within the limits of the project as directed by the Engineer.

Prior to placing bituminous pavement, the paved surface shall be swept and cleaned. This will not be paid for separately, but shall be included in the cost of the Hot Mix Asphalt Pavement Item.

The Contractor shall coordinate the subgrade operation with that of the compliance to the existing grades is obtained on a daily basis following the paving operation for the affected area unless otherwise approved by the Engineer.

Overlay of planned areas shall commence within 8 working days following the planning unless otherwise approved by the Engineer.

The pavement shall be cut to a neat line [XXX] as directed by the Engineer. This will not be paid for separately, but shall be included in the Hot Mix Asphalt Pavement Item.

It is estimated that the old road to be rehabilitated at the following locations: [XXX]

Moisture-density control will be required for the full depth of those embankments in this project.

Depth of moisture-density control for this project shall be as follows:

- a. Depth of embankments within 80 Feet of bridge abutments.
- b. [XXX] Feet of those embankments which [XX] Feet or more in height.
- c. Depth of embankments which are less than [XX] Feet in height.
- d. Depth of all embankments.
- e. Mass of cuts and fills [XX] Feet or less in height. [XX] Feet.
- f. Depth of spur dikes (check with bridge section).
- g. Depth of embankment sections used for ditches and channel changes.

Excavation required for completion of boxes of cuts and fills will be considered as subsidiary to that operation and will not be paid for separately.

The average thickness of topsoil shall be [XX] inches. It is established that [XX] Cu. Yds. will be required based on the average thickness of [XX] inches.

Type of compaction for this project will be AASHTO T-[XXX].

Concrete pipe joint fasteners as shown in Standards are required on:

- A. concrete culvert installations excluding side drains.
- B. concrete culvert installations located at stations [XXX-XX].

Board posts, delimiters and [XXX] will be removed by State forces at its cost to the project. The post will be adjusted or reset by State forces at no cost to the project.

It is estimated that [XX] gallons of pavement marking paint will be required on this project as follows:

White..... [XX] gallons	
Yellow..... [XX] gallons	

Final staking and striping will be done by state forces at its cost to the project.

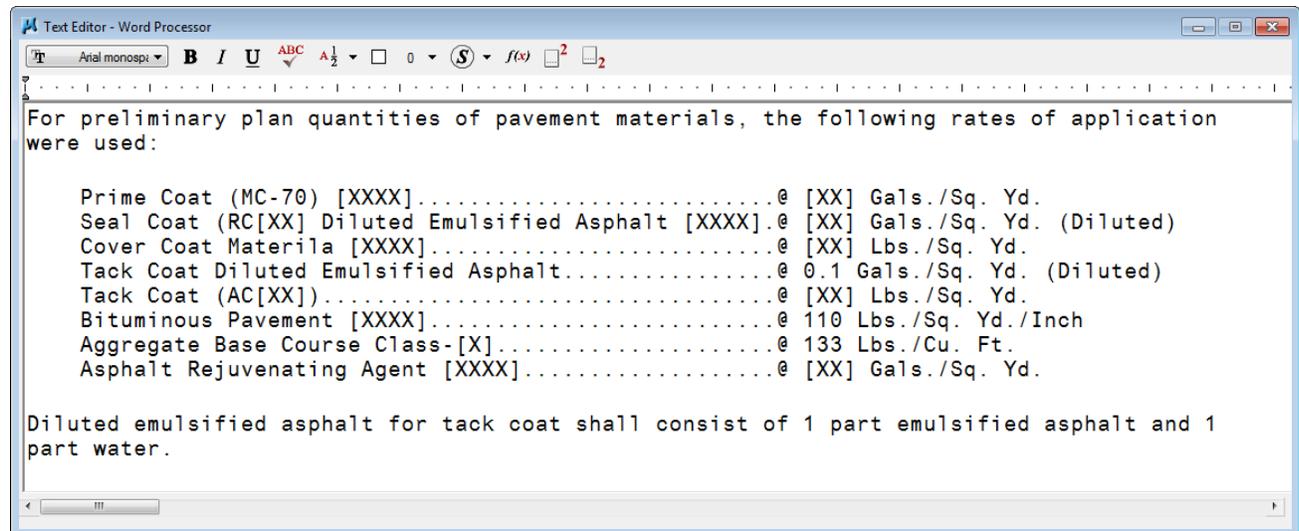
It is estimated that [XX] hours of blading with a motor grader in sub [XX] to [XX] horsepower range will be required as directed by the Engineer.

It is estimated that [XX] of curing with a power crawler type tractor in sub [XX] to [XX] horsepower range will be required as directed by the Engineer.

It is estimated that [XX] mile posts will be adjusted or reset by the Contractor and paid for by State forces.

It is estimated that [XX] days of Traffic Control Management will be required on this project.

<p>with CDOT BNA/CE File Names: BFL/CSB Map/ Sheets: BSCA/CSHRT URL Information</p>	<p>Sheet Revisions</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Color</th> <th>Comments</th> <th>Init.</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> </tbody> </table>	Color	Comments	Init.													<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>As Constructed</th> <th>GENERAL NOTES</th> <th>Project No./Code</th> </tr> </thead> <tbody> <tr> <td>Revisions</td> <td>Designers: XXXXXXXX Calculators: XXXXXXXX Sheet Subj: XXXXXXXX</td> <td>Project Number: XXX-XX-XX Code: XXX-XX-XX Sheet Number: XXX</td> </tr> </tbody> </table>	As Constructed	GENERAL NOTES	Project No./Code	Revisions	Designers: XXXXXXXX Calculators: XXXXXXXX Sheet Subj: XXXXXXXX	Project Number: XXX-XX-XX Code: XXX-XX-XX Sheet Number: XXX
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Revisions	Designers: XXXXXXXX Calculators: XXXXXXXX Sheet Subj: XXXXXXXX	Project Number: XXX-XX-XX Code: XXX-XX-XX Sheet Number: XXX																					



If used, these files should replace those containing the linked Word documents and should not be used in addition to them.

Workflow OP 2 - Linking Excel Documents to MicroStation

This document guides you through linking Microsoft Office Documents within MicroStation.

Workflow Outline

Creating a New Link - To create a link to an Excel file within MicroStation; copy the data from the Excel file, then Paste Special the data into MicroStation.

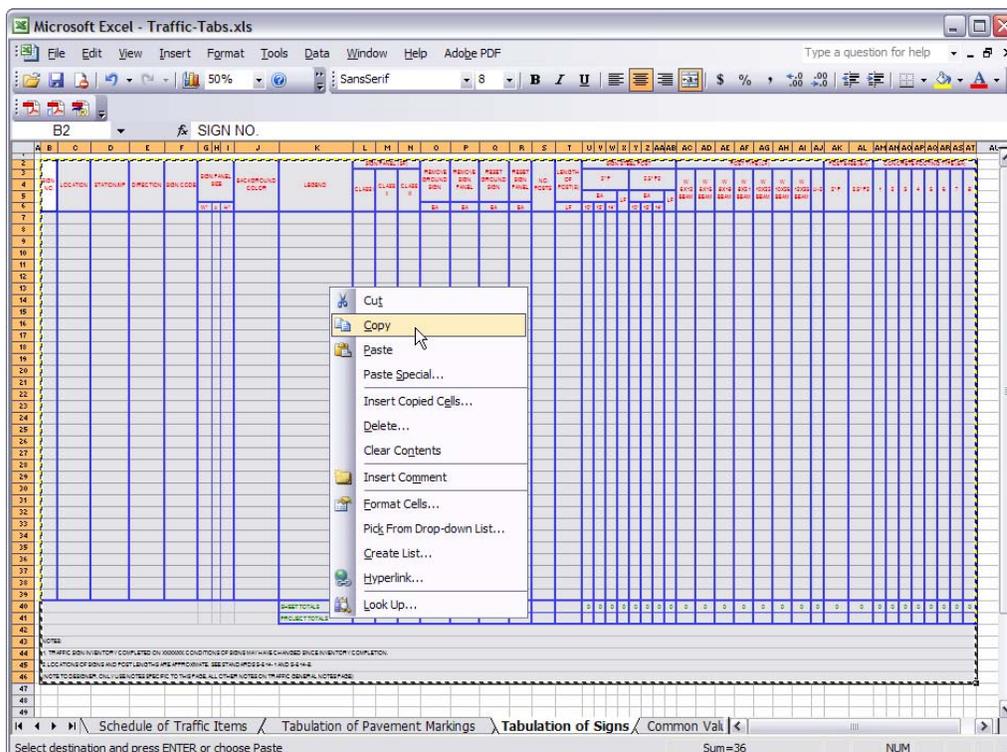
- ◆ **Excel > Copy** - Used to identify the text to be linked.
- ◆ **MicroStation > Paste Special** - Used to create the new link in MicroStation.
 - **Method** - Use the By Size option.
 - **Scale** - Use 10 so that the text will be the correct size.

Updating Links to the Excel - If a linked document gets moved or renamed, the link to that file can be restored without re-creating the link.

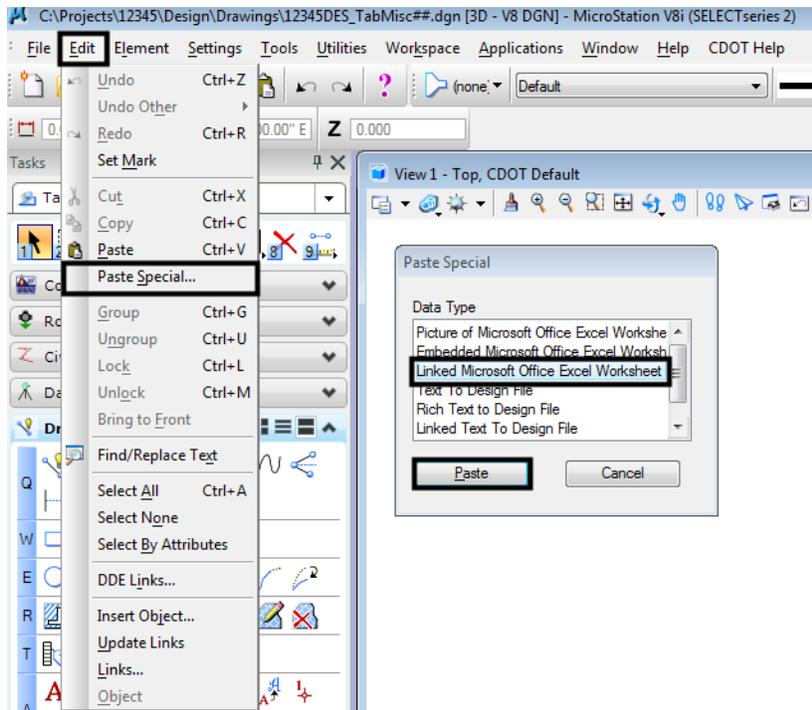
- ◆ **Commands Used: Edit > Links > Change Source** - Used to change the directory path to the linked Word document.

Linking Excel Documents

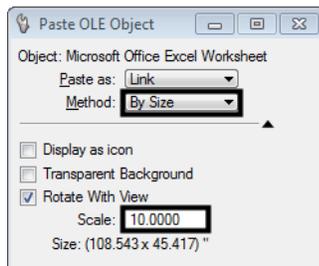
1. Open your MicroStation File and your Microsoft Excel file.
2. Within the Excel file, select the information you would like in the MicroStation Sheet file and copy by **right clicking** and selecting **Copy**.



3. Within the MicroStation file, select **Edit > Paste Special ...** from the MicroStation menu. On the **Paste Special** dialog box, **<D> Linked Microsoft Office Excel Worksheet** and **<D> Paste**.

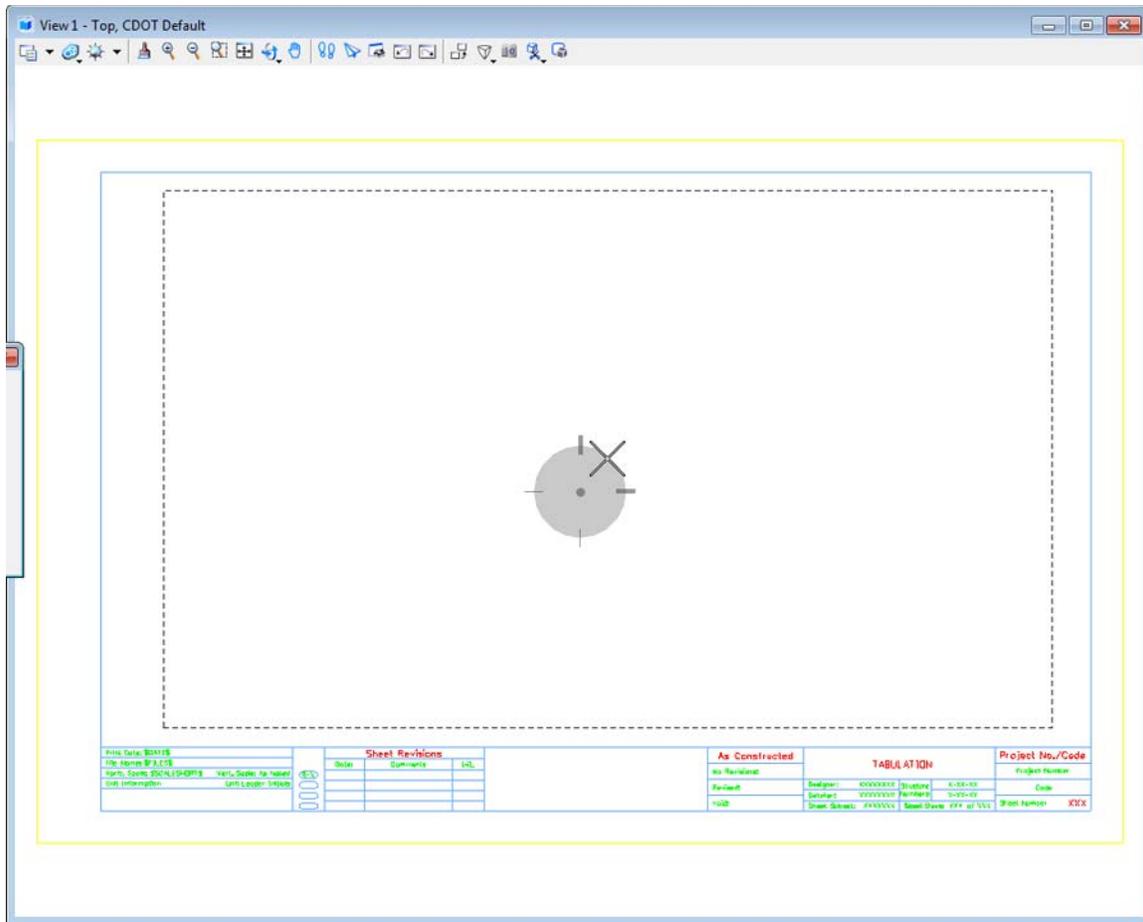


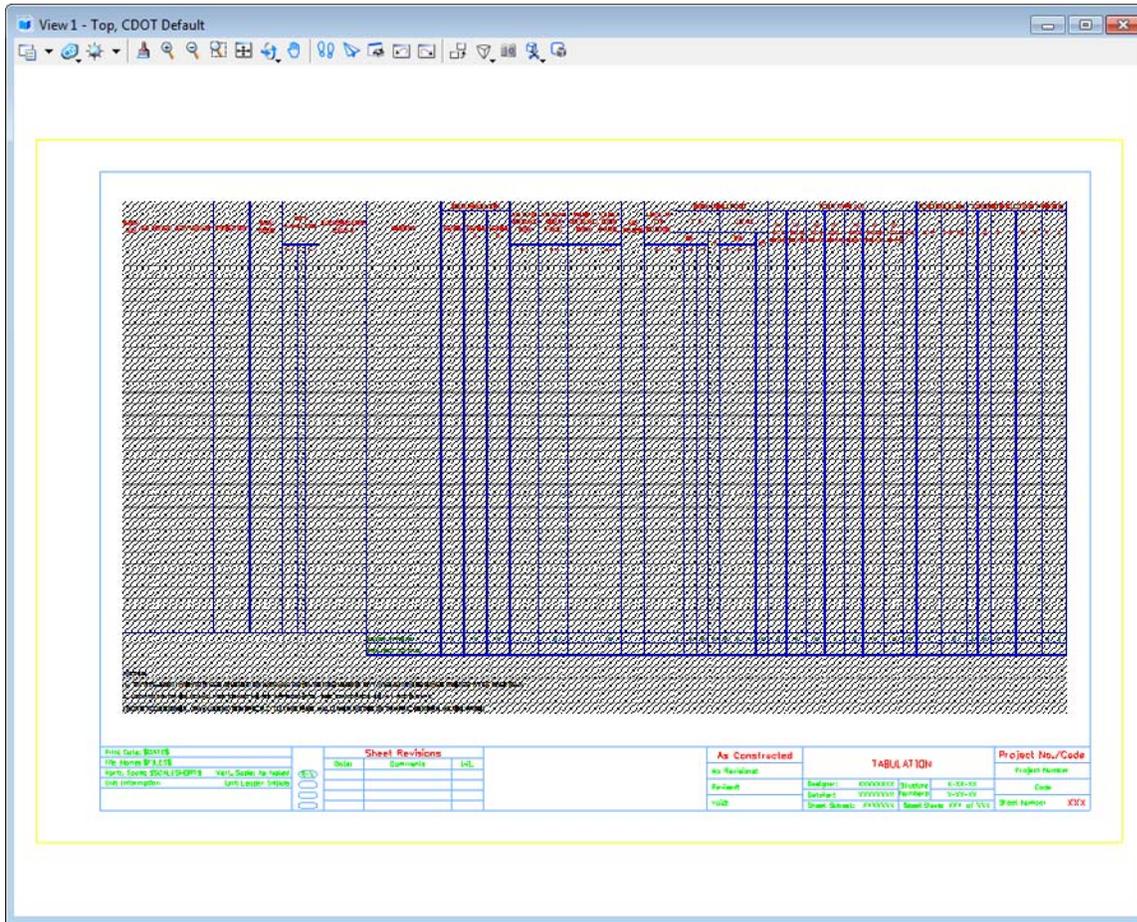
4. This brings up the **Paste OLE** dialog box. Select **By Size** as the **Method:** and enter a **Scale** of **10**.



Note: The San Serif font should be used as the default Font in Microsoft Excel documents. The San Serif 8 pt font in Excel, is equivalent to CDOT Standard Text (.07”), and the San Serif 12 pt font is equivalent to CDOT Title Text (.10”) for a 1”=1’ Drawing with a Scale of 10 noted above. The fonts are not exact duplicates but the San Serif will be the most similar Font to the CDOT Standard.

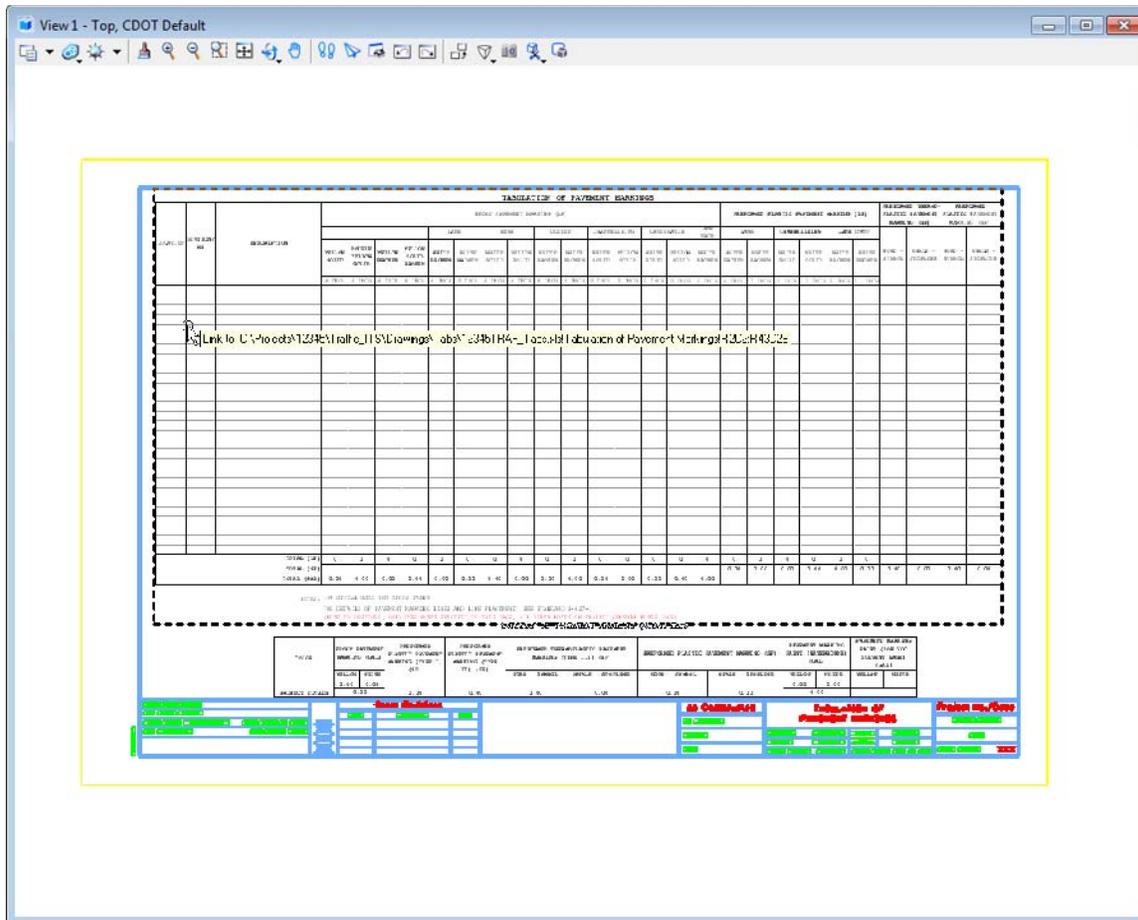
- The limits of the selected Excel data to be placed in the MicroStation Sheet will display in the MicroStation Window. Select the location for the Excel File and <D> to place the file.





Note: The link will display with hatching which indicates that the Excel file containing the linked data is currently open. If you close out of your Excel file, the hatching will go away.

- You can single click on the Linked graphics and use MicroStation Commands to move the image. Do not resize the linked window with the handles, as the text size will also resize and will not plot as desired.



Note: You can hover over the linked image to display the location of the Excel file. Double clicking the link will open the Microsoft Excel document. You can edit the Excel file, close the file, and the updates will be displayed in the MicroStation file.

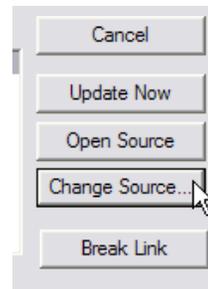
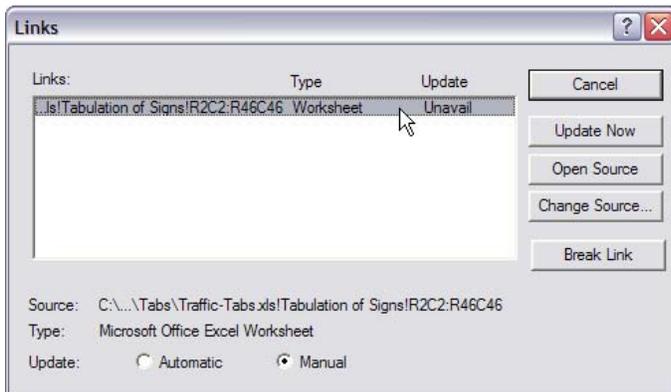
Updating Document Link Source and Properties

- If the Excel document has been moved or renamed, you can simply update the link instead of redoing the above procedure. This is also the case for MicroStation files with links that were created with the **Create Project Directory** program. These files will be linked to Office files in a standard template and need to be updated to link to the Office files in the Project Directory Structure.

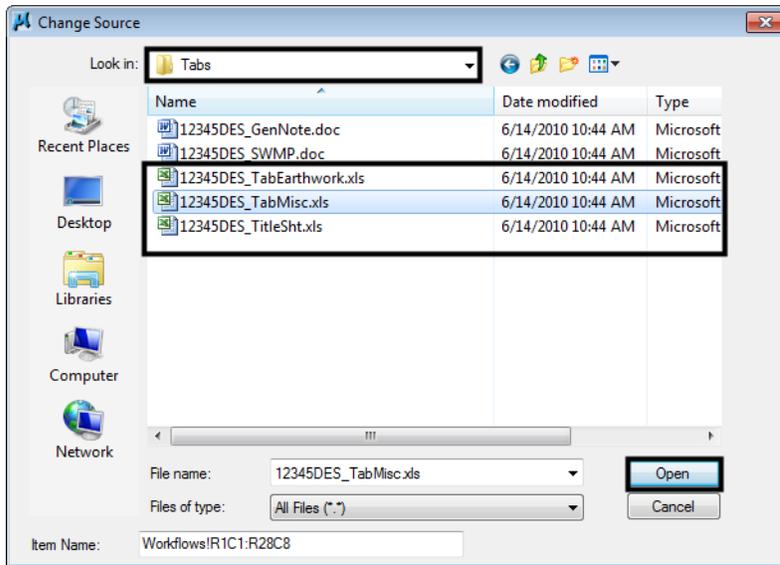
- 2. From the **MicroStation** menu, select **Edit > Links...**



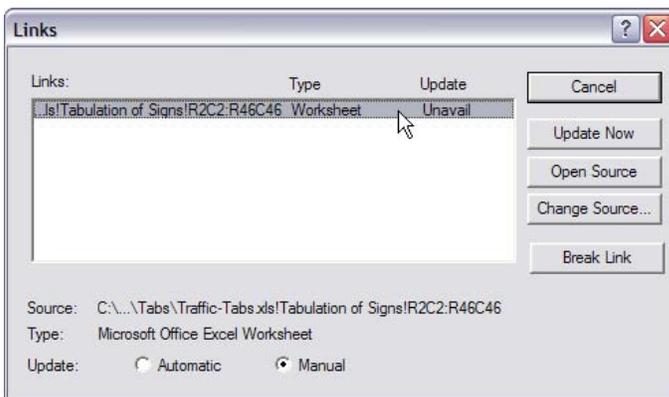
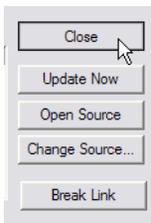
- 3. This will bring up the **Links** dialog box. You can select an available document link and **<D> Change Source...**



- This brings up the **Change Source** dialog box. Use this to navigate to and select the file with its new location. **<D> Open**. This dismisses the **Change Source** dialog box and re-displays the **Links** dialog box.



- You can select another available document link to update or **<D> Close** to exit the **Update Links** dialog box.



Note: You can select either to have the link update manually or automatically by selecting the method you prefer. You can do a manual update from the **Links** dialog box by selecting the link and **<D> Update Now**.

Workflow OP 3 - Monumentation Sheets

This document describes the process used to assemble a Right of Way Monumentation Sheet. An InRoads XML report is used to display the required data from the geometry project. This data is copied and pasted into the *JPC#ROW_TabMon.xls* Excel file and then linked to the *MicroStation JPC#ROW_Mon##.dgn* file.

Workflow Outline

Creating the InRoads XML File - The data used to create the Right of Way Monumentation sheet is stored in an Geometry Project. The InRoads Clearance report is used to extract that data for use on the sheet.

- ◆ **Commands Used: Tools > XML Reports > Clearance** - Used to create the geometry report data used on the Monumentation sheet.
- ◆ **InRoads Report Browser > Templates** - Used to select the template that formats the report.
- ◆ **Format Options** - Used to set the number of decimal places shown in the report.

Copying the Report - After the report is formatted, it is copied and pasted into Excel.

- ◆ **Commands Used: InRoads Report Browser > Copy** - Used to copy the data from the report browser.
- ◆ **Excel > Paste** - Used to paste the report data into Excel.
- ◆ **Protect Sheet** - Used to give the user the ability to turn off the sheet gridlines.
- ◆ **Options > View** - Used to turn the gridlines off.

Creating a New Link - Once the report is in Excel and formatted, it can be linked to the MicroStation file..

- **Commands Used: MicroStation > Delete** - Used to remove the old link.
- **Word > Copy** - Used to identify the text to be linked.
- **MicroStation > Paste Special** - Used to create the new link in MicroStation.

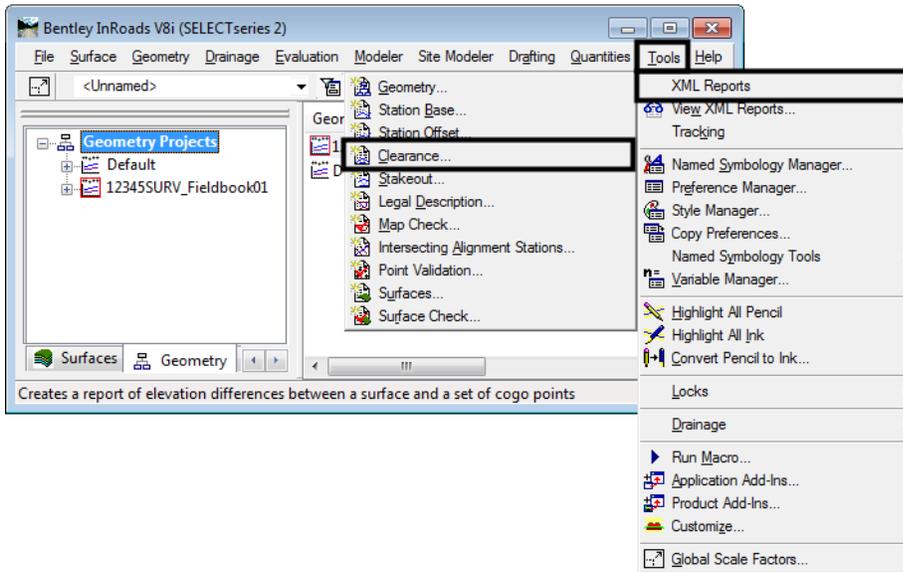
Creating the InRoads XML File

The data used to create the Right of Way Monumentation sheet is stored in an InRoads Geometry Project (*.alg). Depending on the data required, one of two different reports are used to extract the data from the geometry project. Both reports display Point Number, Northing, Easting, and Elevation. If this is all the data that is required, a Geometry report is used. If Station and Offset information is also required, then the Clearance report is used.

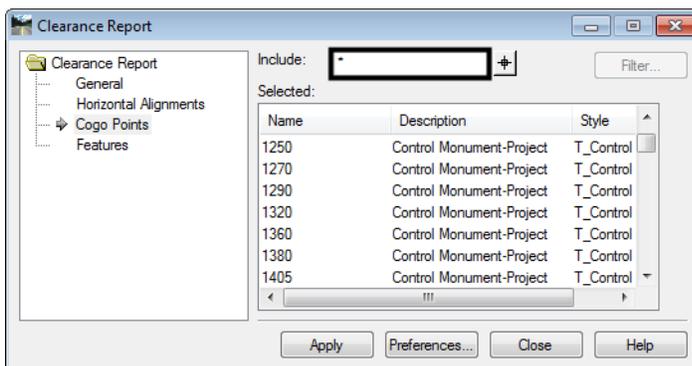
Geometry Report

A geometry project containing the data is the only prerequisite for creating a Geometry Report.

1. From the **InRoads** menu, select **Tools > XML Reports > Clearance**. The **Clearance Report** dialog box is displayed.



2. <D> the **Cogo Points** leaf.
3. In the **Include** field, key in the desired COGO point numbers then Tab to accept the keyed in information. COGO points can be specified as a range (XXX-XXX), a list of individual points (XXX,XXX,XXX) or a combination of both (XXX-XXX,XXX,XXX-XXX). If the required point numbers are unknown, all points can be listed by keying an asterisk (*) into the **Include** field. The asterisk can be used in conjunction with text to limit the list of points. For example, keying in ' 10*' would find all points whose first two digits were ' 1' and ' 0'.
4. <D> **Apply** to start the report compilation process. The **Bentley InRoads Report Browser** dialog box displays.

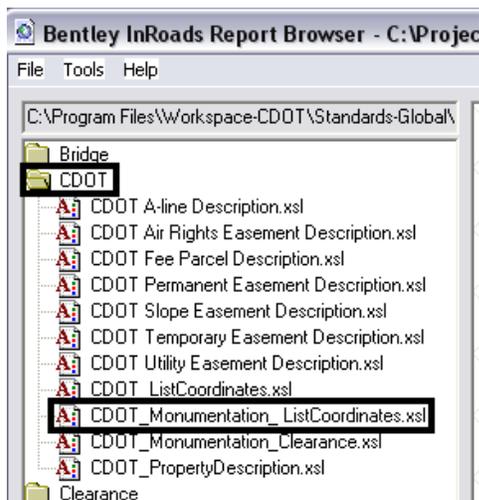


The Bentley InRoads Report Browser

The **Bentley InRoads Report Browser** is a modified version of the Internet Explorer web browser used specifically for InRoads XML reports. It is launched automatically when an XML report is ran. It can also be launched by selecting **Tools > View XML Reports** from the InRoads main menu. The illustrations below use the **List Coordinates** report, however procedures are the same for the **Clearance** report.

Selecting an XML Report Template

1. Report templates are program files that format the raw data contained within the XML file. When the **Bentley InRoads Report Browser** opens, it selects a default report template for the type of report that was created.
2. CDOT’s custom report templates are stored in the CDOT folder. <D> on the CDOT folder to display the available templates. Two custom templates are provided for creating Monumentation sheets; **CDOT_Monumentation_ListCoordinates** and **CDOT_Monumentation_Clearance**. <D> on the desired template name to activate that template.



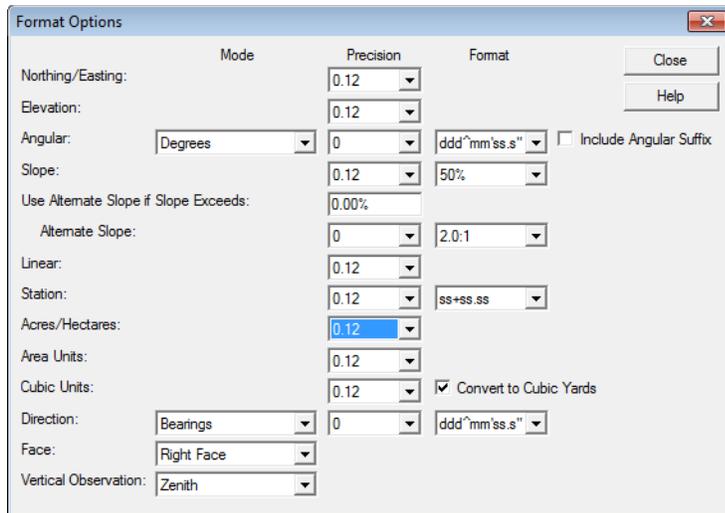
3. This updates the report layout automatically in the browser window.



Format Options

1. The default precision for reporting is set to two decimal places. If a different precision is required, it can be set using **Format Options**.
2. From the **Bentley InRoads Report Browser**, select **Tools > Format Options**. This displays the **Format Options** dialog box.

- Use the pull downs to set the desired precision for the different options. For the reports discussed in this document, the following fields are used: **Northing/Easting, Elevation, Linear** (for offsets), and **Station**.



- Selecting a different precision will automatically update the column or columns in the report that uses that format option. **<D> Close** to dismiss the dialog box when finished.

Copying the Report to the Monumentation Spreadsheet

- Now that the report has been generated and formatted properly, the contents of the report can be copied into the **JPC#ROW_TabMon.xls** Excel file. This file contains separate sheets for different types of monuments. These are; ROW Markers To Be Set, Control Points To Be Set, ROW Markers To Be Reset, Permanent Easement Markers, Aliquot Corners, and Temporary Easement Points. Because any number of these monument types may be stored in the geometry project, it may be necessary to copy different blocks of data from the report to paste into different sheets in the spreadsheet.
- Open the **JPC#ROW_TabMon.xls** file with Excel then minimize it.
- Go back to the Bentley InRoads Report Browser and highlight the desired data in the report.
- Right Click on the highlighted data to display the menu. Select **Copy** from that menu.

Cogo Points

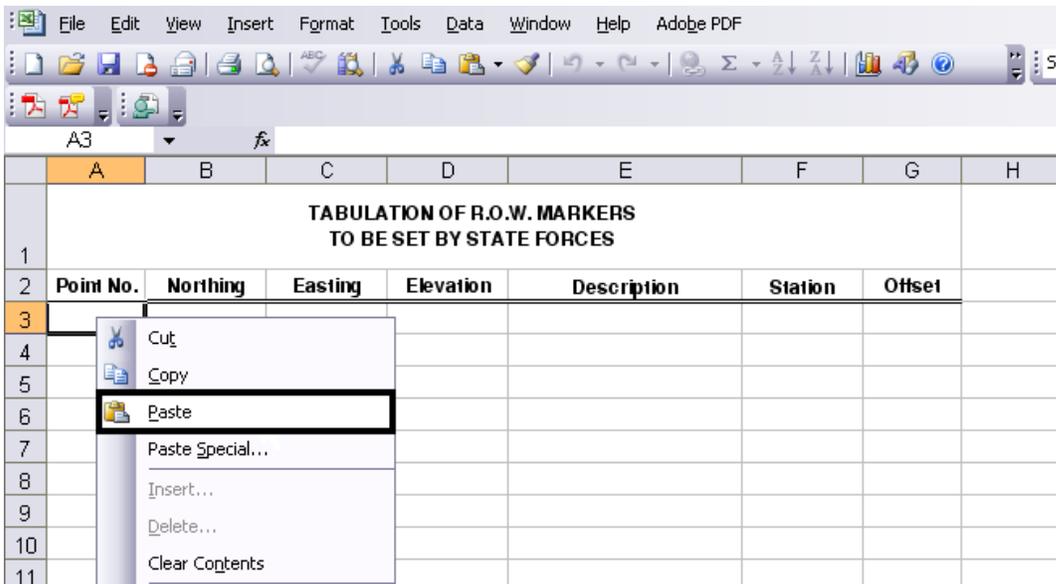
POINT NAME	NORTH (ft)	EAST (ft)	ELEV (ft)	DESCRIPTION
104	1558514.31	3277056.40	0.00	N 1/4 Corner Sec. 14
105	1558527.87	3279643.18	0.00	NW Corner Sec. 13
106	1553239.97	3279699.86	0.00	SW Corner Sec. 13
107	1553924.17	3281413.94	0.00	SW Corner Sec. 13
108	1553239.97	3279699.86	0.00	SW Corner Sec. 13
109	1558460.37	3269305.1		SW CORNER SECT 10
123	1559379.09	3279172.1		ROW MONUMENT to be set
124	1558494.08	3281809.1		ROW MONUMENT to be set
125	1557449.77	3284676.1		ROW MONUMENT to be set
202	1558228.58	3274676.1		ROW MONUMENT to be set
203	1557378.97	3280570.1		ROW MONUMENT to be set
204	1556263.86	3283756.1		ROW MONUMENT to be set



5. Minimize the **Bentley InRoads Report Browser** and maximize the Excel.
6. Using the tabs at the bottom, select the sheet for the copied data.



7. **<D>** in cell A3 of the selected sheet. This is where the copied data will be pasted. **Right click** in the same cell and select **Paste** from the menu that displays.



8. The illustration below shows the result of this operation.

	A	B	C	D	E	F	G
1	TABULATION OF R.O.W. MARKERS TO BE SET BY STATE FORCES						
2	Point No.	Northing	Easting	Elevation	Description	Station	Offset
3	123	1559379.09	3279172.06	2202.8	ROW MONUMENT to be set		
4	124	1558494.08	3281809.39	2202.8	ROW MONUMENT to be set		
5	125	1557449.77	3284676.82	2202.8	ROW MONUMENT to be set		
6	200	1556228.46	3282411.2	2202.8	STATE HWY DEPT MONUMENT		
7	201	1554582.34	3285207.83	2202.8	STATE HWY DEPT MONUMENT		
8	202	1558228.58	3274676.21	2202.8	ROW MONUMENT to be set		
9	203	1557378.97	3280570.38	2202.8	ROW MONUMENT to be set		
10	204	1556283.86	3283756.41	2202.8	ROW MONUMENT to be set		

9. Because the example is a List Coordinates report, the **Station** and **Offset** columns are empty. These two columns will be hidden in order to center the title over the data.

10. **<D>** and hold the mouse button on the ‘F’ column label and drag the cursor over the ‘G’ column label. Both columns highlight.

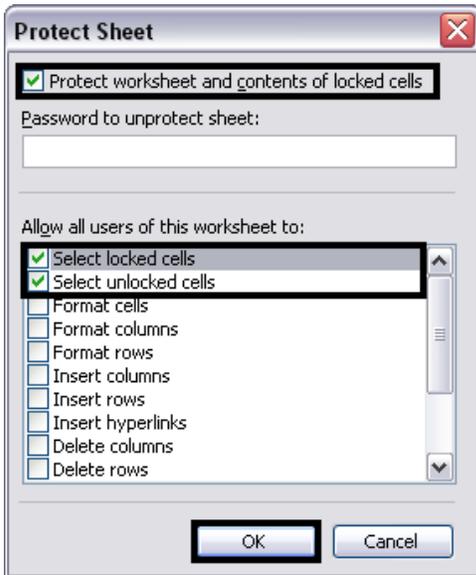
11. **Right Click** on the highlighted columns (in the body of the table) and select **Hide** from the menu.

	A	B	C	D	E	F	G	H	
1	TABULATION OF R.O.W. MARKERS TO BE SET BY STATE FORCES								
2	Point No.	Northing	Easting	Elevation	Description		Offset		
3	123	1559379.09	3279172.06	2202.80	ROW MONUMENT to be set				
4	124	1558494.08	3281809.39	2202.80	ROW MONUMENT to be set				
5	125	1557449.77	3284676.82	2202.80	ROW MONUMENT to be set				
6	200	1556228.46	3282411.2	2202.80	STATE HWY DEPT MONUMENT				
7	201	1554582.34	3285207.83	2202.80	STATE HWY DEPT MONUMENT				
8	202	1558228.58	3274676.21	2202.80	ROW MONUMENT to be set				
9	203	1557378.97	3280570.38	2202.80	ROW MONUMENT to be set				
10	204	1556283.86	3283756.41	2202.80	ROW MONUMENT to be set				
11									
12									
13									
14									
15									
16									

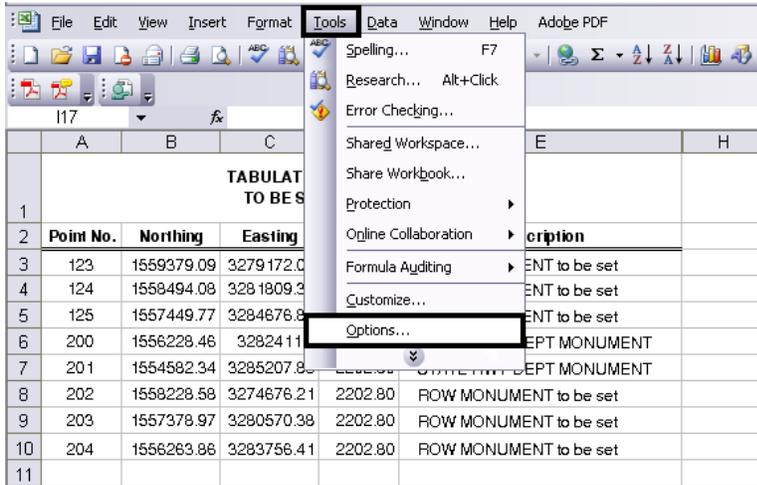
- The Station and Offset columns vanish and the title is centered over the remaining columns.

	A	B	C	D	E
1	TABULATION OF R.O.W. MARKERS TO BE SET BY STATE FORCES				
2	Point No.	Northing	Easting	Elevation	Description
3	123	1559379.09	3279172.06	2202.80	ROW MONUMENT to be set
4	124	1558494.08	3281809.39	2202.80	ROW MONUMENT to be set
5	125	1557449.77	3284676.82	2202.80	ROW MONUMENT to be set
6	200	1556228.46	3282411.2	2202.80	STATE HWY DEPT MONUMENT
7	201	1554582.34	3285207.83	2202.80	STATE HWY DEPT MONUMENT
8	202	1558228.58	3274676.21	2202.80	ROW MONUMENT to be set
9	203	1557378.97	3280570.38	2202.80	ROW MONUMENT to be set
10	204	1556283.86	3283756.41	2202.80	ROW MONUMENT to be set
11					

- Before the sheet can be linked to the *JPC#ROW_Mon##.dgn* file, the grid lines need to be turned off. If they are left on, they will appear in a print of the dgn file.
- Select **Tools > Protection > Protect Sheet** to maintain the new sheet formatting. This will display the **Protect Sheet** dialog box.
- Toggle on **Protect worksheet and contents of locked cells** near the top of the dialog. In addition toggle on **Select locked cells**, and **Select unlocked cells** under *Allow all users of this worksheet to:*. <D> **OK** to accept the changes and dismiss the dialog box.

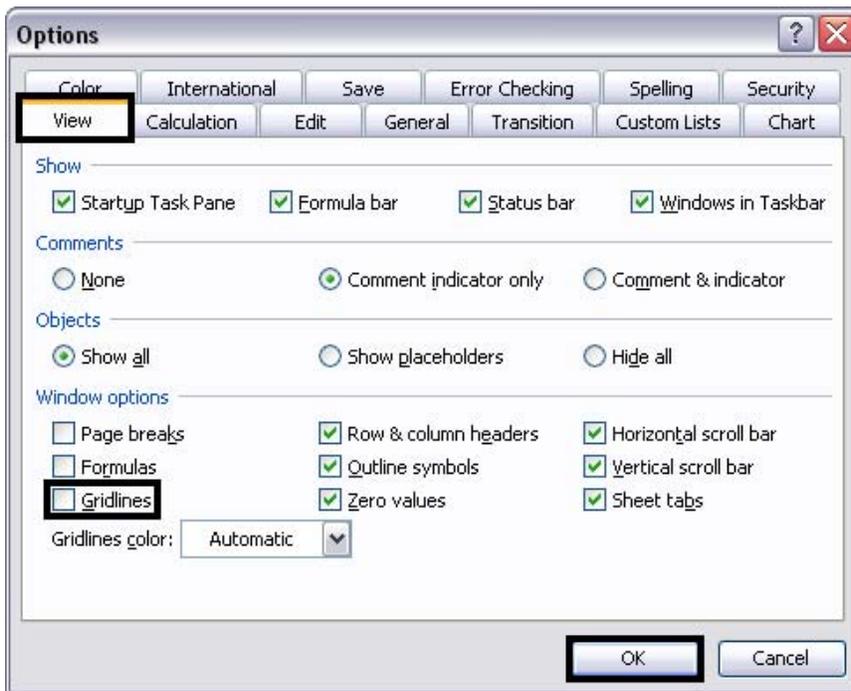


16. Select **Tools > Options** from the Excel menu.



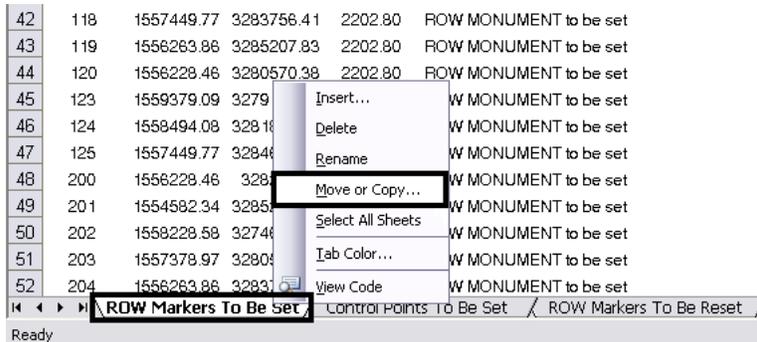
17. From the **Options** dialog box, select the **View** tab.

18. In the **Windows Options** area, toggle off **Gridlines**. <D> OK to accept the changes and dismiss the dialog box.



19. The left most column in the *JPC#ROW_Mon##.dgn* file can hold 50 rows of data (not counting the two title rows). Other columns can hold 41 rows of data. If there are more rows of data than a column can hold, the sheet can be copied and the duplicate data deleted from the sheets.

- To make a copy of a sheet, right click on the sheet tab (at the bottom of the window) and select **Move or Copy** from the menu.



- In the **Move or Copy** dialog box, toggle on **Create a copy**. <D> **OK** to create the copy and dismiss the dialog box.



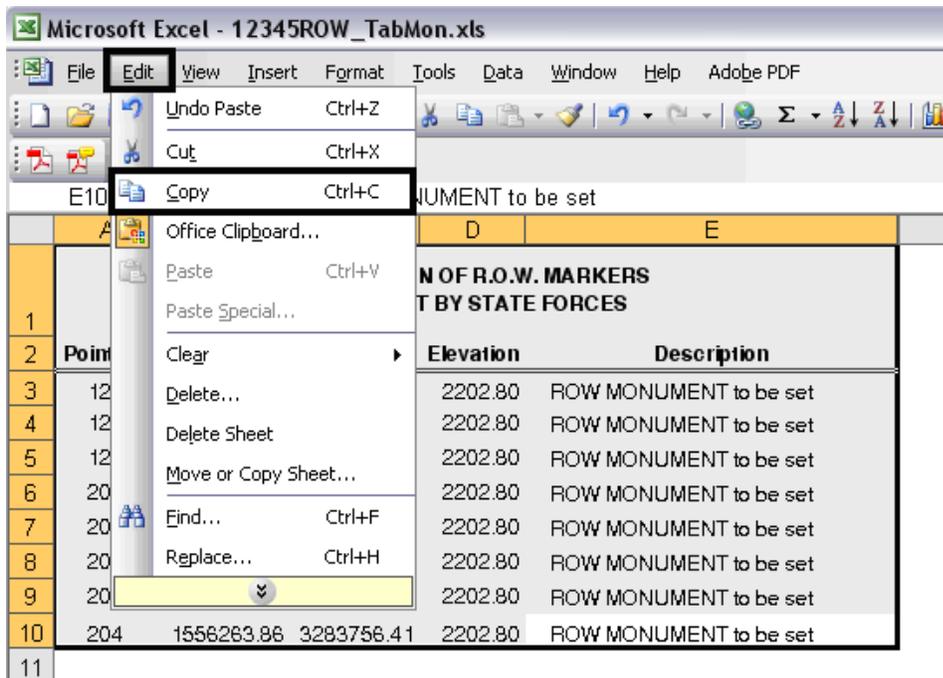
- The Copy of the sheet is named with (2) appended to the sheet name. The sheets can be renamed by right clicking on the tab and selecting **Rename** from the menu. Key in the new name and press the **Enter** key to accept the change.
- In the original sheet, delete all the data below row 52 for the long column, below row 43 for the short columns (the long column can hold 50 rows of data and there are two rows of headings).
- In the copied sheet, delete the data from rows 3 through 52.

Linking the Spreadsheet to the MicroStation Sheet File

Once the data has been copied to the spreadsheet and the sheets formatted, they can be linked to the MicroStation sheet border.

- Open *JPC#ROW_Mon##.dgn* in MicroStation then minimize it.
- In the *JPC#ROW_TabMon.xls* file, highlight the data to be linked. Be sure to include only columns and rows with data (including the two title rows).

- From the Excel menu, select **Edit > Copy** (or right click in the highlighted area and select **Copy** from the menu).



- Maximize the MicroStation window. From the MicroStation Menu select **Edit > Paste Special**.



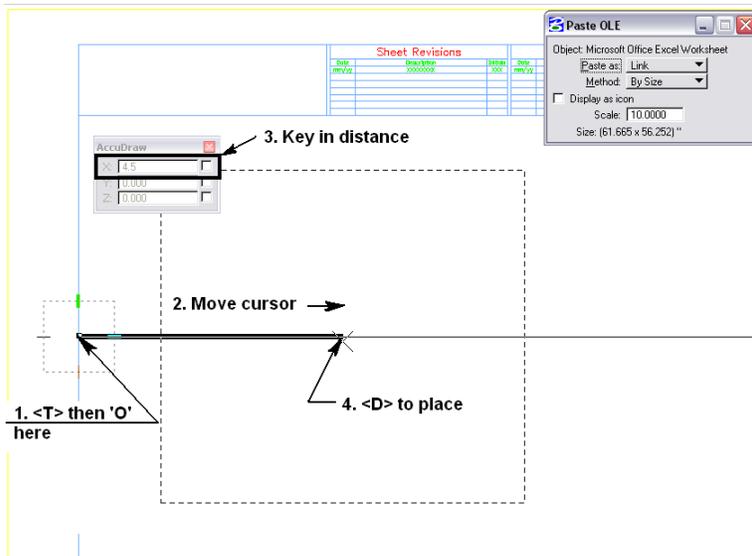
- The **Paste Special** dialog box is displayed. Select **Linked Microsoft Office Excel Worksheet** from the list and **<D> Paste**.



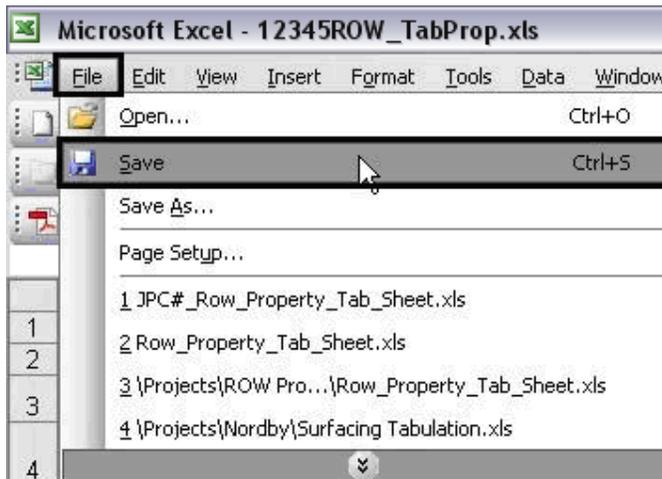
6. In the **Paste OLE** dialog box, set the **Method** to **By Size**.
7. In the **Scale** field, key in **9.25**.



8. An outline of the linked file is now attached to the cursor.
9. With **AccuDraw** active, **<T>** to the no-plot line in the middle of the sheet. Press the **'O'** key to identify this point as the origin on the link placement.
10. Move the cursor along the line, away from the sheet border, then key in the desired value in the AccuDraw tool setting box. This should be **4"** for a table with the Station and Offset columns and **4.5"** for a table without. **<D>** to accept the location.



2. After typing in the desired data, press the Tab key to move to the next available cell. This will move the cursor across each row, one cell at a time until the end of the row is reached. A tab at the end of the row will move the cursor to column A of the next row. A tab at the end of a table will move the cursor to the first row and column of the next table.
3. After the desired data is entered select **File > Save**. Do not close the document.

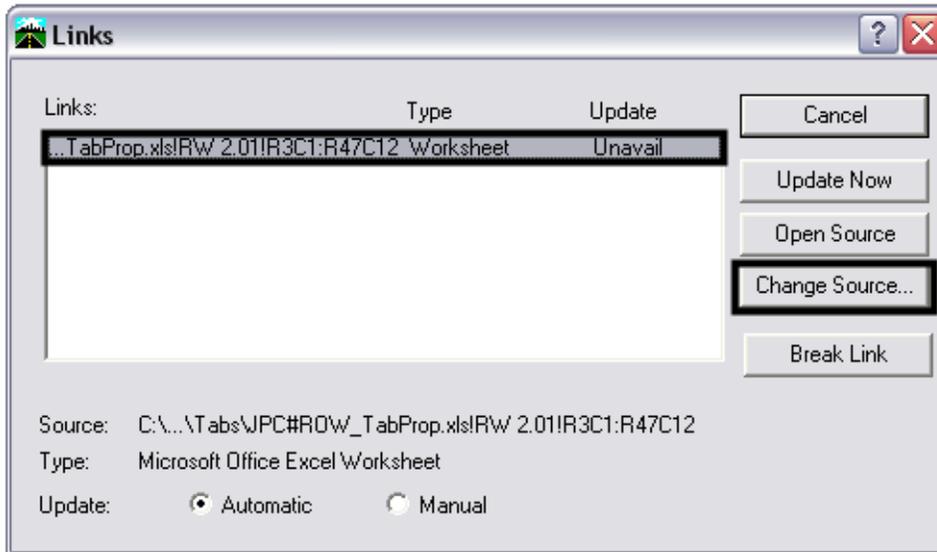


Updating the Link to the ROW_TabProp.xls file

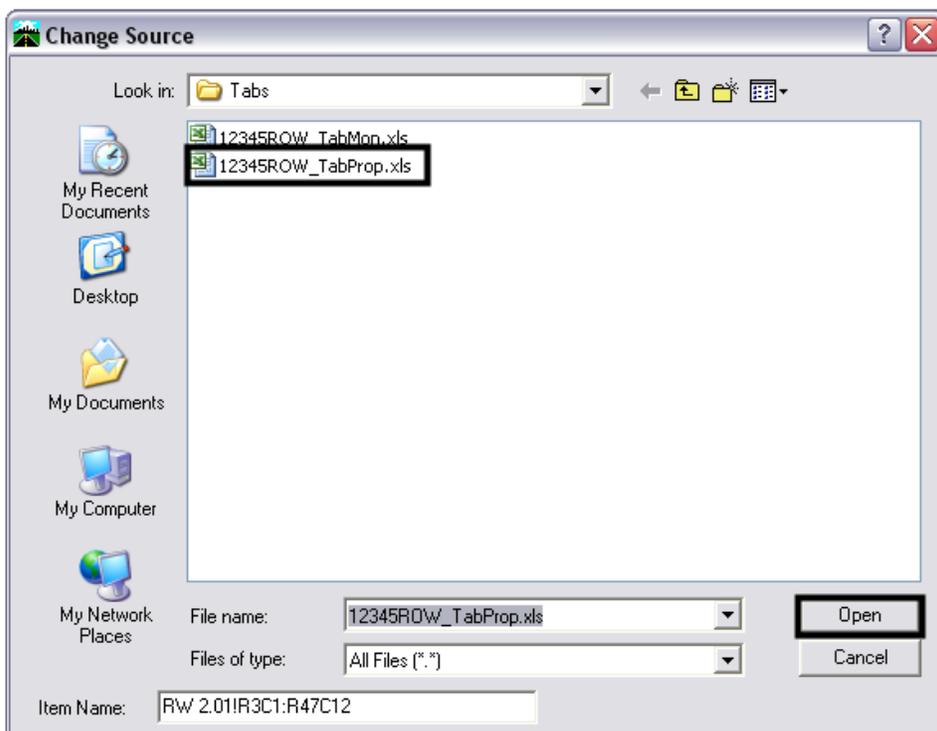
1. Open the JPC#ROW_TabProp##.dgn in MicroStation.
2. Select **Edit >Links** from the menu. This will display the **Links** dialog box.



- In the **Links** dialog box, highlight the link to the spreadsheet and <D> **Change Source**.



- From the **Change Source** dialog box, highlight the JPC#ROW_TabProp.xls file and <D> **Open**.



- Repeat steps 4 through 7 for other spreadsheets if needed.

Editing the ROW_TabProp.xls file

- The Excel file (and thus the MicroStation tab sheet) can be edited from MicroStation by selecting the **Element Selector** then double clicking (<D> <D>) on the table. This opens Excel and the linked spreadsheet.

2. Make the desired edits in Excel, **Save** then **Close** the file. The corrections will be updated automatically.

Note: If the link to the spreadsheet is lost or additional sheets are required, refer to the workflow document **CDOT Linking MicroStation to Excel Documents** for directions on reestablishing or creating new links.

Workflow OP 5 - Numbering Plan Sets In Adobe

This document guides you through the use of the page numbering option within Adobe Acrobat Professional.

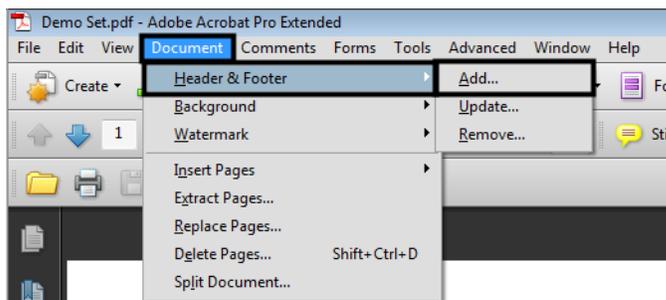
Prerequisites

Before you begin, you will need a pdf file of the plan set that is not numbered in MicroStation.

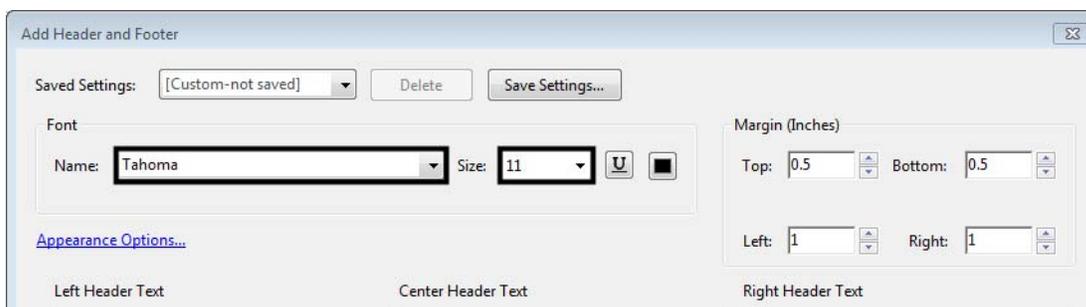
Basic Page Numbering

This section, explains how to set up header/footers to number sheets when the title block is located at the bottom of the sheet and at the top of the sheet.

1. Open the plan set PDF using Adobe Acrobat Professional.
2. Because Right-of-Way plans have the title block at the top of the sheet, the numbering at the bottom of the sheet must end prior to encountering the Right-of-Way sheets. Make a note of the page number of the last design plan sheet for use in the steps below.
3. From the menu bar, select **Document > Header & Footer > Add**. This displays the **Add Header and Footer** dialog box.



4. In the **Font** area of the **Add Header and Footer** dialog box, select **Tahoma** for the **Name** and **11** for the **Size**.

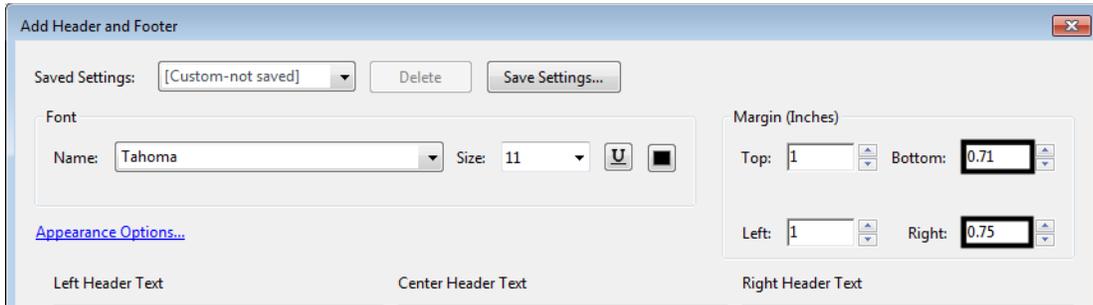


Next the margins and page numbers are set up for sheets with the title block at the bottom of the sheet.

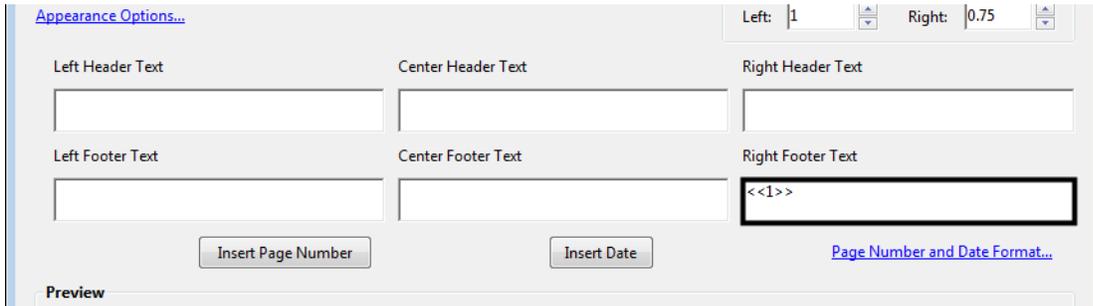
Settings for Numbers in the Lower Right Corner

Use the following steps to set the right and bottom margins.

1. In the **Margins** area of the **Add Header and Footer** dialog box, key in **0.71** for the **Bottom** margin and key in **0.75** for the **Right** margin.



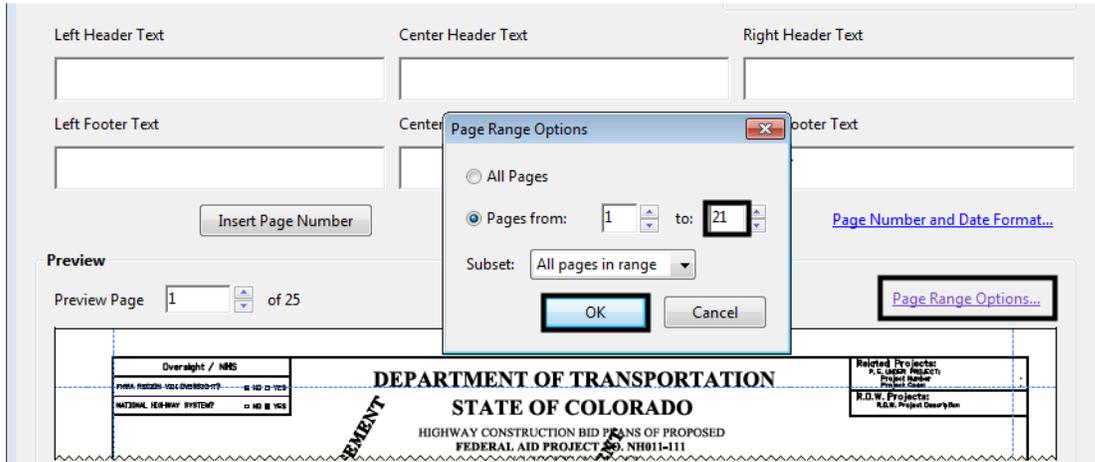
2. **<D>** in the **Right Footer Text** field.
3. **<D>** the **Insert Page Number** button. This places the page numbering variable in the **Right Footer Text** field.



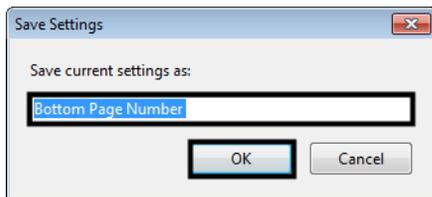
If the plan set contains Right-of-Way plans, then the page range for this header/footer will have to be set. This will prevent the Right-of-Way plans from being numbered in the wrong location. To set the page range:

4. **<D>** The **Page Range Options** link. This displays the **Page Range Options** dialog box.
5. In the **Page Range Options** dialog box, toggle on **Pages From**.
6. In the **to** field, key in the page number noted in the above section. This will stop this header/footer from being applied to the Right-of-Way sheets.

7. <D> the **OK** button to accept the page range.

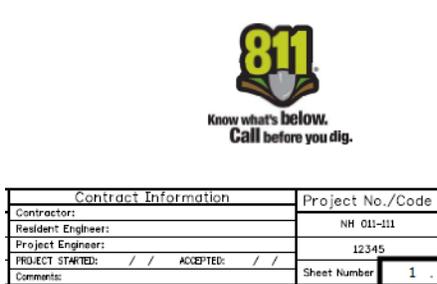


8. <D> The **Save Settings** button. This displays the **Save Settings** dialog box.
9. In the **Save current settings as** field, key in the desired name (e.g. **Bottom Page Number**) and <D> the **OK** button.



10. <D> the **OK** button on the **Add Header and Footer** dialog box. This applies the changes and dismisses the dialog box.

This completes the set up for page numbers at the bottom of the sheet. Below is an example of the sheet numbering.

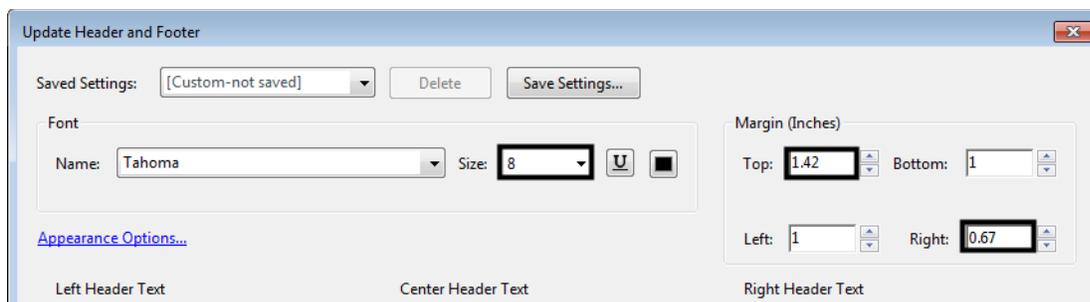


Settings for Numbers in the Upper Right Corner

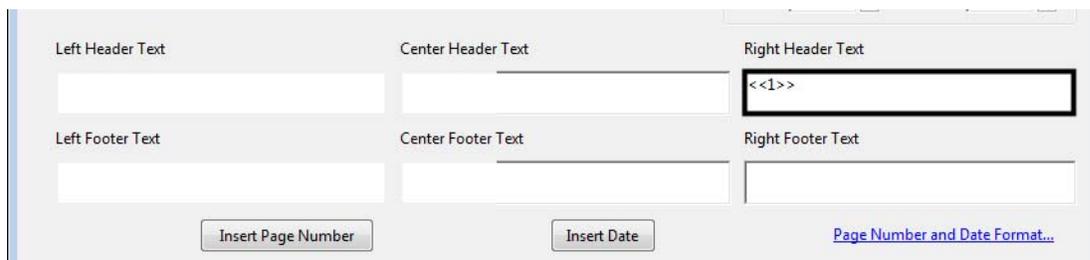
For sheets that are numbered in the upper right corner, the font size, right margin and top margin need to be set.

1. In the **Font** area, set the **Size** to **8**.

- In the **Margins** area of the **Add Header and Footer** dialog box, key in **1.42** for the **Top** margin and key in **0.67** for the **Right** margin.

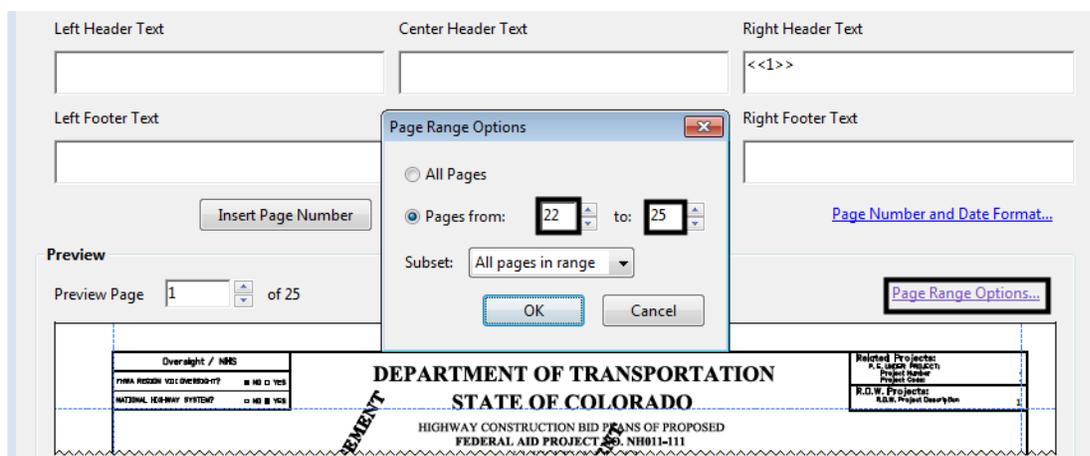


- <D> in the **Right Header Text** field.
- <D> the **Insert Page Number** button. This places the page numbering variable in the **Right Header Text** field.



Note: If the plan set contains Design plans, then the page range for this header will have to be set. To set the page range:

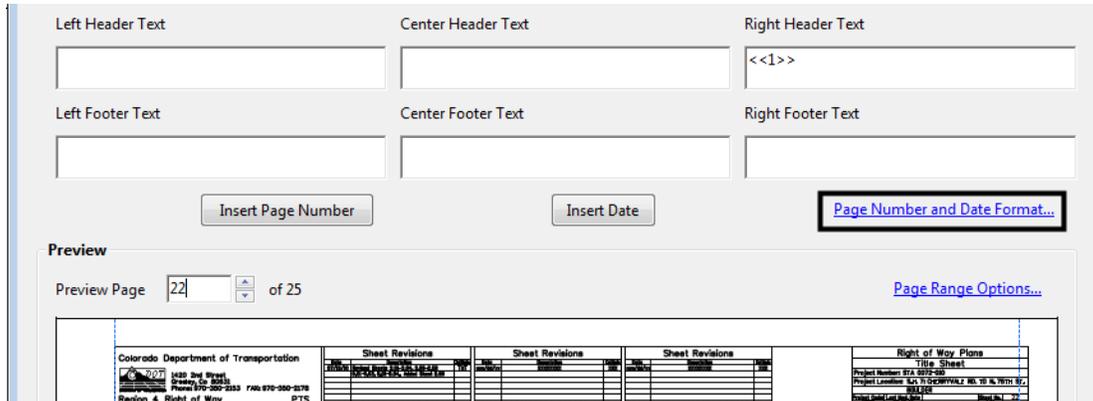
- <D> The **Page Range Options** link. This displays the **Page Range Options** dialog box.
- In the **Page Range Options** dialog box, key in the desired page range.
- <D> the **OK** button to accept the page range.



If this page numbering set up starts in the middle of the plan set, the starting number will have to be set to reflect its starting location within the plan set.

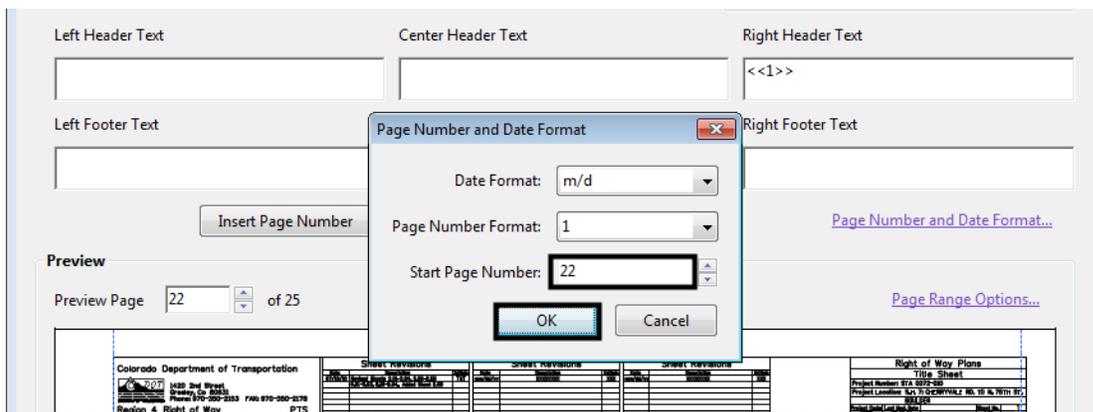
Important! If the **Page Number and Date Format** isn't set, the Right-of-Way plans will be numbered starting with 1.

8. Select **Page Number and Date Format** from the dialog box.



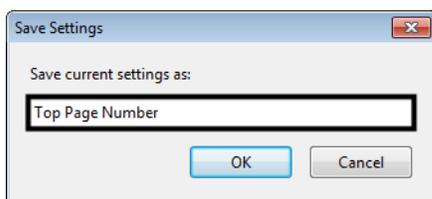
9. In the **Page Number and Date Format** dialog box, key in or select the desired **Start Page Number**.

10. <D> **OK** to accept the page number.



11. <D> The **Save Settings** button. This displays the **Save Settings** dialog box.

12. In the **Save current settings as** field, key in the desired name (e.g. **Top Page Number**) and <D> the **OK** button.



13. <D> the **OK** button on the **Add Header and Footer** dialog box. This applies the changes and dismisses the dialog box.

This completes the set up for page numbers at the top of the sheet. Below is an example of the sheet numbering.

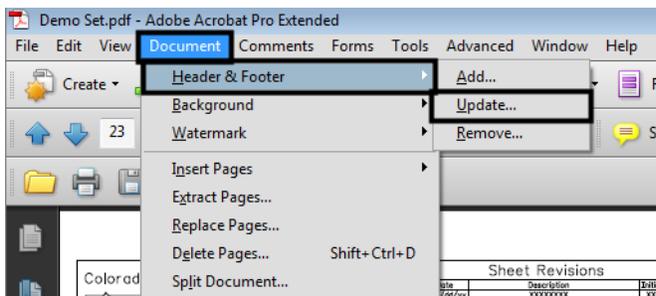
Sheet Revisions		Right of Way Plans	
Description	Entered	Title Sheet	
XXXXXXXX	XXX	Project Number: STA 0072-010	
		Project Location: S.H. 7; CHERRYVALE RD. TO N. 75TH ST.	
		BOULDER	
		Project Code	Sheet No. 22
		Lot	10

SHEET NO.	INDEX OF SHEETS
1.01	(1) Title Sheet
2.01-2.09	(9) Tabulation of Properties
3.01-3.07	(7) Project Control Diagram
4.01-4.04	(4) Land Survey Control Diagram
5.01-5.04	(3) Monumentation Sheets
6.01-6.0X	(NA) Tabulation of Road Approach Sheets
7.01-7.14	(14) Plan Sheets
8.01-8.04	(4) Ownership Map
	(42) Total Sheets

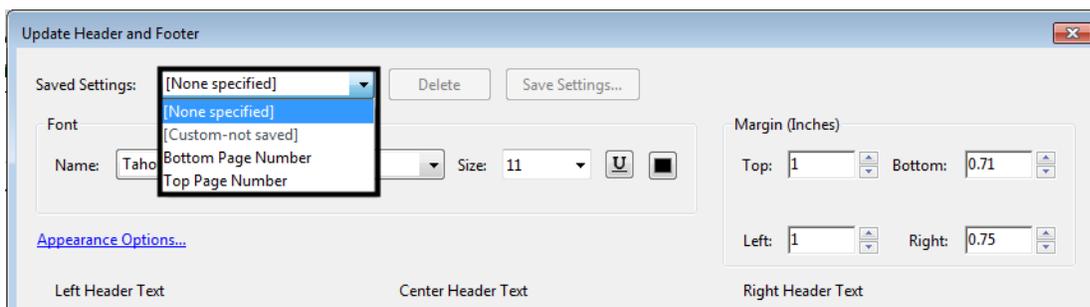
Updating Headers/Footers When Pages Are Added

When a sheet is inserted into a PDF plan set, the inserted sheet does not automatically acquire the header/footer information. To update the page numbering:

1. From the menu bar, select **Document > Header & Footer > Update**. This displays the **Add Header and Footer** dialog box.

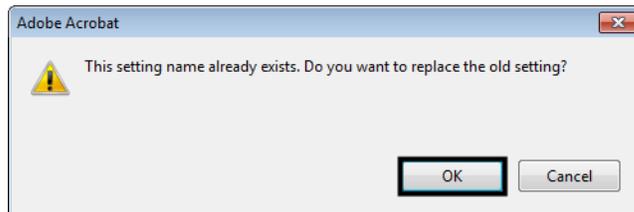


2. In the **Add Header and Footer** dialog box, select the **Saved Settings** that are affected by the added sheet.



3. <D> The **Page Range Options** link.
4. In the **Page Range Options** dialog box, key in the desired page range.
5. <D> the **OK** button to accept the page range.
6. <D> The **Save Settings** button.
7. In the **Save current settings as** field, key in the same name as the setting you selected above.

8. A dialog box asking if you want to replace the original settings is displayed. <D> **OK**.



9. <D> the **OK** button on the **Add Header and Footer** dialog box. This applies the changes and dismisses the dialog box.
10. Repeat the process for other headers/footers affected by page additions.

Adding Sub-Set Numbering

Sub-set numbering can also be added to the sheet border. Creating the header/footer for sub-set numbering is done in the same manner as described in the previous sections, with the following changes.

Note: Sub-set numbering is added to each individual pdf as needed. Sub-set numbering is not part of the Bates numbering described below, however, it can be used in addition to Bates numbering.

Settings for Sub-set at the Bottom of the Sheet

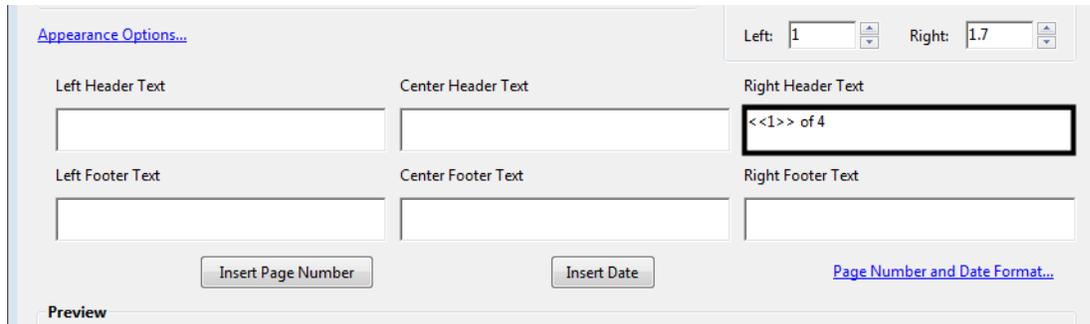
- **Font** - Tahoma
- **Size** - 8
- **Top** - 0.50
- **Bottom** - 0.65
- **Left** - 1.00
- **Right** - 2.10

Settings for Sub-set at the Top of the Sheet

- **Font** - Tahoma
- **Size** - 8
- **Top** - 1.51
- **Bottom** - 1.00
- **Left** - 1.00
- **Right** - 1.70

1. <D> in the appropriate text field (**Right Header Text** or **Right Footer Text**).
2. <D> the **Insert Page Number** button.

- At the right end of the page number text, key in the following: *of #* where the # is the number of sheets in the sub-set.



- <D> The **Page Range Options** link.
- In the **Page Range Options** dialog box, key in the desired page range.
- <D> the **OK** button to accept the page range.
- <D> The **Save Settings** button.
- In the **Save current settings as** field, key in the desired name. This name should describe the sub-set the header/footer is used for.
- <D> the **OK** button on the **Add Header and Footer** dialog box. This applies the changes and dismisses the dialog box.

Note: A different header/footer is required for each sub-set in the plans.

Below are examples of top and bottom page numbering with sub-set numbers included.

Right of Way Plans				
Tabulation of Properties				
Project Number: XXXXX				
Project Location: XXXXX				
XXXXX				
Project Code:	Last Mod. Date	Subset	Sheet No.	
XXXXXX	mm-dd-yy	1 of 4	5	

Sub-set Number → (points to '1 of 4')
 Sheet Number → (points to '5')

SWMP CONSTRUCTION PLAN SHEET			Project No./Code	
			Project Number	
Designer: XXXXXXXX	Structure Numbers	X-XX-XX		Code
Detailer: XXXXXXXX		X-XX-XX		
Sheet Subset: SWMP	Subset Sheets:	1 of 4	Sheet Number	4

Sub-set Number → (points to '1 of 4')
 Sheet Number → (points to '4')

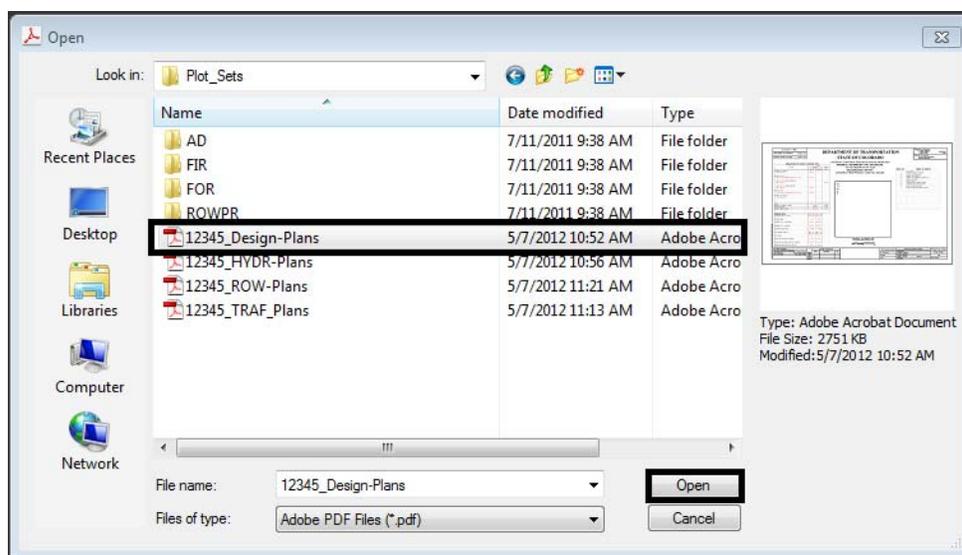
Note: Sub-set numbering will need to be updated when pages are inserted into the plan set. Use the steps from the **Updating Headers/Footers When Pages Are Added** section above to make changes to sub-set numbering.

Using Bates Page Numbering

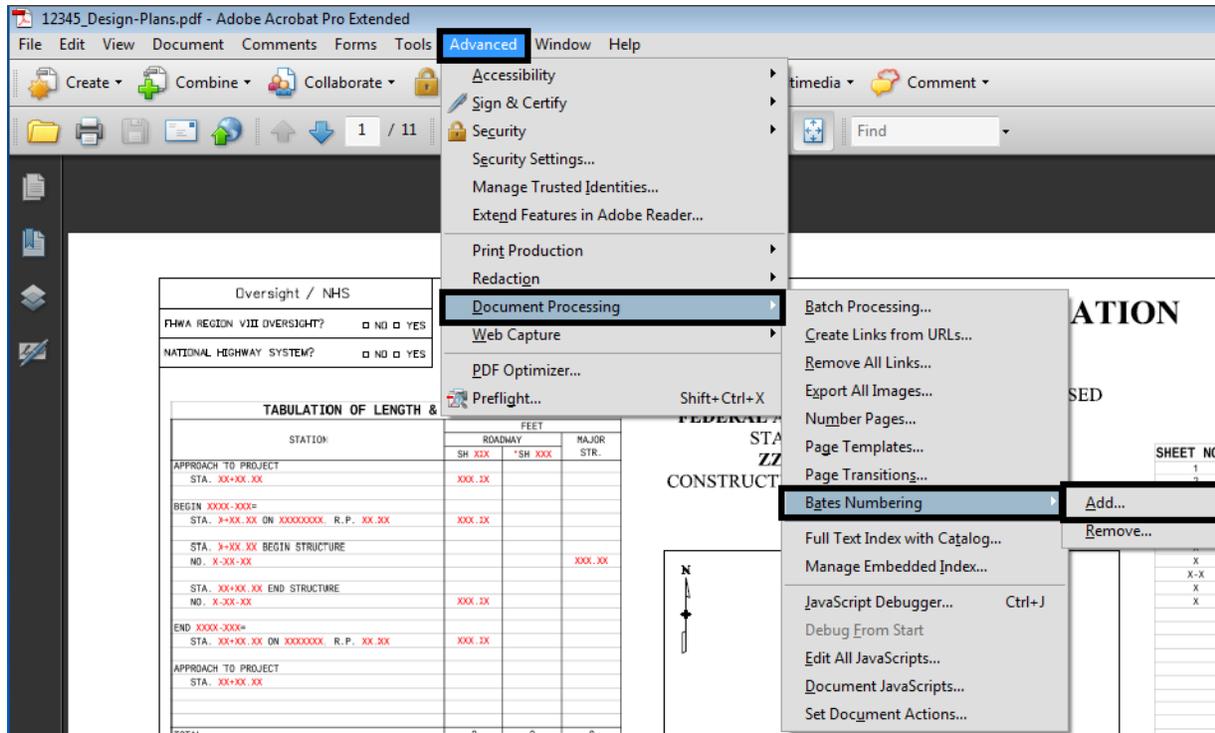
Bates page numbering is used to number multiple pdf documents with a consistent series of numbers. This process replaces the Basic Page Numbering above when the plan sets are made up of multiple PDF files. Please note that the process for sub-set numbering remains the same as defined above.

Because Bates Numbering does not use page ranges across all of the files selected, this option requires sections that have the page number in a different location to be renumbered. In the example below, the second section (using the 12345_ROW-Plans.pdf file) has the page numbering in the upper right corner while the other three files have it in the lower right corner. The Bates Numbering will be added to all four files. then it will be removed from the 12345_ROW-Plans.pdf file and reapplied using the proper header/footer definition.

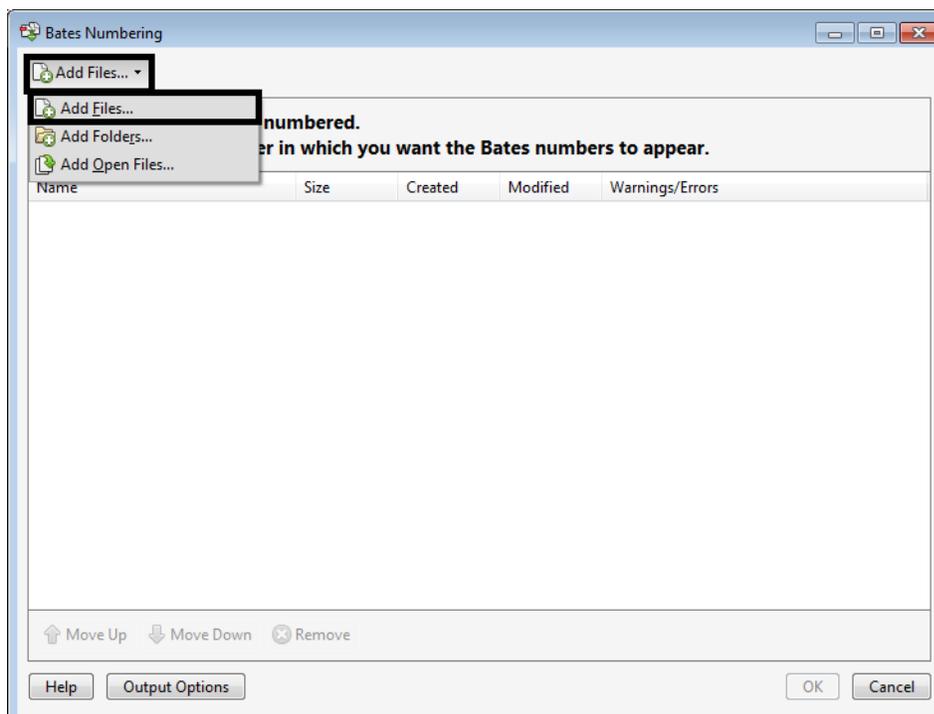
1. Launch **Adobe Acrobat Pro**, selecting the first PDF used in the plan set.



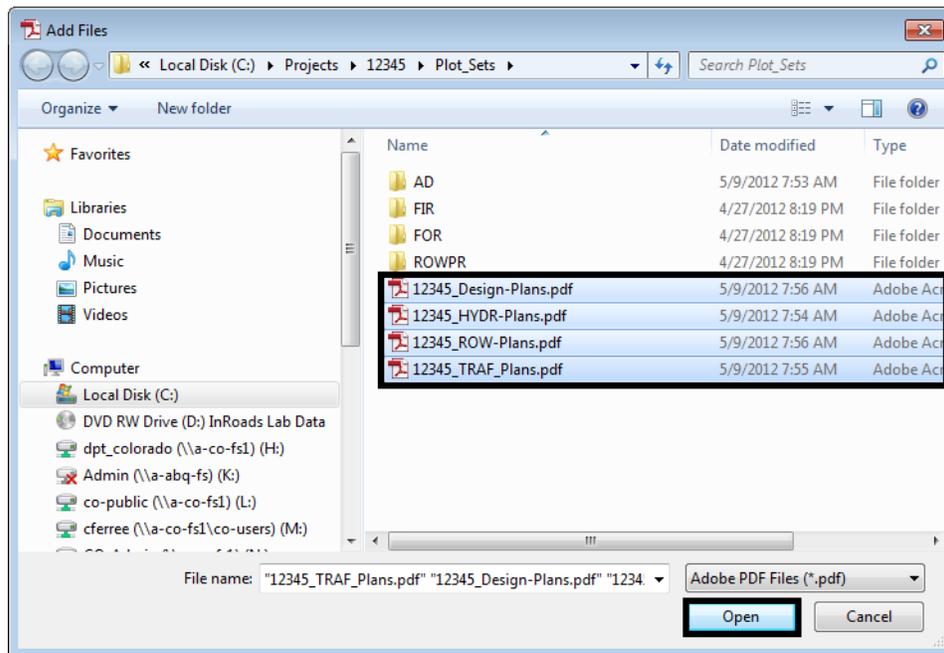
- From the **Adobe Acrobat Pro** Menu bar, select **Advanced > Document Processing > Bates Numbering > Add**. This displays the **Bates Numbering** dialog box.



- In the **Bates Numbering** dialog box, Select **Add Files > Add Files**. This displays the **Add Files** dialog box.



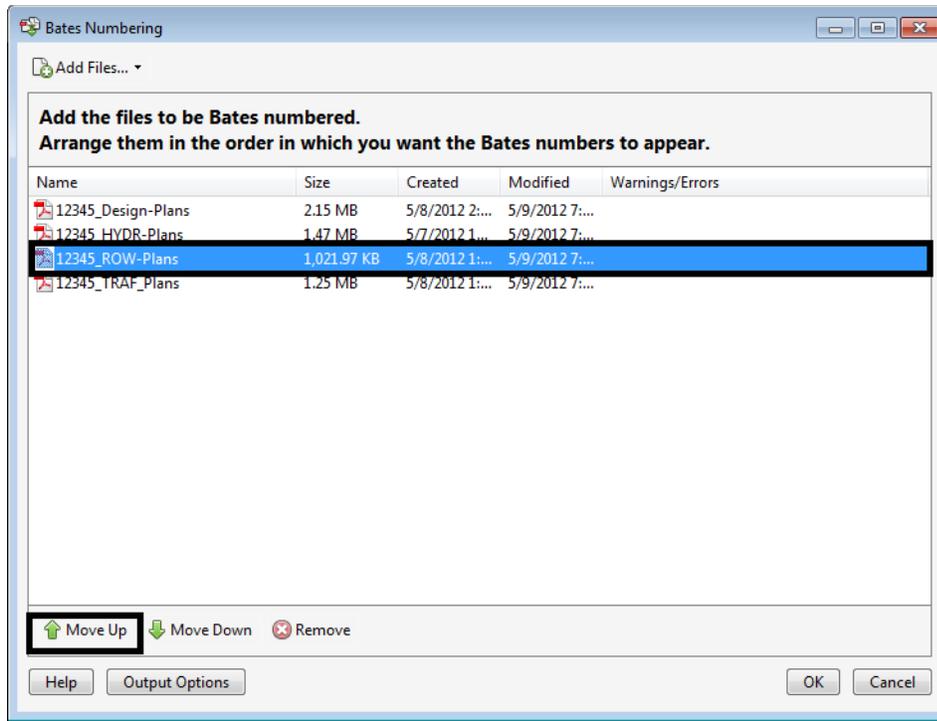
4. In the **Add Files** dialog box, navigate to the folder that contains the desired PDF files.
5. Select the desired files to be included in the plan set. <D> the **Open** button to add the files. In this example, **12345_Design-Plans.pdf**, **12345_HYDR-Plans.pdf**, **12345_ROW-Plans.pdf**, and **12345_TRAF-Plans.pdf** are used.



Next, organize the files into the desired order. In this example the **12345_ROW-Plans.pdf** is moved up to the second position.

6. Highlight the file to be moved. In this example the **12345_ROW-Plans.pdf** will be moved.

- Use the **Move Up** and **Move Down** buttons to change the file's location. In this example the **Move UP** button is used.



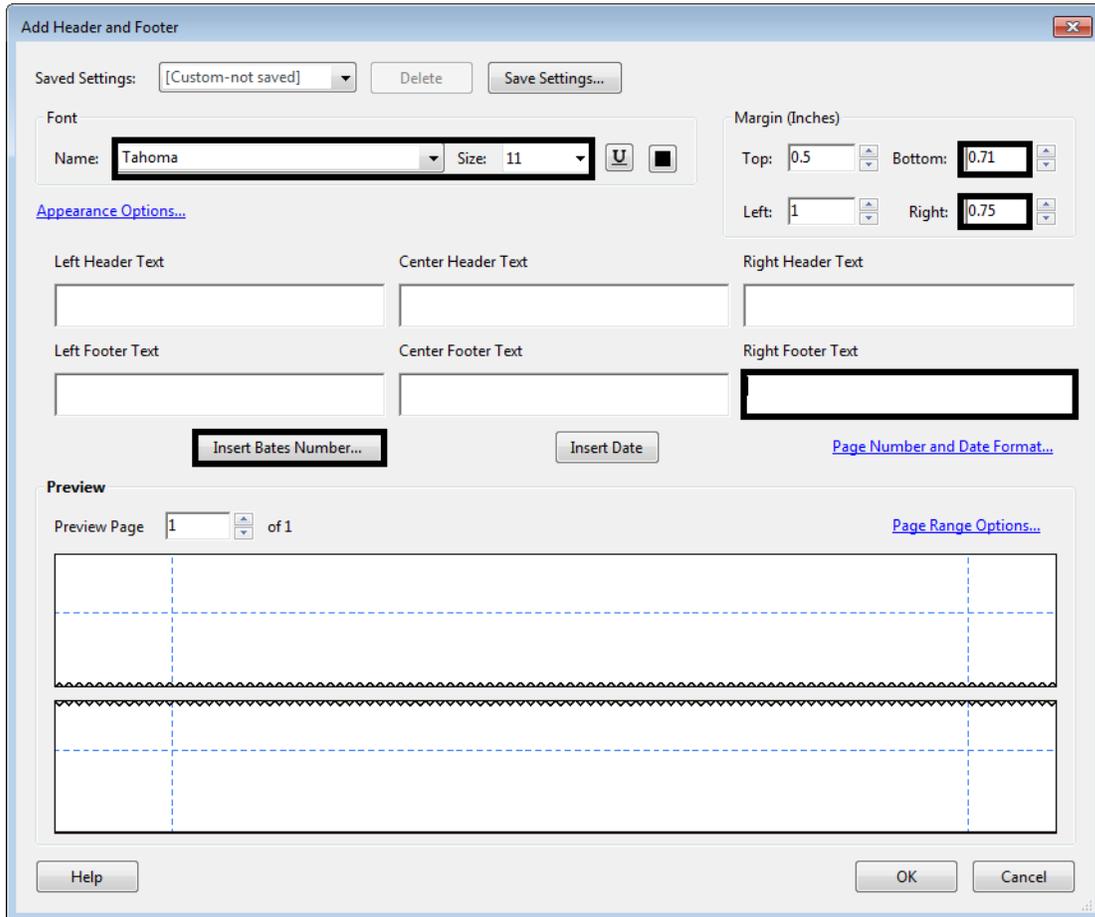
- <D> OK**. This accepts the files and opens the **Add Header and Footer** dialog box.

Use the following settings for Bates Numbering at the bottom of the sheet:

- **Font** - Tahoma
- **Size** - 11
- **Top** - 0.50
- **Bottom** - 0.71
- **Left** - 1.00
- **Right** - .75

- <D>** in the **Right Footer Text** field.

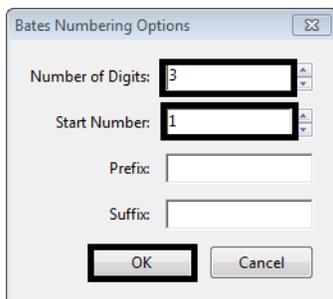
10. <D> the **Insert Bates Number** button. This displays the **Bates Numbering Options** dialog box.



11. In the **Bates Numbering Options** dialog box, set the **Number of Digits** to **3**.

12. Set the **Start Number** to **1**.

13. <D> **OK** to accept the changes and dismiss the **Bates Numbering Options** dialog box.

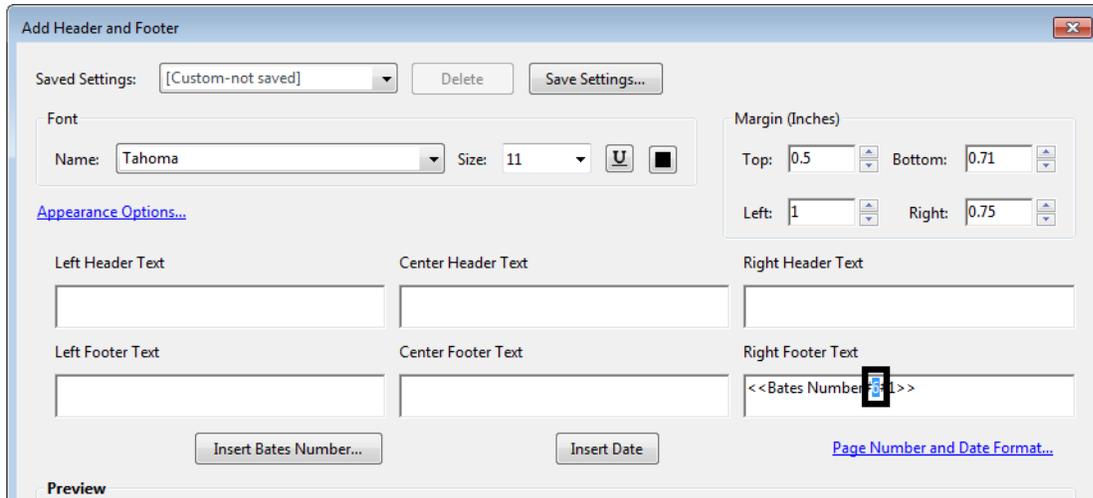


This completes the set up for the Bates Numbering for the bottom right corner. Next, save these settings so that they can be used on other projects.

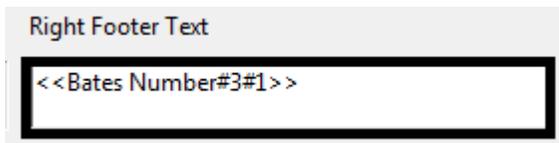
Bates Numbering Options In Adobe Acrobat Pro 9

The Adobe Acrobat Pro 9 Bates Numbering Options dialog box does not allow less than **6** in the **Number of Digits** field. This can be corrected once the numbering code has been placed into the **Add Header and Footer** dialog box.

1. In the **Add Header and Footer** dialog box, highlight the “6” in the Bates numbering code located in the **Right Footer Text** field.

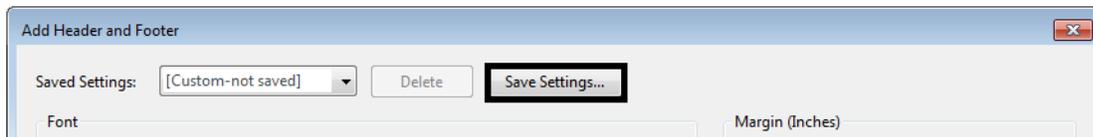


2. Key in **3**. This resets the digits to 3.

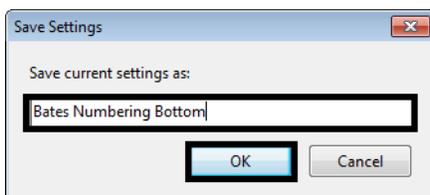


Saving and Applying a Bates Numbering Definition

1. **<D>** the **Save Settings** button. This displays the **Save Settings** dialog box.



2. In the **Save Settings** dialog box, key in the desired settings name. In this example **Bates Numbering Bottom** is used.
3. **<D>** **OK** to accept the entry and dismiss the **Save Settings** dialog box.



4. In the **Add Header and Footer** dialog box, **<D> OK**. This adds the Bates Numbering to the selected files and dismisses the **Add Header and Footer** dialog box.

A **Progress** message box is displayed which shows the program adding the page numbering to the selected files. When the processing is complete, another message window is displayed indicating the successful completion of the numbering.

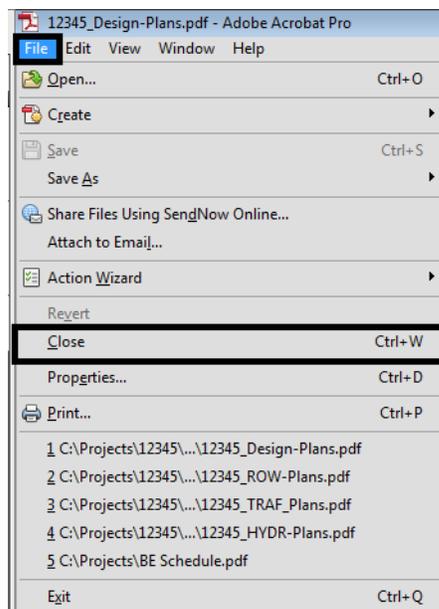
5. In the **Adobe Acrobat** message window, **<D> OK** to dismiss the window.



The Bates Numbering has been added to each of the selected files. Even though the numbering is placed in the wrong location on the 12345_ROW-Plans.pdf file, it was included here in order to get the correct numbers on the files that follow. Next, the Bates Numbering is removed from the 12345_ROW-Plans.pdf file and reapplied with the correct page numbers in the upper right corner of the sheets.

Replacing Bates Numbering on a File

1. In the **Adobe Acrobat Pro** dialog box, Select **File > Close** to close the open file.



2. Open the file that needs to have the numbering replaced. In this example, the **12345_ROW-Plans.pdf** file is used.

3. Make a note of the page number currently on the page. This will be the starting Bates Number when the correct formatting is applied.

Sheet Revisions			Sheet Revisions			Sheet Revisions			Right of Way Plans	
Date	Description	Initials	Date	Description	Initials	Date	Description	Initials	Title Sheet	
	XXXXXXXX			XXXXXXXX			XXXXXXXX		Project Number: XXXXX	
									Project Location: XXXXX	
									Project Code: XXXXX	
									Project Code	Sheet No.
									XXXXX	101

DEPARTMENT OF TRANSPORTATION

STATE OF COLORADO

RIGHT OF WAY PLAN OF PROPOSED
FEDERAL AID PROJECT NO. XXXXXXXXX
 STATE HIGHWAY NO. XXX
ZZZZZZZZZ COUNTY
 RIGHT OF WAY PROJECT CODE NO. XXXXX

SHEET NO. INDEX OF SHEETS

RW 1.01 (1) Title Sheet
 RW 2.01-RW 2.0X (0) Tabulation of Properties
 RW 3.01-RW 3.0X (0) Control Diagram
 RW 4.01-RW 4.0X (0) Monumentation Sheets
 RW 5.01-RW 5.0X (0) Plan Sheets
 RW 6.01-RW 6.0X (0) Ownership Sheets
 M-100-1 (3) Standard Symbols
 M-629-1 (2) Survey Monuments
 (XX) Total Sheets

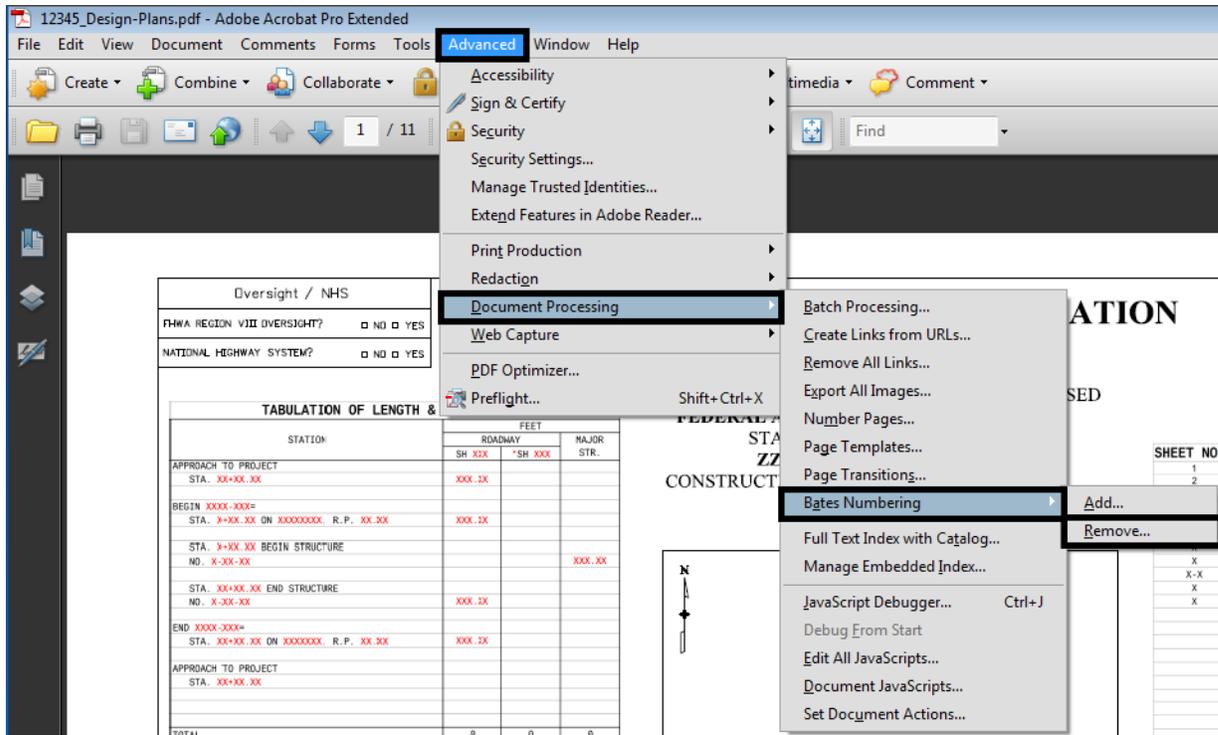
PROJECT LOCATION MAP

DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION	
AUTHORIZED: _____	DATE: _____
DIVISION ADMINISTRATOR	

011

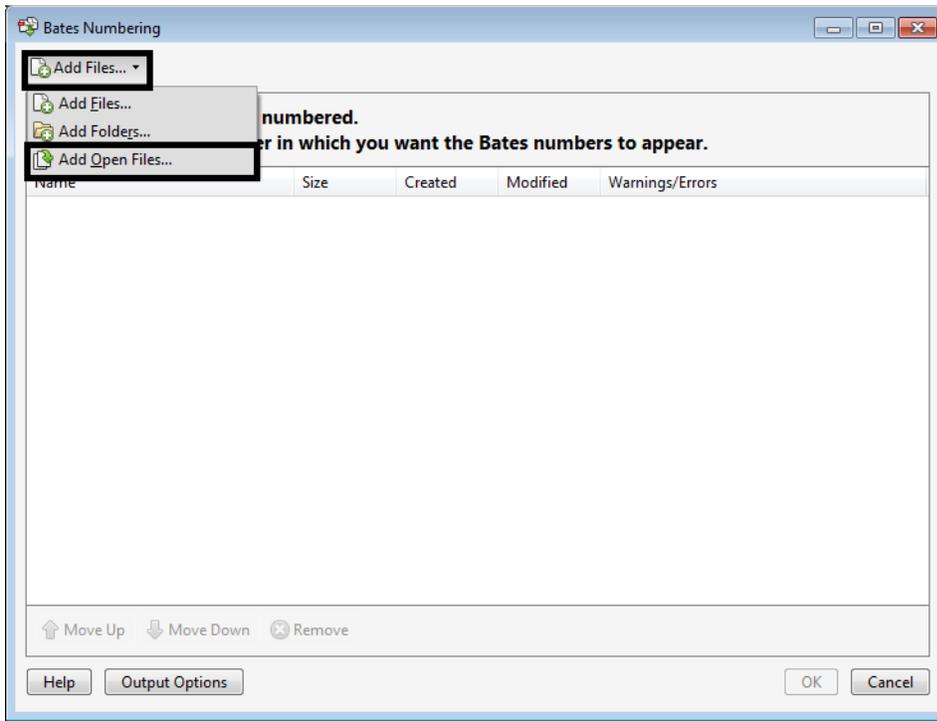
c:\pwworking\cdot\project\123456789\123456789.dwg

- From the **Adobe Acrobat Pro** Menu bar, select **Advanced > Document Processing > Bates Numbering > Remove**. This deletes the Bates Numbering from this file only.

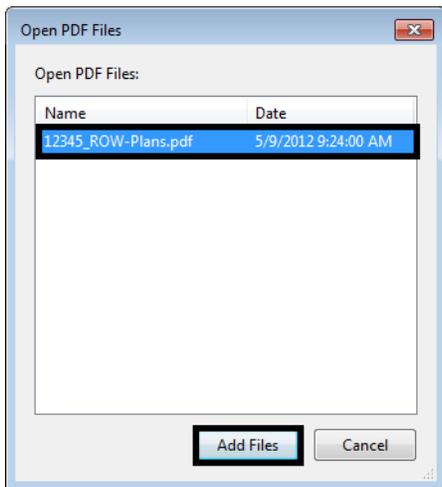


- Select **Advanced > Document Processing > Bates Numbering > Add**. This displays the **Bates Numbering** dialog box.

- In the **Bates Numbering** dialog box, Select **Add Files > Add Open Files**. This displays the **Open PDF Files** dialog box.



- In the **Open PDF Files** dialog box, highlight the desired files and **<D> Add Files**. this adds the files to the list and dismisses the **Open PDF Files** dialog box.



- In the **Bates Numbering** dialog box, **<D> OK**. This accepts the files and opens the **Add Header and Footer** dialog box.

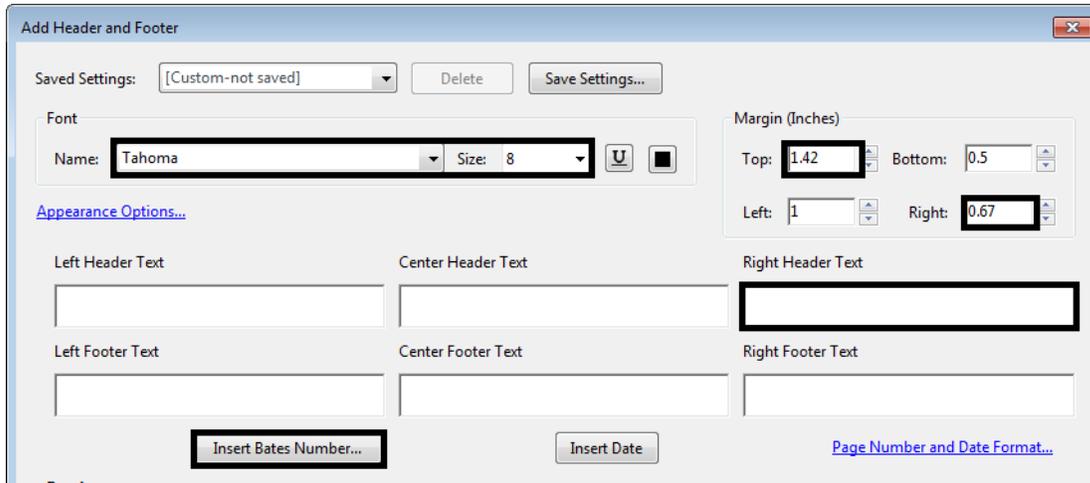
Use the following settings for Bates Numbering at the top of the sheet:

- **Font** - Tahoma
- **Size** - 8

- **Top** - 1.42
- **Bottom** - 0.50
- **Left** - 1.00
- **Right** - 0.67

9. <D> in the **Right Header Text** field.

10. <D> the **Insert Bates Number** button. This displays the **Bates Numbering Options** dialog box.



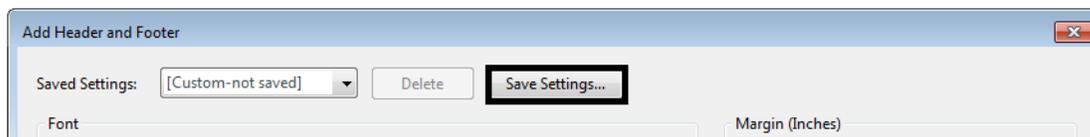
11. In the **Bates Numbering Options** dialog box, set the **Number of Digits** to **3**.

12. Set the **Start Number** to that generated in the first run of the Bates Numbering. In this example **11**.

13. <D> **OK** to accept the changes and dismiss the **Bates Numbering Options** dialog box.

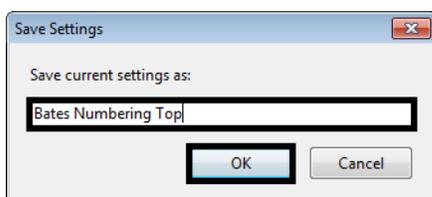
This completes the set up for the Bates Numbering for the top right corner. Next, save these settings so that they can be used on other projects.

14. <D> the **Save Settings** button. This displays the **Save Settings** dialog box.



15. In the **Save Settings** dialog box, key in the desired settings name. In this example **Bates Numbering Top** is used.

16. <D> **OK** to accept the entry and dismiss the **Save Settings** dialog box.



17. In the **Add Header and Footer** dialog box, <D> **OK**. This adds the Bates Numbering to the selected files and dismisses the **Add Header and Footer** dialog box.

This completes the page numbering for the plan set.

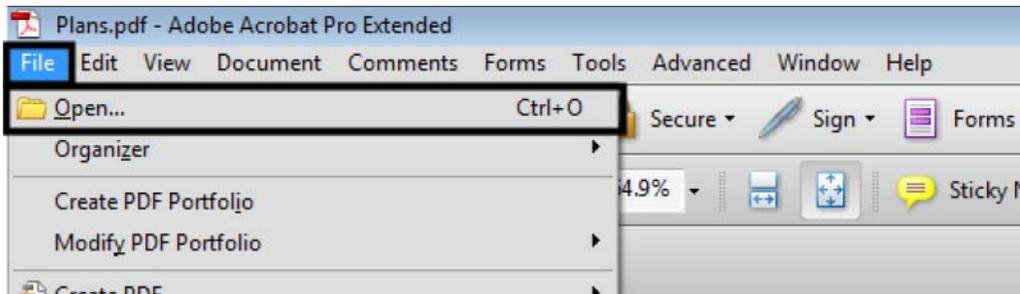
Notes on Using Bates Numbering

- After the Bates Numbering is applied to a set of files, there is no further connection between the files. Therefore, if the page count changes for some reason, each file will have to be opened and the Bates Numbering removed before the files can be re numbered.
- Bates Numbering cannot be updated. If the page count changes for some reason, each file will have to be opened and the Bates Numbering removed before the files can be re numbered.
- A file cannot have more than one set of Bates page numbers.
- A Page Range setting in the Add Header and Footer dialog box will affect every PDF file selected for Bates page numbering.
- Each PDF file will have to be opened and printed then collated manually to assemble the plan set.

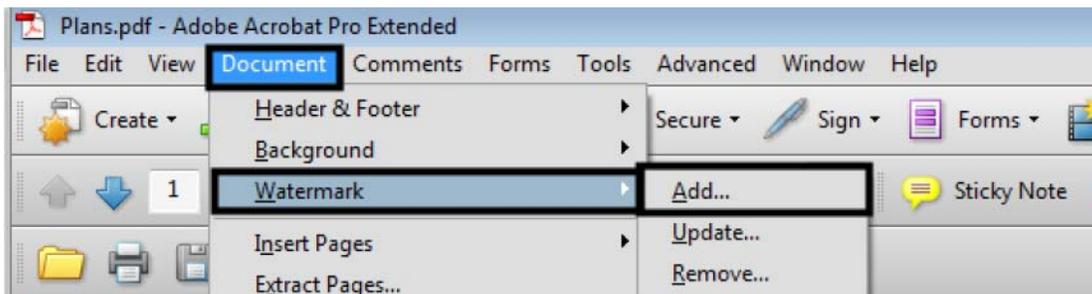
Workflow OP 6 - Adding a Watermark to PDF Files

This document guides you through the process of adding a watermark to a PDF plan set. This method uses Adobe Acrobat Professional to add a watermark to an existing set of plans in PDF format.

1. Open the desired plan set in Adobe Acrobat Professional.

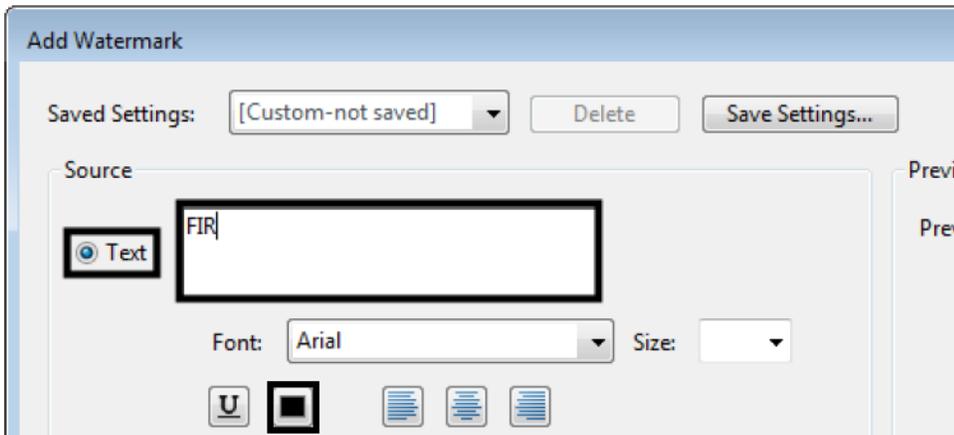


2. From the menu bar, select **Document > Watermark > Add**. This displays the **Add Watermark** dialog box.

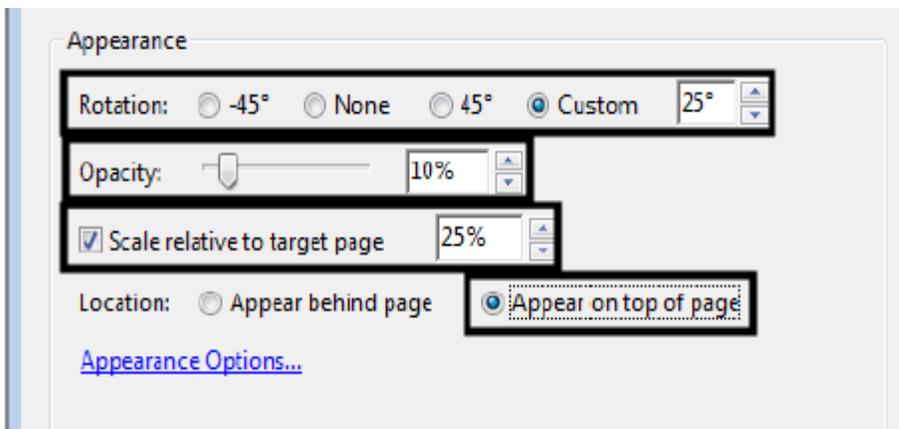


3. In the **Source** area of the **Add Watermark** dialog box, toggle on **Text**.
4. In the **Text** key in field, type the desired text (FIR, FOR, etc.).

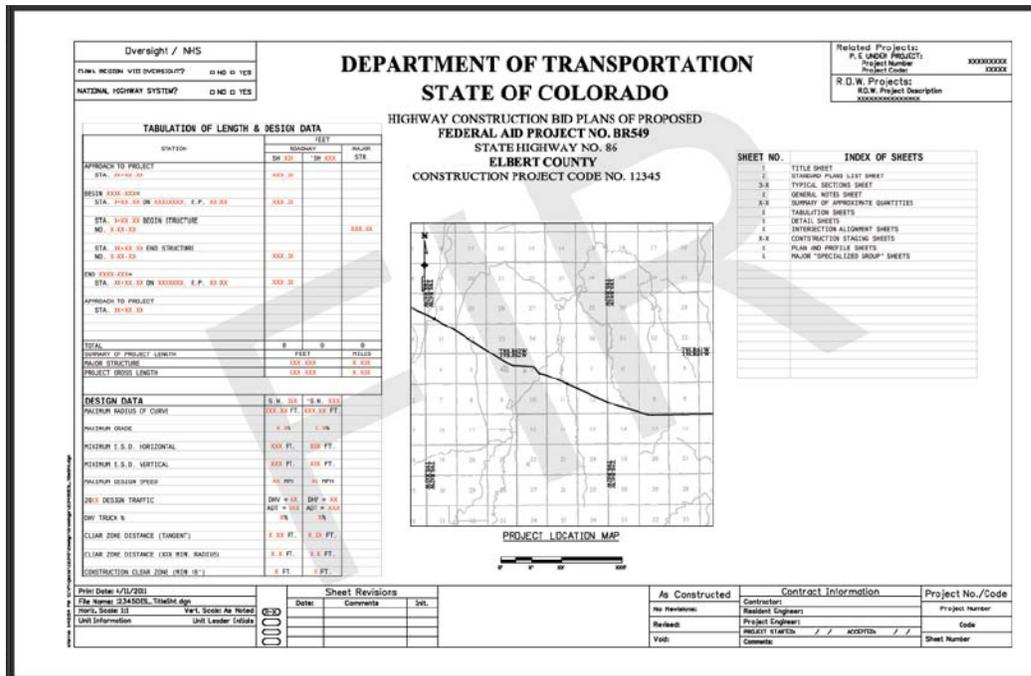
5. Select the desired text color. Use **Black** for a watermark on line drawings. Use **White** for a watermark on sheets with aerial photos.



6. In the **Appearance** area, set the desired **Rotation**. In this example, the **Rotation** was set to **Custom** and **25** degrees.
7. Set the desired **Opacity**; **25%** is used for black text, **50%** is used for white text.
8. Toggle on **Scale relative to target page** and set the desired scale. In this example **100%** was used.
9. Toggle on **Appear on top of page** for **Location**.



10. **<D> OK** to accept the changes. This adds the watermark to each sheet in the plan set and dismisses the **Add Watermark** dialog box.

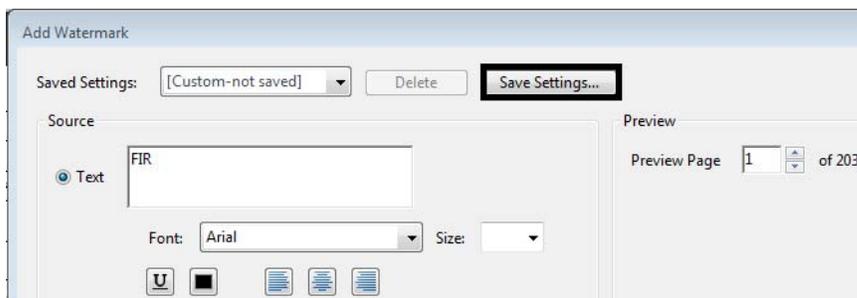


11. To change the watermark settings, reopen the **Add Watermark** dialog box and make the desired changes.

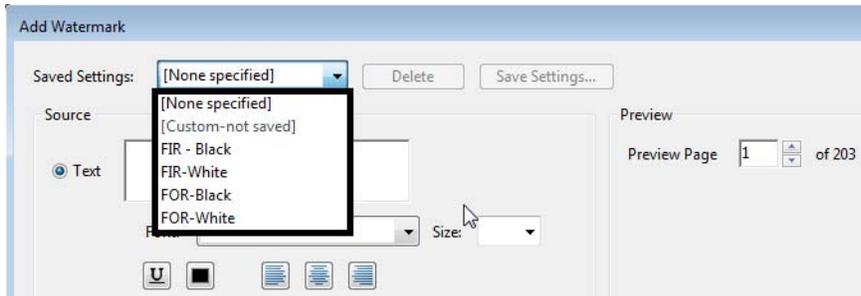
Using Multiple Watermarks in a Plan Set

Plan sets may contain both line drawings and aerial photos combined into a single file. In these cases, multiple watermarks are required; black watermarks are used on line drawings while white watermarks are used on aerial photos.

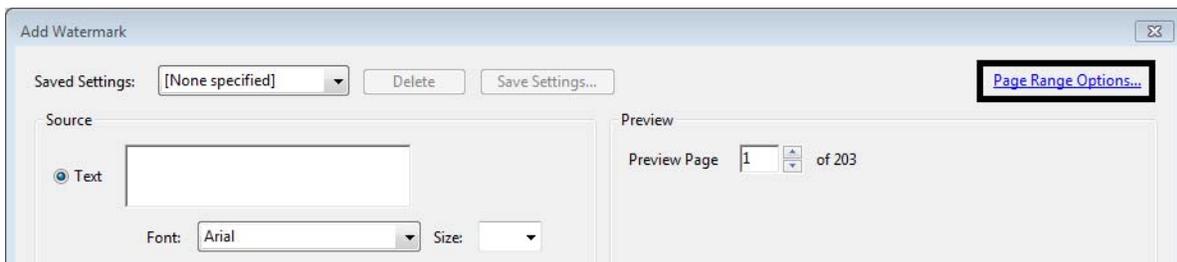
1. Follow steps 1 through 9 above to set up the first watermark.
2. **<D>** the **Save Settings** button.



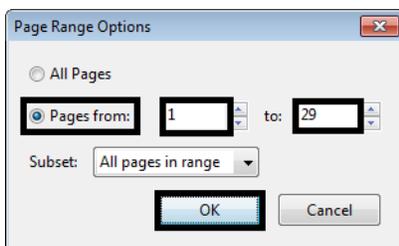
3. In the **Save Settings** dialog box, key in the desired setting name. The setting name should identify what the watermark is for. In the illustration below, the name indicates that the watermark is used for FIR line drawings.
4. **<D> OK** to save the settings.
5. Using the same process, create the other watermarks needed.
6. Select the desired watermark from the **Saved Settings** menu.



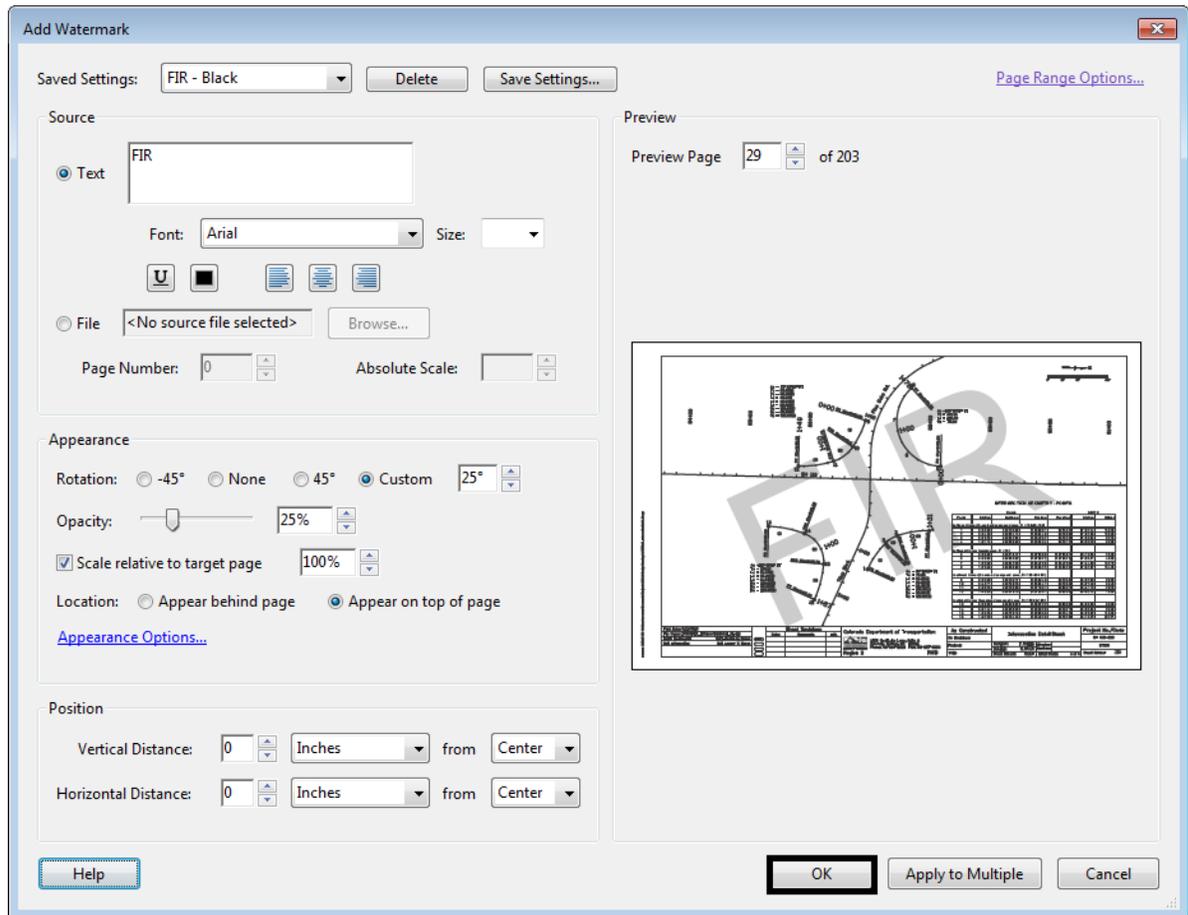
7. **<D>** the **Page Range Options** link (in the upper right corner).



8. In the **Page Range Options** dialog box, toggle on **Pages From**.
9. Key in or select the desired number in the **From** and **To** fields.
10. **<D> OK**. This sets the specified watermark for the indicated pages.



11. In the **Add Watermark** dialog box, <D> **OK**. This applies the specified watermark to the indicated pages.



12. From the menu bar, select **Document > Watermark > Add**. An **Adobe Acrobat** information dialog box is displayed. It explains that the document already has a watermark.
13. <D> the **Add New** button. This allows you to add an additional watermark.
14. Repeat steps 6 through 11 to add the additional watermark.

Any number of watermarks can be added in this manner. Also, the watermark settings are saved within Adobe Acrobat Professional (on your local computer) so they will be available for the next plan set to be printed.

InRoads Related Workflows

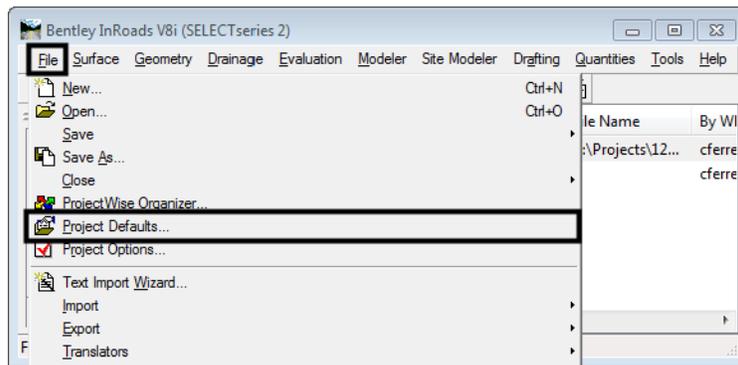
Workflow IR 1 - InRoads V8i Project Defaults Management

This document describes the set-up procedure InRoads Project Defaults in the V8i version of the software. InRoads project defaults perform two functions; firstly they load the appropriate CDOT standard resource files such as the standard XIN file, annotation resources, XML style sheets, etc. Additionally they define default paths to project specific directory folders that contain project data such as DTM's, alignments, survey data, etc.

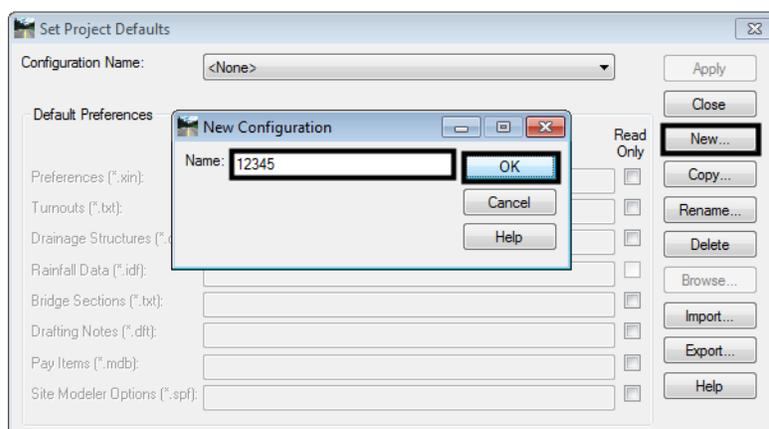
Setting Up Project Defaults

To set up a Project Default:

1. Launch InRoads V8i.
2. select **File>Project Defaults** from the InRoads menu bar.



3. Click on the **New** button.
4. In the **New Configuration** dialog box, key in the desired **Project Code**.
5. **<D>** **OK** to accept the key-in and dismiss the **New Configuration** dialog box.



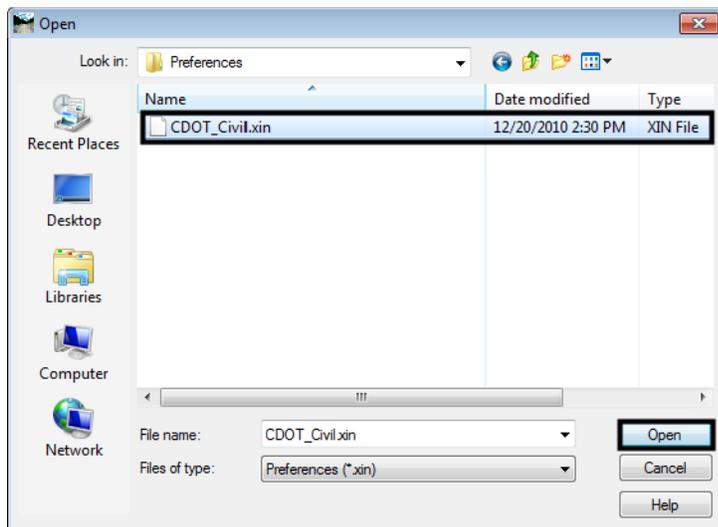
This activates the **Set Project Defaults** dialog box so that it can be edited.

6. **<D>** in the **Preferences (*.xin)** field then **<D>** the **Browse** button.

7. Browse to:
C:\Workspace\Workspace-CDOT_V81\Standards-Global\InRoads\Preferences

Note: If you are logged into ProjectWise, the ProjectWise browser will be displayed. <D> the **Cancel** button to dismiss it and display the (local) file Browser.

8. Select the file: *CDOT_Civil.xin*

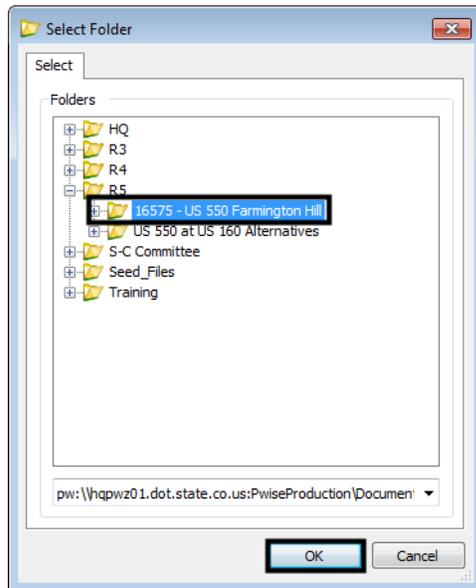


9. <D> in the **Drafting Notes (*dff)** field then <D> the **Browse** button.
10. Browse to:
C:\Workspace\Workspace-CDOT_V81\Standards-Global\InRoads\Notes.
11. **Cancel** the ProjectWise browser if necessary.
12. Select the file: *CDOT-Notes.dft.*

This completes the Default Preferences part of the dialog box. Next the directory paths are filled in. If your project data resides on the ProjectWise server, fill in only the ProjectWise Directory field.

13. <D> in the **ProjectWise Directory** field.
14. <D> the **Browse** button. This displays the ProjectWise **Select Folder** dialog box.
15. Navigate to the desired folder and highlight it.

16. <D> the **OK** button to select the folder and dismiss the *Select Folder* dialog box.

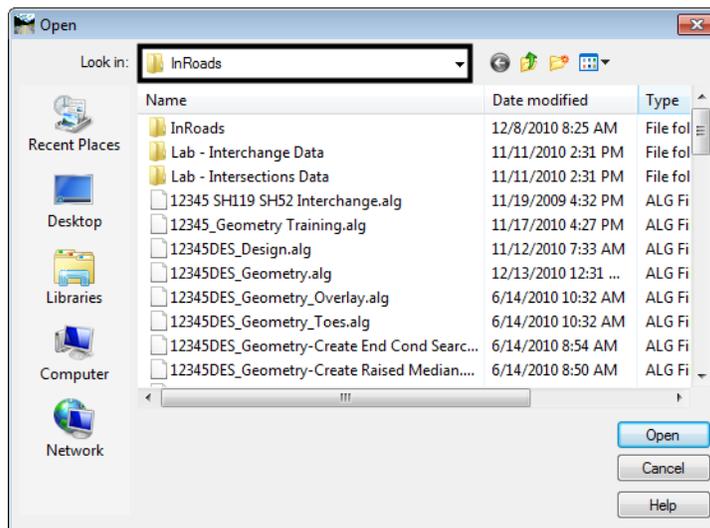


If the project data is stored locally, then the fields below the ProjectWise Directory field should be used.

17. <D> in the **Project Default Directory** field.

18. <D> the **Browse** button. This displays the *Open* dialog box.

19. Navigate to the desired folder then <D> the **Open** button.



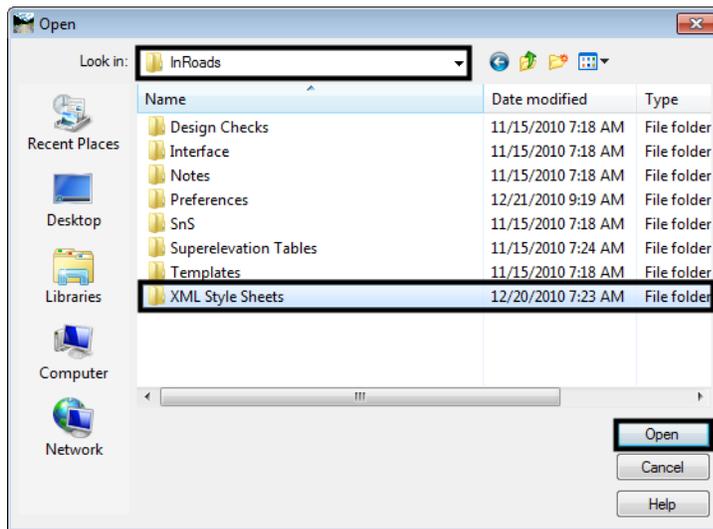
Note: Typically, the *Projects (*.rwk)*, *Surfaces (*.dtm)*, *Geometry Projects (*.alg)*, *Template Libraries (*.itl)*, and *Roadway Design (*.ird)* will use the same directory path as the *Project Default Directory*. Therefore, you do not have to fill in those fields unless they are different than the *Project Default Directory*.

The path to the Style Sheet directory should be set for both ProjectWise and locally stored projects.

20. <D> in the **Style Sheet (*.xsl)** field.
21. <D> the **Browse** button. This displays the *Open* dialog box.
22. Navigate to the following directory:

C:\Workspace\Workspace-CDOT_V8i\Standards-Global\InRoads\XML Style Sheets

23. <D> the **Open** button.

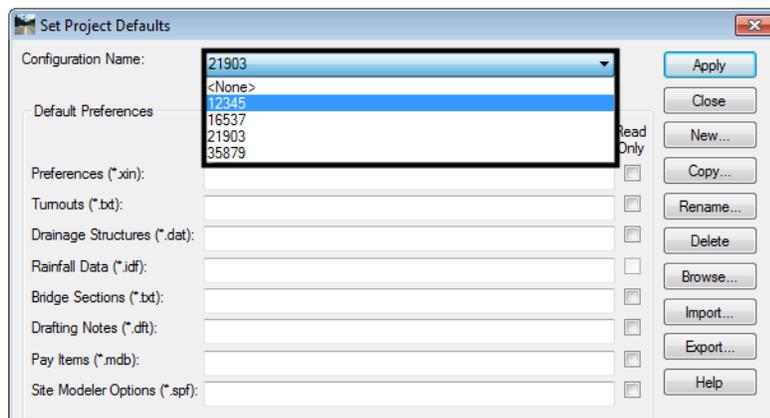


24. Once the desired fields are filled in, <D> the **Apply** button to accept the changes.

The Project Defaults are now active and will be used when opening and saving files.

Setting Project Defaults

1. Users can use the *Configuration Name* field to choose the appropriate Project Defaults for the project .



Using Project Defaults Example

The following example demonstrates the benefits of using project defaults. Here, the project data is stored onProjectWise.

1. Open InRoads.
2. Select File > Project Defaults.
3. In the **Set Project Defaults** dialog box, select any discipline from the **Configuration Name** drop-down list. Then Select the **Apply & Close** buttons.

Set Project Defaults

Configuration Name: **12345**

Apply
Close

Default Preferences

Read Only

Preferences (*.xin): C:\Workspace\Workspace-CDOT_V8i\Standards-Global\InRoads

Turnouts (*.bt):

Drainage Structures (*.dat):

Rainfall Data (*.idf):

Bridge Sections (*.bt):

Drafting Notes (*.dft): C:\Workspace\Workspace-CDOT_V8i\Standards-Global\InRoads

Pay Items (*.mdb):

Site Modeler Options (*.spf):

Default Directory Paths

ProjectWise Directory: pw:\\hqpwz01.dot.state.co.us:PwiseProduction\Documents\Training\12345\Design\InF

Project Default Directory:

Report Directory:

Projects (*.rwk):

Surfaces (*.dtm):

Geometry Projects (*.alg):

Template Libraries (*.itl):

Roadway Design (*.ird):

Survey Data (*.fwd):

Drainage (*.sdb):

Style Sheet (*.xsl): C:\Workspace\Workspace-CDOT_V8i\Standards-Global\InRoads\XML Style Sheets\

Quantity Manager (*.mdb):

Site Modeler Projects (*.gsf):

Default Grid Factor

Grid Factor: 1.0000

Export

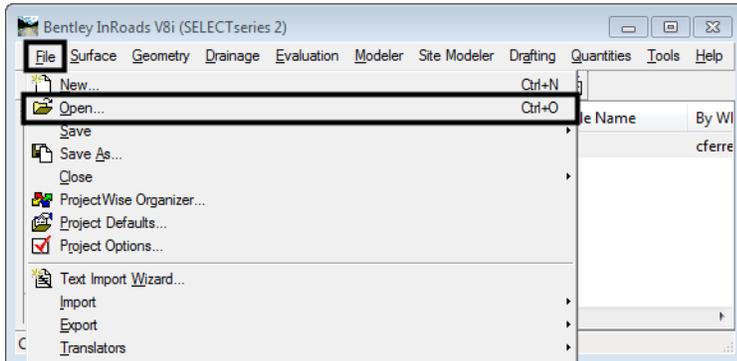
Active Only

Preferred Preference

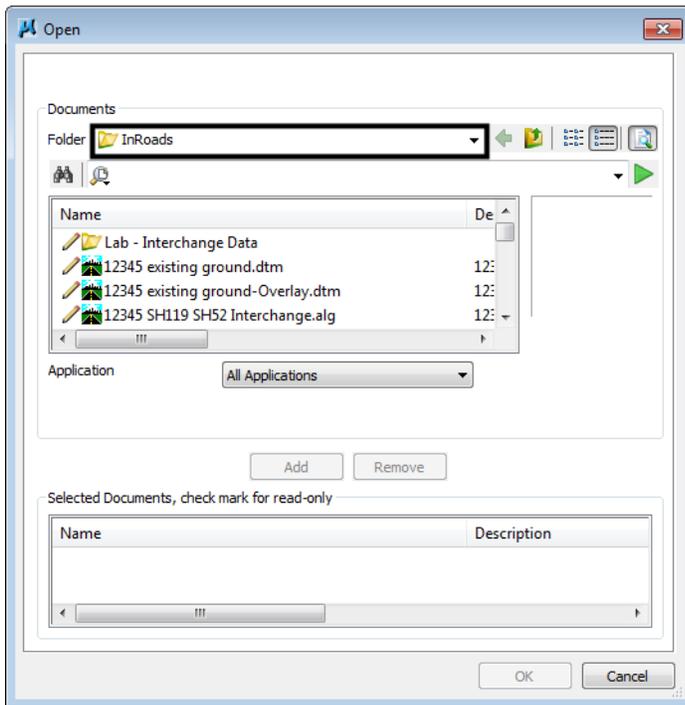
Name: **Default** Default

New...
Copy...
Rename...
Delete
Browse...
Import...
Export...
Help

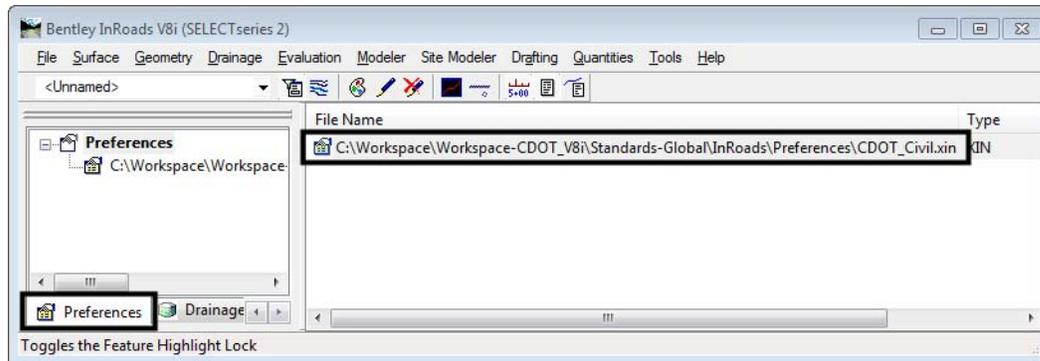
4. From the InRoads interface, select **File>Open**



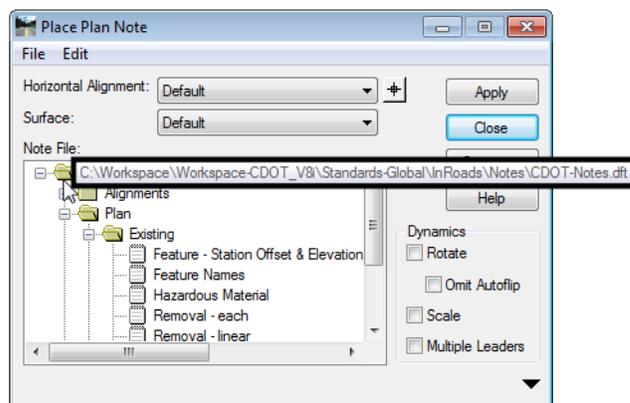
Notice that the ProjectWise **Open** dialog box is already set to the default directory specified in the Project Defaults.



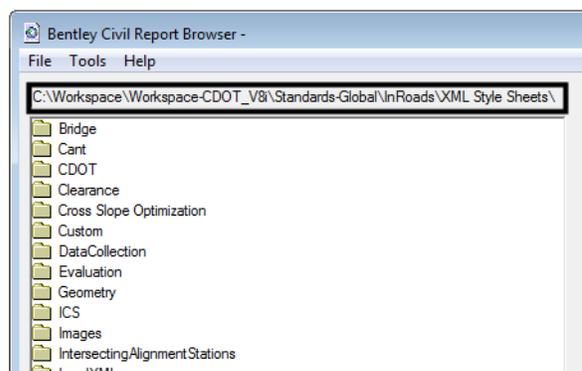
5. Select the **Preferences** tab at the bottom of the InRoads Explorer. Notice that the default CDOT xin file is loaded.



6. Select **Drafting > Place Plan Note** from the InRoads main menu.
7. Notice that the **CDOT-Notes.dft** file is loaded here.



8. Select **Tools > View XML Reports** from the InRoads Main menu.
9. In the Bentley InRoads Report Browser, notice that the Style Sheet folder is located within the CDOT workspace.



Workflow IR 2 - InRoads Feature Filters

This document guides you through the use of InRoads feature filters.

InRoads Feature Filters

Purpose of using Feature Selection Filters

InRoads utilizes feature based digital terrain models (DTM). Often users find the need to sort, or filter, through the contents of various InRoads dialog boxes that allow the users to display, annotate, or review the contents of a DTM. By creating Feature Selection Filters, the user will more efficiently be able to:

- Identify or view different categories of features found in a DTM
- Create a selection set of specific features

Example Feature Filters

A variety of feature filters have been developed for the CDOT configuration. A user may elect to use the developed feature filters or build and/or refine filters to suit individual needs.

Feature filters have been created based on major categories such as Design, Hydraulics, Topography and pay item number. Additional filters have been developed to allow the filtering of select subsets within the major categories.

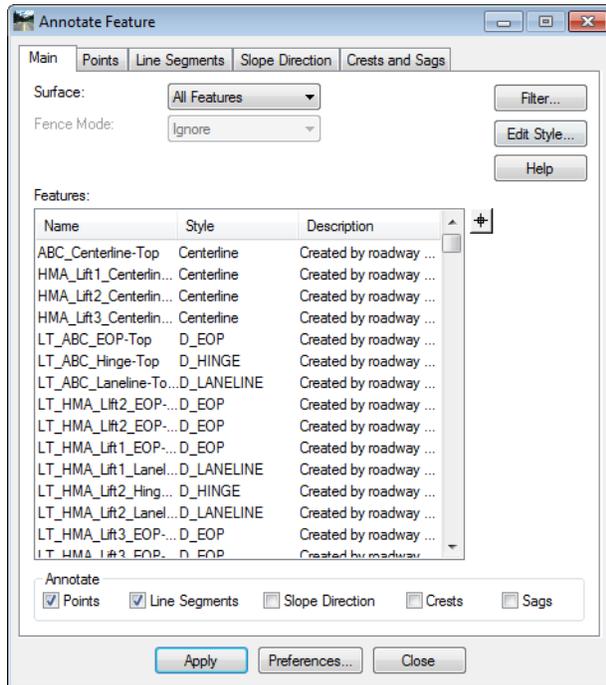
For example, the filter:

- T_* will display only features beginning with the T-under bar designation (all topography features)
- T_Gate* (ALL)..... will display all features that relate to Topo_Gate. (i.e. T_Gate Barbed Wire, T_Gate Combination, T_Gate Chain Linked etc.)
- Pay Items 403*..... pay items beginning with the primary number 403

Example 1 - No Feature Filter

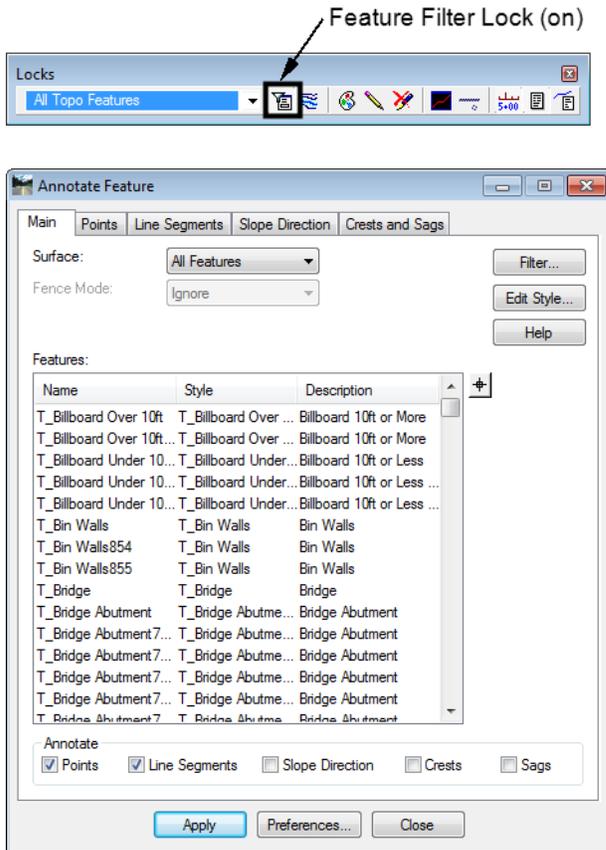
In the **Locks** toolbar shown below, the **Feature Filter Lock** is off, or deactivated, so the selected filter **_All Topo Features** is not active. If the **Surface > View Surface > Annotate Feature** command is selected, the **Annotate Feature** dialog box would display all features located in that particular DTM in the *Features* list.

Note: Features within a Feature Filter can be verified by executing the **View Features**, **Edit Feature**, or **Annotate Feature** commands.



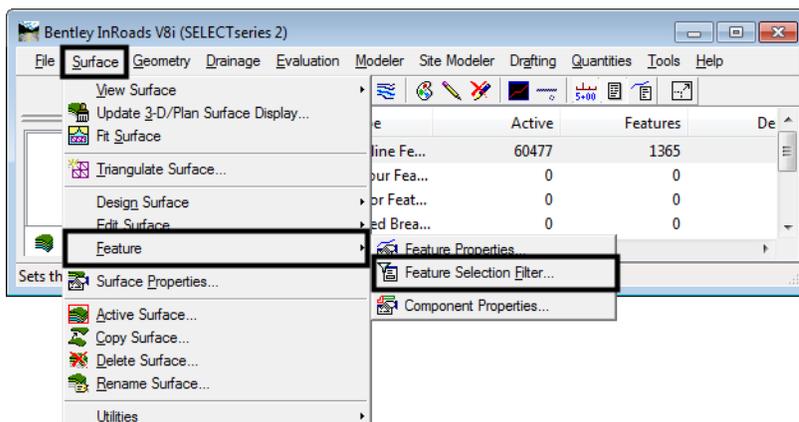
Example 2 - Applied Feature Filter

To display the results of the selected **Feature Filter**, in this case **All Topo Features**, the **Feature Filter Lock** is simply toggled **on**, or activated, and the filter will then sort the assigned features. Notice in the **Annotate Feature** dialog box shown below, the features are displayed once the filter is activated, when compared to Example #1 when the filter was deactivated.

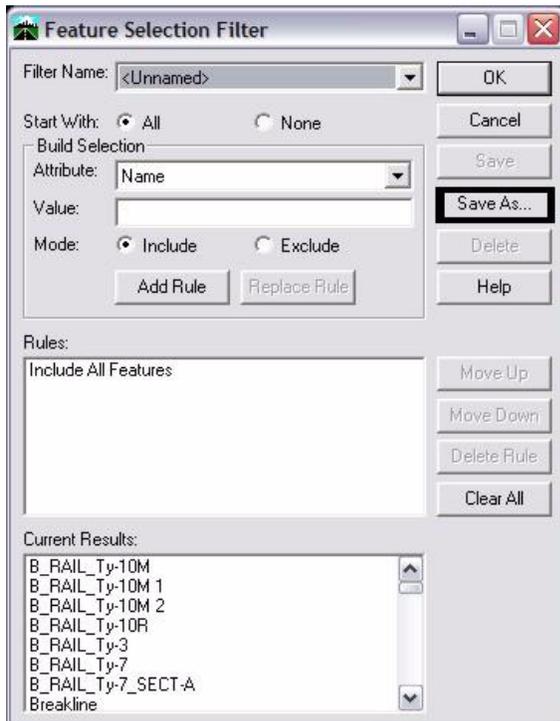


Creating a Selection Filter

1. From the Surface pull down menu **Surface>Feature>Feature Selection Filter**.



- In the **Feature Selection Filter** dialog box, create a name in the **Filter Name** field by <D> **Save As...**



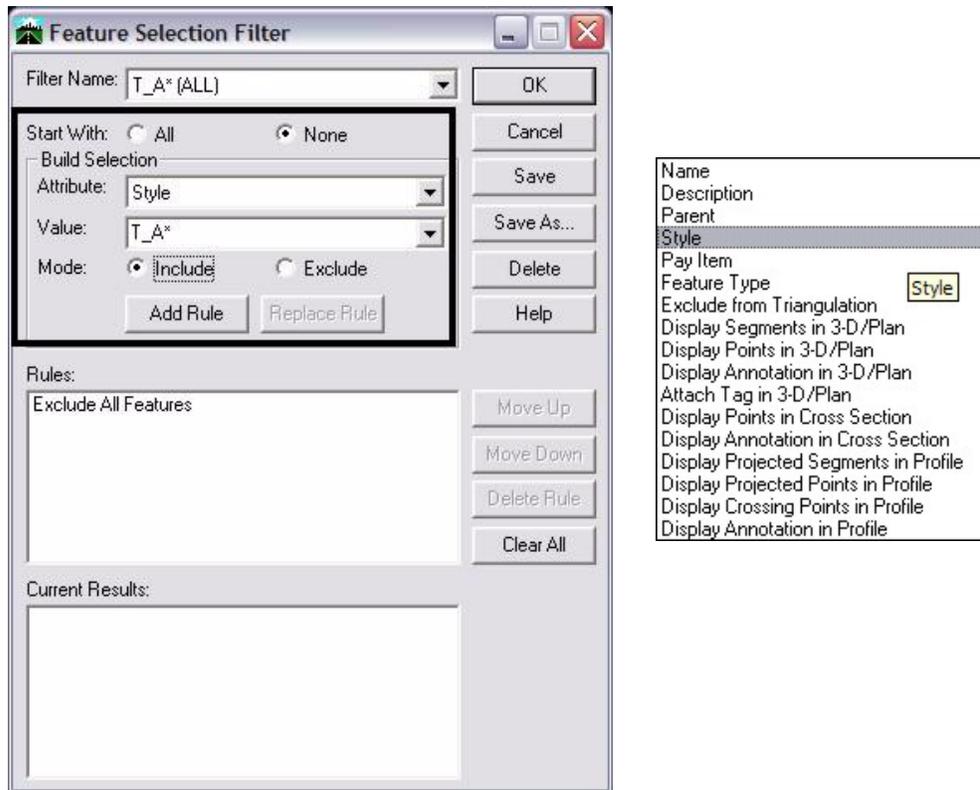
- In the **Save Filter As** dialog box, **key in** a name for the filter and <D> **OK**. The newly created filter name will appear in the **Filter Name** drop-down list in the **Locks** toolbar.

Note: The **Feature Filter** drop-down list in the **Locks** toolbar has a limited amount of viewing display capability, so the filter name should be created accordingly.



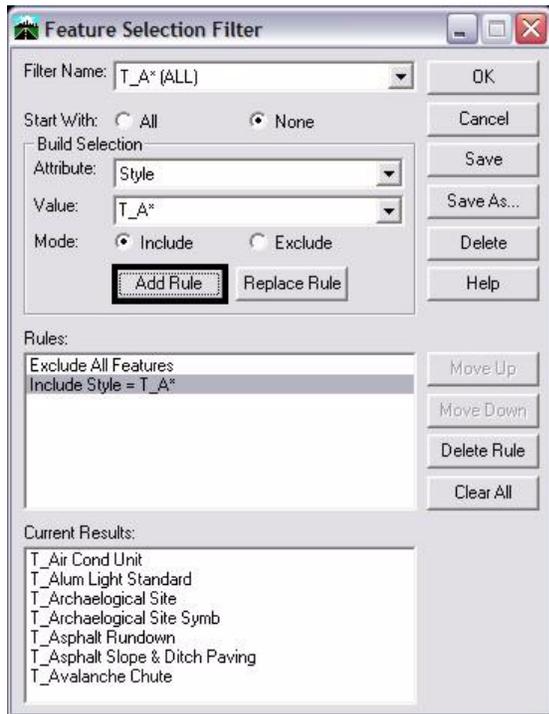
- The first step in defining any filter is the **Start With** toggle. Toggle either **All** or **None** on. This selection allows the user to build the filter by adding or removing features with subsequent rules.
- Complete the **Build Selection** section of the **Feature Selection Filter** dialog box by selecting an **Attribute** and keying in a **Value**, and selecting the appropriate **Mode**.

Note: A wide variety of Attributes are available as criteria for building filters. These include display properties as defined by the feature style assigned to the features.

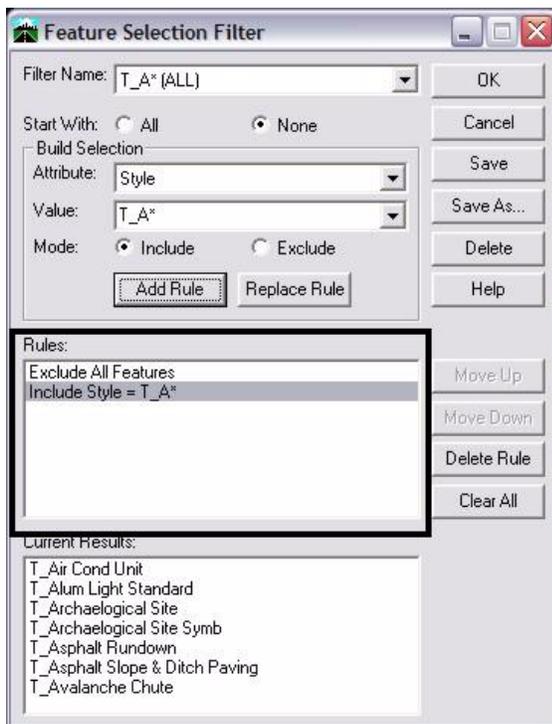


Note: The wild card symbol “*” is often used in filters created for CDOT. This particular symbol matches any number of characters at and following the location of the symbol.

6. <D> **Add Rule**. The **Current Results** list box updates as rules are added, deleted, updated, or re-ordered.

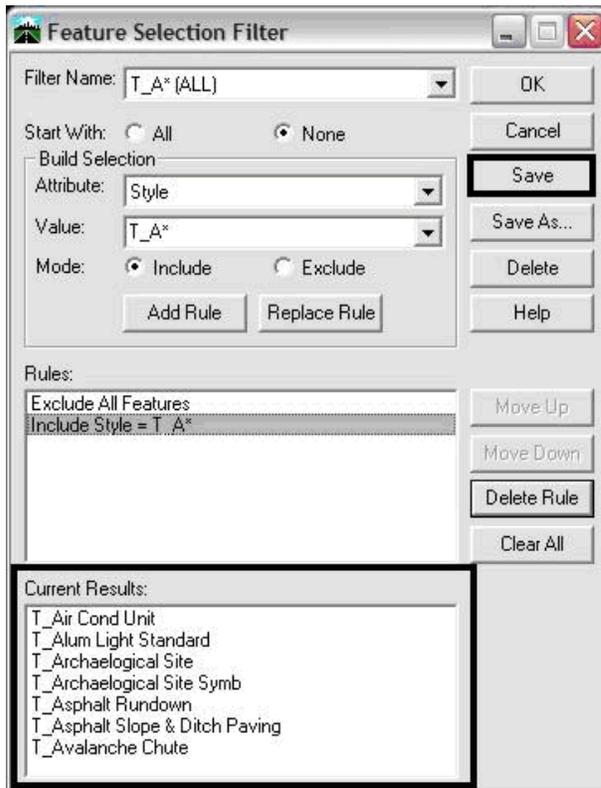


7. Verify that the rule was added in the **Rules** list box.



8. Verify that the correct Feature(s) were added in the **Current Results** list box.

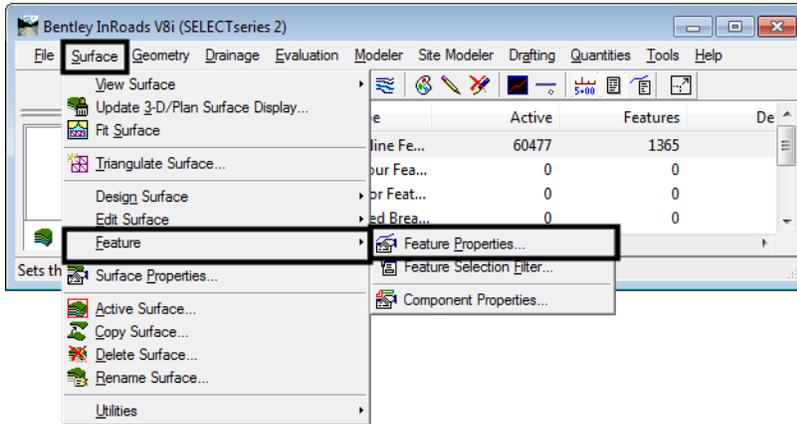
9. <D> Save.



Note: The previous Feature Filter example was created by the use of only two rules: **Exclude All Features and Include Style = T_A***. It should be noted that when creating rules, they can include any of the following attributes: style, name, description, parent, pay item, triangulation, etc. Multiple rules can be incorporated to further refine the filtering. The order in which the rules are listed in a filter is important. They are always read from top to bottom and build sequentially based on the Results that passed the previous rule. Also, be aware that when inputting value(s) as rules, the input is case sensitive.

Using a Feature Selection Filter

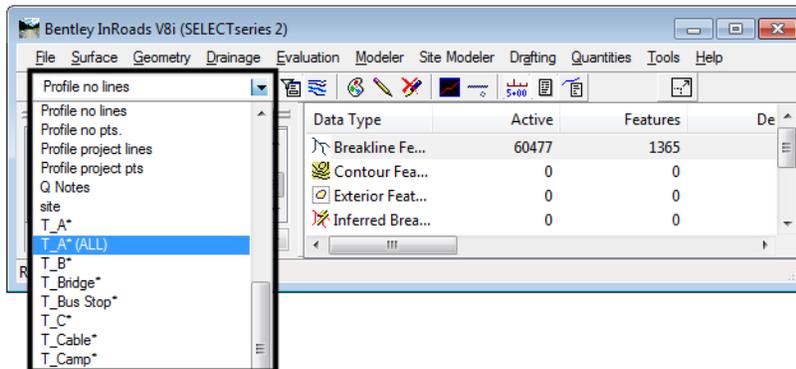
1. From the InRoads menu, select **Surface>Feature>Feature Properties**.



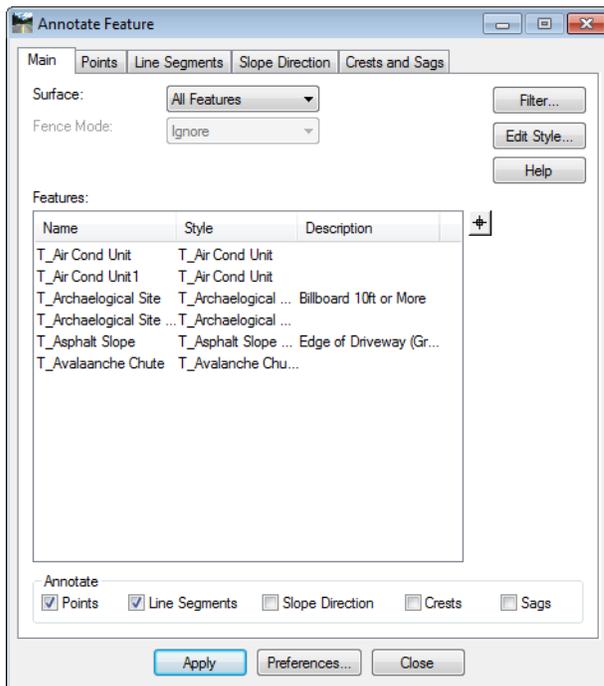
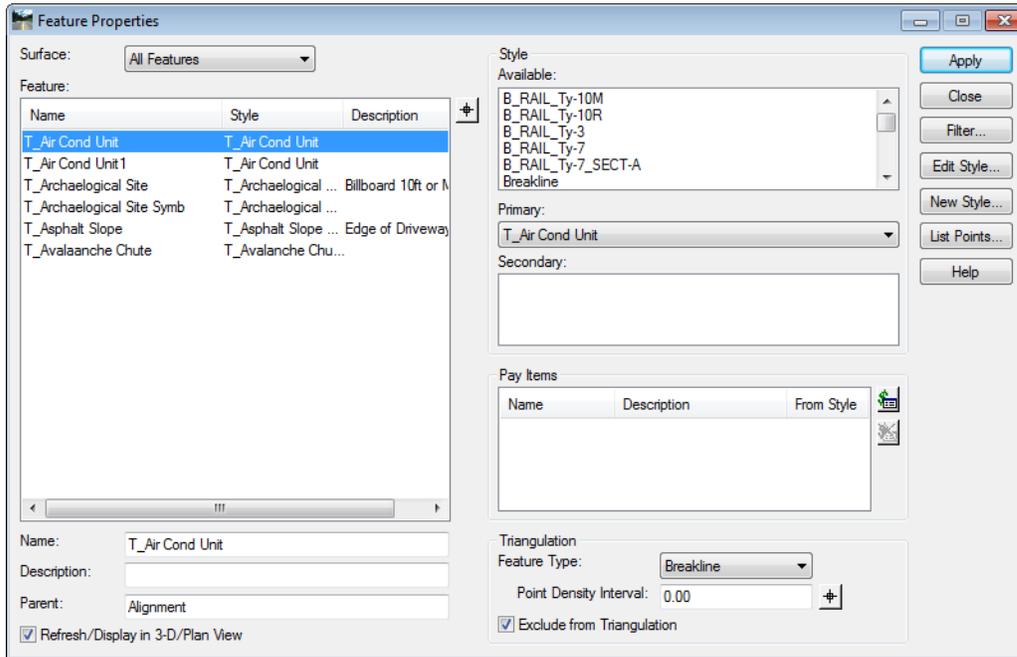
2. Verify that the **Feature Filter Lock** is toggled on.



3. In the **Locks Toolbar**, use the **Feature Filter** drop-down list to select a **Feature Filter**.



4. The selected Features will be displayed in the appropriate dialog boxes.



Note: Remember to disable the **Feature Filter Lock** when it is no longer needed.

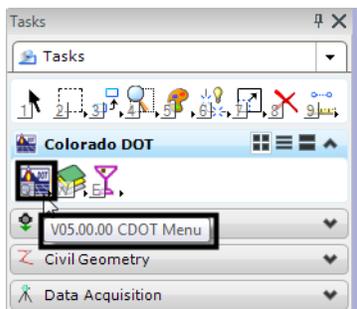
Workflow IR 3 - Update InRoads Features

This document is a guide for updating Digital Terrain Model (DTM) feature styles within InRoads. These changes are necessary due to new feature styles being developed and modifications or deletions to previous feature style names in previous CDOT Configuration Releases.

Opening InRoads Files

1. Open MicroStation and InRoads
2. Load design DTM's that have been created with a prior configuration.

Note: Existing topographic DTMs will not require this update. The version of the CDOT configuration can be determined by pausing the cursor over the CDOT logo located on the Colorado DOT Task Tab.



Updating Digital Terrain Models Feature Styles

DTM Evaluation

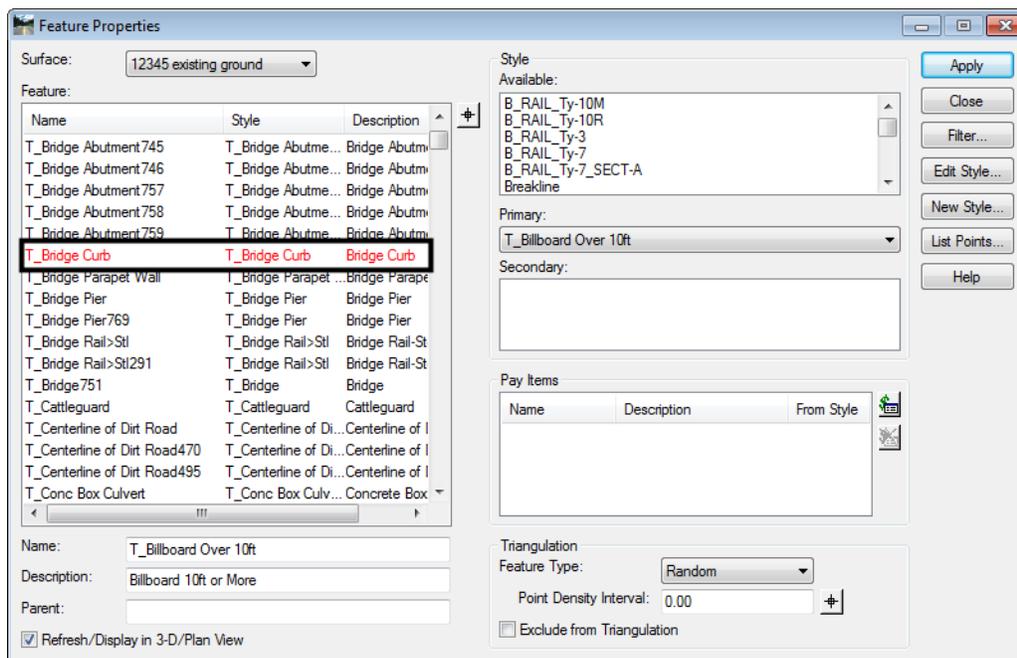
Determine if the design DTM contains features that require re-association to any new or modified Feature Styles. This can be accomplished by Scrolling through the feature list in the Feature Properties dialog box, looking for entries colored red.

Note: The **Feature Filter** named **CDOT v3.0 Update** can be used to locate features in older DTMs that had style changes.

DTMs that require feature re-association

1. From the InRoads menu select **Surface > Feature > Feature Properties**. The **Feature Properties** dialog will appear.

2. Scroll through the Feature list until a red entry is found.



3. Highlight the feature name that requires re-association. In the example shown here, **T_Bridge Curb** is the selected feature.
4. In the **Style** section of the dialog box, select an appropriate *Feature Style* from the **Primary** and then **<D> Apply**.
5. Continue updating other feature styles by repeating steps 5 and 6 until no features are displayed in red.

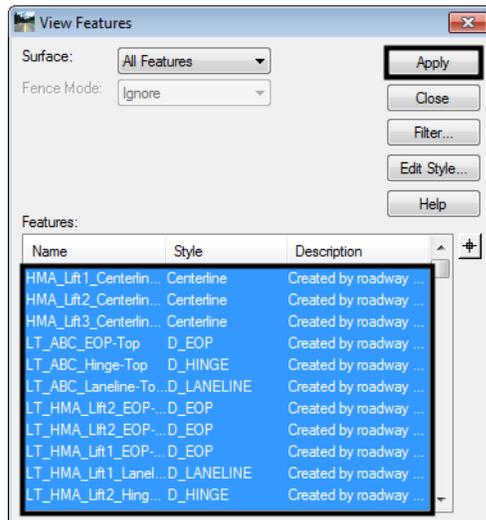
Note: To expedite the update process, sort the features by style and select several features that have common styles in a single selection. Using this method, multiple features can have their Primary Feature Style updated in a single execution of the command. Remember to hold down the **<CTRL>** or **<SHIFT>** keys while selecting features.

6. Once all feature styles have been updated, close the **Feature Properties** dialog box and toggle the **Feature Filter** lock off.
7. **Save** the DTM Surface.

Updating graphics

DTM features that are currently displayed in a MicroStation file will require redisplay to refresh the graphic display based on the new feature properties.

1. From the InRoads menu select **Surface > View Surface > Features**.



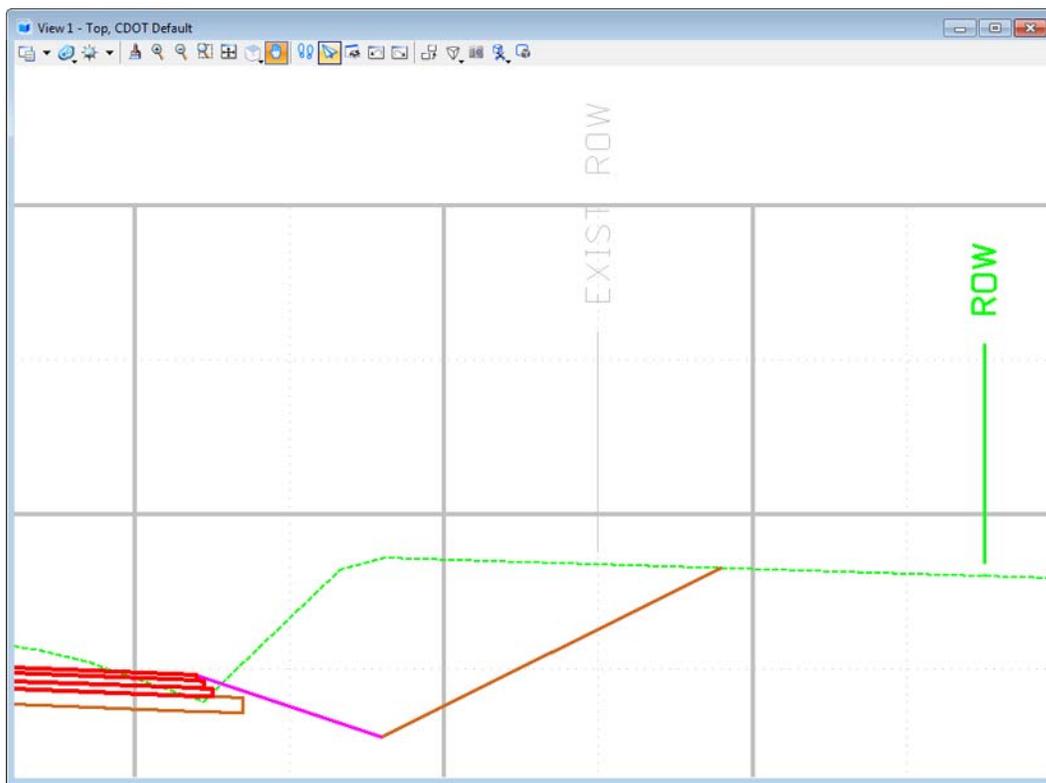
2. Highlight all, or only the features that require redisplay, from the **Feature** list box and **<D> Apply**. Both the DTM and graphics display should now be up to date with the current CDOT configuration.

Workflow IR 4 - Alignment Display in Cross Section

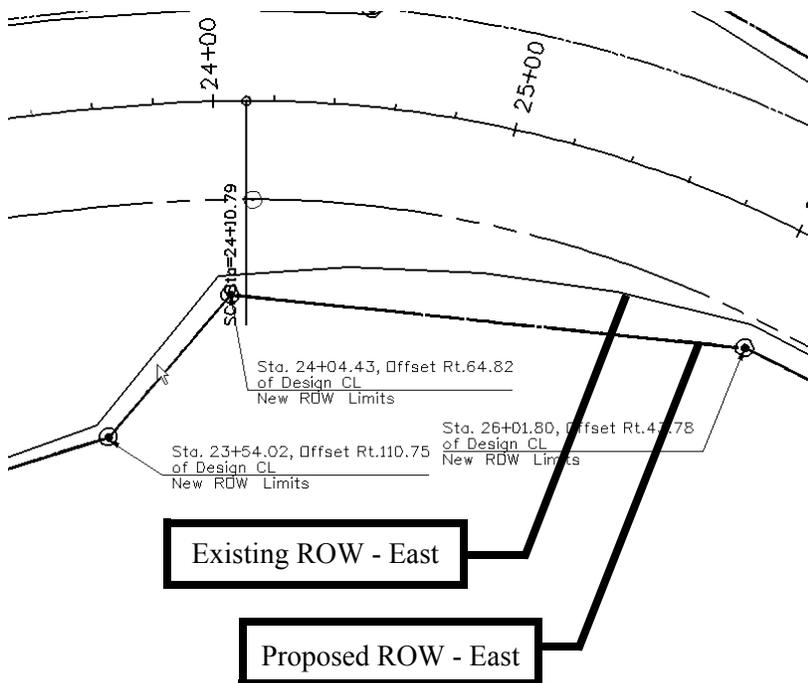
This document guides you through the process of displaying the location of alignments such as Right-of-Way locations in cross section or profile views.

Desired Result

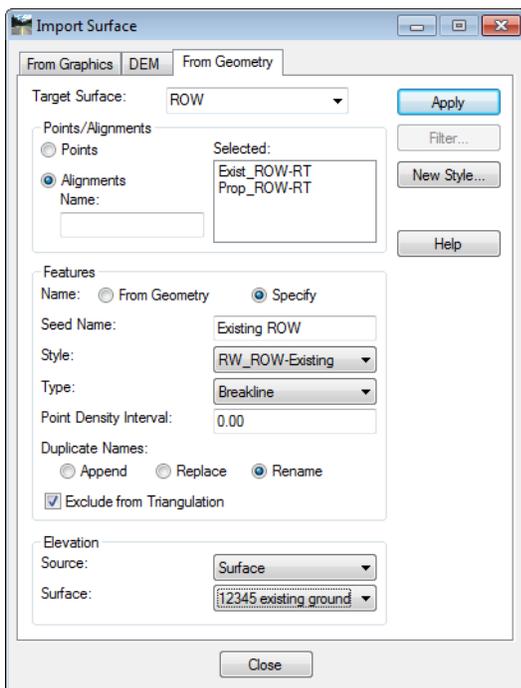
The overall workflow is to export horizontal alignments to a surface as features with the appropriate feature styles assigned. A surface feature that is defined as having breakline properties can be displayed as a 'crossing point' in cross sections or profiles. A cell is used to indicate this 'crossing point'.



Exporting the Alignment



1. Once the alignment has been created, as shown above, select **File > Import > Surface** from the InRoads menu. The *Import Surface* dialog will appear.
2. Select the **From Geometry** tab.

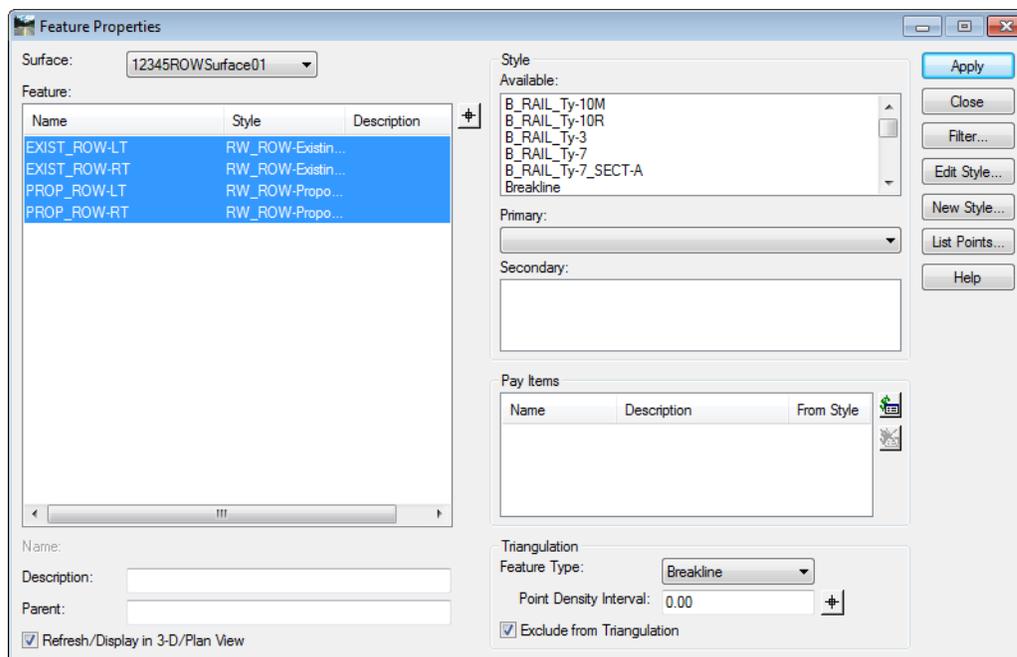


◆ **Target Surface:** Surface to be created or appended that will contain the alignment features

- ◆ **Alignments:** Alignments identified for importing
- ◆ **Name:** Set to **Specify**
- ◆ **Seed Name:** key-in the name of initial feature to be created. InRoads will automatically increment the seed name for multiple features.
- ◆ **Style:** Select **RW_ROW-Existing** or **RW_ROW-Proposed**
- ◆ **Type:** **Breakline**
- ◆ **Point Density Interval:** **0**
- ◆ **Duplicate Names:** **Rename** is a good default setting
- ◆ Under **Elevation:** Set **Source** to **Surface**
- ◆ Under **Elevation:** Select the **Surface** for extraction of Elevation information for placement of the annotation.

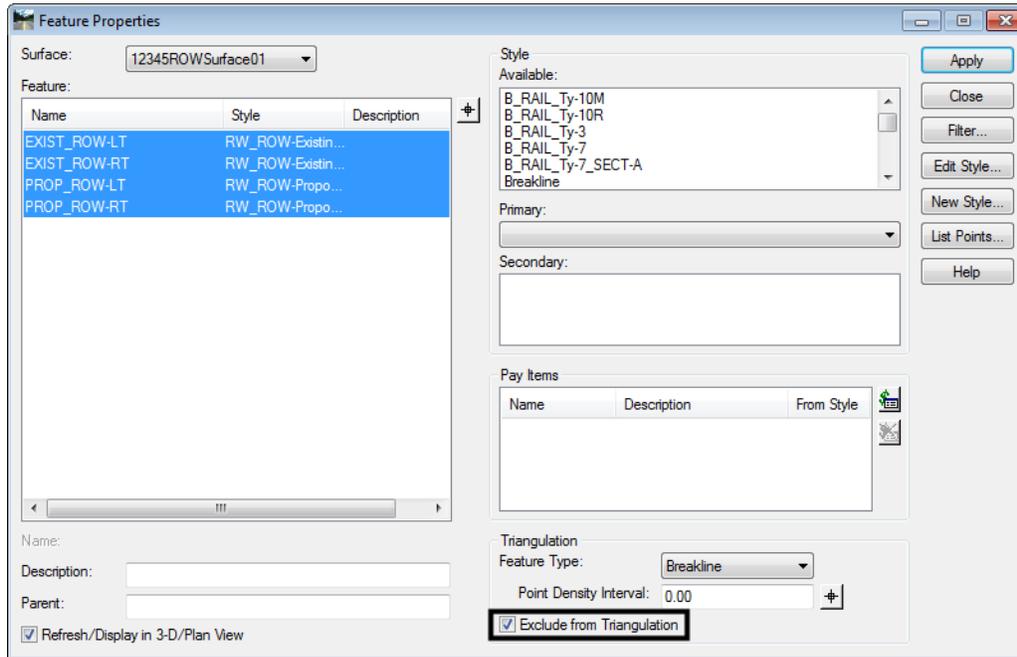
Note: Existing and proposed alignments should be exported separately as they require different feature styles assignments.

3. **<D> Apply** to create or append the target surface
4. Repeat above steps to export additional alignments. Continue to Step 5 when all alignments have been exported.
5. Make sure that **12345ROWSurface01** is the **Active Surface**. From the InRoads pull down menu select **Surface > Feature > Feature Properties** the **Feature Properties** dialog box will appear.



6. Verify that the features were added to the surface.

7. Select the features created and place a check in the **Exclude from Triangulation** check box

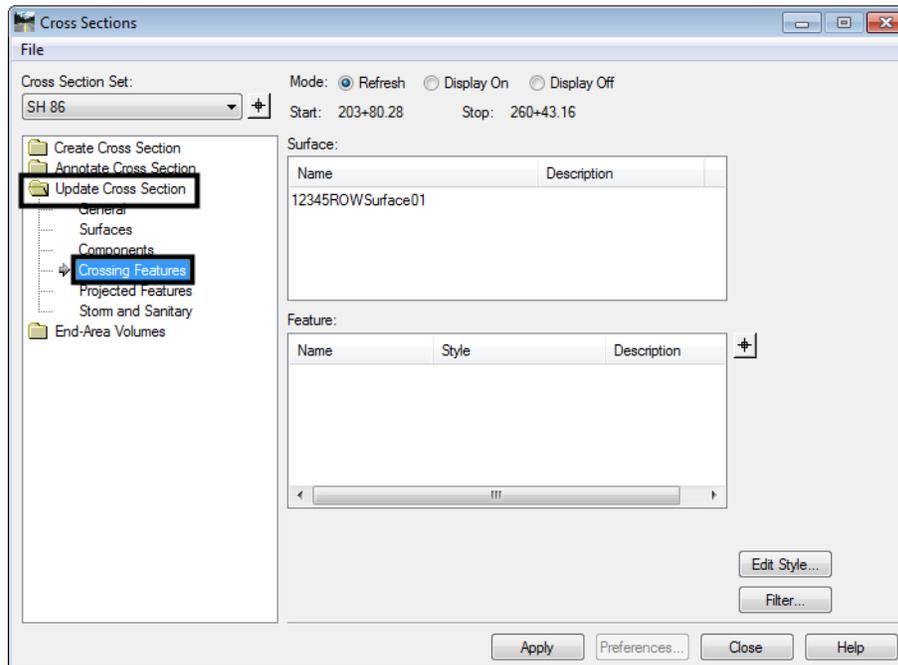


8. <D> **Apply** then <D> **Close**.

Note: Excluding the features from triangulation eliminates the possibility of the exported alignments becoming part of a surface (contoured) model. Features excluded from triangulation can be displayed in cross sections or profiles as crossing features, which is why these alignments were imported into the Surface as features.

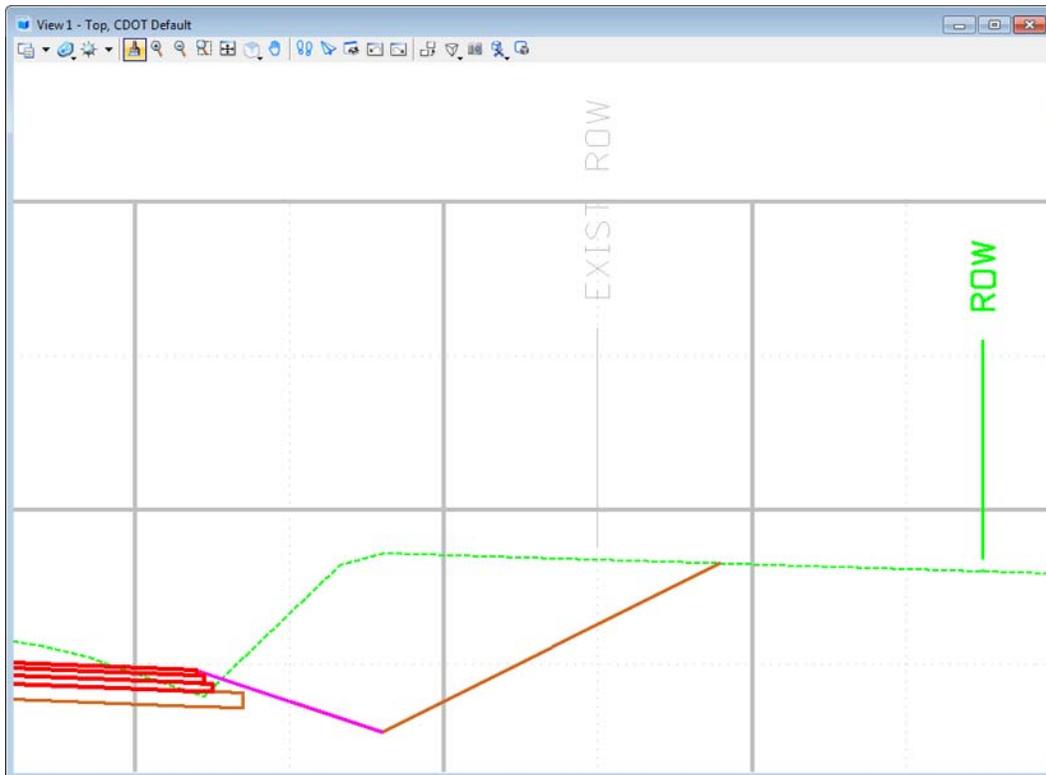
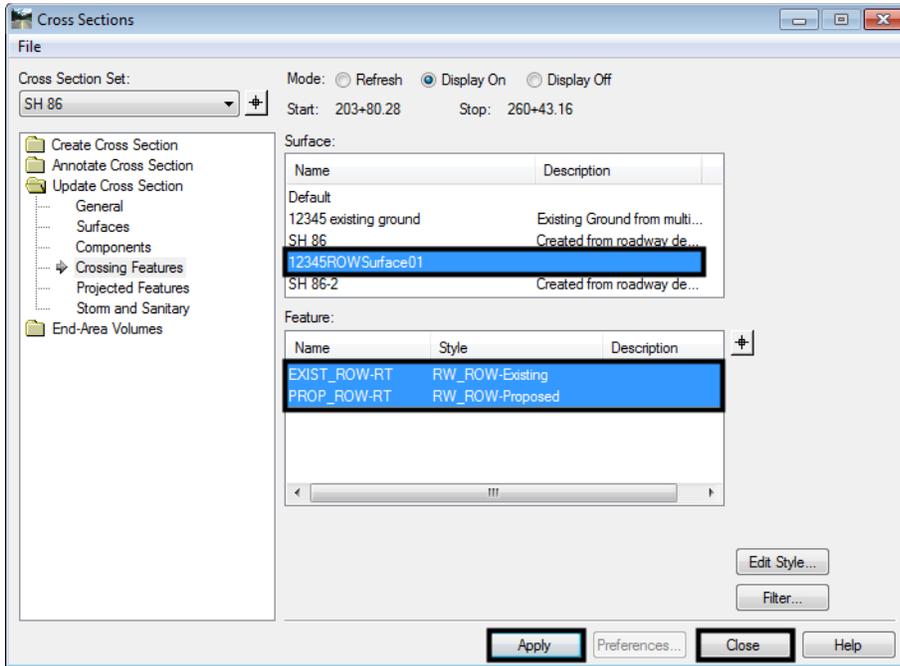
9. Select **Evaluation > Cross Section > Cross Sections** (or **Evaluation > Profile > Update Profile**) to add, remove, or update the display for the new features.
10. <D> the **Update Cross Section** folder from the dialog box explorer.

11. Highlight the **Crossing Features** leaf.



12. Select the desired **Cross Section Set** from the drop-down list.
13. Highlight the **Display On** radio button.
14. From within the **Surface** list box, highlight the surface containing the alignment features.

- 15. In the **Features** list box, highlight the features to be displayed then **<D> Apply**. **<D> Close** to dismiss the window.



Note: The InRoads global scale factor values should be set as they were when the cross sections were originally created. Additionally, the default vertical exaggeration for CDOT cross sections is a factor of 2:1. The feature styles used to place the cells depicting the ROW locations have been created at this ratio. See the following workflow to accommodate varying ratios.

Adjusting vertical distortion

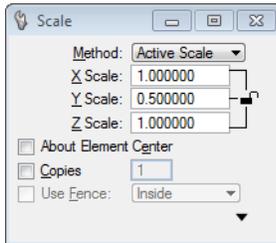
Adjusting vertical scale of cells representing ROW limits can be accomplished in 2 ways. First is scaling the cells placed, second is temporarily modifying the named Symbologies used to place the cells.



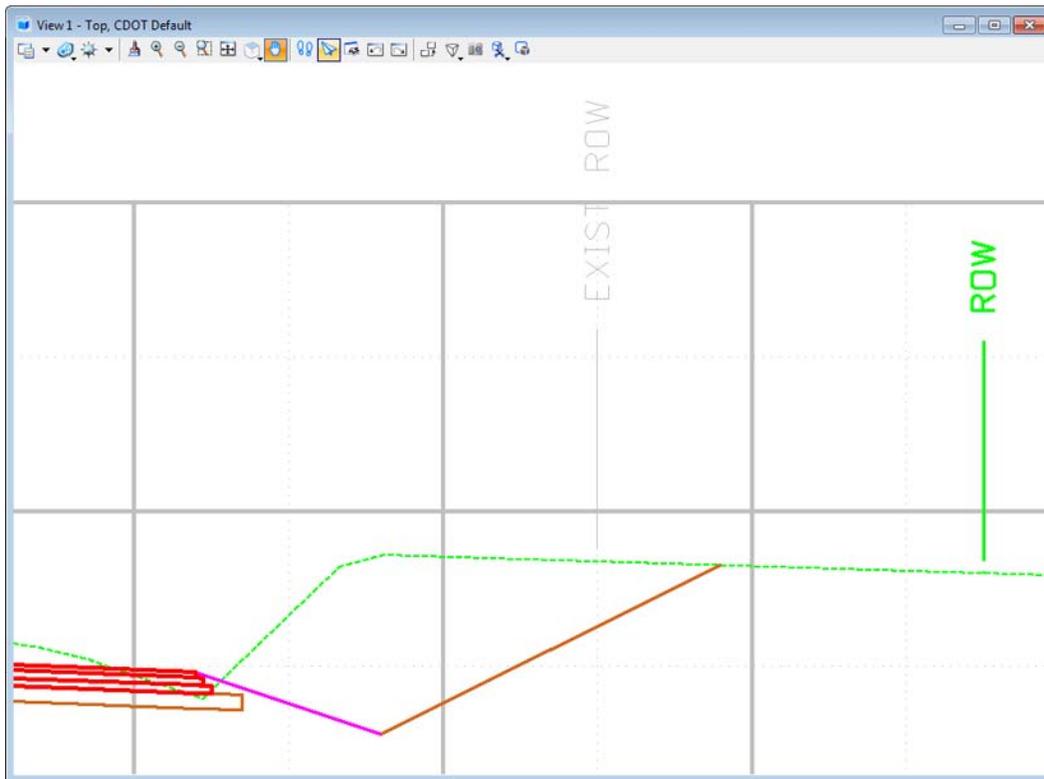
Method One

1. Select the cells for scaling using the **Element Selection, Power Selector, Select by Element**, or by isolating the level(s) and using a **Fence**.
2. Select the MicroStation **Scale** command
3. Ensure that the scale lock is opened as shown in graphic under Step 5. Set **X & Z** scale factors to **1**.
4. Set the **Y** scale factor to the appropriate value (**2:1** is the default in the configuration). This example used **1:1** for the cross sections. Consequently, the cells are scaled (distorted) $\frac{1}{2}$ the required amount.

- Place a check in the **About Element Center** check box (scales about the cell origin) .



- <D>** in the MicroStation view to execute the scale command.



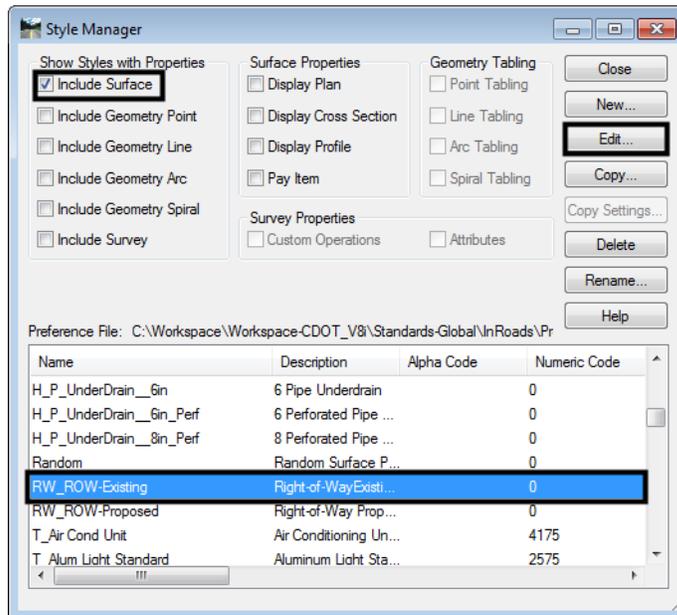
Note: The cells should now be updated to the desired scale factor.

Method Two

The second method is to temporarily modify the named symbology used to place the annotation.

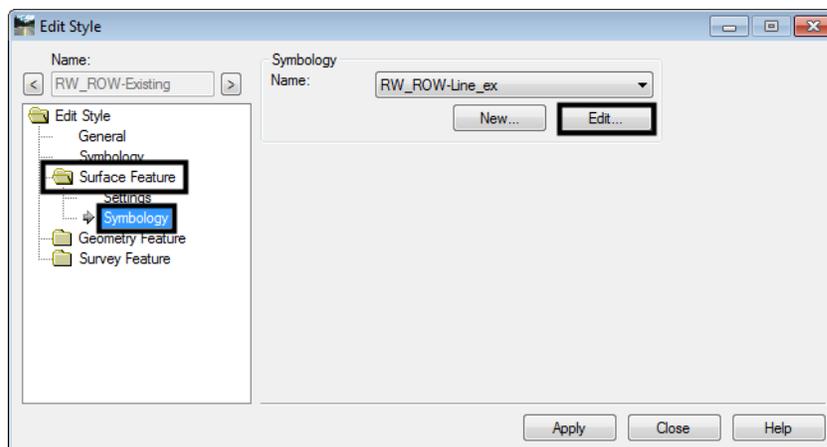
- Select **Tools > Style Manager** to display the **Style Manager** dialog box.
- Toggle on **Include Surface** in the **Show Styles with Properties** area.

- Identify and highlight the appropriate feature style from the list and **<D> Edit**.

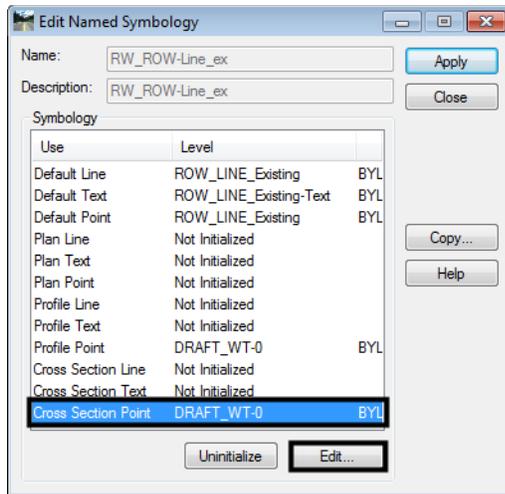


The named symbology that is associated with the feature style(s) used to create the features will be edited. In this example RW_ROW-Existing and RW_ROW_Proposed will be modified.

- <D>** the **Surface Feature** folder in the dialog box explorer.
- Highlight the **Symbology** leaf.
- <D> Edit** in the **Symbology** section of the **Edit Style** dialog box. The **Edit Named Symbology** dialog box will appear.

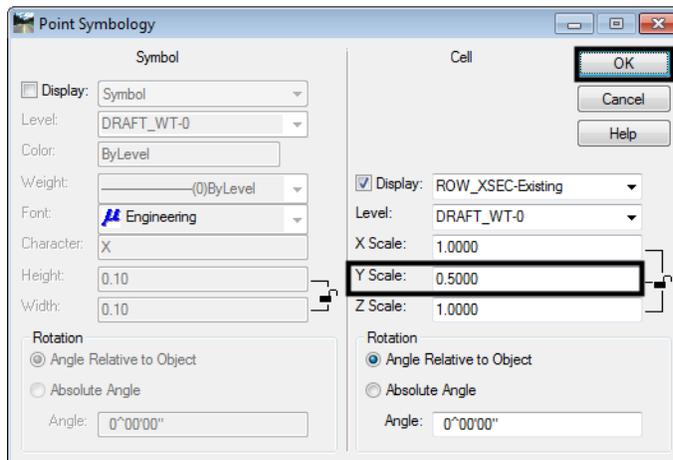


7. In the **Edit Named Symbology** dialog box, highlight the **Cross Section Point** and **<D> Edit**. The **Point Symbology** dialog box now appears.



Note: The **Y Scale** is set to **0.5** by default to compensate for the default vertical distortion of 2:1 as the cell is created proportionally correct as a 1:1 graphic. In other words, when creating a cross section at 2-Vertical:1-Horizontal, the cell would be stretched a factor of 2. The **Named Symbology** compensates for this by ‘offsetting’ the effect of vertical distortion.

8. Set the appropriate **Y Scale** For a cross section without a vertical exaggeration (1:1), input a value of **1** in the **Y Scale** field.
9. **<D> OK** in the **Point Symbology** dialog box. This closes the **Point Symbology** dialog box.

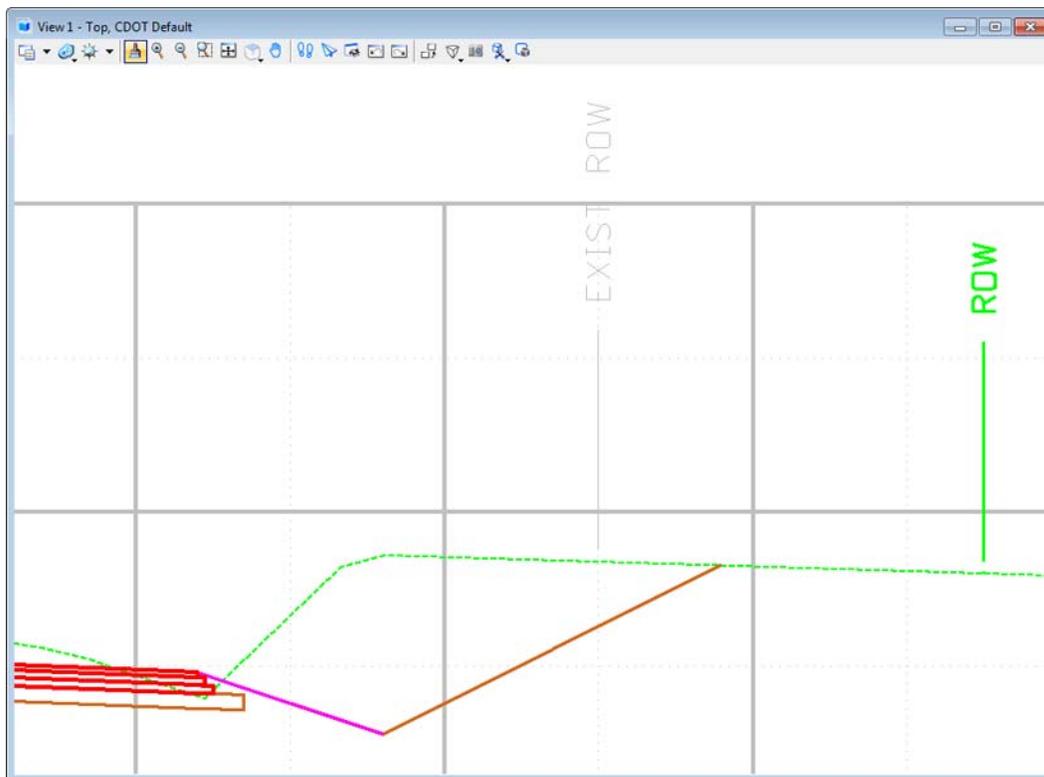
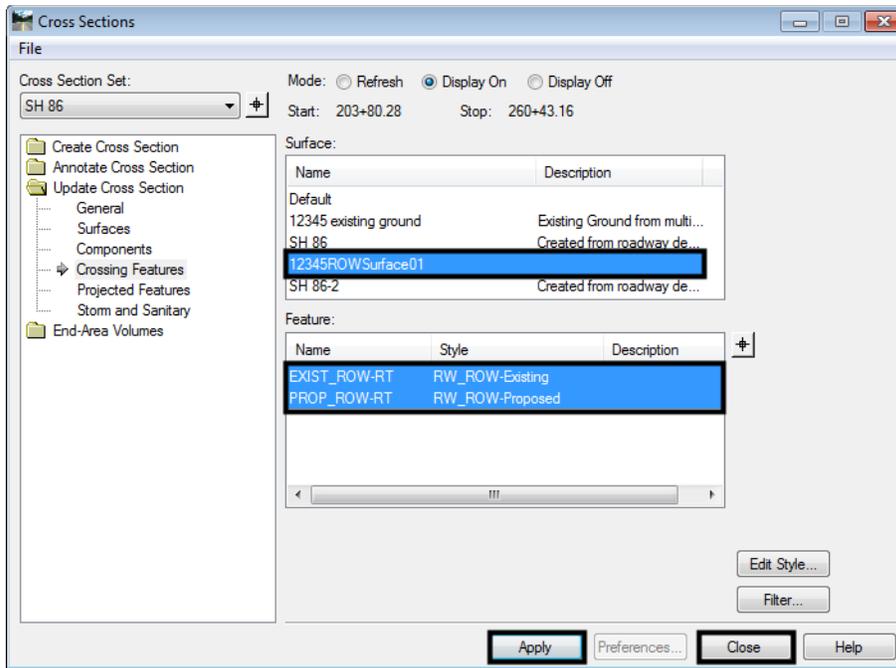


Note: Other useful values for scaling cells with MicroStation or symbology modification would be:

- Vertical exaggeration - Y Scale
 - 1:1 – 1.0
 - 2:1 – 0.5
 - 5:1 – 0.2
 - 10:1 – 0.1

10. **<D> Apply** then **Close** in the **Edit Named Symbology** dialog box.

- Use the update commands for Cross Sections or Profiles to add, remove, or update the display for the required features.



- Repeat the above steps for the Feature Style **RW_ROW-Proposed**.

Workflow IR 5 - Annotating Horizontal and Vertical Alignments

This document demonstrates the procedure for displaying annotation for horizontal and vertical alignments. It further presents the workflow for annotating horizontal alignments that contain spiral components.

InRoads can display most alignment annotation as per the M&S standards. However some annotation will require editing and/or repositioning using standard MicroStation commands.

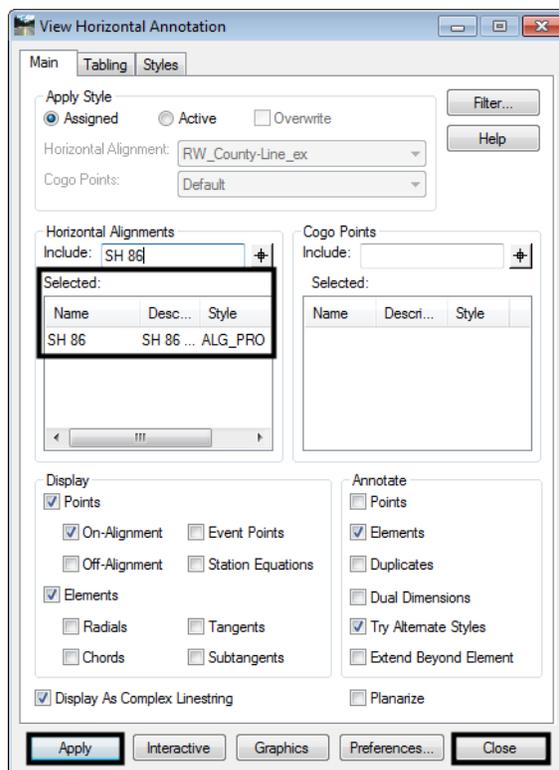
Annotating a Horizontal Alignment

Two InRoads commands are required to annotate a horizontal curve in the CDOT format. The first command (horizontal annotation) is used to display the linework and annotate the tangents. The second command (horizontal curve set annotation) is used to display the PI symbol, short tangents, and curve data. Once the InRoads annotation tools have been used the user needs to modify the text content and positioning to have it appear as per the M&S standards.

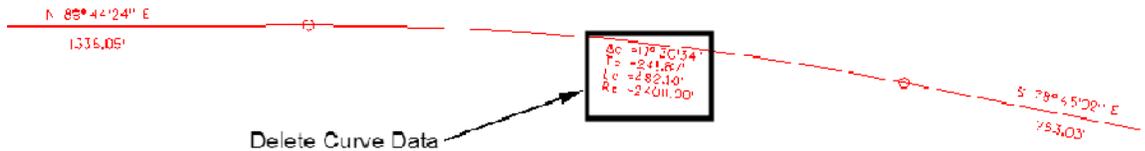
Display the alignment

This first example illustrates annotating a circular curve. This is followed by the workflow required for annotating circular curves with spiral transitions.

1. Display the horizontal alignment using **Geometry > View Geometry > Horizontal Annotation**. The **View Horizontal Annotation** dialog box is displayed.



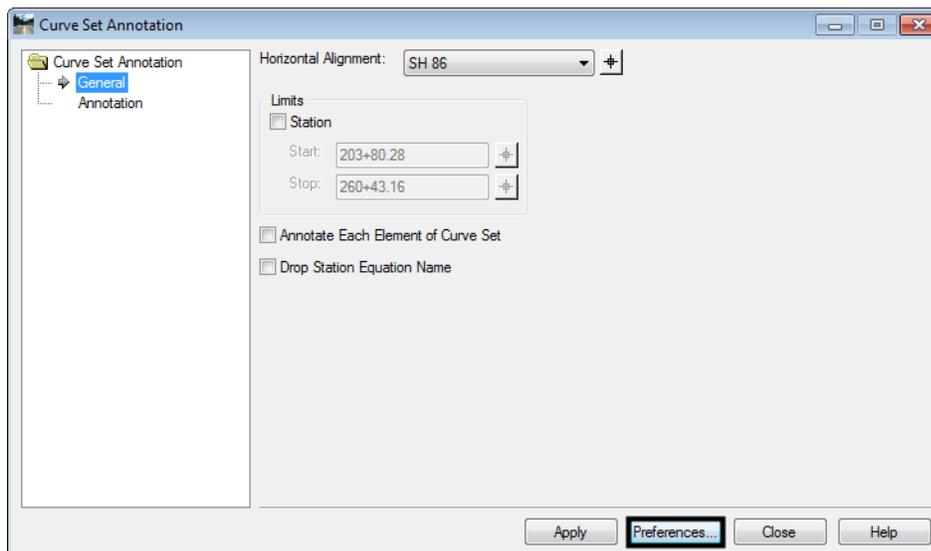
2. Select the correct alignment for display, **<D> Apply** then **<D> Close**.



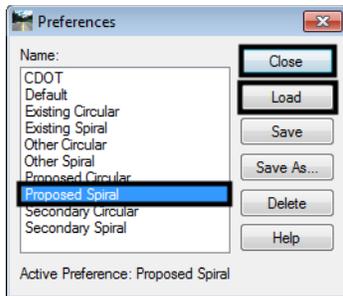
3. Use the MicroStation **Delete Element** command to remove the curve annotation from the display, as this information will be re-displayed in the following steps.

Note: Prior to deleting the curve information, the MicroStation **Graphic Group** lock must be disabled (**Settings > Locks**). Otherwise the entire alignment will be deleted.

4. Display the curve annotation using **Geometry > View Geometry > Curve Set Annotation**. The **Curve Set Annotation** dialog box is displayed.
5. In the **Main** tab, select the correct **Horizontal Alignment (SH 86)** from the drop down list.



6. **<D> Preferences**, as shown above, and choose the appropriate **Spiral** preference (**Proposed Spiral** was selected in this example). **<D> Load** and then **<D> Close**.

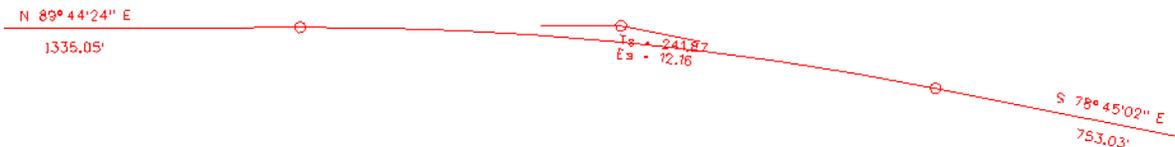


Note: The preferences established for spirals serve the dual purpose of annotating curves with either circular or spiral components. The central curve information required is common between the two types of geometry.

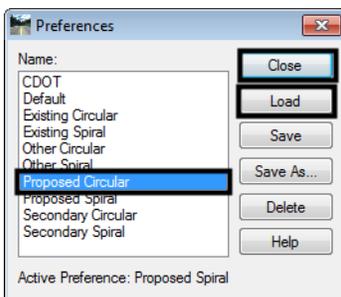
7. The InRoads **Write Lock** must be set to **PEN** mode prior to the next command. The curve requires annotation twice and **PEN** mode will retain previous annotation displays.



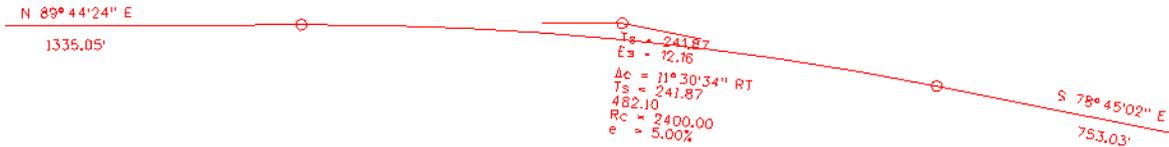
8. **<D> Apply** on the **Curve Set Annotation** dialog box. The central curve is annotated



9. **<D> Preferences** again and choose the appropriate **Circular** preference (**Proposed Circular** in this example). **<D> Load** then **<D> Close**.

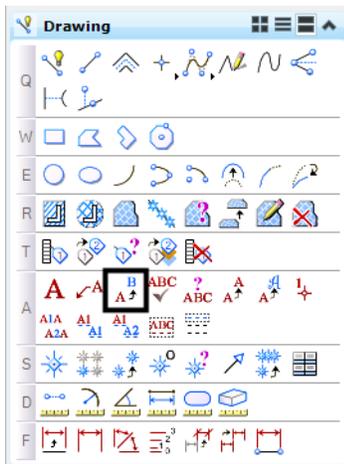


10. **<D> Apply** on the **Curve Set Annotation** dialog box. The remainder of the central curve information is annotated

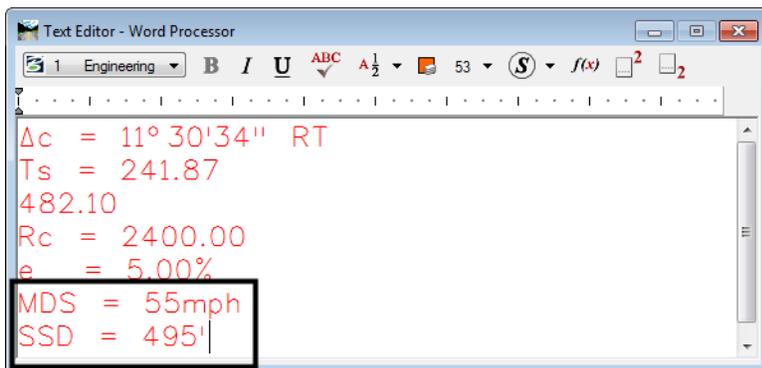


Note: The M&S standards specify that curve information should include the Mean Design Speed (MDS) and Stopping Sight Distance (SSD) information. This information is not annotated by InRoads and will have to be added with MicroStation.

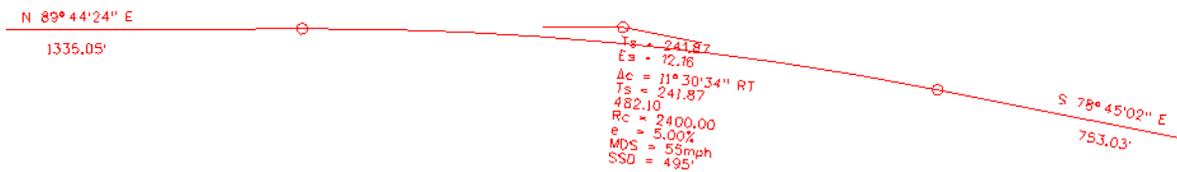
11. Select the MicroStation **Edit Text** command.



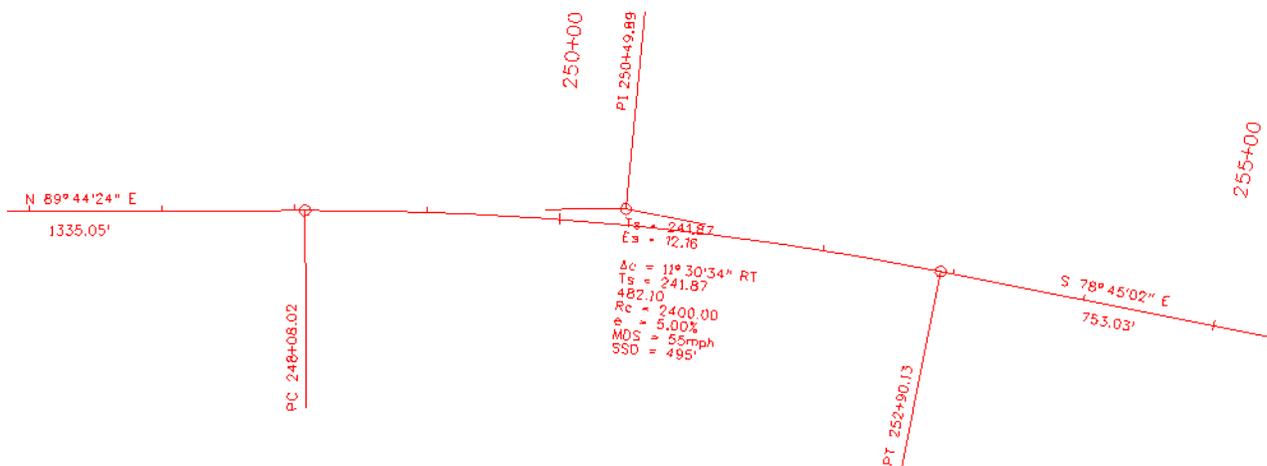
12. Select the desired text. The text editor will appear allowing the user to add the required information for MDS and SSD.



13. Use MicroStation commands to reposition the text as desired.



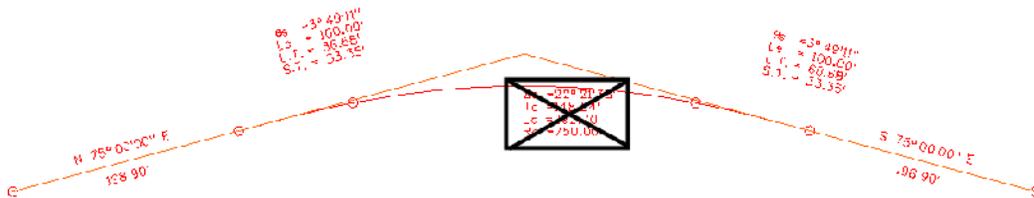
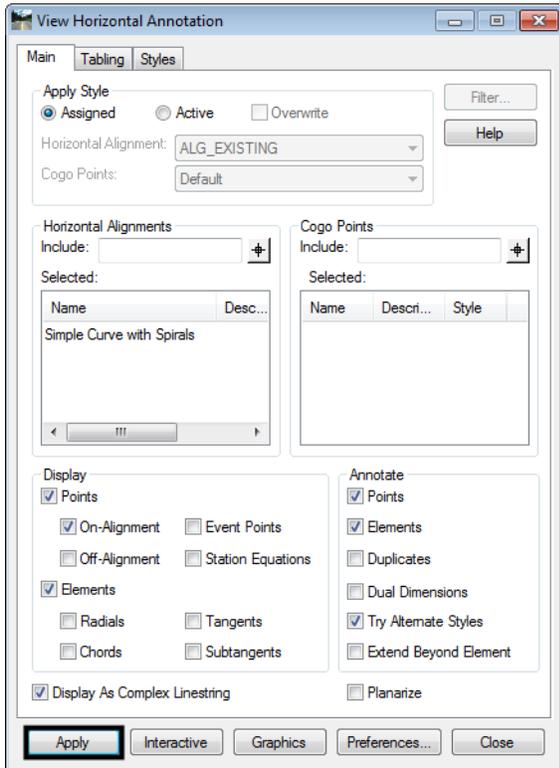
14. If necessary, display the alignment stationing by selecting **Geometry > View Geometry > Stationing**.



Annotating a Horizontal Curve – Spiral Curve

The workflow is almost identical to the above steps 1-12. The exceptions are noted below.

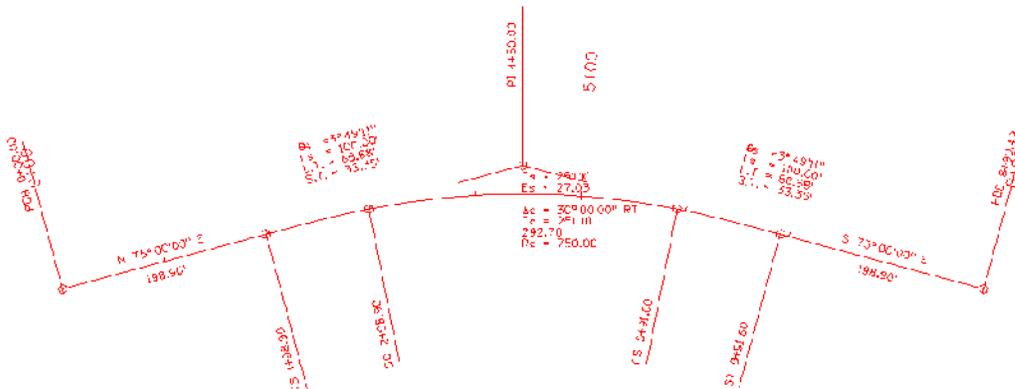
1. Display the horizontal alignment using **Geometry > View Geometry > Horizontal Annotation**.



2. Use the MicroStation **Delete** command to remove the central curve data leaving the spiral curve annotation intact.

Note: Prior to deleting the curve information, the MicroStation ‘Graphic Group’ lock must be disabled (**Settings>Locks**). Otherwise the entire alignment will be deleted.

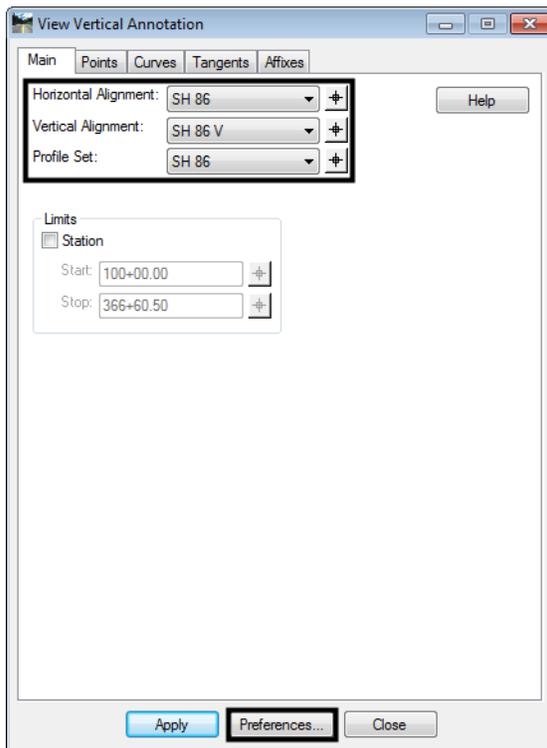
3. Follow steps 4-12 above to complete the annotation.



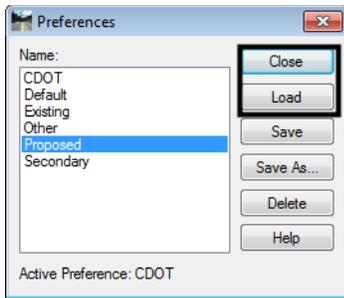
Annotating a Vertical Curve

Display the Alignment

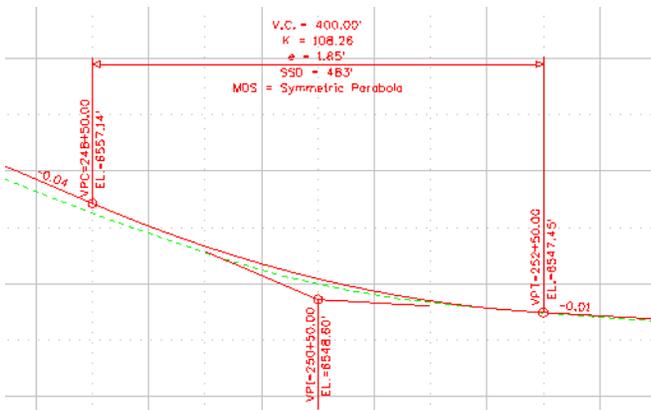
1. The first step is either have, or generate a profile view along the alignment using **Evaluation > Profile > Create Profile**.
2. Display the vertical alignment using **Geometry > View Geometry > Vertical Annotation...**
3. Select the appropriate **Profile Set**, **Horizontal Alignment**, and **Vertical Alignment**.



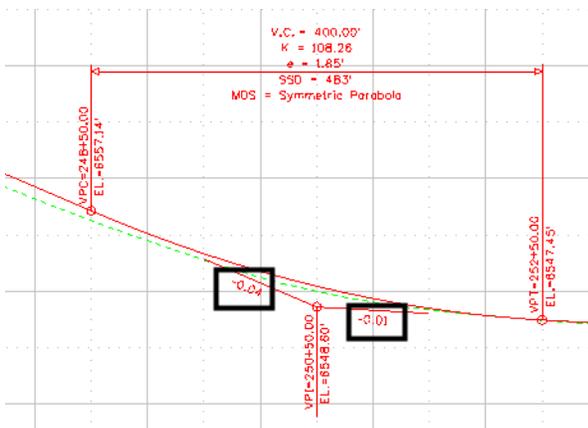
4. **<D> Preferences** and highlight the preference for the appropriate symbology (**Proposed** in example below). **<D> Load** then **<D> Close**.



5. **<D> Apply** on the **View Vertical Annotation** dialog box to display the annotation.



6. Using the MicroStation **Move** command, relocate the tangent grade annotation to the short tangent lines.



Known Issues

1. The arrowheads in the vertical annotation are not user definable. They are hard-coded by the software as open arrow heads.

Workflow IR 6 - Creating Combined Surfaces

This document explains the procedures for creating an exterior boundary, merging surfaces, and copying features from one surface to another.

An exterior boundary eliminates inaccurate triangles that can occur in concave areas within the data.

The **Merge Surfaces** command can be used to create a single surface from two or more “existing” surfaces, update the “existing” surface with additional data, or to make an “as constructed” surface for the project by combining a proposed surface with an existing surface.

The **Copy Portion of Surface** command copies features (or portions of features) from one surface and places them in another surface. This can be used to create a new surface from elements of one or more other surfaces or to update a surface with data from another surface.

These tools can be used singularly or in conjunction with each other to achieve the desired results. The Creating an Exterior Boundary, Merging Surfaces, and Copy a Portion of a Surface sections will each have their own outline.

Creating an Exterior Boundary

An Exterior Boundary is a closed shape DTM feature that defines the area where triangulation can occur. InRoads will triangulate the surface (without an exterior boundary) across concave areas creating inaccurate triangles that could adversely affect proposed surface models. An exterior boundary will prevent the creation of false triangles outside of the actual data.

An exterior boundary should be created for a surface that does not currently have a boundary or for a surface that has been modified and now has usable data outside the current boundary.

Workflow Outline

The following outline describes the steps needed to create an exterior boundary for a surface along with a brief explanation of what each step does.

Creating an Exterior Boundary - To create an accurate exterior boundary, erroneous triangles are removed, the perimeter of the modified surface is displayed, and the perimeter graphic is imported as the exterior boundary.

Removing Inaccurate Triangles - A surface that does not contain an exterior boundary may contain triangles that do not represent actual data. Removing these triangles is essential to creating an accurate exterior boundary.

- ◆ **Triangulate Surface** - The Triangulate Surface dialog box has settings that allow the user to set the maximum length of a triangle leg. Because most erroneous triangles are long and narrow, setting a maximum length shorter than these triangles will remove many of them.
 - Command Used: View Triangles - Used to display the triangle data so that inaccurate triangles can be identified.
 - Measure Distance - Used to determine an appropriate maximum triangle length.
 - **Triangulate Surface** - Used to set a maximum triangle length, thus reducing the number of inaccurate triangles.
- ◆ **Delete Triangles** - The Triangulate Surface command will get rid of many of the erroneous triangles, but not all of them. The Delete Triangle command is used to get rid of the rest.

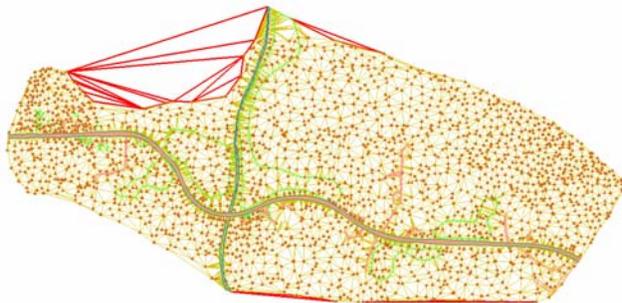
- Commands Used: **Delete Triangles** - Used to remove erroneous triangles.

Creating an Exterior Boundary - Now that the surface triangles are cleaned up, the exterior boundary can be created.

- ◆ **Displaying the Perimeter** - The perimeter of the modified surface will be used as the exterior boundary.
 - Commands Used: **3D/Plan Surface Display** - Used to display the surface perimeter.
 - **View Perimeter** - Used to display the surface perimeter. May be used instead of 3D/Plan Surface Display.
- ◆ **Importing the Exterior Boundary** - The final step is to import the z perimeter as an exterior boundary feature. This will contain the triangles within the area of the data.
 - **Import Surface** - Used to create the exterior boundary feature.
 - **Triangulate Surface** - Use to incorporate the exterior boundary into the triangulated surface.

Creating an Exterior Boundary for a Surface Without One

It may occur that a surface does not include an exterior boundary. If this is the case, an exterior boundary should be created and added to the surface. Adding the boundary will eliminate inaccurate triangles from the surface. Below is an example of a surface with no exterior boundary. The example is representative of what can happen when a boundary is omitted and a maximum triangle length is not defined. In the event of a missing exterior boundary, the software will calculate the inaccurate triangles shown in bold red below.



To create an exterior boundary for this surface three steps are required. One, the erroneous triangles are removed, two, the perimeter of the surface is displayed, and three, the MicroStation graphic representing that perimeter is then imported as an exterior boundary feature into the DTM.

Removing Inaccurate Triangles

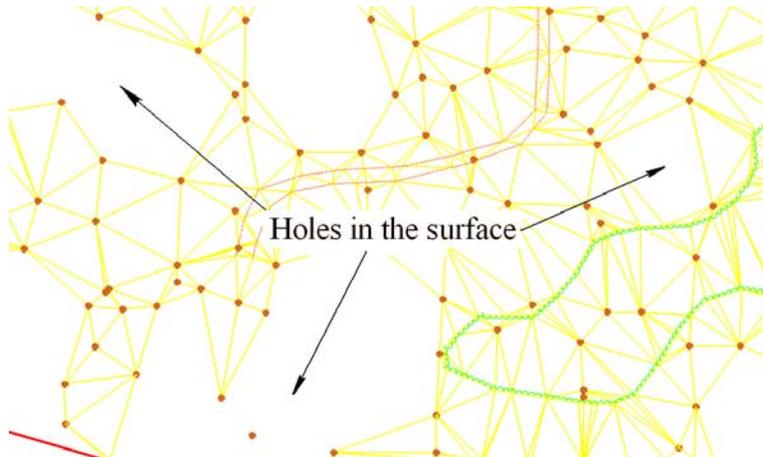
Inaccurate triangles are usually long narrow triangles or those that span concave areas of a DTM. InRoads has two commands that can be used to reduce, then eliminate the number of inaccurate triangles, namely the **Triangulate Surface** and **Delete Triangle** commands.

The **Triangulate Surface** command is used to set a limit on the length of a triangle edge, thereby reducing the number of inaccurate triangles. The **Delete Triangle** command is then used to eliminate the remainder of the inaccurate triangles.

It should be noted that neither of these commands affect the data which was collected for the surface. The commands either modify the computation used to define triangles (in the case of **Triangulate Surface**) or delete specific triangles that have been defined (in the case of **Delete Triangle**).

Triangulate Surface

There is no definitive rule for setting the **Maximum Length** when triangulating a surface. If the length is set too short, triangles will not be defined in areas they should be, forming holes where good data was not used. Below is an example of a surface whose **Maximum Length** is set too short.



When the length is set to long, an undesirable number of inaccurate triangles will remain. A general rule of thumb is to err on the long side. It is better to have the inaccurate triangles that can later be deleted than to lose data.

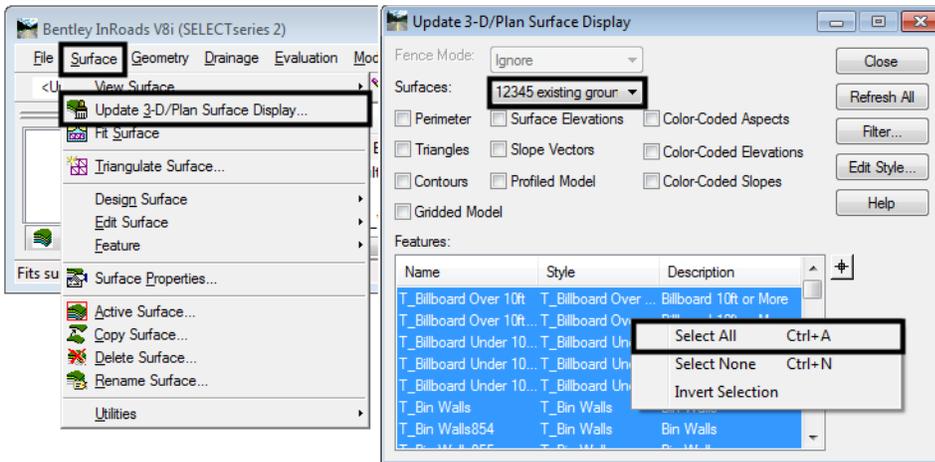
To get an idea of what **Maximum Length** to use, display the surface's features and triangles. Look for the longest triangles that lie within the data area (there is no need to be exact here, the object is to get an idea for the **Maximum Length**). Measure the long side of the triangle and use that as a starting point.

1. Select **Surface > Update 3D/Plan Surface Display**. The **Update 3-D/Plan Surface Display** dialog box is displayed.

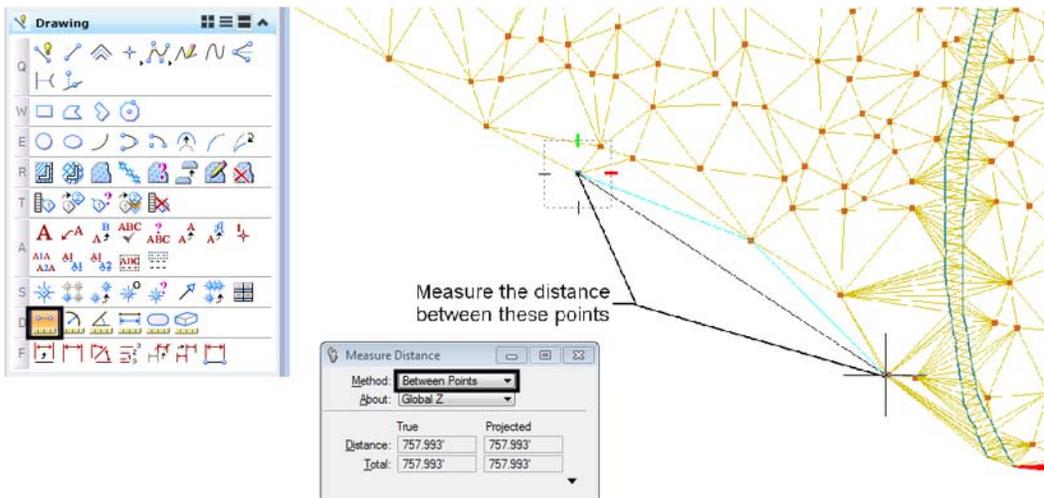
Note: If available, reference files showing the location of survey data can be used to view the DTM features without having to display them.

2. In the **Update 3D/Plan Surface Display** dialog box, set the **Mode** to **Display On**.
3. In the **Surfaces** drop down menu, select the desired surface.
4. Below the **Surface** drop down menu are a number of toggles. Toggle on **Triangles**.
5. Right click in the **Features** list at the bottom of the dialog box and choose **Select All** from the menu.

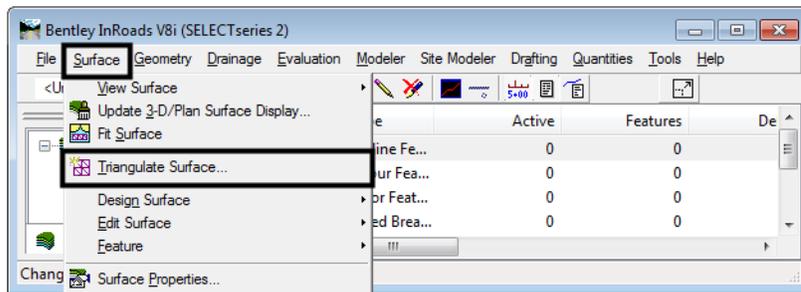
- The items selected are automatically displayed if they were not previously displayed. If some of these items were previously displayed in the dgn file, <D> **Refresh All** to update those existing items.



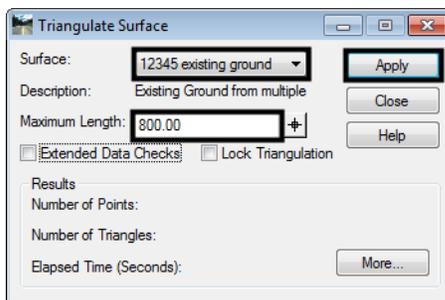
- Scan the triangles displayed and identify a large triangle within the data area.
- Select the MicroStation **Measure Distance** command.
- In the **Measure Distance** tool settings box, set the **Distance** to **Between Points**.
- <D> at one triangle corner then the other. The distance measured will be displayed in the tool settings box.



- From InRoads select **Surface > Triangulate Surface**. This displays the **Triangulate Surface** dialog box.



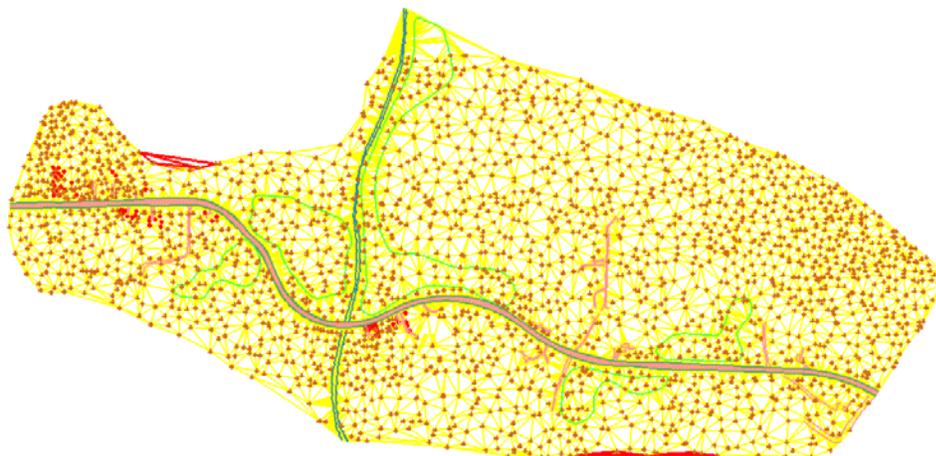
- In the **Surface** drop-down, select the surface.
- In the **Maximum Length** field, **key in** the desired length. Because this length is just an estimate, it is advisable to increase the measured length as a buffer.
- <D> Apply** to launch the command.



Note: In the example above, the measured distance of the triangle edge was 757.993'. Because this may not be the biggest triangle within the data, 800' is used for the Maximum Length to insure all actual data is included.

- Go back to the **Update 3D/Plan Surface Display** dialog box and **<D> Refresh All** to will re-display the triangles as computed using the **Maximum Length** set above.

- Examine the triangles to be sure no actual data was lost. Look for features not connected by triangles. If good triangles were lost, go back to the **Triangulate Surface** dialog box, increase the **Maximum Length** and **Apply** the new settings. Repeat this process as necessary until the desired results are obtained.

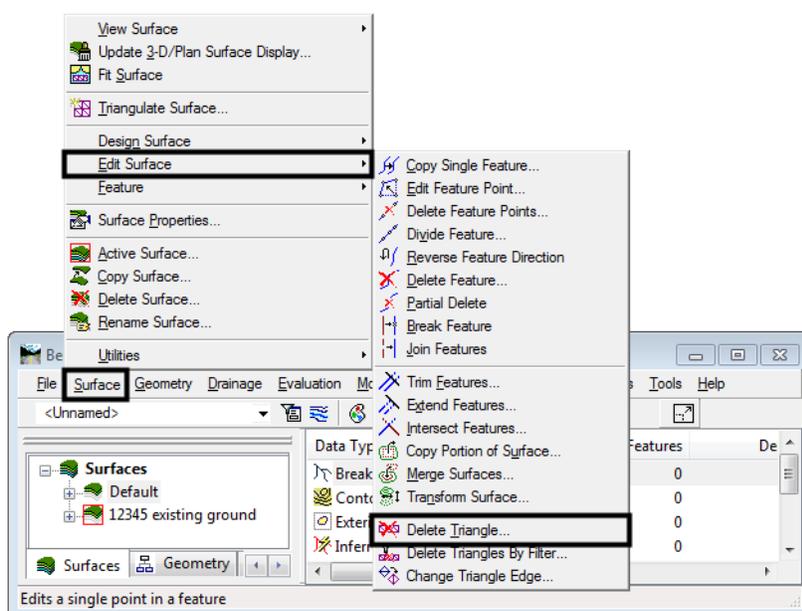


In the example above, most of the inaccurate triangles have been deleted by setting the **Maximum Length** and re-triangulating the surface. The remainder will be eliminated using the **Delete Triangle** command.

Delete Triangle

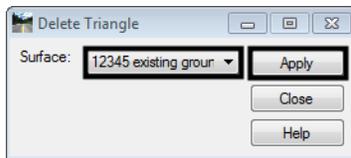
Now that the number of inaccurate triangles has been reduced to a manageable level, the rest can be removed easily with the Delete Triangle command.

- Zoom in on the area where triangles are to be deleted.

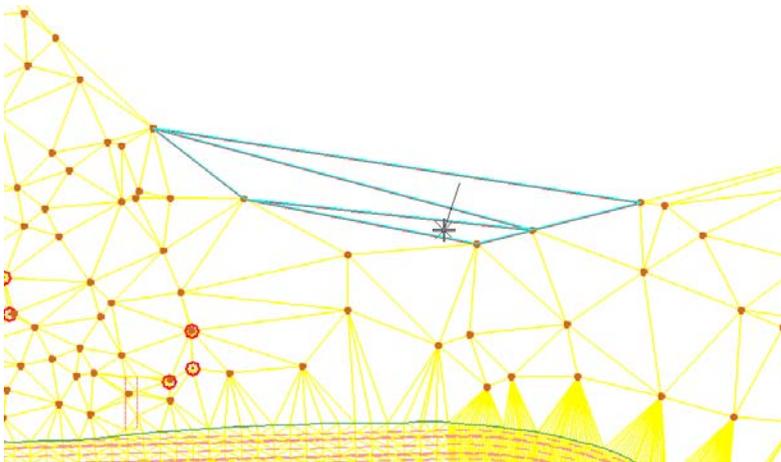


- From InRoads, select **Surface > Edit Surface > Delete Triangle**. This displays the **Delete Triangle** dialog box.

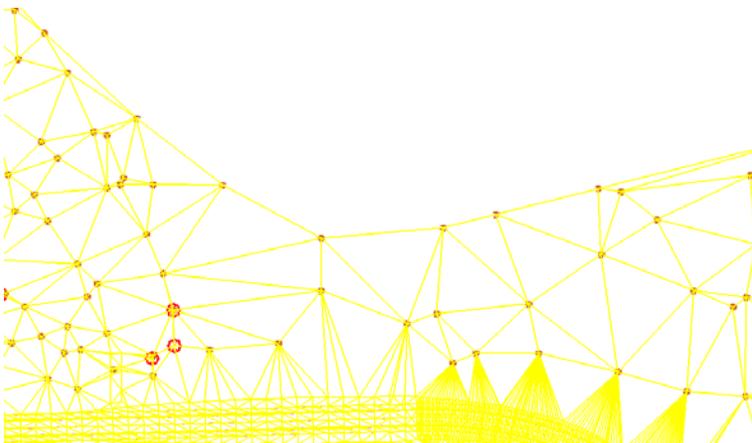
- In the **Delete Triangle** dialog box, use the **Surface** drop-down to select the desired surface.
- <D> Apply.**



- The **Delete Triangle** dialog box will minimize. **<D>** inside the first triangle to be deleted, then move the cursor through other adjacent triangles that are to be deleted. Be sure not to pass through triangles you do not want to delete. The triangles will highlight as they are passed through.



- After the last triangle in the group is selected, release the left mouse button to end triangle selection. The **Accept/Reject** prompt is displayed. **<D>** to confirm deletion of the triangles, **<R>** to reject the selection.



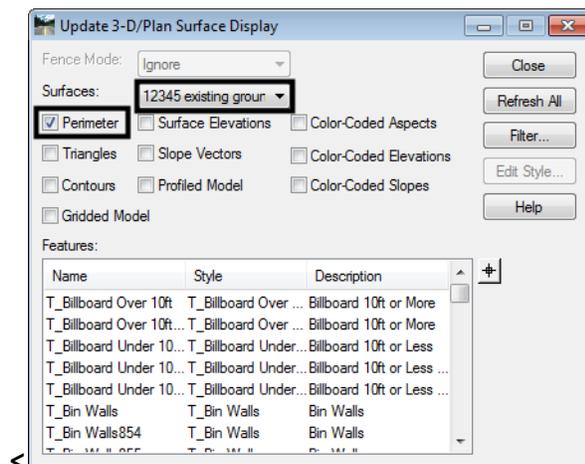
- Using the same process, delete the remaining inaccurate triangles. After all of the desired triangles are deleted, **<D> Close** to dismiss the **Delete Triangle** dialog box.

Note: Do not re-triangulate the surface until the exterior boundary is added to the DTM. Otherwise all deleted triangles will regenerate.

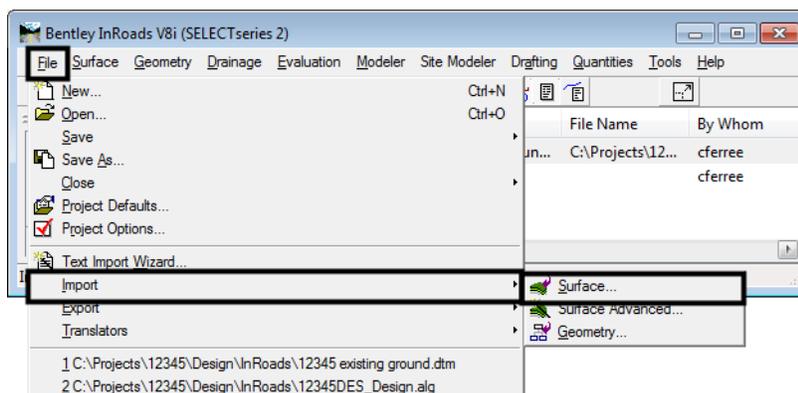
Creating the Exterior Boundary

After the triangles have been edited, the exterior boundary can be created. To create the boundary, the perimeter of the triangulated area will be displayed and that perimeter will be imported as the exterior boundary.

1. From the InRoads dialog box, select **Surface > Update 3D/Plan Surface Display**.
2. In the **Surfaces** list box, select the desired surface.
3. Toggle on **Perimeter**. All other toggles should be off and all features in the list deselected. This will turn off the display of the triangles and the features.

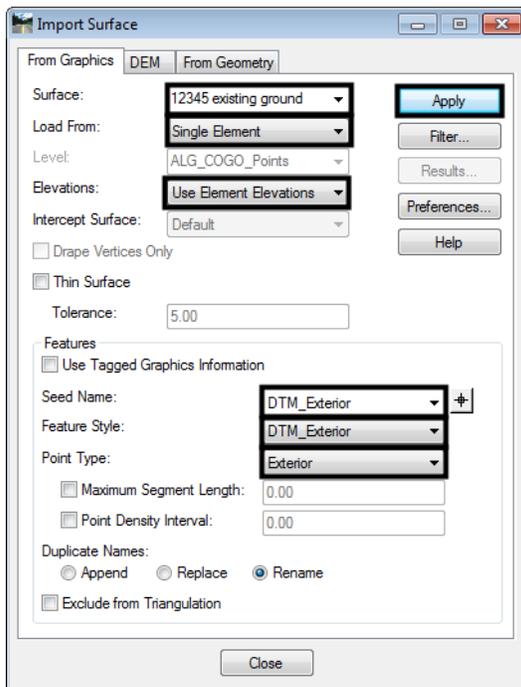


4. To complete the exterior boundary process, the perimeter must now be imported as a feature into the surface.
5. From InRoads, select **File > Import > Surface**. The **Import Surface** dialog box will be displayed.

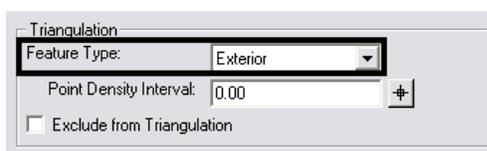
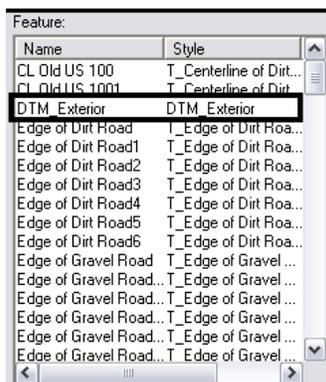


6. Select the **From Graphics** tab. Select the desired surface from the **Surface** drop-down.
7. Select **Single Element** from the **Load From** drop-down.
8. Verify that **Elevations:** is set to **Use Element Elevations**.
9. In the **Features** area of the dialog box, **key in DTM_Exterior** in the **Seed Name** field.

10. From the **Feature Style** drop-down list, select **DTM_Exterior**.
11. From the **Point Type** drop-down list, select **Exterior**.
12. After the specified changes are made, **<D> Apply**.



13. **<D>** on the boundary shape. The shape will highlight. **<D>** again in the blank area of the screen to accept the element and add it to the surface. Dismiss the **Import Surface** dialog.
14. To verify that the data was imported, select **Surface > Feature > Feature Properties**. This displays the **Feature Properties** dialog box.
15. Verify that the desired surface is selected in the **Surface** drop-down.
16. Verify that **DTM_Exterior** appears in the **Feature** list box. Also verify that the **Feature Type** is set to **Exterior** in the **Triangulation** area.

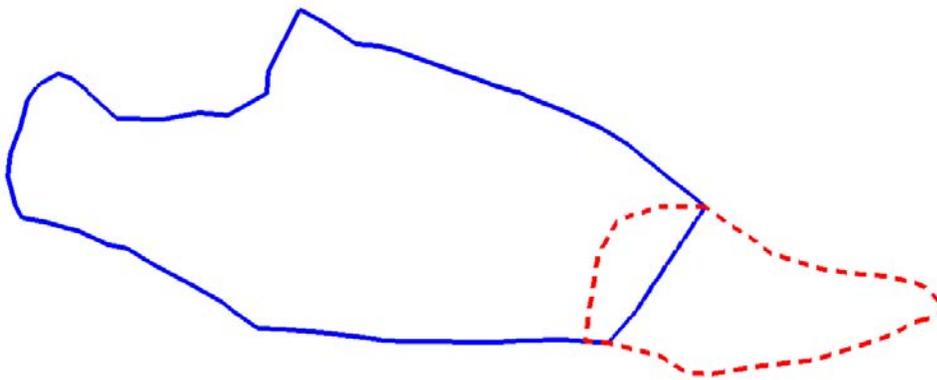


17. To complete the process, the surface must be re-triangulated.

Merging Surfaces

The InRoads Merge Surfaces command is used to create a single surface from two surfaces. The surfaces being merged must be adjacent or overlapping. The merging of surfaces that are not adjacent or overlapping would result in inaccurate triangles between the areas of data.

In the examples below, the original surface is being extended by using information contained in an additional surface. The solid line represents the perimeter of the “Original” surface. The dashed line represents the perimeter of the additional surface to be merged, identified as the “Design” surface in the Merge Surfaces dialog box.



Workflow Outline

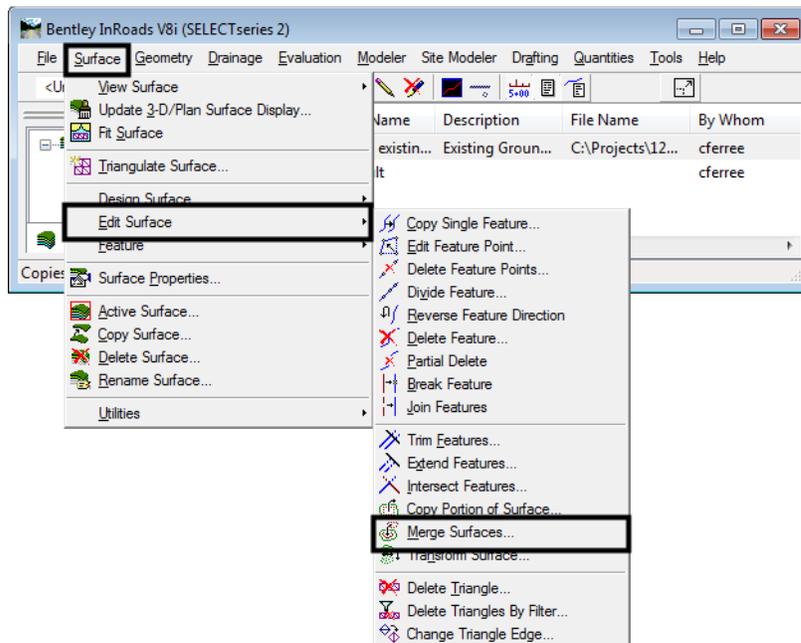
Merge Surfaces - Merging surfaces creates a single surface from two surfaces. If one surface is not fully contained within the limits of the other, an exterior boundary for the merged surface must be built also.

- ◆ **Merge Surfaces** - This combines two surfaces.
 - Commands Used: - **Merge Surfaces** - Used to create the combined surface.
 - **Feature Properties** - Used to identify residual exterior boundary features.
 - **Delete Feature** - Used to remove residual exterior boundary features.
- ◆ **Creating an Exterior Boundary for the Merged Surface** - Once the surfaces are combined a new exterior boundary is required to contain the data. This boundary will be created using the boundaries from the original surfaces.
 - Commands Used: **View Features** - Used to display the exterior boundaries from the two original surfaces.
 - **Place Fence** - Used to define a fence around one of the exterior boundaries. This will be used to clip the other boundary.
 - **Delete Fence Contents** - Used to clip the exterior boundary not fenced.
 - **Partial Delete** - Used to clip the other boundary so that the two clipped lines can be used to create the new boundary.
 - **Create Complex Shape** - Used to combine the two clipped features into a single element that will be imported for the new boundary.
 - **Import Surface** - Used to create the exterior boundary feature.
 - **Triangulate Surface** - Use to incorporate the exterior boundary into the triangulated surface.

Prerequisites

Before two surfaces can be merged, they must both be opened in InRoads.

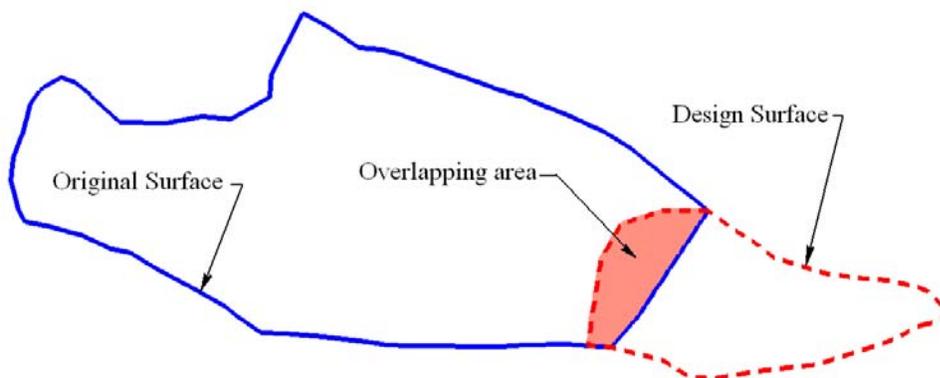
1. From InRoads main menu, select **Surface > Edit Surface > Merge Surfaces**. This will result in the display the *Merge Surfaces* dialog box.



This command operates with three surfaces; the original surface, the design surface, and the destination surface which will be created upon execution of the command.

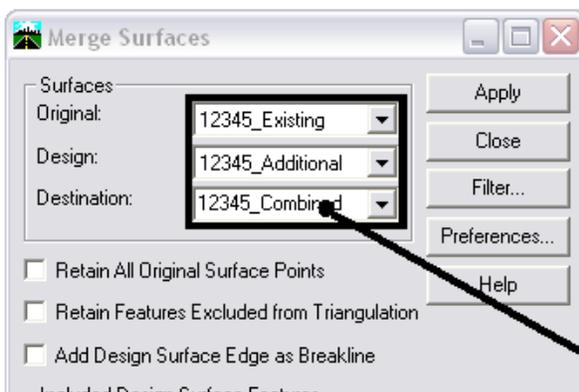
- ◆ **Original Surface**- This is the surface whose features can be deleted or partially deleted in areas that overlap with the merging (Design) surface. Typically, this will be the Existing surface received from ROW/Survey, however it can be any surface. If the original and design surfaces overlap, the common area between the two will be occupied by data from the Design Surface and data from the Original Surface may be removed, depending on the toggle settings described below.
- ◆ **Design Surface**- This surface usually contains additional existing surface data or the Finished Grade surface generated from Roadway Modeler. **Design Surface** data can either replace or supplement the **Original Surface** data in areas where they overlap depending on the toggled setting **Retain All Original Surface Points**. In the illustration below, the shaded area shows the overlap between the original and design surfaces. The data from the **Original Surface** in this area will be deleted and only the **Design Surface** data will remain unless **Retain All Original Surface Points** is toggled on.

Note: The *Original Surface* and the *Design Surface* remain intact. The **Retain All Original Surface Points** setting only affects the creation of the *Destination Surface*.



◆ **Destination Surface**- This surface stores the results of the **Merge** command.

- Use the pull downs in the **Surfaces** area of the dialog box to select the desired surface for **Original**, **Design**, and **Destination**. If a destination surface has not previously been created or loaded, it can be created “on the fly” by typing the desired name in the **Destination** field.



A Destination surface name can be keyed in here to create the surface “on the fly”.

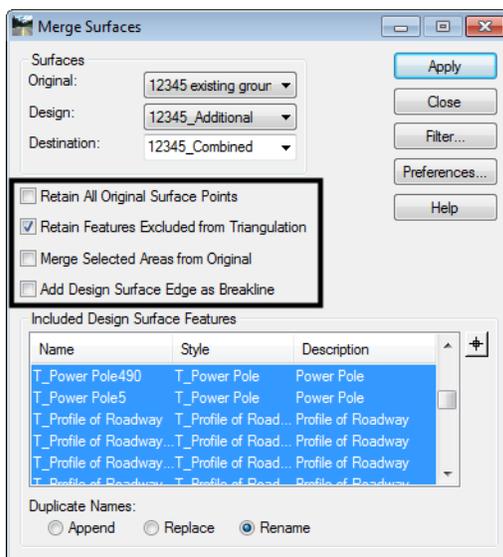
- The next area of the **Merge Surfaces** dialog box contains four toggles: **Retain All Original Surface Points**, **Retain Features Excluded from Triangulation**, **Merge Selected Areas from Original**, and **Add Design Surface Edge as Breakline**.

◆ **Retain All Original Surface Points**- When checked on, all of the original surface’s features will be stored in the destination surface. When checked off, the original surface features that cross into the design surface’s perimeter will be clipped at the perimeter leaving only the design surface’s features in that area. By default the option is checked off.

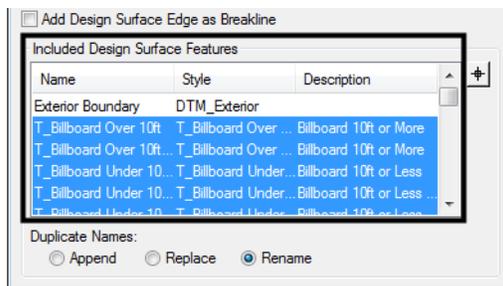
◆ **Retain Features Excluded From Triangulation**- When checked on, features excluded from triangulation from the original surface, like underground utilities, will be stored in the destination surface, regardless of their relationship to the design surface. When checked off, features excluded from triangulation will be treated as any other feature in the original surface. Un-triangulated features from the design surface by default are always included in the destination surface.

- ◆ **Merge Selected Areas from Original** - When toggled on, Merge Surfaces scans the active selection set for closed shapes (these are MicroStation elements selected with the Element Selector tool). Data from the original surface inside the shape is used to replace any data from the design surface in that area. If **Add Design Surface Edge as Breakline** is turned on, boundary features are added for each selected shape.
- ◆ **Add Design Surface Edge as Breakline**- When checked on, the perimeter of the design surface is added to the destination surface as a breakline. This will ensure that the design surface maintains its original triangle structure. When off, the perimeter is not added and the design surface’s triangle structure can be modified by the original surface data. This option should be turned **on** when creating an “as constructed” surface. It should be turned **off** when extending or modifying the existing surface.

4. Turn on or off the toggles as desired.



5. The **Merge Surfaces** dialog box contains an area for including and excluding design features from the destination surface. In the **Included Design Surface Features** area, highlighted features will be added to the destination surface and un-highlighted features will not. By default all features are highlighted.

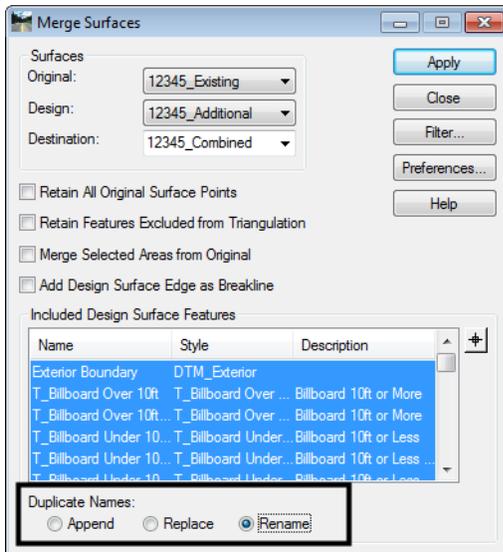


Note: Because this is an example of extending a surface, the Exterior Boundary of the design surface is not highlighted. When creating an “as constructed” surface leave all the features on.

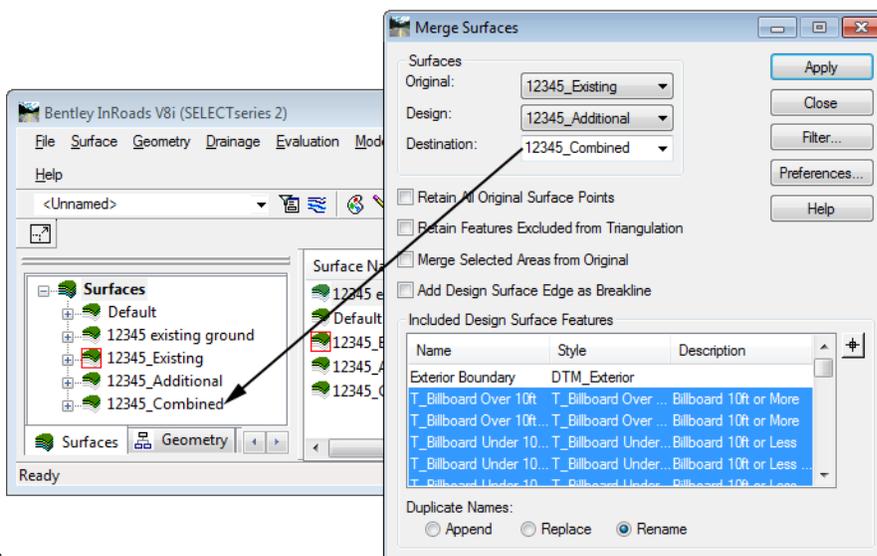
6. Options for resolving feature naming conflicts are located at the bottom of the settings box under **Duplicate Names**. The options are:

- ◆ **Append**- This adds the points from the new feature to those of the existing feature, making one feature out of the two. The combined feature will have a discontinuity (a gap) from the last point of the existing feature to the first point of the new feature.
- ◆ **Replace**- The existing feature will be deleted and replaced by the new feature with this option.
- ◆ **Rename**- The new feature will be renamed by appending a '1' to the end of the name.

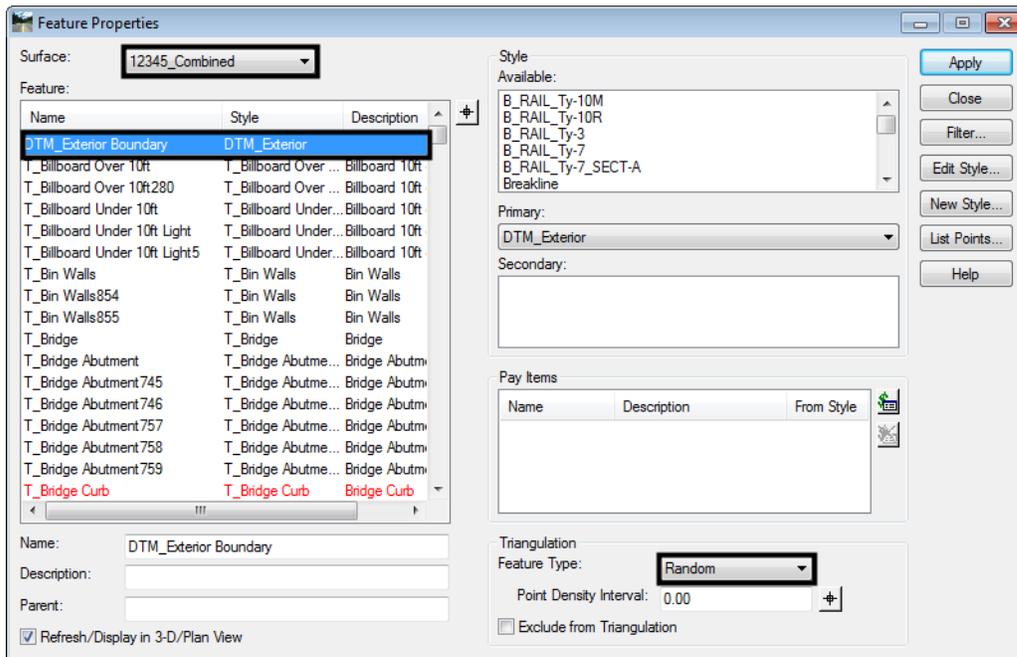
7. By default the **Rename** option is selected.



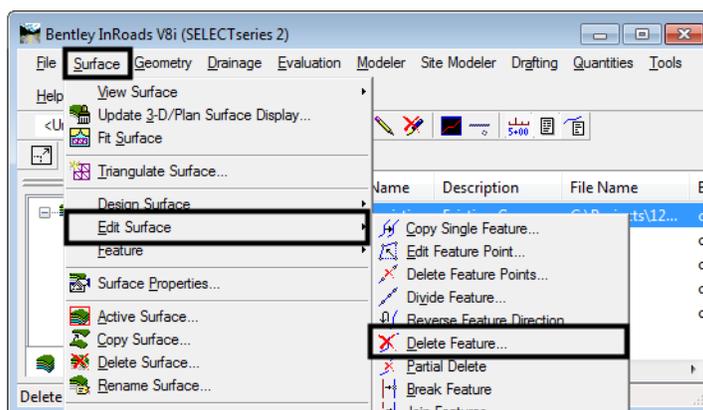
8. Once the desired settings are made, <D> **Apply** to execute the command. If the destination surface did not exist when the command was launched, it will be created now. After the command has been run, the destination surface will be added to the file list in the main InRoads interface. The **Merge Surfaces** dialog box can now be dismissed.



- If the design surface was at least partially outside the area of the original surface (as is the case in this example), a random feature will be created in the combined surface using the original surface's exterior boundary name. This feature should be deleted prior to creating the new exterior boundary. To determine if the random exterior boundary feature was created, look at the **Feature** list in the **Feature Properties** dialog box (**Surface > Feature > Feature Properties**).

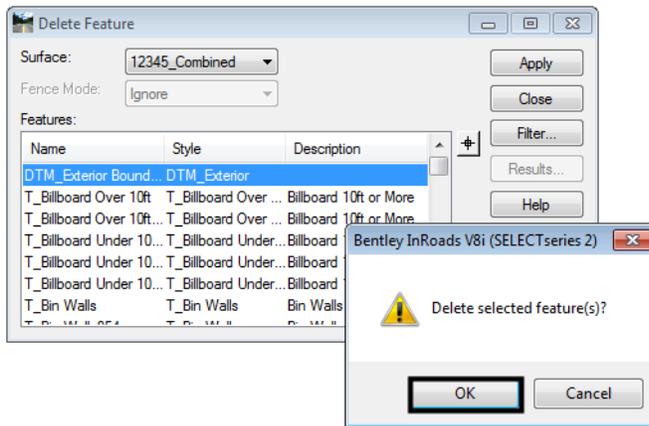
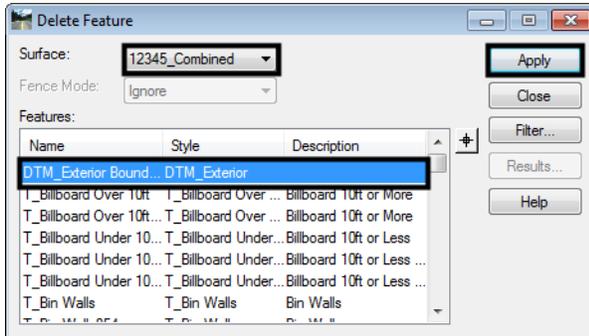


- If the design surface is entirely within the area of the original surface, the original surface's exterior boundary should be retained.
- To delete the random feature that uses the original surface's exterior boundary name, select the InRoads command **Surface > Edit Surface > Delete Feature**.



- The **Delete Feature** dialog box will be displayed. Use the **Surface** drop-down to select the merged surface.
- From the **Features** list, highlight the exterior boundary feature (this will usually be named **DTM Exterior**).

14. **<D> Apply.** A **“Delete selected feature(s)?”** warning message will display. **<D> OK** to complete the deletion. The **Delete Feature** dialog box can be dismissed. It is advisable not to re-triangulate the surface until a new exterior boundary is added.

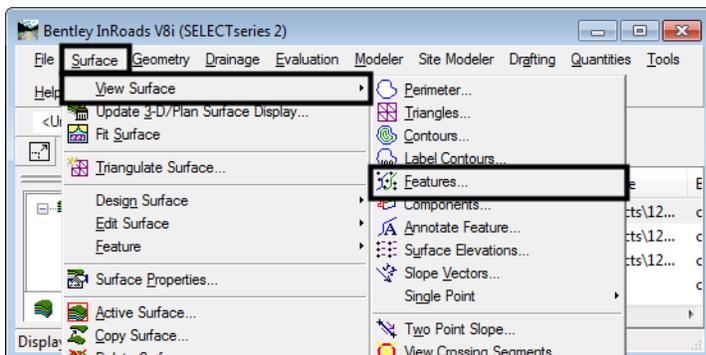


15. The combined surface is now ready for a new exterior boundary.

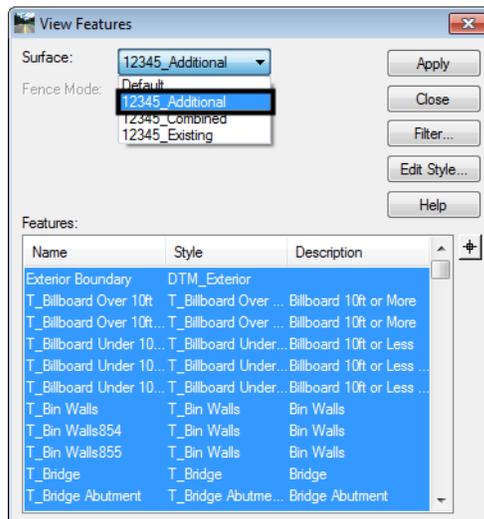
Creating an Exterior Boundary for the Merged Surface

To create the exterior boundary for the merged surface, the exterior boundaries of the source surfaces will be used. This will only be required if the design surface used in the Merge Surfaces operation lays at least partly outside the area of the Original surface. If the design surface is entirely within the area of the original surface, the original surface’s exterior boundary will be retained and this process can be omitted.

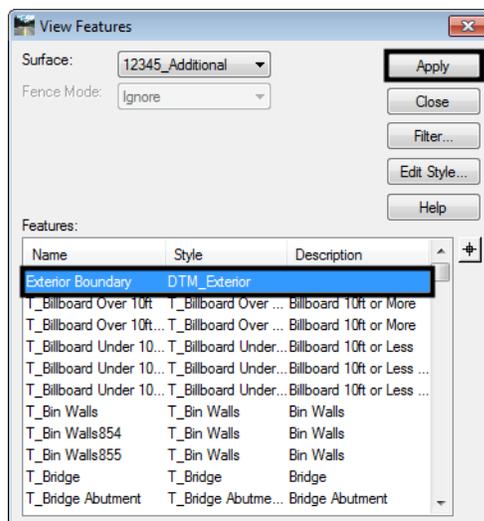
1. Select **Surface >View Surface > Features** from the InRoads dialog box.



- This will result in the display of the **View Features** dialog box. From the **Surface** drop-down, select the **Design** surface, **12345_Additional** in this example, see [Merging Surfaces](#) Step 2.

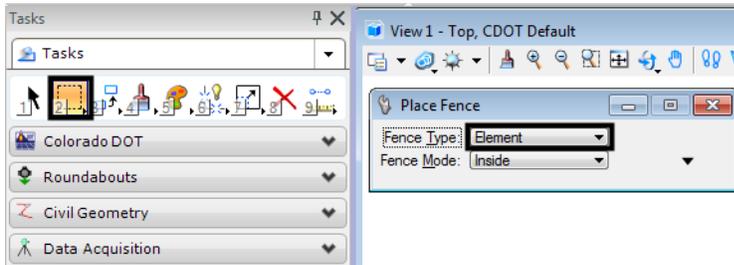


- By default, all of the features are highlighted. **<D>** on the exterior boundary feature (Exterior Boundary in this example) so that only the exterior boundary feature is highlighted.
- <D> Apply** to display the exterior boundary feature. Do not dismiss the **View Features** dialog box yet, as it will be used again.

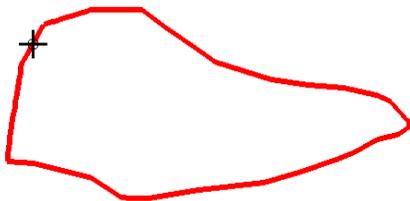


Place a fence using the exterior boundary of the design surface as the fence shape. By placing the fence, the exterior boundary of the original surface can be displayed clipping out the overlapping area so that less editing is required to finish the new exterior boundary.

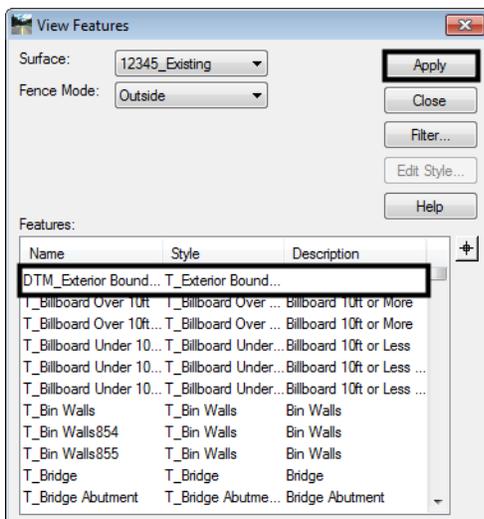
5. Select the **Place Fence** command from the MicroStation Main toolbar. Set the **Fence Type** to **Element** and **Fence Mode** to **Inside**.



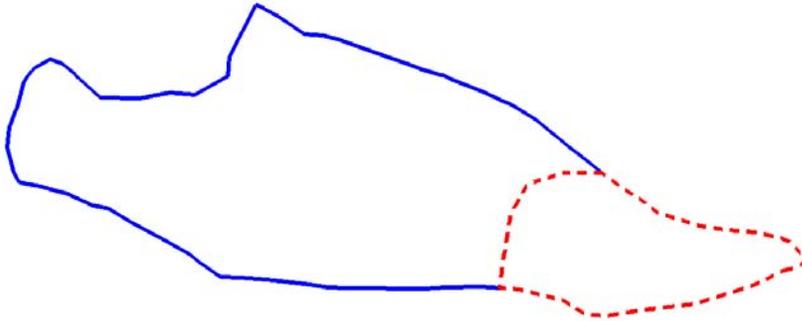
6. Select the design surface's exterior boundary displayed in Step 3 above. Left click again, anywhere in the view to accept the element. This places a fence on the element.



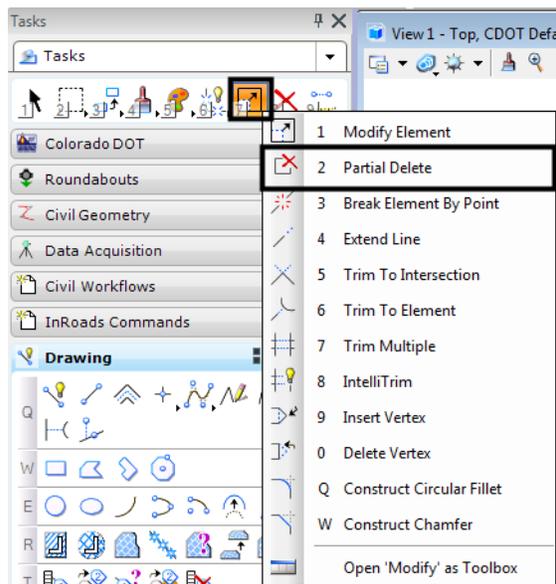
7. Go back to the **View Features** dialog box. Set the **Surface** to **12345_Existing** (the **Original** surface from *Merging Surfaces* step 2).
8. Using the **Fence Mode** drop-down, select the **Outside** option. This will only display the part of the original exterior boundary that is outside of the design exterior boundary.
9. Highlight the **DTM Exterior** boundary feature only. **<D> Apply** to display this feature. The **View Features** dialog box can now be dismissed.



10. Dismiss the fence by selecting the **Place Fence** command again. The results of this operation will look similar to the example below:

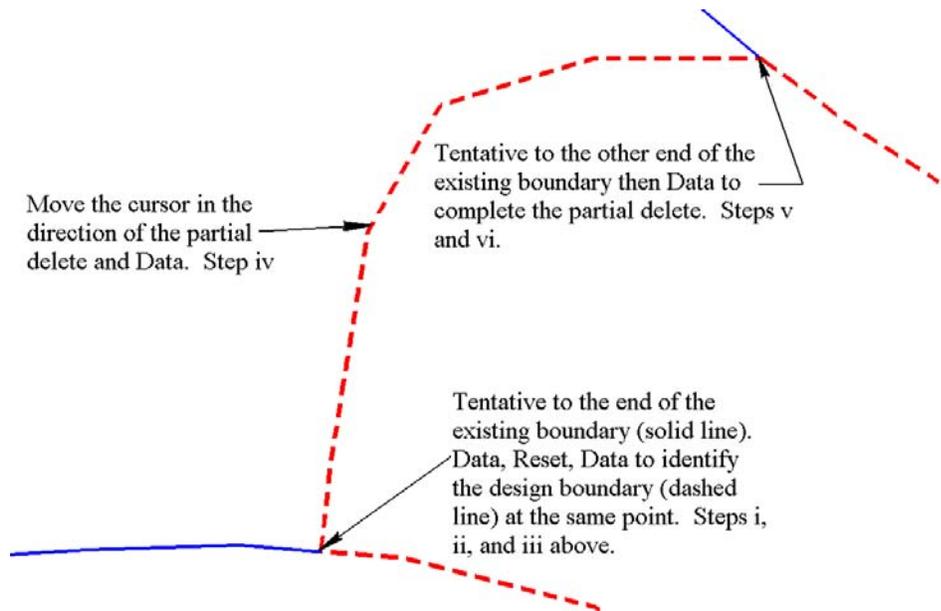


In order to get the element ends to match properly, use the following procedure, starting with selecting the **Partial Delete** command from the MicroStation Main Task toolbar:

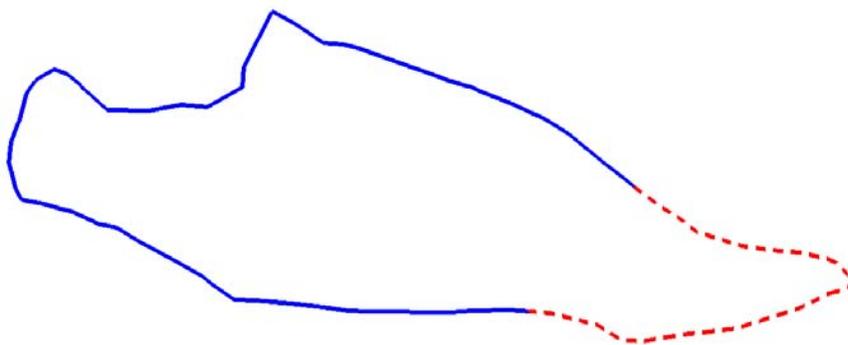


11. Move the cursor near the end of the original exterior boundary (solid line) and **<T>** (left/right cord or middle mouse click, depending on the mouse settings).
12. **<D>** to accept the snap. The original boundary will be highlighted.
13. Next, **<R>** (right mouse click). This will un-highlight the original boundary and highlight the design boundary (dashed line) where the two meet.
14. To identify the direction of the partial delete, move the cursor along the part of the element to be deleted and **<D>**.
15. **<T>** to the other end of the original exterior boundary.

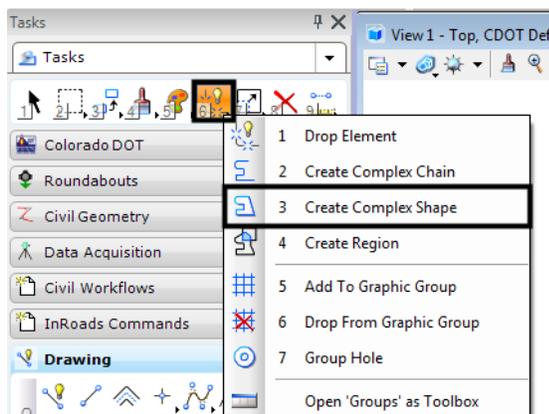
16. <D> to accept the snap and complete the partial delete.



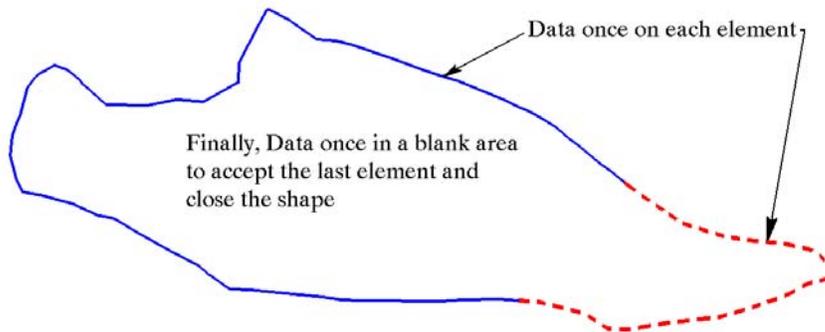
The result will be two elements that represent the desired extent of the exterior boundary of the merged surfaces.



17. Next, a closed shape must be made of the two elements. Select the **Create Complex Shape** command from the MicroStation Main toolbar. From the **Method** drop-down list select **Manual**.

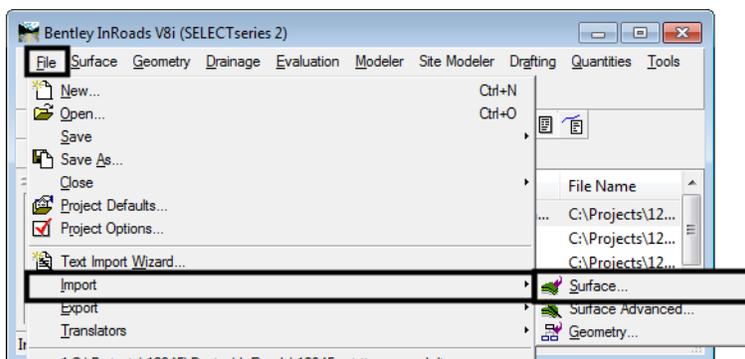


18. <D> on element one (solid line) then <D> on element two (dashed line). <D> once more in a blank area on the screen to finalize the command.



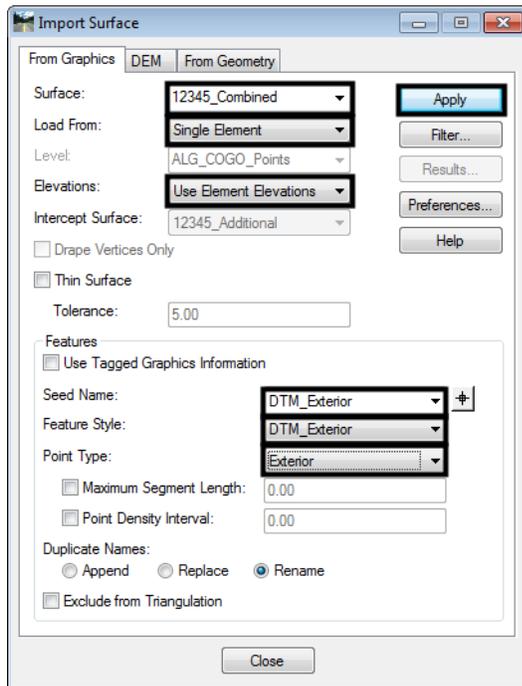
The shape is now ready to be incorporated into the combined surface as an exterior boundary.

19. From InRoads, select **File > Import > Surface**. The *Import Surface* dialog box will be displayed.



20. Select the **From Graphics** tab. Select the combined surface created with the *Merged Surfaces* command (*Merge Surfaces* step 2 above) from the **Surface** drop-down.
21. Select **Single Element** from the **Load From** drop-down.
22. Select **Use Element Elevations** from the **Elevation** drop-down.
23. In the **Features** area of the dialog box, key in **DTM_Exterior** in the **Seed Name** field. This will not appear in the drop down list because the original exterior boundary features were deleted from the surface.
24. In the **Feature Style** drop-down, select **DTM_Exterior**.
25. Using the **Point Type** drop-down, select **Exterior**.

26. After the above settings are made <D> **Apply**.

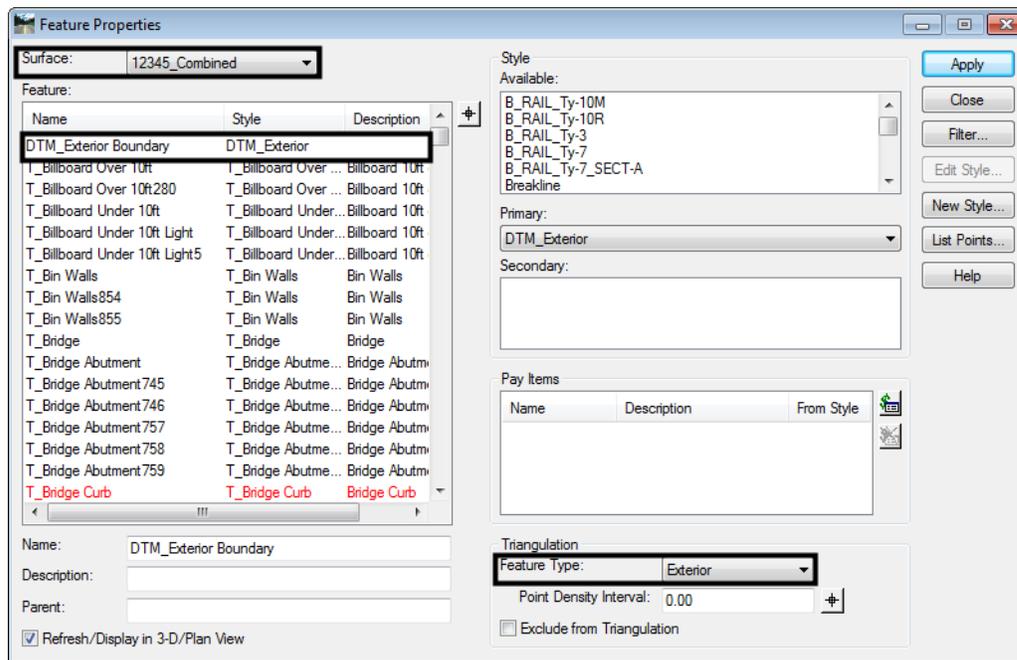


27. <D> on the complete boundary shape created earlier. The shape will highlight. <D> again in a blank area on the screen to accept the element and add it to the merged surface. Dismiss the **Import Surface** dialog box

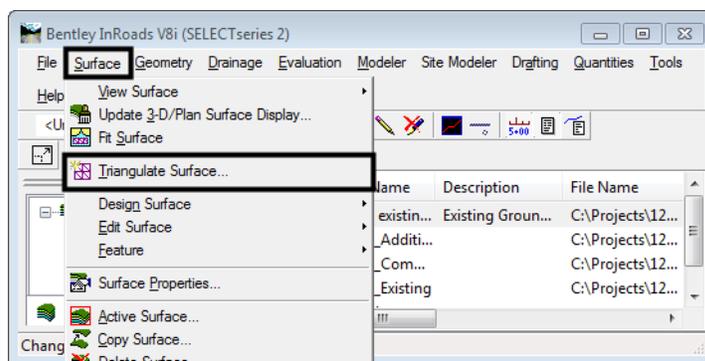
28. To verify that the data was imported, select **Surface > Feature > Feature Properties**. This displays the **Feature Properties** dialog box.

29. Verify that the merged surface is selected from the **Surface** drop-down list.

30. Verify that **DTM_Exterior** appears in the **Feature** list box. Also verify that the **Feature Type** is set to **Exterior** in the **Triangulation** area.

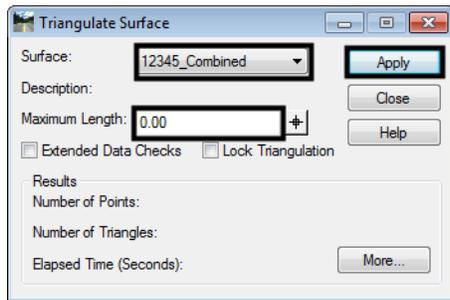


31. To complete the process, the surface must be re-triangulated.
32. From InRoads select **Surface > Triangulate Surface**. The **Triangulate Surface** dialog box is displayed. One could also right click on the surface name in the InRoads Explorer and select **Triangulate** from the menu.

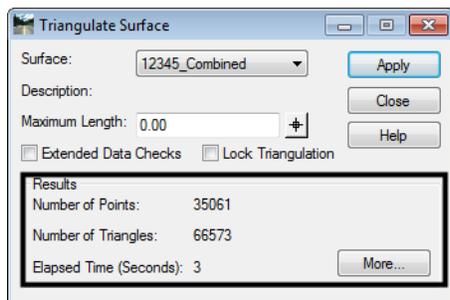


33. From the **Surface** drop-down list, select the merged surface.
34. In the **Maximum Length** field, key in the desired length. This option will automatically remove any triangles that have at least one edge longer than the specified distance. Zero indicates no restriction to length. Because the surface has an exterior boundary, '0' should be used to ensure that all of the data is included in the triangulated surface.

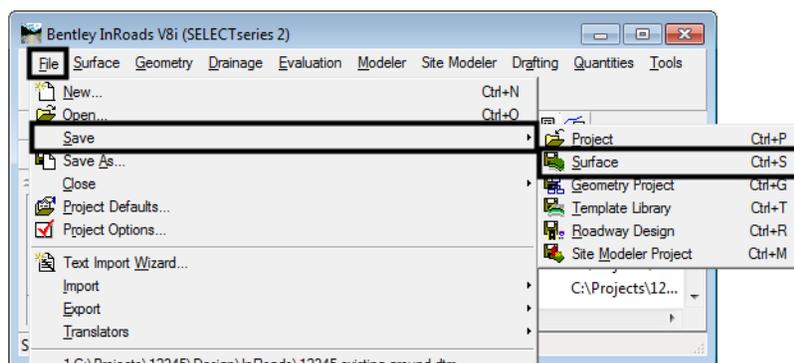
35. <D> **Apply** to execute the command.



36. When the command has finished processing, surface information will be displayed in the **Results** area of the **Triangulate Surface** dialog box. The exterior boundary is now part of the surface and the **Triangulate Surface** dialog box can be dismissed.

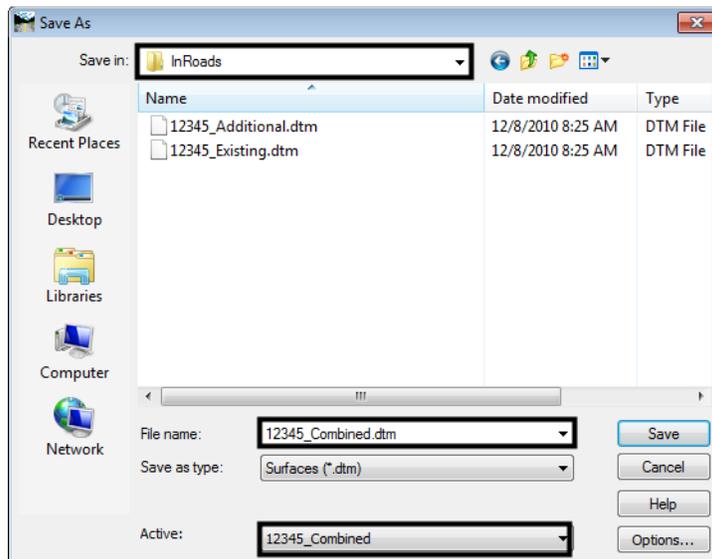


37. Now that the merged surface is complete, it should be saved.
38. From InRoads, select **File > Save > Surface**. If the surface has been saved previously, the updated data will be written to the DTM file. If the surface has not been saved before, then a new DTM file will be created. One could also right click on the surface name in the InRoads Explorer and select **Save** from the menu.



39. The **Save As** dialog box will display. Use the **Save In** drop-down to specify the desired folder for the DTM. Next the file name must be specified. There are two ways to do this; one, by keying in a filename (not recommended), or two, by selecting the surface from the **Active** list at the bottom of the dialog box. Selecting the surface from the **Active** drop-down will ensure that the DTM has the same name in InRoads memory as it does on the hard drive.

40. Select the down arrow on the **Active** drop-down then highlight the desired surface. This should be done even if the desired surface is already displayed in the **Active** drop-down. Selecting the surface in the **Active** drop-down will auto-populate the **File Name** field with the surface name.
41. **<D> Save** to add the file to the 'Save In' directory. After the file has been saved the **Save As** dialog box can be dismissed (**<D> Cancel**).



Copy a Portion of a Surface

There may be occasions when only a portion of a surface is needed. For example, one might wish to extend their existing DTM with a few hundred feet from an adjacent project or perhaps specific features from one surface are required in another. Both copying an area of a surface, and copying whole features can be accomplished using the **Copy Portion of Surface** command.

Two examples will be used to illustrate the **Copy Portion of Surface** command. In the first, all of the features within a given area will be copied into a new surface. In the second example specific features will be copied into a new surface.

Workflow Outline-

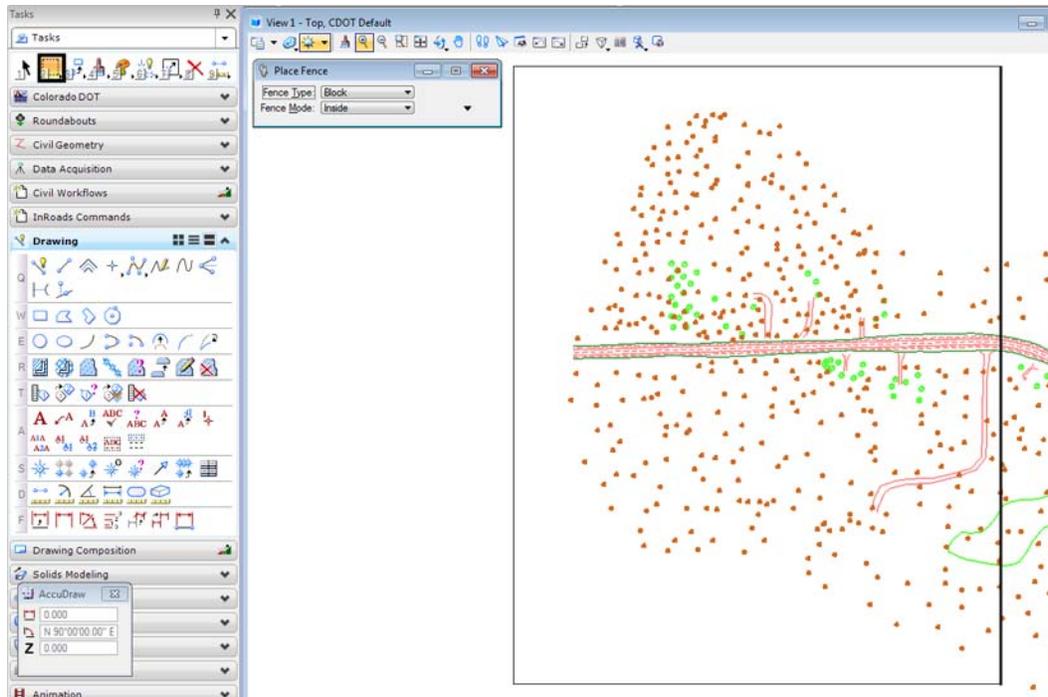
Copy a Portion of a Surface - This command can be used to copy part of a surface, either an area or individual features, to a new DTM file.

- ◆ **Commands Used:** Copy a Portion of a Surface - Used to create a new surface from part of another surface. The new surface can come from a region of the original surface (defined by a fence or shape) and/or by selected features.

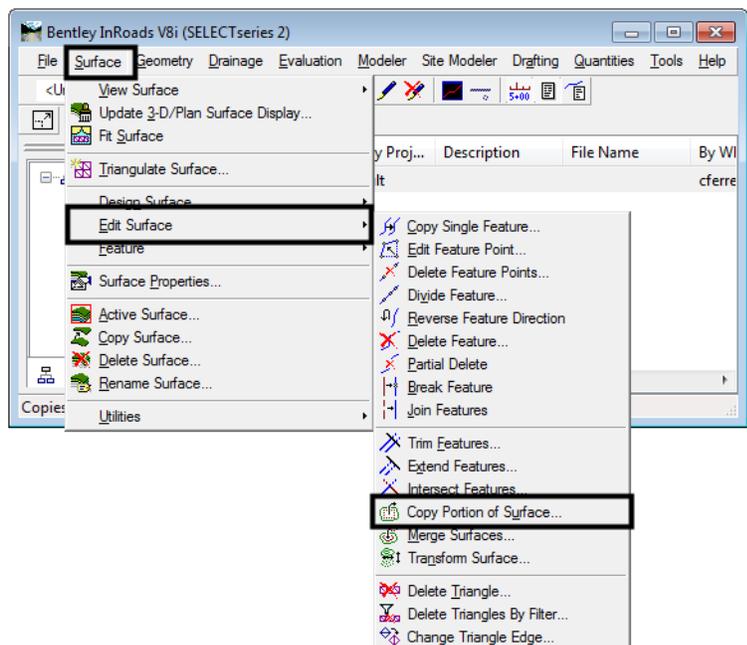
Example 1 – creating a subset of a DTM

In this example, all of the surface data in the box will be copied to create a new surface.

1. A MicroStation fence is used to identify the data to be copied. Select the **Place Fence** command from the MicroStation Main toolbar. Place the fence around the area to be copied. The blue box in the illustration below shows the location of the fence.

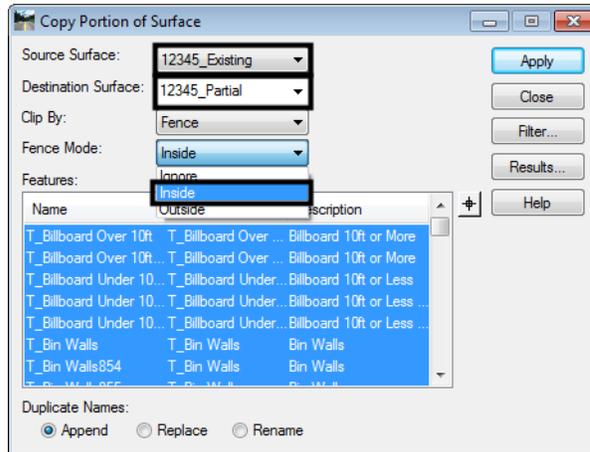


2. From InRoads, select **Surface > Edit Surface > Copy Portion of Surface**. The *Copy Portion of Surface* dialog box is displayed.

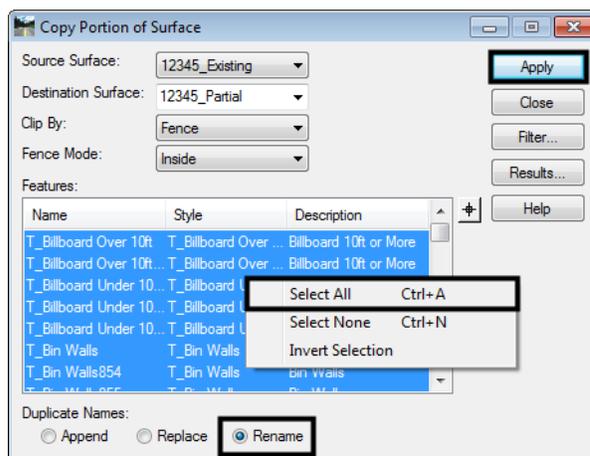


3. In the *Copy Portion of Surface* dialog box, from the **Source Surface** drop-down list select the surface to be copied from.

- From the **Destination Surface** drop-down list select the surface to be copied to. If the surface does not exist, the name for the new surface can be keyed in here.
- Select **Inside** from the **Fence Mode** drop-down.



- To select all the features from the **Features** list box, right click in the Features list box and choose **<D> Select All**.
- For **Duplicate Names**, toggle on the **Rename** option.
- <D> Apply** to initiate the command. The **Copy Portion of Surface** dialog box will minimize then reappear when the process is completed. Dismiss the dialog box.



- From the InRoads dialog box, select **File > Save > Surface** and save the surface. The newly created surface is now ready for use once it's been triangulated.

Example 2 -Copying a single element or multiple elements

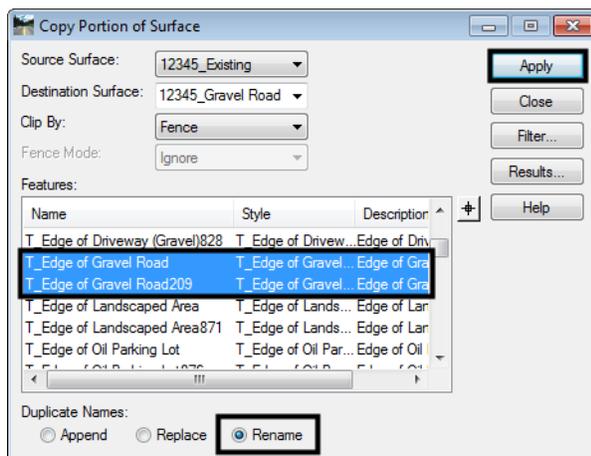
In this example, the Edge of Gravel Road features will be copied into a new surface. The fence will not be used in this example because the whole feature is to be copied.

- From InRoads, select **Surface > Edit Surface > Copy Portion of Surface**. The **Copy Portion of Surface** dialog box is displayed.

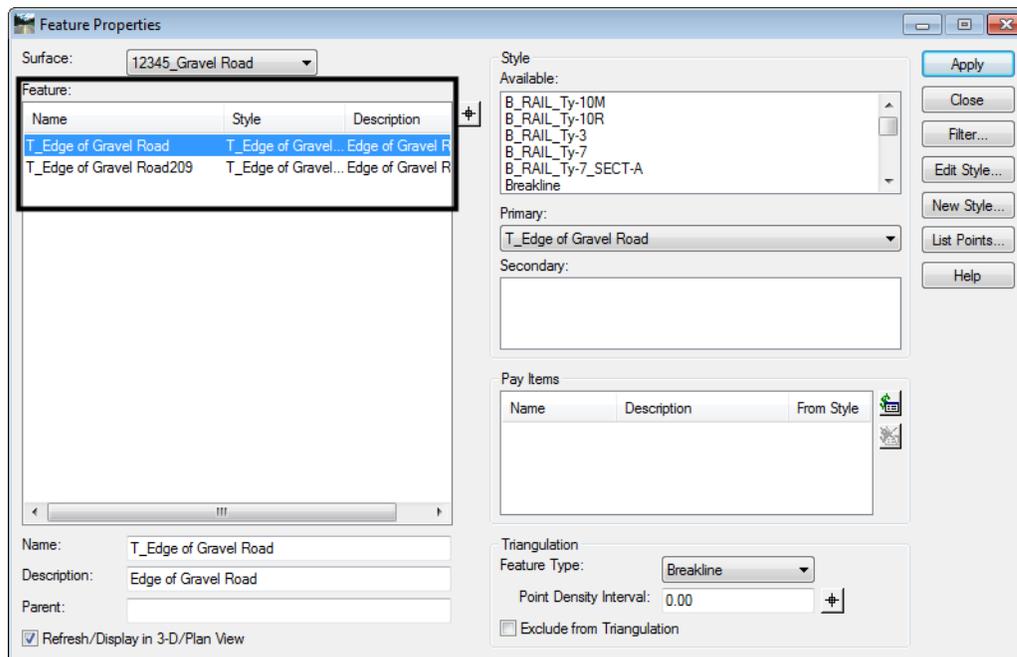
- In the **Copy Portion of Surface** dialog box, use the **Source Surface** drop-down to select the surface to be copied from.
- Use the **Destination Surface** drop-down to select the surface to be copied to. If the surface does not exist, a name to be used for the new surface can be keyed in here.

Note: The **Fence Mode** drop-down is grayed out because no fence is present. If a fence is present, select the **Ignore** option to copy the whole element. If the fence is defining an area to be copied or not to be copied then set the **Fence Mode** as needed.

- In the **Features** area, find the desired features in the list and highlight them individually. Hold the **Ctrl** key down to select a group of individual features or hold the **Shift** key to select a block of features.
- For **Duplicate Names**, toggle on the **Rename** option.
- <D> Apply** to initiate the command. The **Copy Portion of Surface** dialog box will minimize then reappear when the process has completed. Dismiss the dialog box.



7. To verify that the data was copied, select the InRoads command **Surface > Features > Feature Properties**. The copied features should appear in the **Feature** list box.



Note: The destination surfaces in the above examples were empty, newly created surfaces. However, the same process will work to copy portions of a surface into another preexisting surface. This, along with **Creating an Exterior Boundary** can be used to merge two adjacent, non-overlapping, surfaces.)

Note: The **Parent** field in the **Feature Properties** dialog can be populated on a feature level in their respective DTMs prior to the merging or copying of features. Doing so allows the user to track where data originated. Any changes made require the surface to be saved for those changes to be retained for subsequent use.

Workflow IR 7 - Displaying Features in Cross Section and Profile

This document is a guide for displaying features in both cross sections and profiles. Two types of cell placement will be considered in this workflow. One type is based on true scale meaning that the feature has a measurable size. For example a 24” pipe. The other type of cell is the pictorial location of a crossing feature for example overhead electric line. In order to compensate for the two types each needs to be scaled differently. Feature Filters have been developed to display them at their appropriate scale.

Cross Section

Workflow Outline-

Creating Cross Sections - Cross sections are used to evaluate a design surface.

- ◆ Commands Used: **Global Scale Factor** - Used to set size for text and cells displayed by InRoads.
- ◆ **Create Cross Section** - Use to make the set of cross sections.

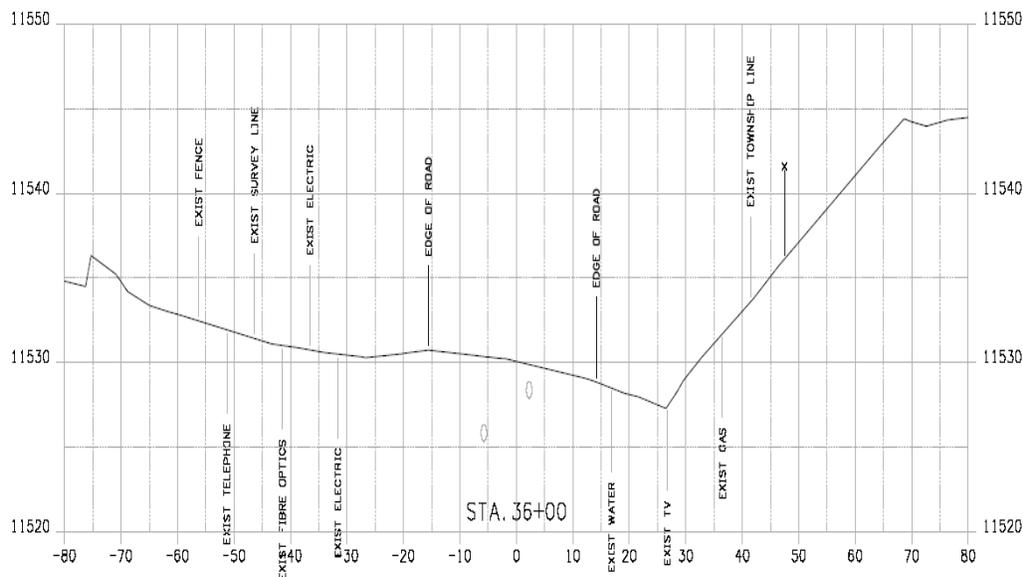
Displaying True Scale Cells - These are cells that represent actual design elements like drainage culverts and pipes. These items should be displayed at their actual size (allowing for vertical exaggeration).

- ◆ Commands Used: **Global Scale Factor** - Used to set size for text and cells displayed by InRoads. Use a cell factor of 1 when displaying True Scale Cells.
- ◆ **Feature Filter Lock** - Use to show only True Scale features in the dialog box. This will help to prevent the user from selecting the wrong feature
- ◆ Update **Cross Section > Crossing Features** - This command is used to display the feature points in the cross sections.

Displaying Plot Cell Scale Cells - These are informational cells that identify the location of linear features like right-of-ways, existing pavement edges, and utility lines.

- ◆ Commands Used: **Global Scale Factor** - Used to set size for text and cells displayed by InRoads. Use the same scale factor that was used when the cross sections were created.
- ◆ **Feature Filter Lock** - Use to show only Plot Scale features in the dialog box. This will help to prevent the user from selecting the wrong feature
- ◆ Update **Cross Section > Crossing Features** - This command is used to display the feature points in the cross sections.

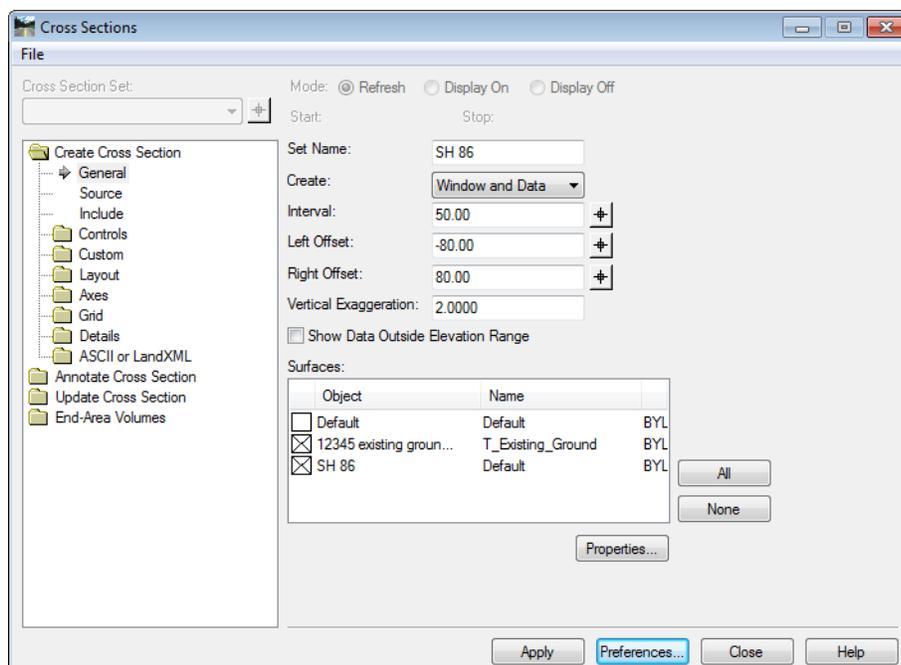
Displaying Features in Cross Sections



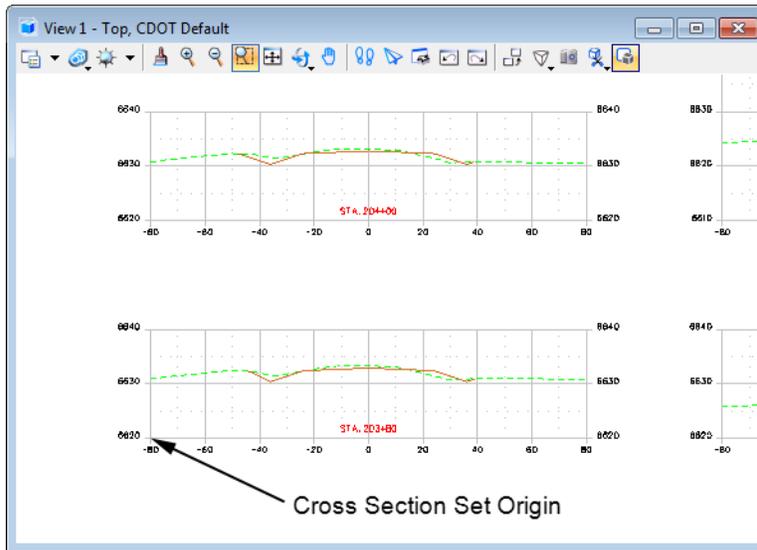
Note: Example Cross Section

The procedure for displaying features in cross sections follows.

1. Verify that the **Global Scale Factor** is set to the desired scale prior to creating the cross sections.
2. From the InRoads, menu select **Evaluation > Cross Section > Cross Sections**. The **Create Cross Section** dialog box will appear. **<D> Preferences** to load the appropriate saved preferences. In this example the CDOT preferences will be used.

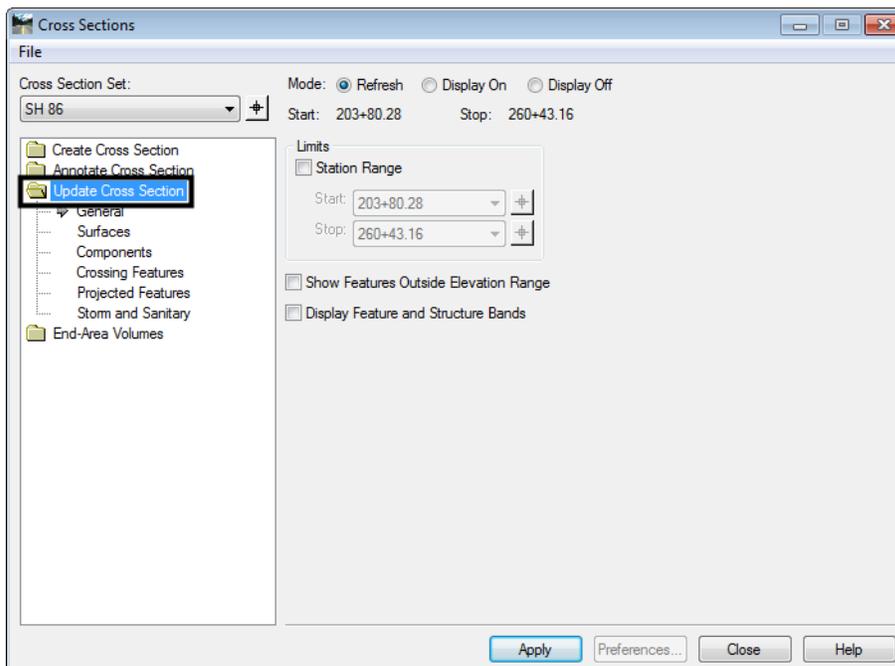


3. On the **Include** leaf in the **Cross Sections** dialog box, verify that **Crossing Features** and **Projected Features** are checked off.
4. **<D> Apply**. The dialog box will minimize allowing the selection of the origin for the cross section set with a **<D>** in a MicroStation View.



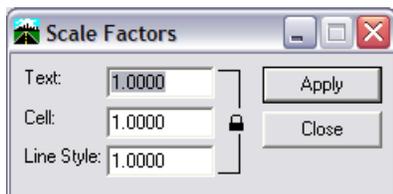
Display True Scale Cells

1. **<D>** the **Update Cross Section** folder in the dialog box explorer.



The first set of features to display will be the features that are defined to be true scale. These features have a defined size, such as pipes. In order to display these types of features, setting the scale factor and feature filter is required prior to displaying.

2. Change the InRoads **Scale Factor** to **1**.

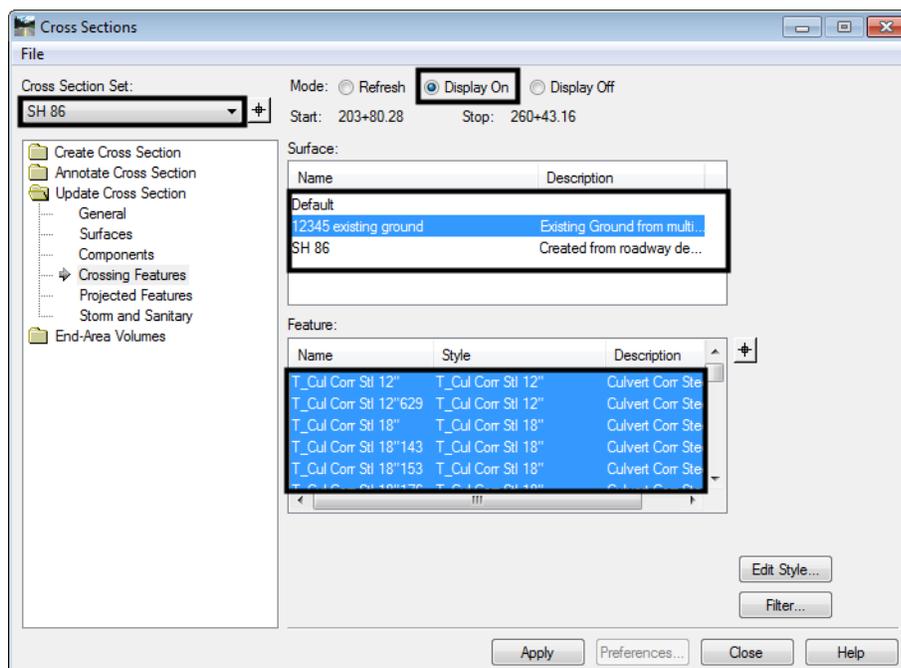


Note: Scale Factor should be 1:1 for true scale cells so that cells come in at actual scale.

3. From the **Locks** toolbar Select the **CELL_True-Scale** filter from the drop-down list and toggle on the **Feature Filter** lock button.



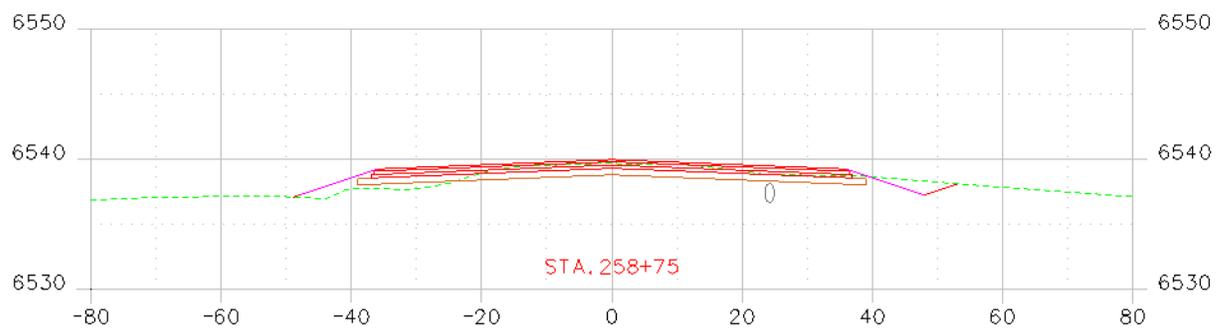
4. Verify the correct **Cross Section Set** selected.
5. **<D>** the **Crossing Features** Leaf.
6. Toggle on the **Display On** radio button.
7. From the **Surface** list box, select the surface name or names to display. The **Feature** list box will then populate with the list of features found in the highlighted surface(s). Use the **Ctrl** or **Shift** keys to select multiple names. Also, by right clicking in the **Feature** list displays a menu that can be used to select all of the features.



Note: The feature names in bold are Feature Styles that can be displayed in cross sections. Any names that are dithered are not configured to be displayed in a cross section view.

Note: If no features are shown in the feature list box, there are no features that meet the criteria for the filter selected in step 5. It may be necessary to associate the correct feature styles to the desired features if this is the case. Feature styles can be re-associated by using the **Surface > Feature > Feature Properties** command. See CDOT Update InRoads Features.pdf for more information on the process involved.

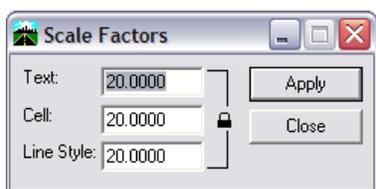
8. **<D> All** (lower right corner of dialog box). The Features that *can* be displayed in cross section view will be highlighted.
9. **<D> Apply**. The dialog will minimize as the features are generated in the cross sections. When the process is finished, the dialog will reappear.



Displaying Plot Scale Cells

The second set of features to display is those that have *location only* defined with annotation. In order to display these types of features, the scale factor and the desired feature filter must be set prior to displaying.

1. Change the InRoads Scale Factor to **20**.



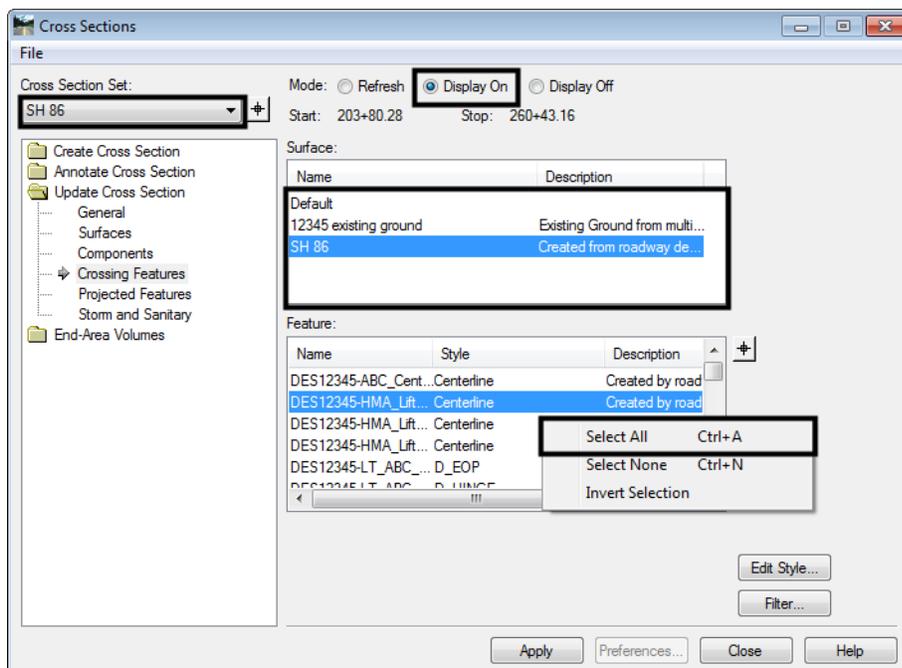
Note: This is the desired plot scale for the set of Cross Sections we are working with. The scale should be changed accordingly to match the scale of the original cross sections.

2. From the **Locks** toolbar select the **CELL_Plot-Scale** filter from the pull down list. Verify that the feature filter is toggled on.



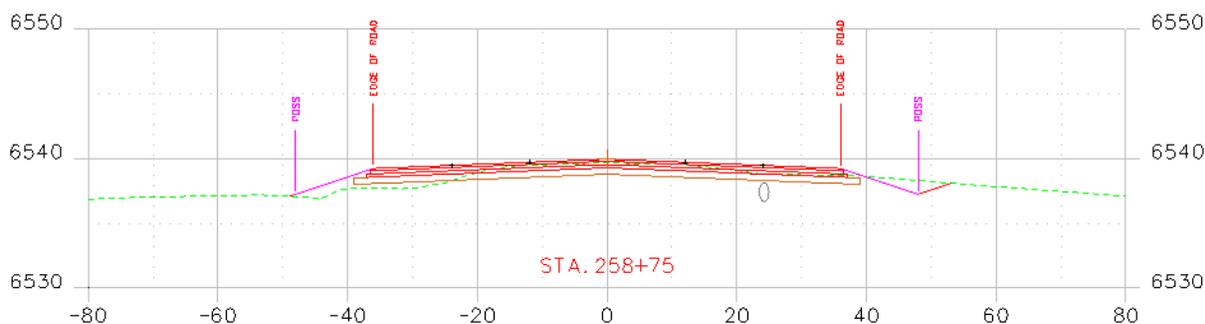
3. Verify that the correct **Cross Section Set** is selected.
4. **<D>** the **Crossing Features** Leaf.

- From the **Surface** list box, select the surface name or names to display. Once a surface or surfaces are selected, the **Feature** list box will populate with the list of features. Use the **Ctrl** and **Shift** keys to select multiple feature names. Also, by right clicking in the **Feature** list displays a menu that can be used to select all of the features.



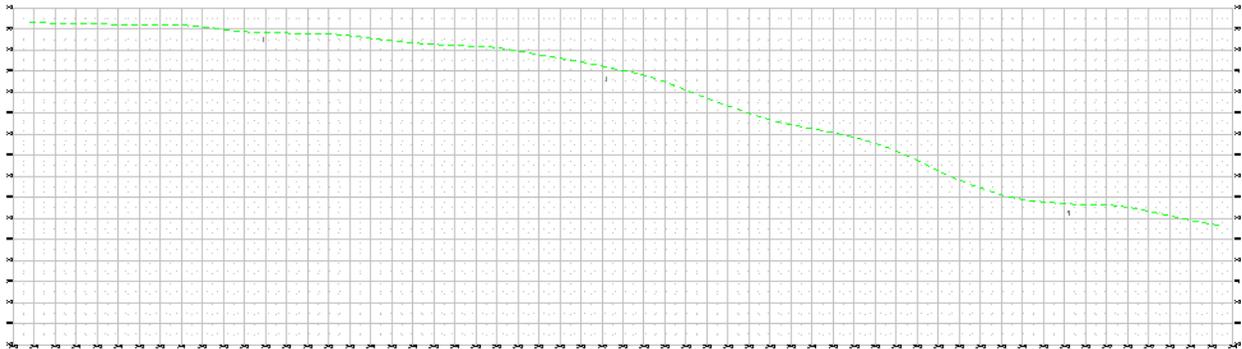
Note: The names in bold are Feature Styles that can be displayed in cross sections. Any names that are dithered are not configured to be displayed in a cross section view.

- <D> Apply.** The **Update Cross Section** dialog box will minimize as the features are generated in the cross sections. When the process is finished, the dialog will reappear.



Profile

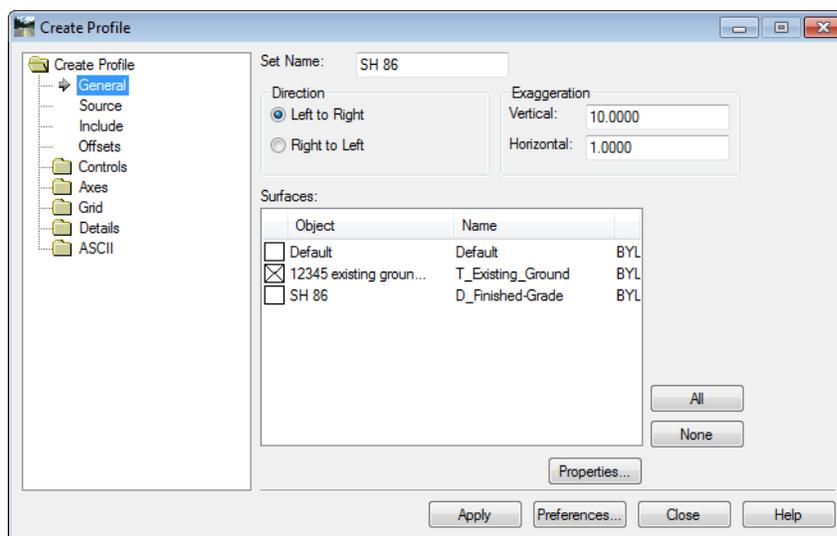
Displaying Features in Profile



Note: Example Profile

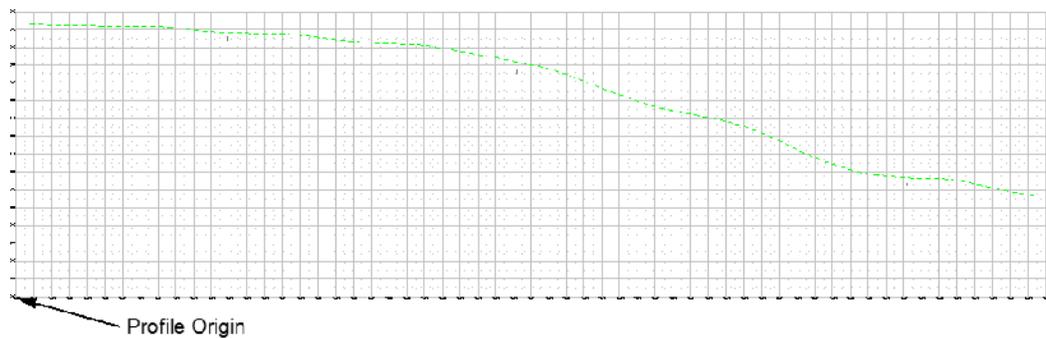
The procedure for displaying features in profiles follows.

1. From the InRoads menu, select **Evaluation > Profile > Create Profile**. The **Create Profile** dialog box will appear. **<D> Preferences** to load the appropriate saved preferences. In this example the CDOT preferences will be used.



2. In the **Create Profile** dialog box, verify on the **Include** leaf that **Crossing Features** and **Projected Features** are checked off.

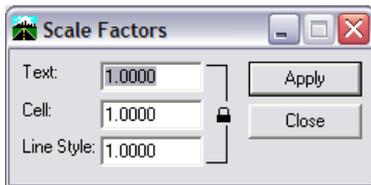
3. **<D> Apply.** The **Create Profile** dialog box will minimize allowing the selection of the origin for the profile set. **<D>** in a MicroStation View to specify this location. After the profile is created **<D> Close.**



4. From the InRoads menu select **Evaluation > Profile > Update Profile.** The **Update Profile** dialog box will appear.

The first set of features to display will be the features that are defined to be true scale meaning the features have a defined size such as pipes. In order to display these types of features, set the scale factor and feature filter prior to displaying.

5. Change the InRoads **Scale Factor** to **1.**

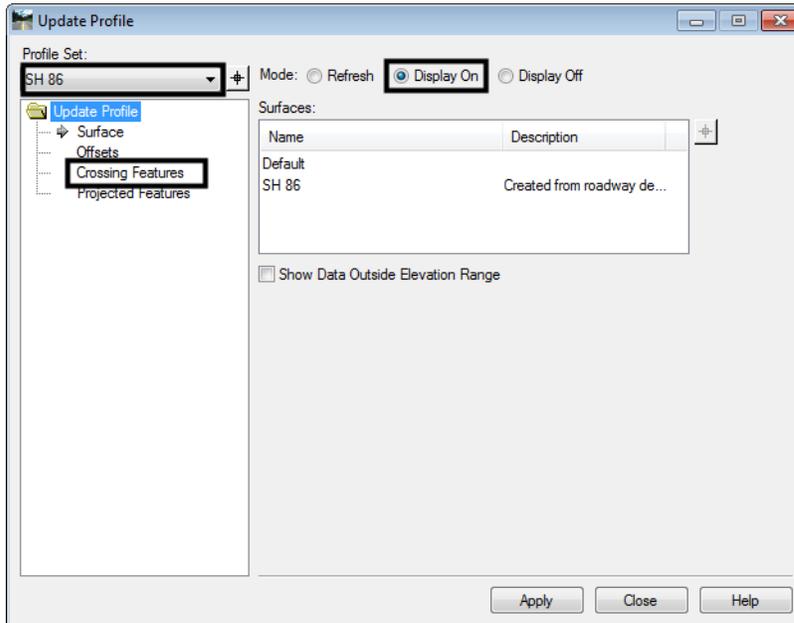


6. From the **Locks** toolbar select the **CELL_True-Scale** filter from the drop-down list and toggle on the **Feature Filter** lock.

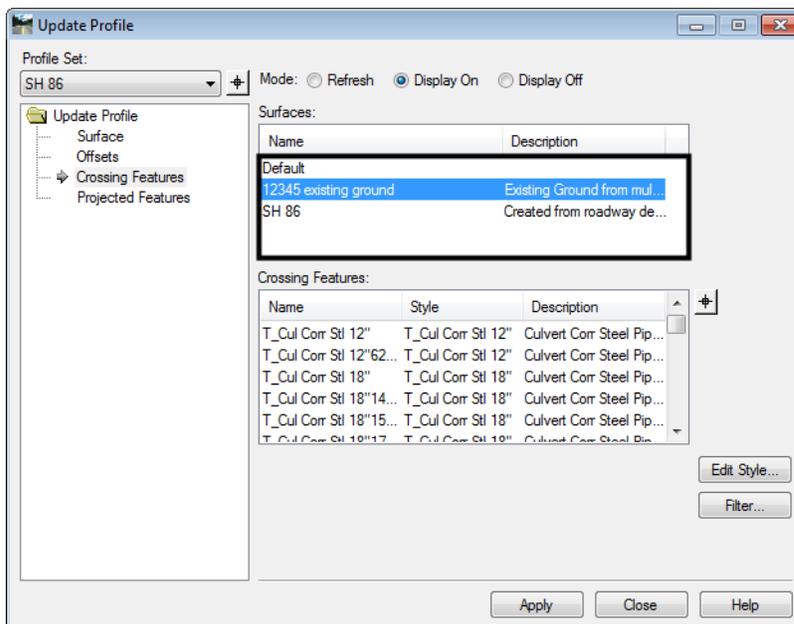


7. Verify the correct **Profile Set** is selected in the **Update Profile** dialog box.
8. For the **Mode**, select the **Display On** radio button

9. <D> the Crossing Features leaf.

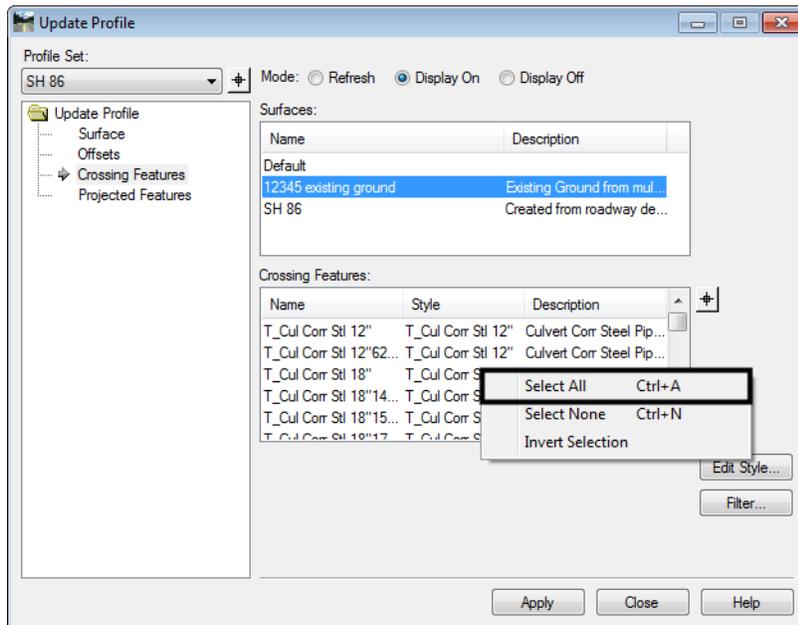


10. From the **Surfaces** list box, select the surface name or names to display. Once surfaces have been selected, the **Crossing Features** list box will populate with the list of features. Use the **Ctrl** or **Shift** keys when you want to select multiple Surface names.

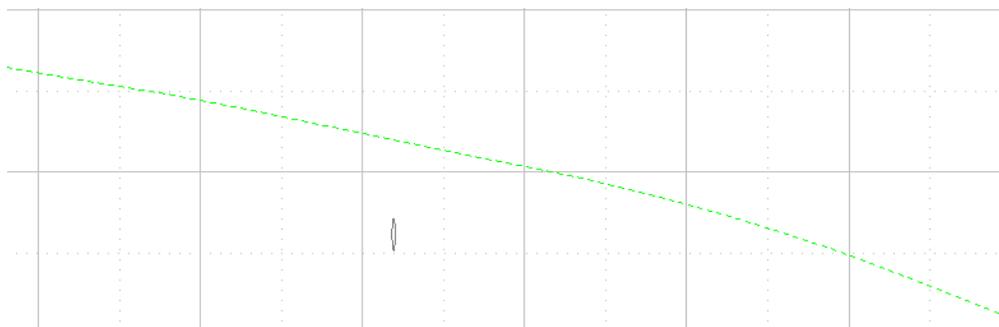


Note: The names that are black are Feature Styles that can be displayed in profile. Any names that are dithered are not configured to be displayed in a profile view.

11. **<R>** in the **Crossing Features** list box and choose **Select All** from the menu.



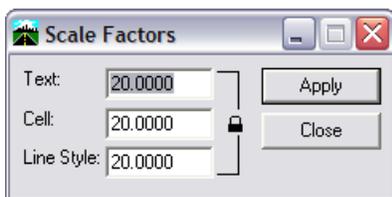
12. **<D> Apply**. The dialog will minimize as the features are drawn in the profile. When the process is finished the dialog will reappear.



Displaying Plot Scale Cells

The second set of features to be displayed is those that have *location only* defined with annotation. In order to display these types of features, set the scale factor and the desired feature filter prior to displaying.

1. Change the InRoads **Scale Factor** to **20**.

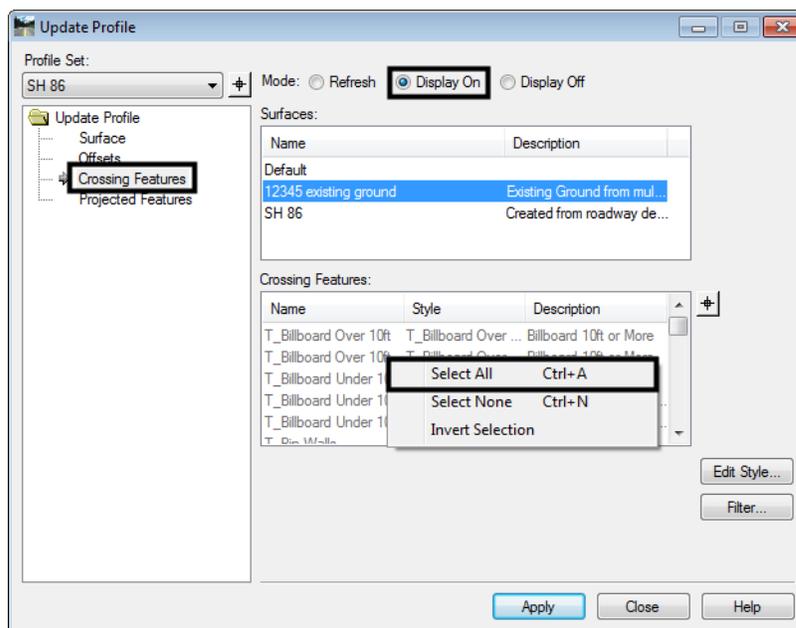


Note: This is the desired plot scale; change accordingly.

- From the **Locks** toolbar select the **CELL_Plot-Scale** filter from the pull down list and toggle on the **Feature Filter** lock.

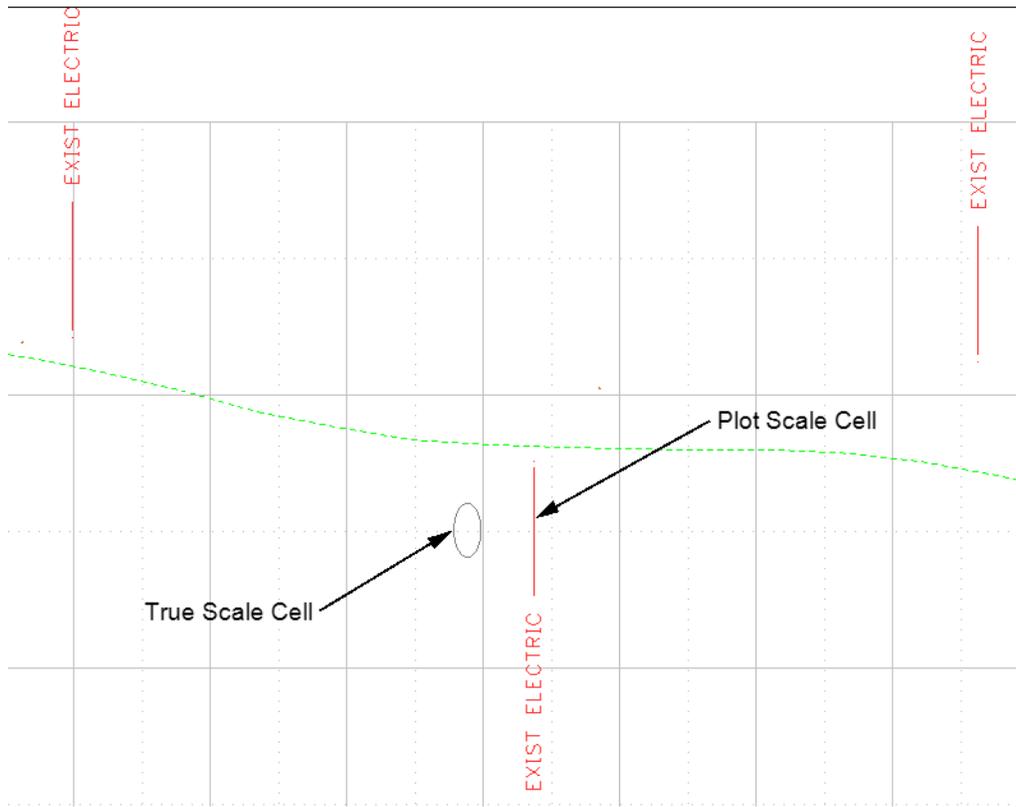


- Verify the correct **Profile Set** is selected in the **Update Profile** dialog box.
- <D>** the **Crossing Features** leaf.
- For the **Mode**, select the **Display On** radio button.
- From the **Surfaces** list box, select the surface name or names to display. Use the **Ctrl** or **Shift** keys when you want to select multiple Surface names.
- <R>** in the **Crossing Features** list box and choose **Select All** from the menu.



Note: The feature names that are black are Feature Styles that can be displayed in profile. Any names that are dithered are not configured to be displayed in a profile view.

- 8. **<D> Apply.** The **Update Profile** dialog box will minimize as the features are generated in the profile. When the process has completed the dialog will reappear.



Workflow IR 8 - Plan & Profile Generator

This document guides you through using the Plan and Profile Generator command in InRoads. The InRoads Plan and Profile Generator can be used for:

- Creating Roadway plan sheets depicting both plan and profile views on a single sheet.
- Full plan view sheets and double plan sheets (suitable for Roadway or Right-of-way plans).
- Full profile view sheets and double Profile Sheets.

Workflow Outline

Open Profile DGN File and Plan and Profile Generator - When the Plan and Profile Generator command is executed, it creates the profiles for the sheets first. Therefore, the dgn file that will contain the profiles must be opened at the time the command is launched.

- ◆ Command Used: **MicroStation File > Open** - Used to open a dgn file for editing.
- ◆ **Drafting > Plan and Profile Generator** - This opens the dialog box use to generate plan sheets.

User Input for Plan and Profile Generator - This command requires a number of user inputs to obtain the desired results. These inputs are entered on various tabs within the Plan and Profile Generator dialog box. The inputs

- ◆ **Global Scale Factor** - Used to set the InRoads text size. Set this before the command is executed.
 - Command Used: **Tools > Global Scale Factor** - Used to set the size factor for text and cells.
- ◆ **Main Tab** - This tab is used to set the Preference, alignment used, station extents, etc.
 - **Preferences** - Used to set the basic settings for most of the tabs. This should be selected before any other settings are made.
 - **Horizontal Alignment** - Used to define which alignment the plan and profile sheets will follow.
 - **Station Limits** - Used to define where along the horizontal alignment the sheets are made and how long each sheet will be.
- ◆ **Plan Controls Tab** - Used to specify the Reference Files used for the plan part of the sheet.
 - **Model Files** button - Used to select reference files for the plan section of the sheets.
- ◆ **Profile Controls Tab** - Used to set the profile preference, size, and data used.
 - **Profile Preference** - This determines some of the basic profile settings, like vertical exaggeration.
 - **Vertical Alignment** - Used to adjust the profile settings to accommodate the data.
 - **Corridor** - Used to specify which corridor will be used for superelevation data.
 - **Surface** - Used to specify which surfaces are displayed and which surface controls profile shifts.
 - **Profile Elevation Shifts** - Used to specify where profile shifts occur.
- ◆ **Sheet Layout Tab** - Used to specify the name for the plan sheets and identify the seed file used to create them.
 - **Host File** - Used to specify the name for the plan sheets.
 - **Seed Host File** - Used to specify the seed file used to create the plan sheets.
- ◆ **Border and Title Tab** - Used to specify the sheet border cell to be used for the plan sheets.
 - **Cell > Name** - Used to specify the sheet border cell to be used for the plan sheets.

- ◆ **Symbols and Details Tab** - Used to specify two cells to be placed on each sheet.
 - **North Arrow > Cell Name** - Used to specify the north arrow cell to be used on the plan sheets.
 - **Miscellaneous > Cell Name** - Used to specify any other cell to be used on every plan sheet.

Editing Sheet Definitions - InRoads does not always create the sheets as the user desires. The following tabs are used to adjust the sheets.

- ◆ **Main Tab** - This tab is used to adjust sheet extents and add additional reference files to sheets.
 - **Plan Views > Use Plan Views** - This toggle tells InRoads to use the defined plan view settings instead of recreating these settings based on the station limits.
 - **Plan View List** - Used to select individual plan view definitions for editing.
- ◆ **Sheet InDex Tab** - Used to navigate between plan sheets and to adjust the location of reference files.
 - **Sheet Index List** - Used to select a plan sheet for display or editing.
 - **Show Sheet Button** - Used to open the selected sheet in MicroStation.
 - **Regenerate Sheet Button** - Used to recreate the selected sheet with data modified on the Main tab and the Sheet Index tab.
 - **Delete Sheet Button** - Used to remove a sheet from the plan list.
 - **Sheet Views List** - Use to select and edit the location of the Plan and Profile reference files.

Required Resources:

Before you begin, a number of resources are required for this command.

Horizontal Alignment - Plan view limits are defined relative to a horizontal alignment (length and right/left offsets). Therefore, a project specific Geometry Project must be loaded into memory.

Digital Terrain Models - Profile view limits are determined by the vertical relief of profiled DTM's. At least one project specific DTM must be loaded into memory.

Cells - Cells are used to place the Drawings border and north arrows. The cell library General.cel must be attached for the Plan and Profile Generator to operate correctly.

Border Sheet - A Cell is used to generate the border sheet and is placed in each drawing created.

Source cell library:

C:\Program Files\Workspace-CDOT\Standards-Global\MicroStation\cells\General.cel

Cell Placed: **SHEET_Design-Sheet**

Scale - Before the P&P command is run, the user needs to determine the final plot scale of the drawings being created. Current preferences exist for 20, 40, 50, 100, 200, and 500 scale plots. This is reflected on specific tabs within the command. See below for additional information.

Under **Tools > Options > Factors** the **Global Scale Factor** must be set to match the **Plan & Profile Generator** preference (horizontal scale) selected.

Note: If you are using ProjectWise, start InRoads and MicroStation from the Start Menu or desktop icon. This allows you to log in to the ProjectWise server through MicroStation establishing a link between the two programs so that file can be written directly to the ProjectWise server.

Dialog Settings:

Project specific parameters need to be defined prior to command execution:

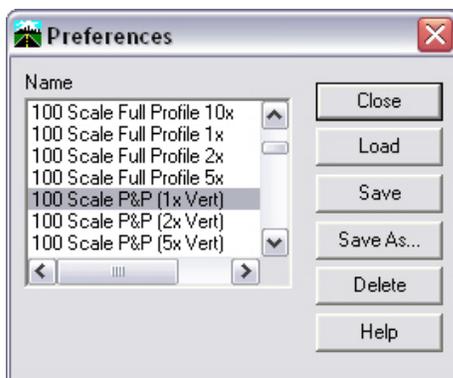
- ◆ Verification of Border Cell
- ◆ Location of MicroStation seed file
- ◆ Location for sheet output (project directory)
- ◆ Length along the alignment that will display in plan view
- ◆ Left and right offsets from a horizontal alignment for plan view display.

User Input:

1. Select **Drafting > Plan and Profile Generator...**

By default, the dialog will populate with the CDOT preference (100 horizontal scale by 1x vertical exaggeration Plan & Profile sheet).

2. **<D> Preferences** if a different scale or full plan sheet or double plan sheet or full profile sheet is desired:



Developed Preferences are:

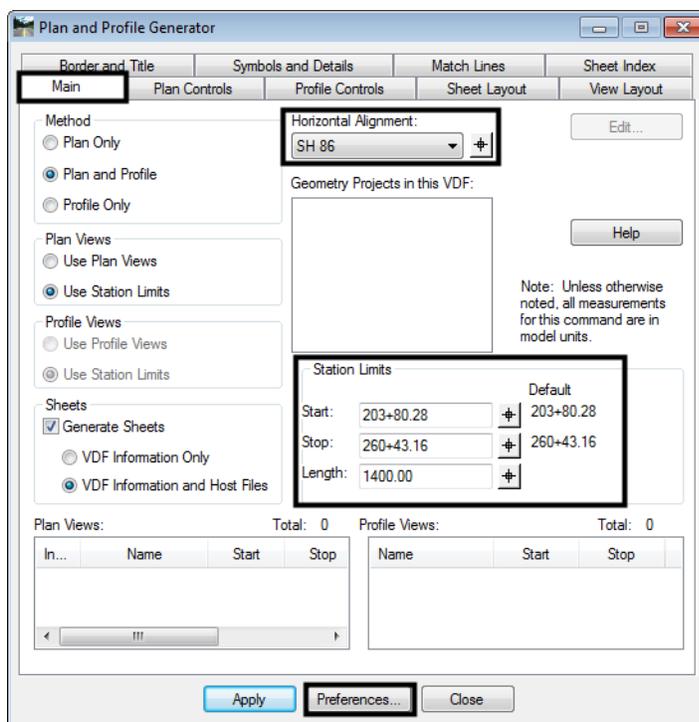
- ◆ **100 Scale Double Plan** – 100 scale (plot factor) double plan sheet
- ◆ **100 Scale Full Plan Sheet** – 100 scale (plot factor) plan sheet
- ◆ **100 Scale Full Profile 10x** – 100 scale (plot factor) full sheet profile with 10 times vertical exaggeration applied
- ◆ **100 Scale Double Profile 10x** – 100 scale (plot factor) double profile sheet with 10 times vertical exaggeration applied
- ◆ **100 Scale Full Profile 1x** - 100 scale (plot factor) full sheet profile with 1 times vertical exaggeration applied
- ◆ **100 Scale Full Profile 2x** - 100 scale (plot factor) full sheet profile with 2 times vertical exaggeration applied
- ◆ **100 Scale P&P (1x Vert)** - 100 scale (plot factor) plan & profile with 1 times vertical exaggeration applied
- ◆ **100 Scale P&P (2x Vert)** - 100 scale (plot factor) plan & profile with 2 times vertical exaggeration applied

- ◆ **100 Scale P&P (5x Vert)** - 100 scale (plot factor) plan & profile with 5 times vertical exaggeration applied
- ◆ **100 Scale ROW Plan Sheet**
- ◆ Replicas of the above for **20, 40, 50, 200,** and **500** scale as appropriate

Note: There is a second copy of the preferences that are prefixed with a 'PW'. These use a ProjectWise sheet border. Once the file is saved then reopened, ProjectWise will fill in the title block information automatically.

Main Tab

By default, the preference **CDOT 100 Scale P&P (1xVert)** will load & populate the dialog for generation of plan and profile sheets.

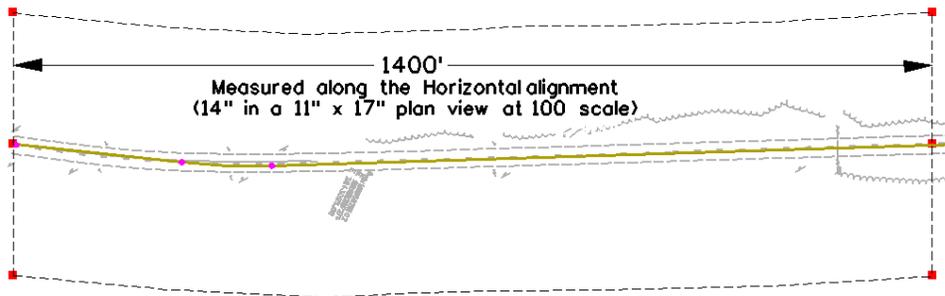


User input – Main Tab

Load the appropriate **Preference** (if necessary)

1. Select the **Horizontal Alignment** to be centered in the plan view
2. Define **Start** and **Stop** stations to define limits of sheet generation

3. **Length** defines the length along the alignment that will fit in a plan view. 1400 feet is the default for a 100 scale 11" x 17" plotted sheet. See graphic below.



Changing Scale

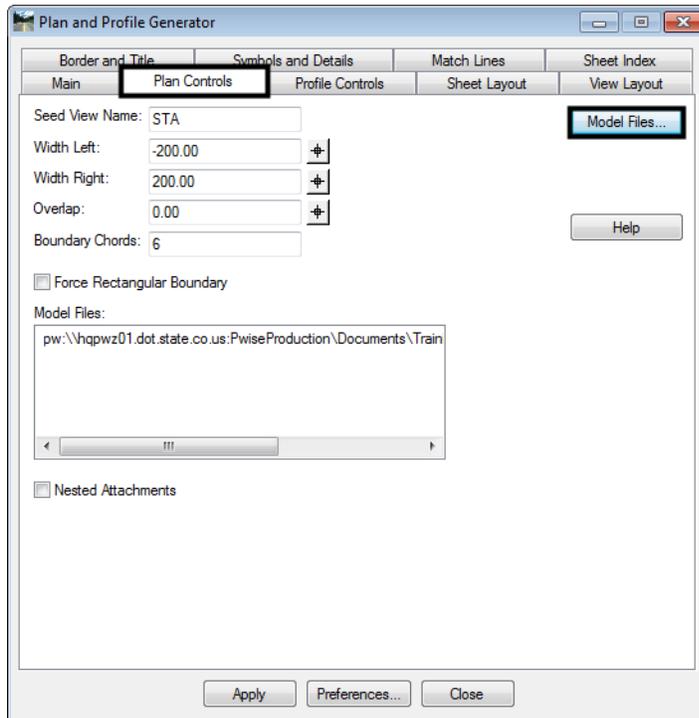
A 50 scale plot will display 700 feet along the alignment in plan view, a 200 scale plot will display 2800 feet.

If something other than 100 scale is desired, the different scaled preferences are created to proportionally change the following:

- ◆ **Main** tab – modifies **Length** along Alignment
- ◆ **Plan Controls** tab – modifies **Width Left** and **Width Right** of reference line (alignment)
- ◆ **Profile Controls** tab – modifies **Profile Height**
- ◆ **View Layout** tab – modifies **Scale**
- ◆ **Symbols and Details** tab – modifies **Scale**
- ◆ One item that is not set by the preferences and that needs to be set by the user is the overall InRoads scale which is set by selecting the command:
Tools > Options > Factors or **Tools > Global Scale Factor** – set **Text, Cell, LineStyle** to the desired plot scale

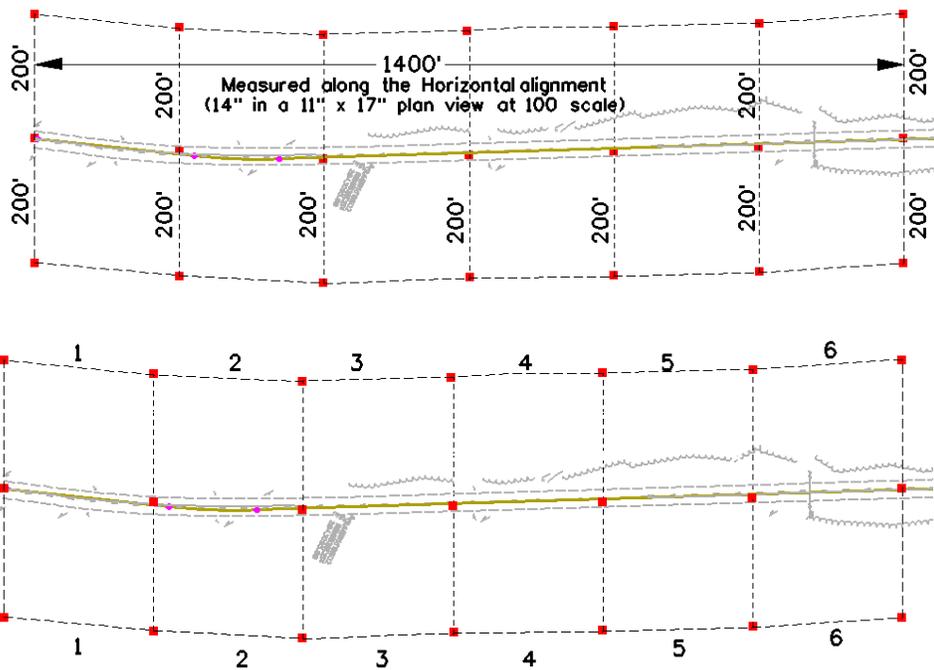
Plan Controls Tab

1. **<D> Model Files** to pick the Drawing files (references) for display in plan view. These files can be located on ProjectWise or on the local hard drive.



Note: Nested Attachments can be checked, but you will only be able to manipulate levels (on or off) through Level Display and not in the Level Manager. Also, you can switch to live nesting in the actual P&P sheets by changing the reference file attachment settings.

- The inputs **Width Left** and **Width Right** define plan view limits perpendicular from the reference line (left is negative).



- The **Boundary Chords** setting will create a clipping limit that will fit the extents of the upper plan window area. This reference file clipping edge should be considered a “first pass limit” and may have to be edited on curved portions of the corridor path in locations where the cut / fill limits extend outside this “calculated” clipping limit. This plan limit editing, along with any shifting of the plan window position, is accomplished on the **Sheet Index** tab after the sheets have been created.

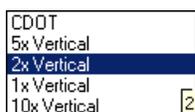
Model Files & Levels

The Model files selected (along with the profile generated) will be attached as reference files. The attached files will have the levels turned on that contain data. If additional data (levels) are added to the referenced files after the sheets are created, the user is required to turn on the appropriate levels through the use of the level display dialog box.

Additionally, the files referenced will have the design file ‘CDOT Default’ model attached. It is CDOT policy that only the model titled ‘CDOT Default’ should be used in any MicroStation file.

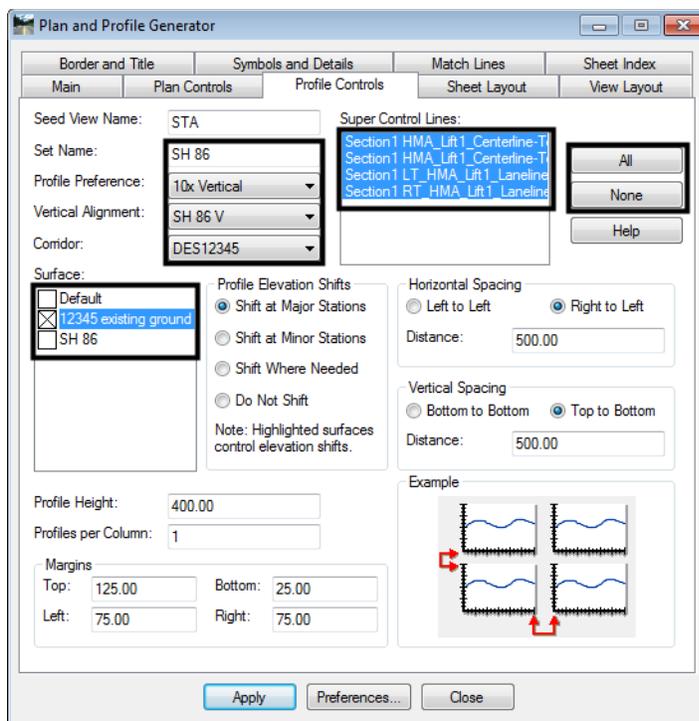
Profile Controls Tab

- Profile Preference** defines profile grid settings (ticks, annotation, grid/tick spacing etc.) as stored as a preference in **Evaluation > Profile >Generate Profile**.



- Enter an appropriate profile **Set Name**. For better tracking and locating, this field will default to the name of the **Horizontal Alignment** from the **Main** tab.

3. Select the **Vertical Alignment** from the drop-down list. (This tells InRoads to create a profile window with an elevation range compatible with the vertical design.) The alignment specified determines window clearance (top/bottom profile grid clearance) and vertical profile shifts if necessary.
4. Check on (X) any **Surface** that you wish to display in the profile window as it is created (you can always display additional data after the profiles have been constructed).
5. Hold down the **CTRL** key and select any **Surface** that should be considered when establishing the elevation range position of the profile window. These selected surfaces can also affect the **Profile Elevation Shifts** locations.
6. Highlight the superelevation control lines that will be displayed in the profile from the **Super Control Lines** list box. The **All** and **None** buttons to the right of the **Super Control Lines** list box can be used to select or deselect all of the superelevation control lines.

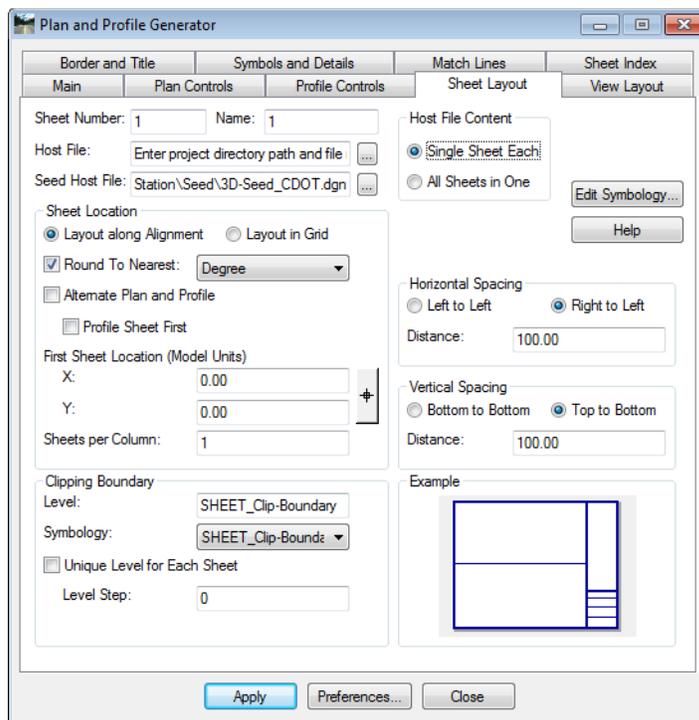


Note: The Margin on the Top has additional space provided in case a superelevation diagram is shown in combination with the profile window.

From the InRoads help menu:

When a profile is shifted (vertically), the starting elevation will always be a multiple of the Spacing value for the ticks on the left axis in the **Create Profile** command. To set this parameter, go to the **Axes** tab on the **Create Profile** dialog box, set **Axis** to **Left**, set **Annotation** to **Ticks**, and key in the **Spacing** value in the **Major Ticks** group box. Therefore, if you get a message stating that the profile will not fit in the given profile height, you have two choices: (1) increase the profile height or (2) specify a smaller spacing value for the left axis.

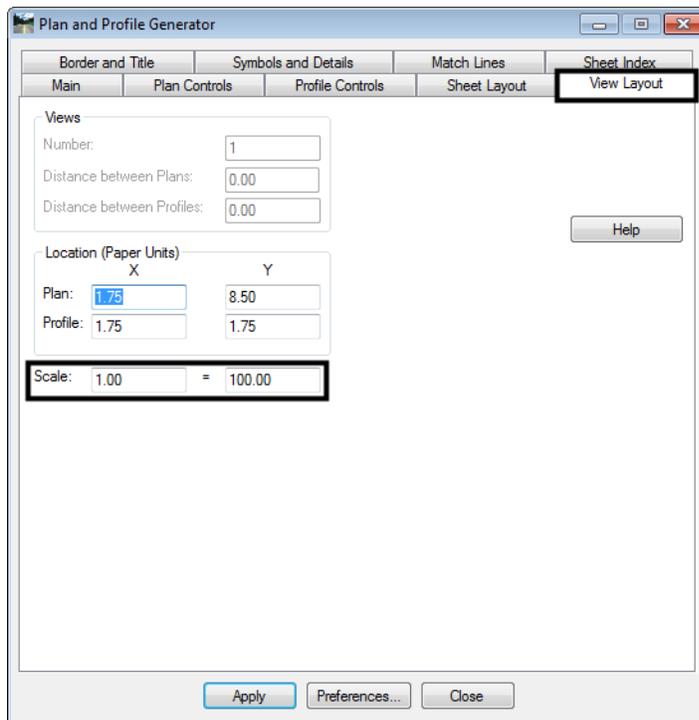
Sheet Layout Tab



1. **<D> ...** next to the **Host File** field to identify the path and initial sheet name for the new drawing set. The **Host File** refers to the new MicroStation plan and profile drawings that will be created by this tool. The last number, “1”, will be automatically updated as each new sheet is created. This should be set to the project directory, i.e.: **C:\Projects\12345\ Design\Drawings\12345DES_PnP01.dgn**.
Note: This can also be a path to a ProjectWise location.
2. The **Seed Host File** is the ‘prototype’ file used to create the Host files. Verify the path is set to: **C:\Workspace\Workspace-CDOT_V8i\Standards-Global\MicroStation\seed\3D-Seed_CDOT.dgn**
3. The **Symbology** for the **Clipping Boundary** will be blank since the **Level** specified will determine the clipping boundary symbology.

View Layout Tab

1. This tab sets location (origin) for the profile and plan views relative to the border sheet. No user input is required in this dialog unless creating sheets at a scale other than 1"=100'



Note: The *Location* of the *Profile Y* position was determined by 1.50" of outside title block border plus 0.25" of clear space for the station text at that bottom of the profile window. ($1.50+0.25 = 1.75$)

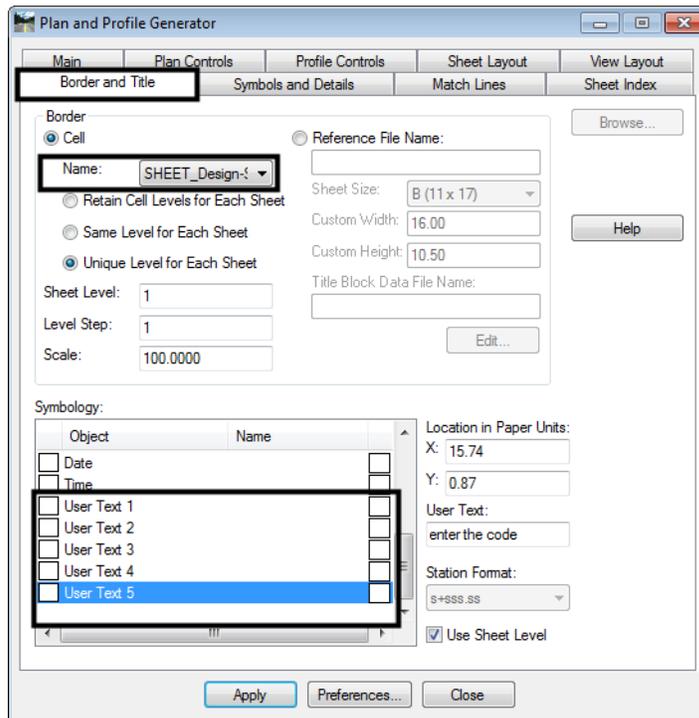
Note: The *Location* of the *Plan Y* position was determined by 1.50" of outside title block border plus 0.25" clear space for the station text below the profile window plus 4.5" of space required for 45° of profile elevation plus 0.25" of clear space above the profile window plus ½ of the remaining 4" width of the plan window. ($1.50+0.25+4.50+0.25+2.00 = 8.50$)

Border and Title Tab

The only user input on this tab is to ensure the correct cell is specified for the border sheet and turn off the *User Text* if it is not used.

1. Cell Placed:

- ◆ SHEET_PW_Design-Plan-Sheet
- ◆ SHEET_Design-Sheet



Note: Use the *SHEET_PW_Design-Plan-Sheet* with projects located on ProjectWise. Use *SHEET_Design-Sheet* with projects stored on a local computer.

Symbols and Details Tab

The **North Arrow** cell is preset on this tab. The **ProjectWise Title Block** area is not used because the ProjectWise tags are imbedded in the sheet border cell. The **Miscellaneous** area can be used to place another cell in the sheet. To use the Miscellaneous area:

1. Toggle on **Attach**.
2. Select the desired **Cell Name**.
3. Toggle on **Retain Cell Levels for Each Sheet**.
4. Key in the desired **Scale**.

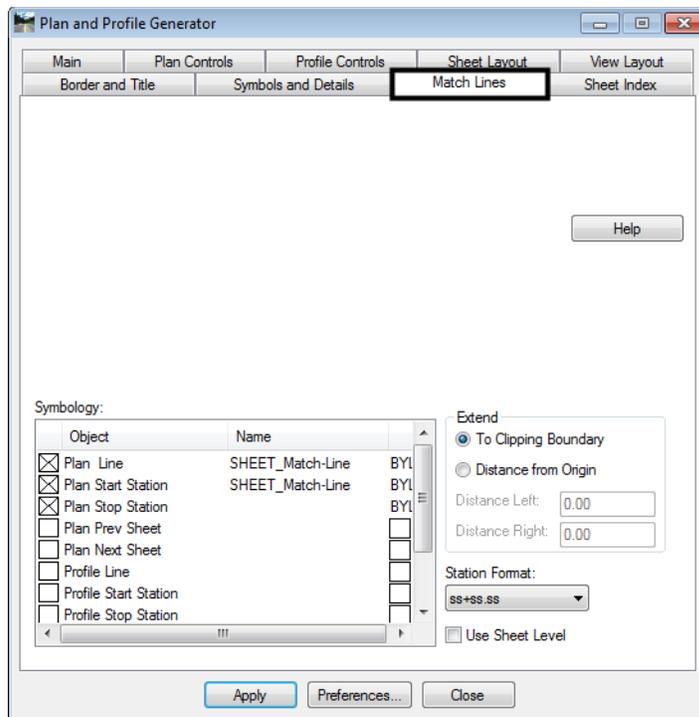
5. Key in the **X** and **Y** values for the **Location in Paper Units**.

Note: The **North Arrow** position is specified by the **Location in Paper Units** input and is set to the upper right corner of the sheet. This is a rough placement and will likely have to be moved for clarity and conflicts on many sheets. Once the sheets are constructed each sheet should be checked for optimum cell position.

Note: The **North Arrow** and matchline information are not being placed on the correct level. A workflow document has been created to assist you in moving the **North Arrow** and matchline information to the correct level through a batch process. If these elements are not moved to the correct level, they will not plot. InRoads places these elements on a no plot level. See the **CDOT Batch Processing** workflow document for more information on this process.

Match Lines Tab

1. No user input is required in this dialog.



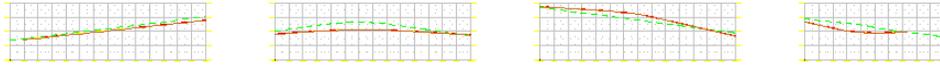
Executing the Command

The workflow process for this command follows the sequence:

1. New profiles are generated for referencing to individual sheets.
2. Plan view reference limits are established.
3. New drawing files are created based on the host file name.
4. Each new drawing file has 3 items generated (Sheet Border, North Arrow, and one user specified cell).
5. Plan views or Plan and Profile views.
6. Profile views.
7. Border sheet placed as a cell in each generated drawing.
8. North arrows are placed in all sheets.
9. The Plan and Profile dialog (sheet index tab) will populate with sheets created and sheet limits.

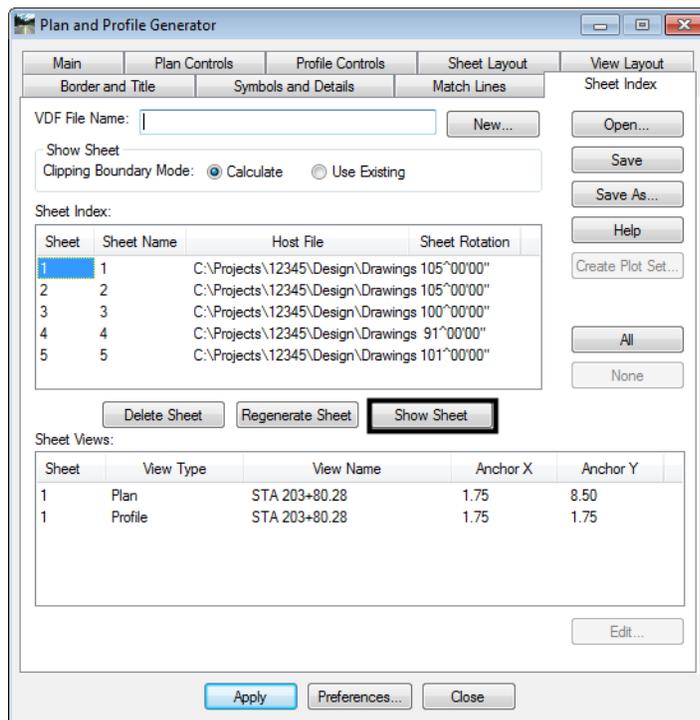
Note: Because new profiles will be generated, you should execute the command in a drawing specific for this use. For example:

C:\Projects\12345\Design\Drawings\Reference_Files\12345DES_Prof.dgn



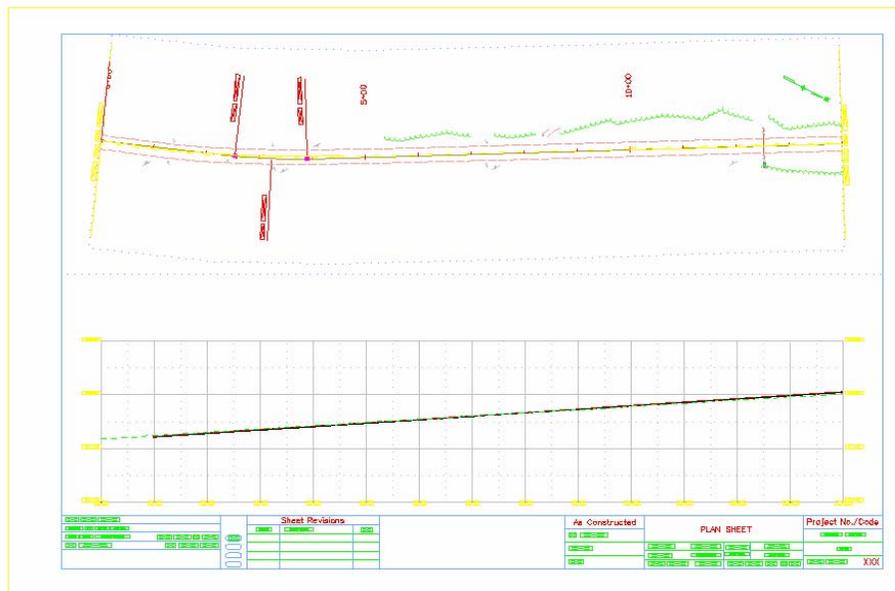
Sheet Index Tab

- Nothing is required by the user on this tab prior to Plan & Profile sheet creation.



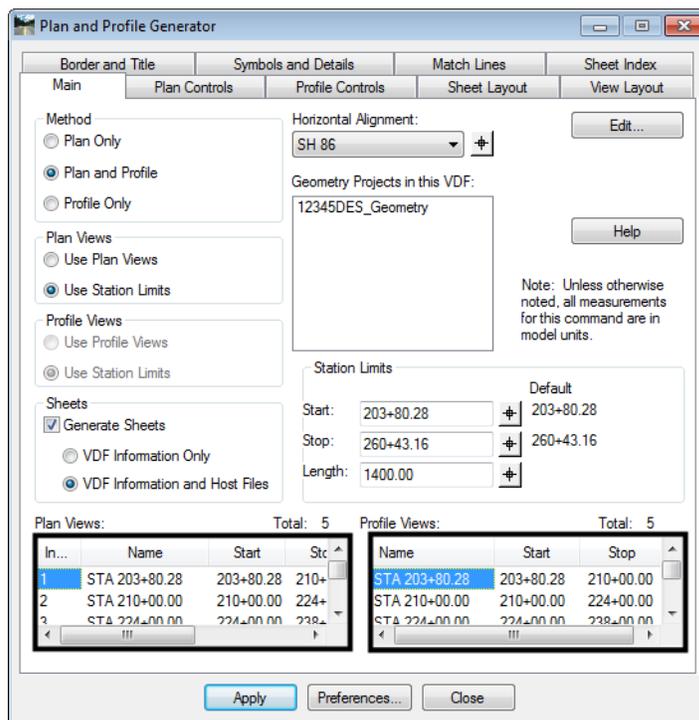
- After the *Plan and Profile Generator* has been run, each sheet should be reviewed for:
 - ◆ North Arrow position and Miscellaneous Cell. (Manually move the Cell if necessary).
 - ◆ Plan view Clipping limits (Using MicroStation Modify, edit the clipping shape). This level is set to be on a no plot level.
 - ◆ Plan View Position (Select the sheet on the **Sheet Index** tab, modify the anchors as necessary, and **Regenerate Sheet** to reconstruct).
- Save a project specific View Definition File (VDF) so that sheet definitions can be recalled and modified if necessary. This file should be saved to your InRoads project folder location, not within the CDOT Workspace.

- By highlighting a specific sheet and **<D> Show Sheet**, MicroStation will open the selected drawing.

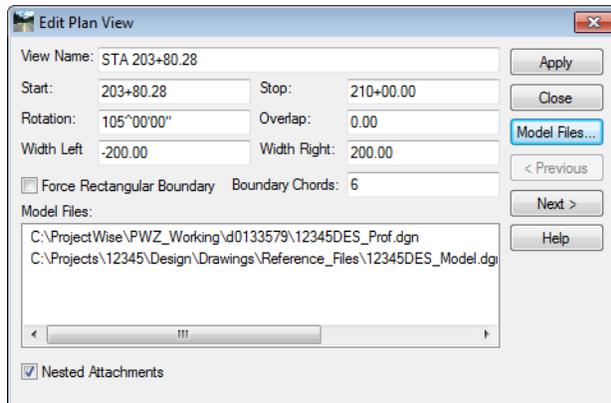


Main Tab

- Once the command has been run the **Geometry Projects in this VDF**, **Plan View** and **Profile View** list boxes are updated.



2. <D> <D> on a Plan or Profile View in the list to open an **Edit** dialog box. Sheet limits can be modified and reference files can be added or removed from this location.



Note: If you are using ProjectWise and you are going to regenerate the P and P sheets, you must first delete the sheets off of the ProjectWise server. InRoads cannot overwrite files on the ProjectWise server as it does with locally stored files.

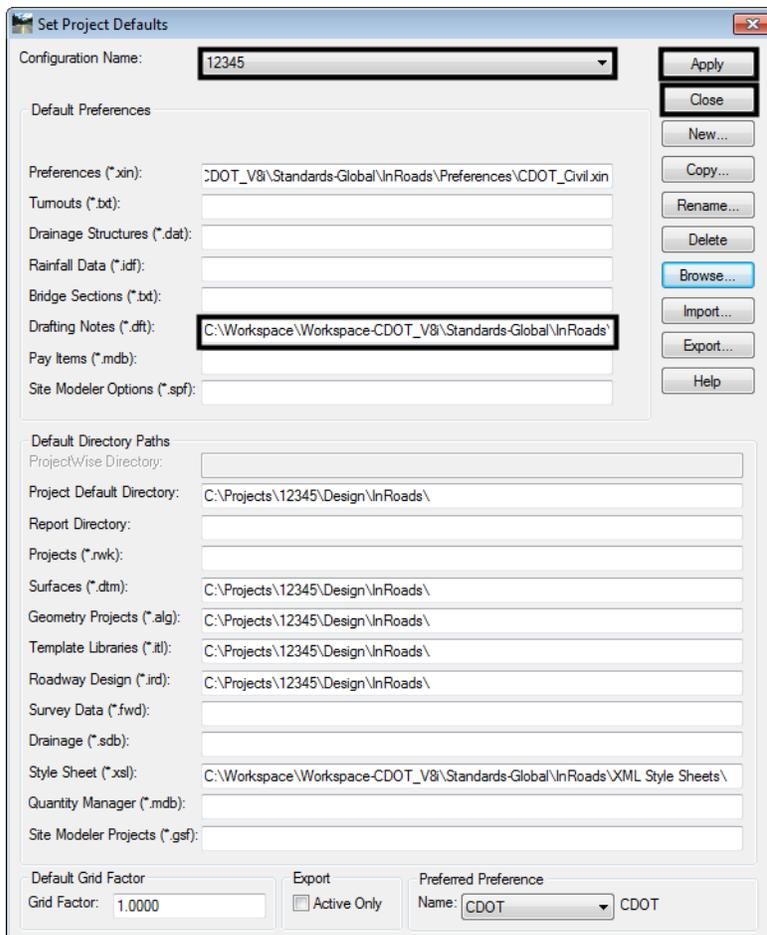
Workflow IR 9 - InRoads Place Note Command

This document guides you through using the InRoads Place Plan Note command, which places annotation based on a combination of manual input and information extracted from InRoads geometry, surfaces, profiles, or cross sections. A major benefit of using this command is generation of annotation based on the engineering model and the ability to automate updating the annotation if the engineering information changes.

Plan Notes

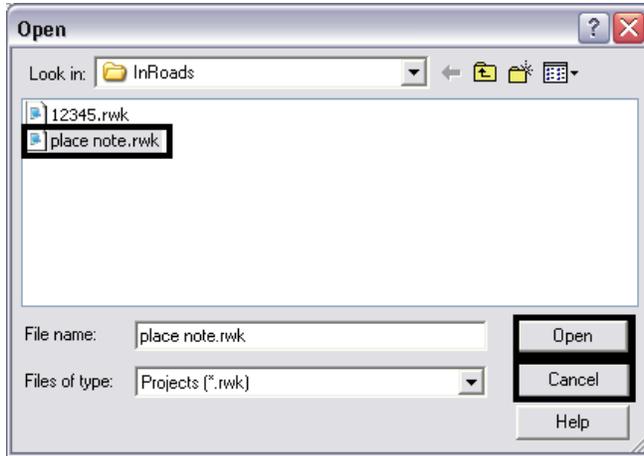
Setting Defaults

1. Launch both MicroStation and InRoads with the CAD file that requires annotation. This document follows **C:\Projects\12345\Design\Drawings\Reference_Files\12345DES_Model.dgn**.
2. From the InRoads menu, select **File>Projects Defaults**. Select the appropriate configuration name for the active project. If not already defined, the **Drafting Notes** field should be directed to: **C:\Program Files\Workspace-CDOT\Standards-Global\InRoads\Notes\CDOT-Notes.dft**.
3. **<D> Apply** and **Close**.



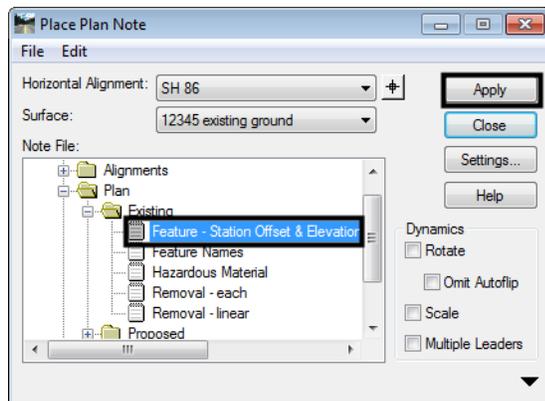
Note: Project specific DFT (drafting notes) files can be created and stored in the project directory structure. Creating this file will be discussed later in this document.

4. Open project related data files such as geometry projects and surfaces. If developed, choose the projects RWK file to open project related data. (**File > Open**). Select the appropriate project file and **<D> OK**. **<D> Cancel** to dismiss the *Open* dialog box.

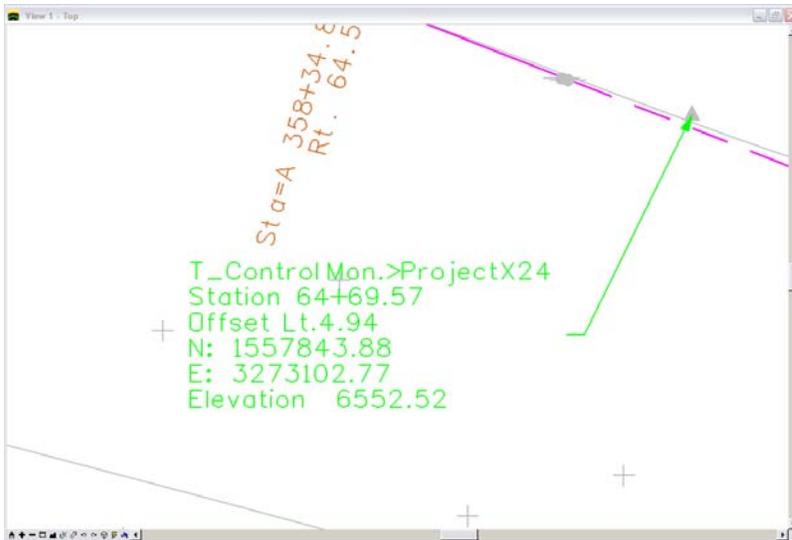


Placing Notes

1. Select **Drafting>Place Plan Notes**.
2. Expand the file tree structure (+) for **Plan > Existing**. Select **Feature – Station Offset & Elevation** and **<D> Apply**.



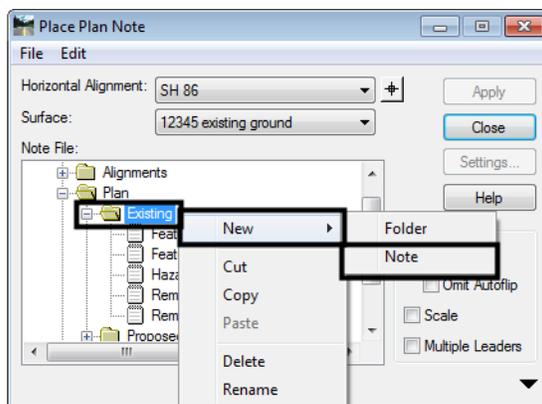
3. **<D>** on any element, **<D>** to accept, move mouse to desired location, and **<D>** again to insert note into drawing.



Note: In order for InRoads to generate annotation extracted from a surface feature, that feature must be displayed in the CAD file using the **Surface > View Surface > Feature** command. If text fields appear empty (non quantitative) it is more than likely due to the feature’s properties. Either a description is not provided or the element is not displayed as a feature in the design file.

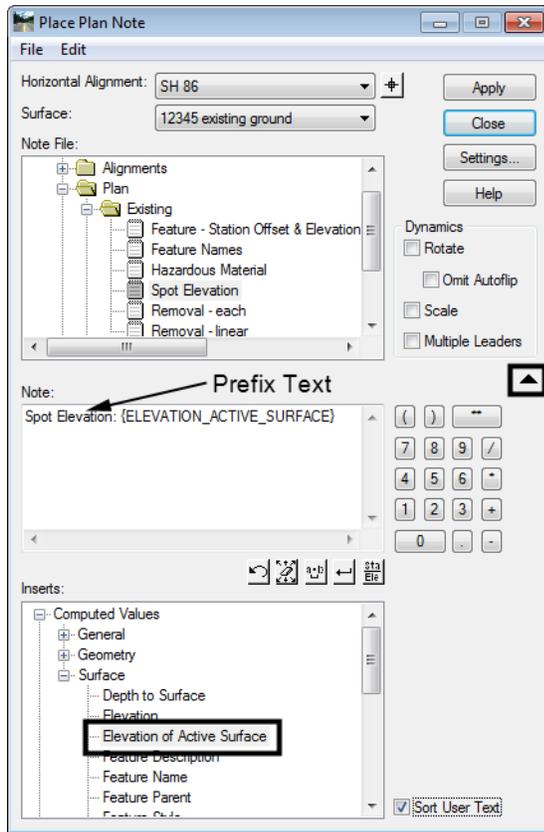
Creating a Plan Note

1. From the **Place Plan Note** dialog box, **<R>** in desired folder to insert note. Select **New > Note**.



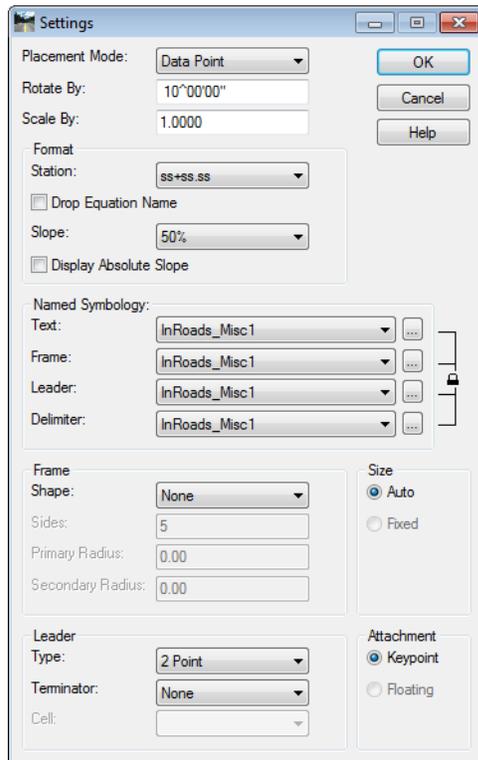
2. Enter a name for the note (**Spot Elevation** for this example) and hit **Enter** to complete.
3. Expand dialog box using the downward arrow in the lower right of the dialog box. Use the keyboard to insert any prefix text (**Spot Elevation:** in this example) into the **Note:** field.

4. <D> <D> the desired computed values (**ELEVATION_ACTIVE_SURFACE** in this example) from the **Inserts:** list box



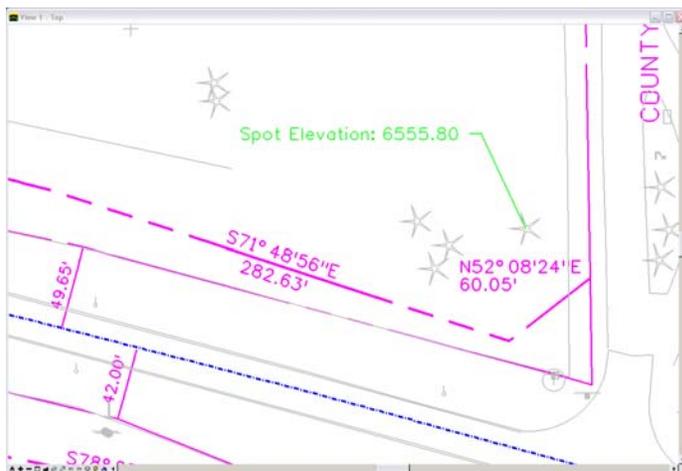
5. <D> **Settings.**

6. In the **Settings** dialog box, make the desired settings then **<D> OK**.



Note: To keep note settings for future use, save the DFT file in a project specific folder (**Projects\####\Project_Configuration**) by selecting **File>Save As** from the **Place Plan Note** dialog box. Saving to the CDOT workspace will not retain this information.

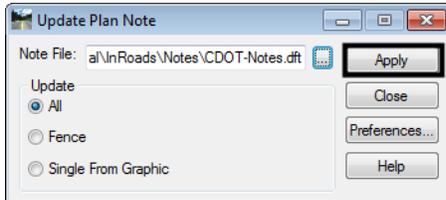
7. **<D> Apply** in the **Place Plan Note** dialog box. **<D>** at any location in the MicroStation view, **<D>** to accept, move mouse to desired location, and **<D>** again to insert note into drawing.



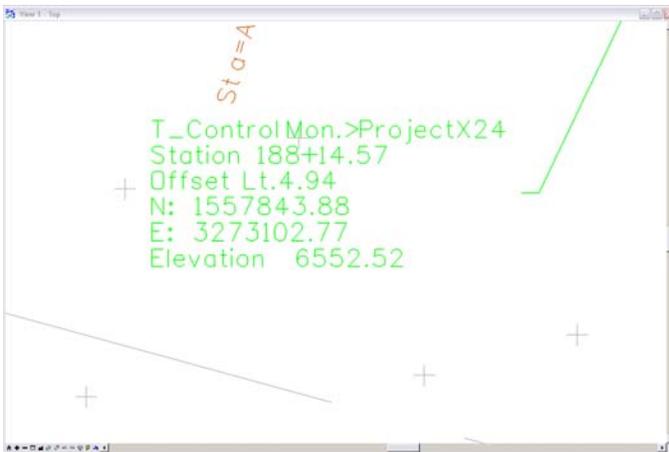
Updating Plan Notes

If design information such as stationing, surface elevations or feature information changes, annotation placed with the **Place Note** command does not have to be deleted and regenerated. However, it does need to be updated. The following example shows the procedure assuming the stationing of an alignment has been modified.

1. Select **Drafting > Update Plan Note**. To update a single note, toggle **Single From Graphic** on. If multiple changes are desired, the **Update** modes **All** or **Fence** can be used. **<D> Apply**.



2. **<D>** on note to update, **<D>** again to accept. The note will automatically be updated with new stationing information.



Moving Notes

1. Select **Drafting > Move Note**.
2. **<D>** on note to be moved; **<D>** to accept selection; **<D>** to choose new location.

Note: When using the **Drafting > Move Notes** command, the leader will stay associated with the original insertion point. Using the MicroStation **Move** command would reposition both the note and leader.

Editing Notes

1. From the MicroStation Drawing Task Tab, select **Edit Text**.



2. **<D>** on any note to edit the text in the **Text Editor**. **<D>** anywhere in MicroStation view to accept changes made to text.

Note: Editing text will disassociate values, disabling the automatic updates to text feature.

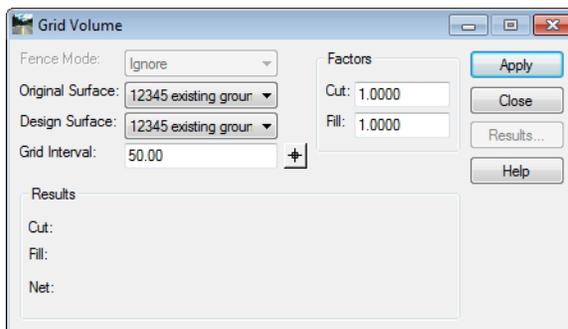
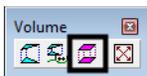
Workflow IR 10 - Calculate Volume

This document guides you through three methods to calculate volume: Grid, Triangle, and End Area.

Calculating Grid Volumes

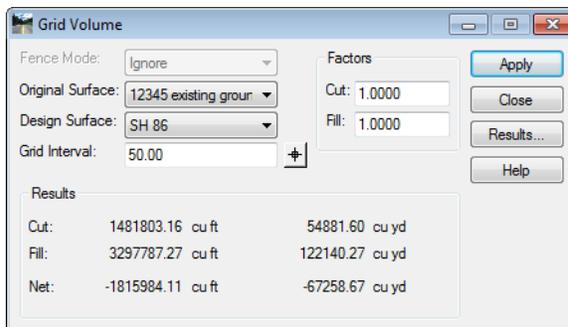
Calculate the volume between the existing surface and the proposed surface using the grid volume method.

1. Select **Tools > Customize > [Toolbars]** and check on **Volume**. **<D> Close** to dismiss the *Customize* dialog.
2. Select the **Grid Volume** command.



- ◆ Select the desired **Original Surface**.
- ◆ Select the desired **Design Surface**.
- ◆ Enter the **Grid Interval**. Ideally, this should be equal to or a factor of the template drop interval or the interval at which data was collected.
- ◆ Set the desired the **Cut Factor** and **Fill Factor**.

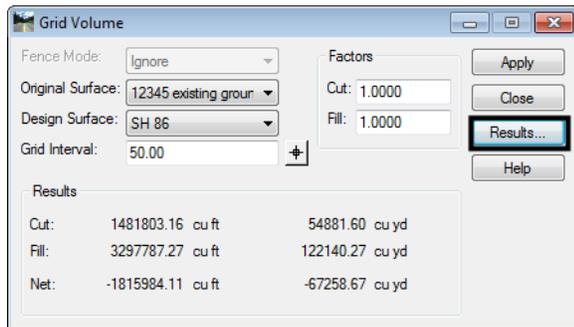
3. **<D> Apply**.



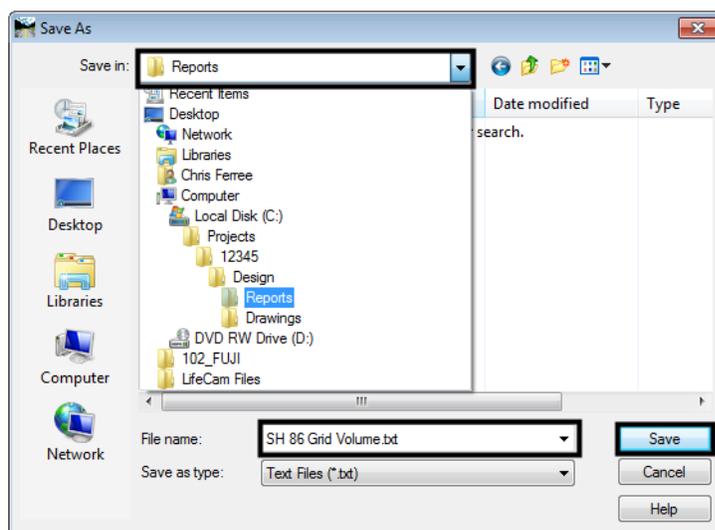
4. Record the results.

If you would like an electronic copy of the Grid Volume:

5. <D> the **Results** button. This displays the Results dialog box with the volume data.



6. In the **Results** dialog box, <D> the **Save As** button.
7. Navigate to the desired folder, enter a **File name**, then <D> **Save** to create the report file.

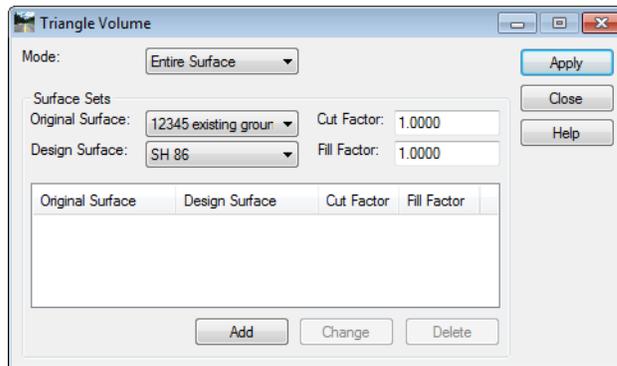
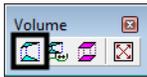


8. <D> **Close** to dismiss the **Results** dialog box.
9. <D> **Close** to dismiss the **Grid Volume** command.

Calculating Triangle Volumes

Calculate the volume between the existing surface and the proposed surface using the triangle volume method.

1. From the **Volumes** toolbar select the **Triangle Volume**.



- ◆ Set the **Mode** to **Entire Surface**.
 - ◆ Select the desired **Original Surface**.
 - ◆ Select the desired **Design Surface**.
 - ◆ Set the **Cut Factor** and **Fill Factor** as required for the project.
2. <D> the **ADD** button.
 3. <D> **Apply**.

This method will take longer to process than the grid method.

4. The results are displayed in the **Bentley Civil Report Browser** dialog box.
5. Use the **Triangle Volume.xls** template to review the report.

If you would like an electronic copy of the Triangle Volume:

6. Select **File > Save** from the menu bar.
7. Navigate to the desired folder, enter a **File name**, then <D> **Save** to create the report file.
8. <D> **Close** to dismiss the **Triangle Volume** command.

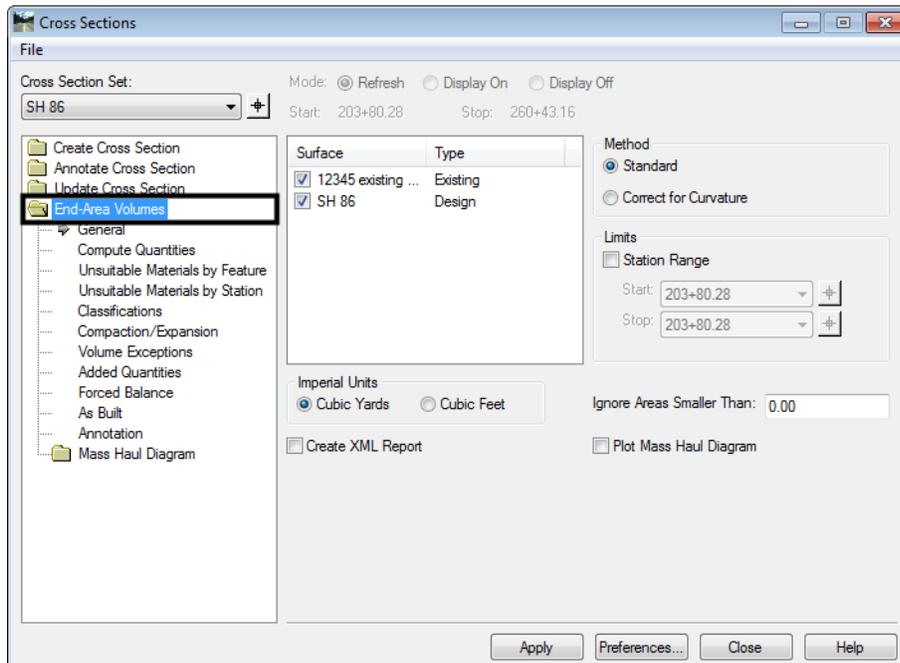
Calculating End-Area Volumes

Calculate the volume between the existing surface and the proposed surface using the end-area volume method (CDOT standard method). With the first run, you will not take the subgrade into account.

In order to use this command, you must be in the design file where your final cross sections were cut.

1. Open the desired cross section design file.

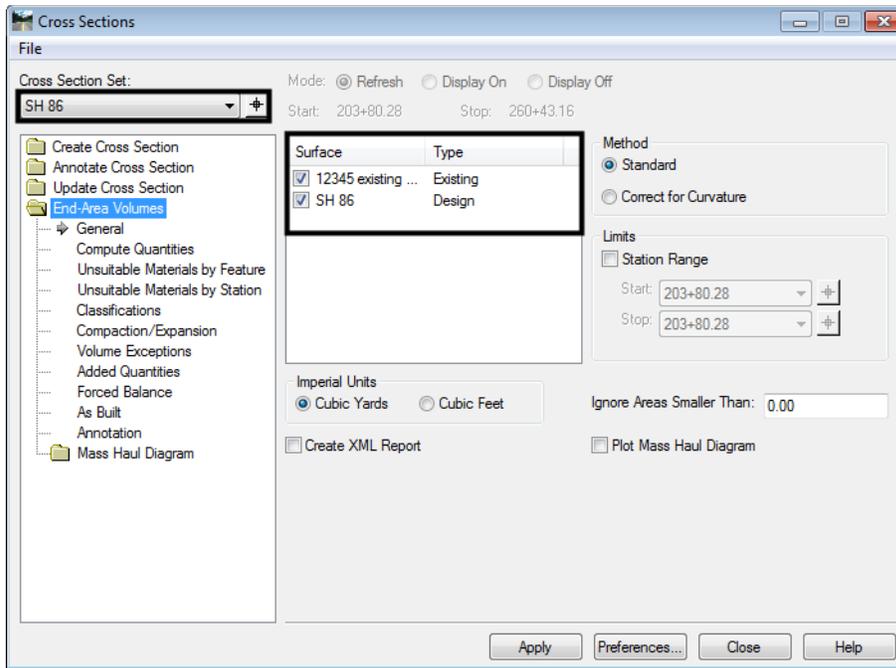
- From the **Cross Sections** dialog box, select the **End-Area Volumes** from the dialog box explorer.



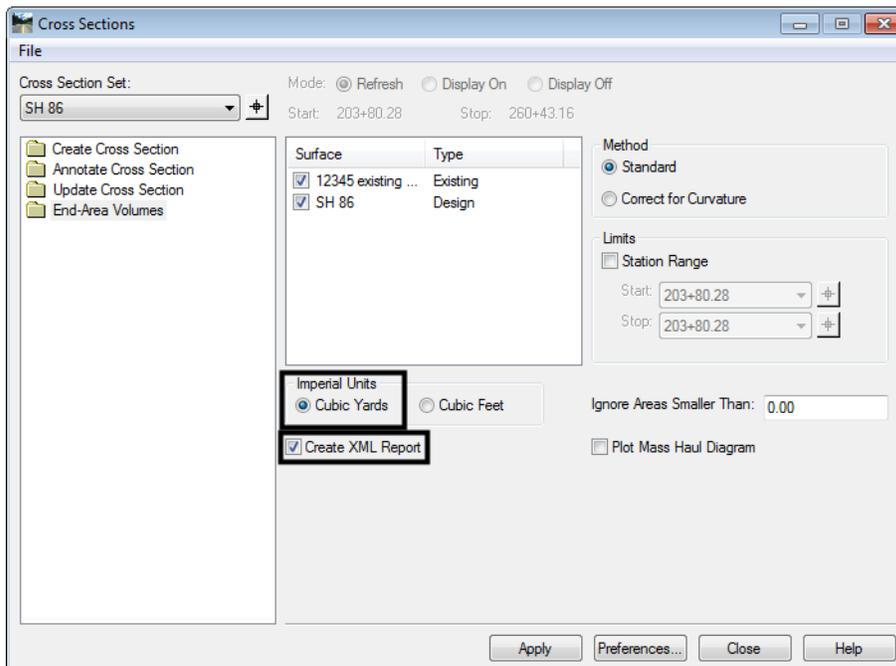
- Select the desired Cross Section Set using the drop down menu.

Note: End area volumes are calculated based on the cross section graphics. If the selected set does not contain sections for the full length of the project, or the design toes fall outside the cross section grid, then the volumes will not be correct for the project.

- Identify the surfaces to be compared from the Surfaces list. There must be one Existing type surface and one Design type surface.



- Set **Imperial Units** to **Cubic Yards**.
- Toggle on **Create XML Report**.



- <D> Apply.**

8. The **Bentley Civil Report Browser** appears. There are several report templates that are useful. Some recommended templates to look at are:

- ◆ EndAreaVolume.xml
- ◆ EndAreaVolumePage Totals.xml
- ◆ Volumes.xls

The first two are standard end area volume reports. the Volume.xls also has the same volume data, but is formatted differently. It also contains volume information on the closed shape template components contained in the design surface.

If you would like an electronic copy of the End Area Volume:

9. Select **File > Save** from the menu bar.
1. Navigate to the desired folder, enter a **File name**, then **<D> Save** to create the report file.
2. **Close** the **Bentley Civil Report Browser**.

Workflow IR 11 - Calculating Quantities With InRoads and Quantity Manager

This document guides you through the use of InRoads and Quantity Manager to calculate and extract quantities from InRoads data. The processes included in this document cover:

- ◆ Editing the Pay Item database to calculate quantities for materials that use the same pay item code but use different variables or formulas to compute the quantity
- ◆ Importing MicroStation graphic elements into a surface (DTM) so that they can be quantified
- ◆ Using the Shapes Tool to create surface features from closed areas
- ◆ Using the Compute Quantities tool to calculate quantities and store the output to a database
- ◆ Working with Quantity Manager to input quantities that were not calculated and create various reports on the quantity data

CDOT Customizing the Pay Items Database

When figuring quantities, it is possible that two or more features will use the same pay item code but require different values for some formula variables. For example, the same paving material may be used for both the roadway and driveways but the thickness of that material can vary. Pay Item Manager will be used to copy a pay item and edit that copy for use with different variables or formulas.

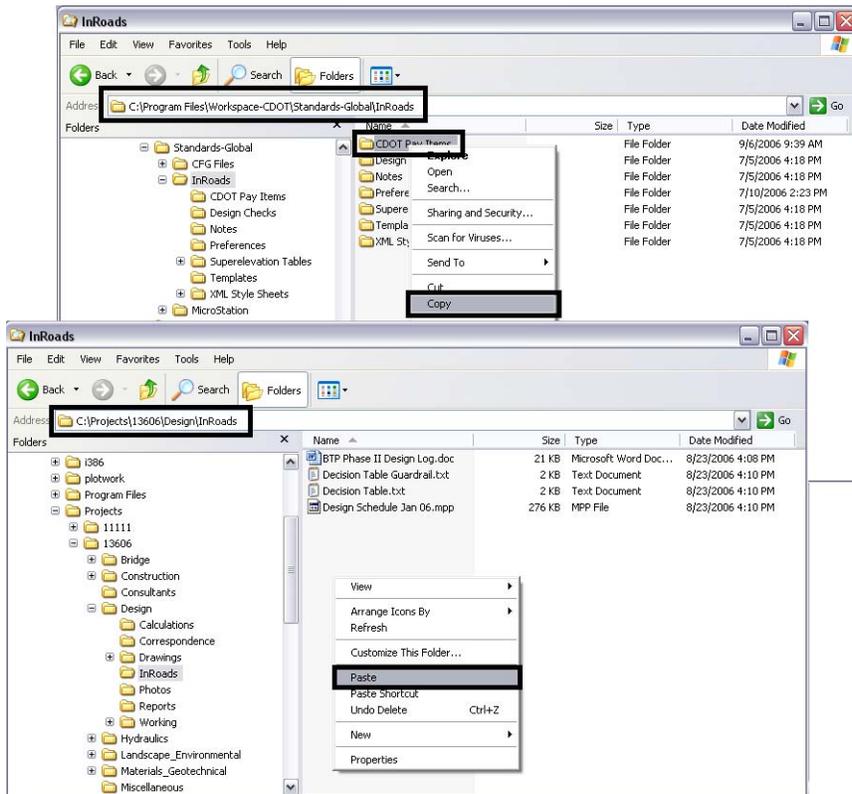
Copying The CDOT Pay-Items.mdb:

Because the changes made to the pay items database will be unique to the project, a copy of the CDOT Pay-Items.mdb should be placed in the project directory.

Making The Copy

1. Open an Explore window to the C:\Program Files\Workspace-CDOT\Standards-Global\InRoads directory and **Copy** the entire **CDOT Pay Items** folder.

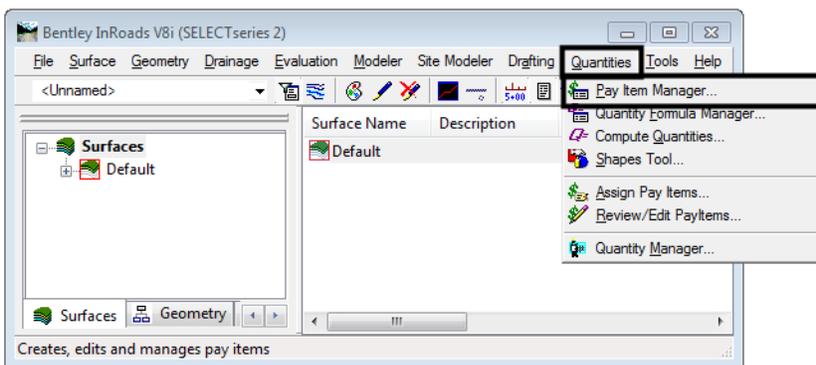
- Change the directory to **C:\Projects\JPC#\Design\InRoads** and **Paste**.



Copying A Pay Item

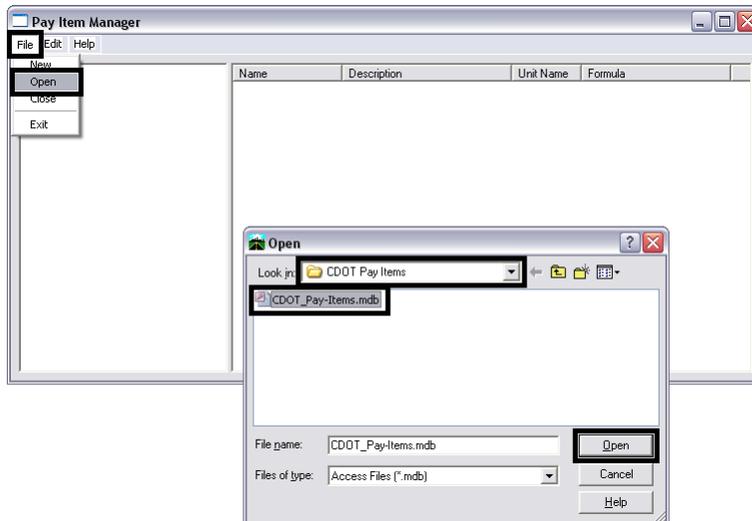
Now that a copy of the master database has been made, customizing the copy for the particular project can be accomplished.

- Start InRoads (and MicroStation), opening the; **C:\Projects\JPC#\Design\Working\XXXJPC#Quantity-Model##.dgn** file.
- From the InRoads menu, select **Quantities > Pay Item Manager**. This displays the **Pay Item Manager** dialog box.



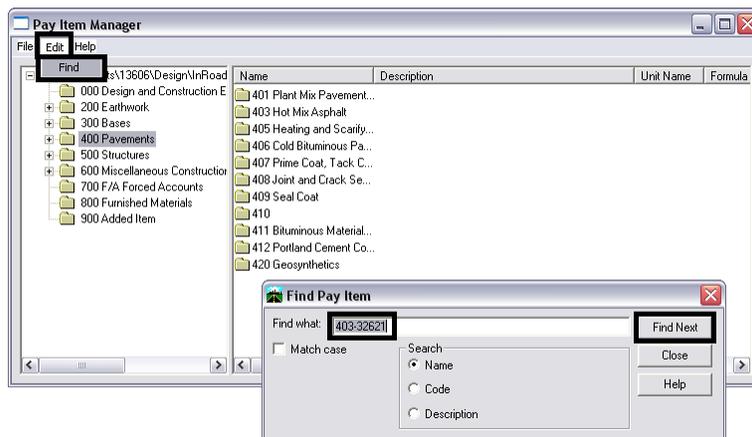
- From the **Pay Item Manager** dialog box, select **File > Open**.

- In the **Open** dialog box, Set the directory path to: **C:\Projects\JPC#\Design\InRoads\CDOT Pay Items**.
- Select **CDOT Pay-Items.mdb** and **Open**.



Locate The Pay Item To Be Copied

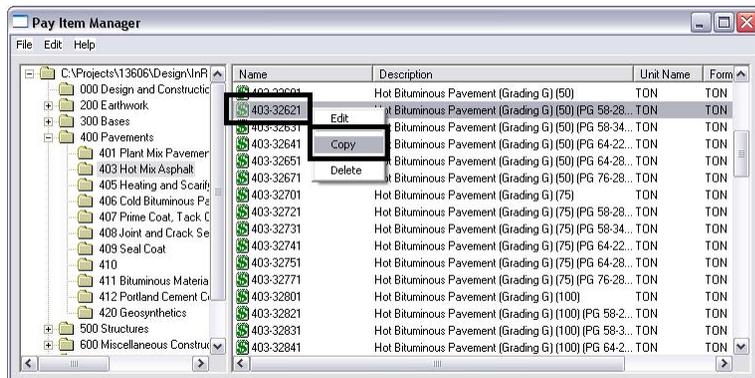
- Select **Edit > Find** from the **Pay Item Manager** dialog box. This displays the **Find** dialog box.
- In the **Find What** field of the **Find** dialog box, **key in** the desired **Pay Item Code**. And select **Find Next**. The desired pay item will be displayed, highlighted in the right pane of the **Pay Item Manager** dialog box.



- Select **Close** from the **Find** dialog box.

Making The Copy

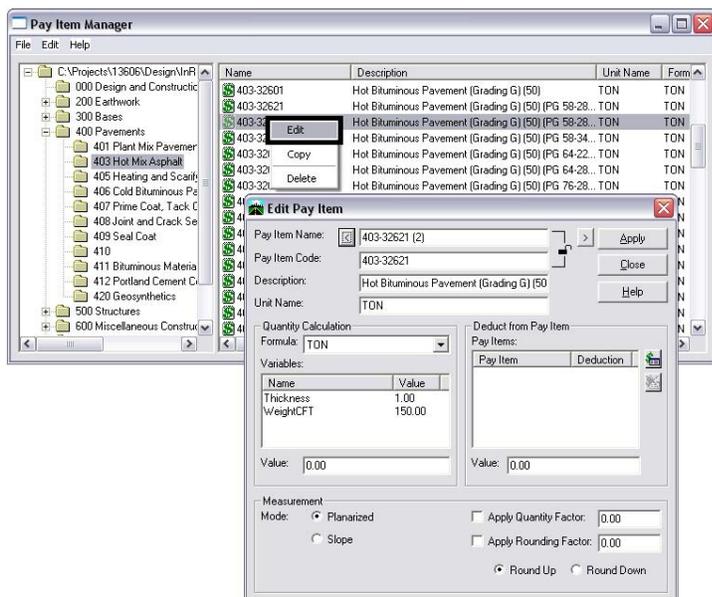
1. In the right pane of the **Pay Item Manager** window, <R> on the desired Pay Item Name. **Note:** be sure that the cursor is in the **Name** column. Select **Copy** from the menu that is displayed.



2. Move the cursor to the **Description** column, <R> and select **Paste**. A copy of the pay item with (2) appended to the name is placed under the original.

Editing The Pay Item:

1. In the right pane of the **Pay Item Manager** window, <D> on the copied Pay Item Name. **Note:** be sure that the cursor is in the Name column. This will highlight the copied Pay Item.
2. <R> on the Pay Item Name and select **Edit**. This displays the **Edit Pay Item** dialog box.



3. <D> just to the left of the '(2)' in the **Pay Item Name** field. **Key in** a brief, descriptive addition to the name. **Delete** the '(2)'.

- For Example, if pay item 403-32621 is to be laid down 6” thick, the name could read, **403-32621 – 6 Thick**.

- Do not change the **Pay Item Code**, **Description**, or **Unit Name**. Doing so will result in errors in the pay quantity calculations.
- A different formula may be selected from the **Formula** pull-down in the **Quantity Calculation** area.
- For example, there are two formulas for computing tons; ‘Ton’ and ‘Ton – L’. ‘Ton’ uses the area of a feature and the variables Thickness and WeightCFT. ‘Ton – L’ uses the length of the feature and the variables Width, Thickness, and WeightCFT.

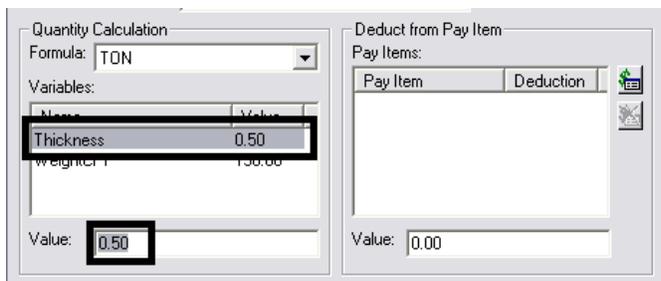
Name	Value
Thickness	1.00
WeightCFT	150.00

Pay Item	Deduction

Editing Formula Variables

- <D> on the desired variable from the **Variables** list in the **Quantity Calculation** area.

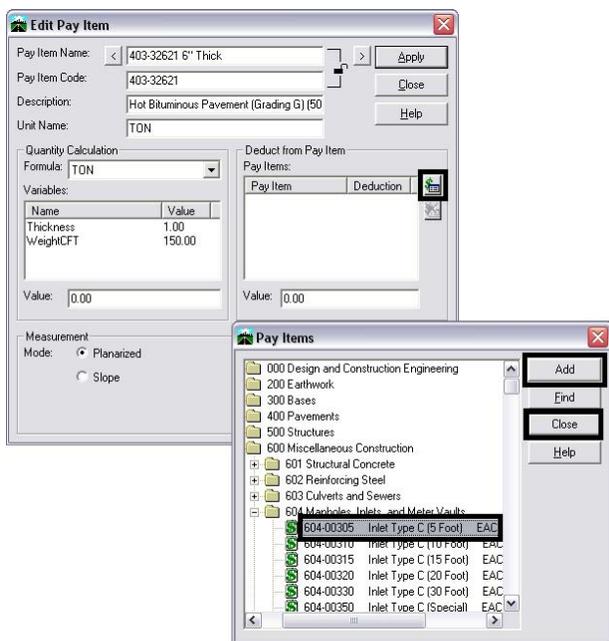
2. **Highlight** the data in the **Value** field directly below the **Variables** list and **key in** the desired value. Press the **Tab** key to accept the value.



Deduction From Pay Items

This option is used when two features occupy the same location (are coincident) and one of those features can reduce the quantity of the other. For example, suppose a curb feature is stored as a continuous Breakline and inlet features are stored as random points on the curb Breakline. For each occurrence of an inlet on the curb, the quantity of the curb can be reduced by a defined value.

1. To add a pay item for deduction <D> on the **Pay Item Browser** button. This displays the **Pay Item** browser dialog box.
2. <D> on the desired pay item and select **Add**. The **Pay Item** is add to the **Deduct From Pay Items** list. <D> on the **Close** button to dismiss the **Pay Item** browser dialog box.



3. <D> on the desired pay item from the list in the **Deduct From Pay Items** area.

4. **Highlight** the data in the **Value** field directly below the **Pay Items** list and *key in* the desired value. Press the **Tab** key to accept the value.

The image shows two side-by-side dialog boxes. The left one is titled 'Quantity Calculation' and has a 'Formula' dropdown set to 'TON'. Below it is a 'Variables' table with two columns: 'Name' and 'Value'. The table contains two rows: 'Thickness' with value '1.00' and 'WeightCFT' with value '150.00'. At the bottom, there is a 'Value' field containing '0.00'. The right dialog box is titled 'Deduct from Pay Item'. It has a 'Pay Items' list with two columns: 'Pay Item' and 'Deduction'. The list contains one row: '604-00305' with '5.00'. Below the list is a 'Value' field containing '5.00'. In both dialogs, the 'Value' fields and the 'Pay Item' cell in the list are highlighted with black boxes.

The Measurement Area

The options in this area are used to determine how areas and lines are measured. It is also used to specify quantity factors and rounding.

1. There are two mode of measurement; Planarized and Slope. Planarized projects the shape to a flat (2D) plane for measurement. Slope measures the actual (3D) shape.
2. **<D>** on the desired radio button to select the measurement **Mode**.

The image shows a single dialog box titled 'Edit Pay Item'. It has several input fields: 'Pay Item Name' (403-32621 6" Thick), 'Pay Item Code' (403-32621), 'Description' (Hot Bituminous Pavement (Grading G) (50)), and 'Unit Name' (TON). There are 'Apply', 'Close', and 'Help' buttons. Below these are two sub-dialogs: 'Quantity Calculation' (same as in the previous image) and 'Deduct from Pay Item' (same as in the previous image). At the bottom is a 'Measurement' section with a 'Mode' group box containing two radio buttons: 'Planarized' (selected) and 'Slope'. To the right are two checkboxes: 'Apply Quantity Factor' (unchecked) and 'Apply Rounding Factor' (unchecked), each followed by a 'Value' field (both containing '0.00'). Below these are two radio buttons: 'Round Up' (selected) and 'Round Down'.

3. A **Quantity Factor** is a multiplier applied to the calculated quantity.
4. If a **Quantity Factor** is to be used, **<D>** the check box to the left of **Apply Quantity Factor**.

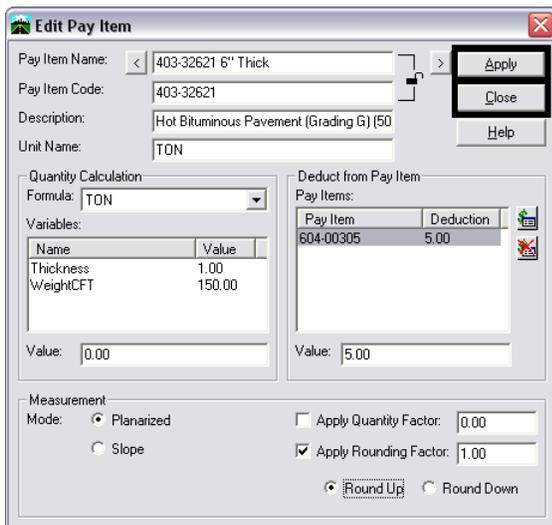
5. **Highlight** the data in the field to the right of **Apply Quantity Factor** and *key in* the desired value. Press the **Tab** key to exit the field.



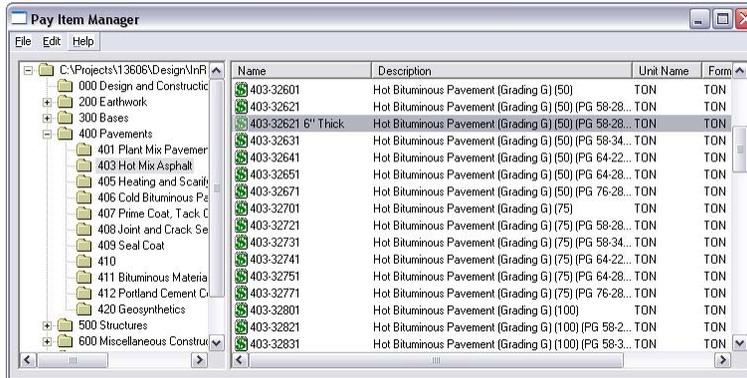
6. A **Rounding Factor** is used to modify the computed value to the nearest specified increment. There is also the option to round up or down.
7. If a **Rounding Factor** is to be used, **<D>** the check box to the left of **Apply Rounding Factor**.
8. **Highlight** the data in the field to the right of **Apply Rounding Factor** and *key in* the desired value. Press the **Tab** key to exit the field.
9. Select the desired rounding option from the two radio buttons below **Apply Rounding Factor**.



10. **<D>** the **Apply** button to accept all of the changes made to the pay item.
11. **<D>** the **Close** button to dismiss the **Edit Pay Item** dialog box.



12. This completes the edit.



Importing Graphics To surface

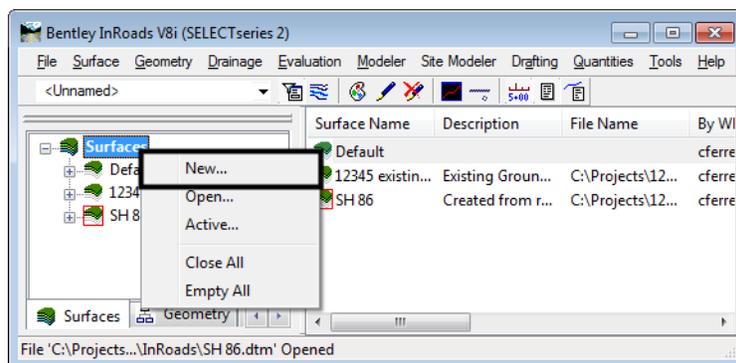
This command takes the X, Y, and Z coordinate information from a MicroStation element and stores it in a DTM file. This command will be primarily used for creating pay quantity data. Because of the high level of data control required, the **Load From Fence** option is inappropriate and will not be described.

Creating Or Opening The Surface

Data imported from graphics can be either loaded into a new or existing surface.

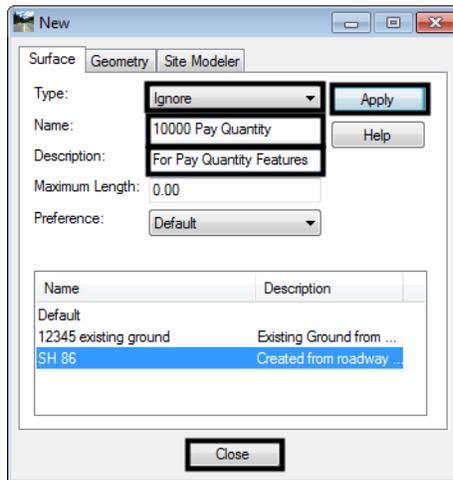
Creating A Surface

1. In the InRoads menu, <D> on the bottom **Surfaces** tab. <R> on the word '**Surfaces**' at the top of the left pane then select **New** from the menu.



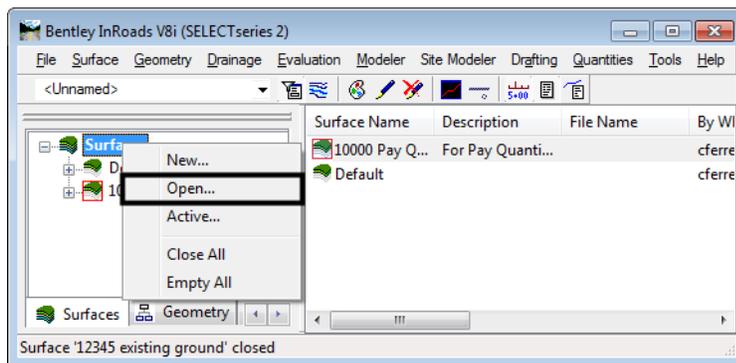
2. Set the **Type** to **Ignore**.
3. In the **Name** field of the **New** window, **key in** the desired name.
4. In the **Description** field, **key in** the desired description.

5. <D> the **Apply** button then <D> **Close**.



Opening An Existing Surface

1. In the InRoads menu, <D> on the bottom **Surfaces** tab. <R> on the word ‘**Surfaces**’ at the top of the left pane then select **Open** from the menu.



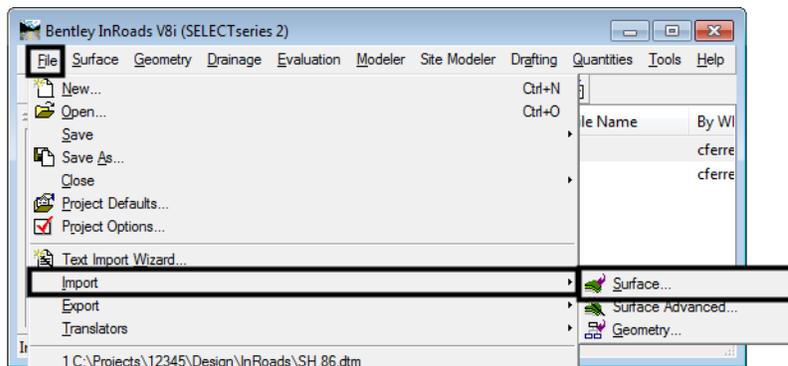
2. In the **Open** dialog box, use the **Look In** pull down menu to select the desired directory path.
3. <D> on the desired file name.

4. <D> on the **Open** button, then <D> on the **Cancel** button to dismiss the **Open** dialog box.



Importing Graphic Data

1. In the InRoads menu, select **File > Import > Surface**. The **Import Surface** dialog box will be displayed.

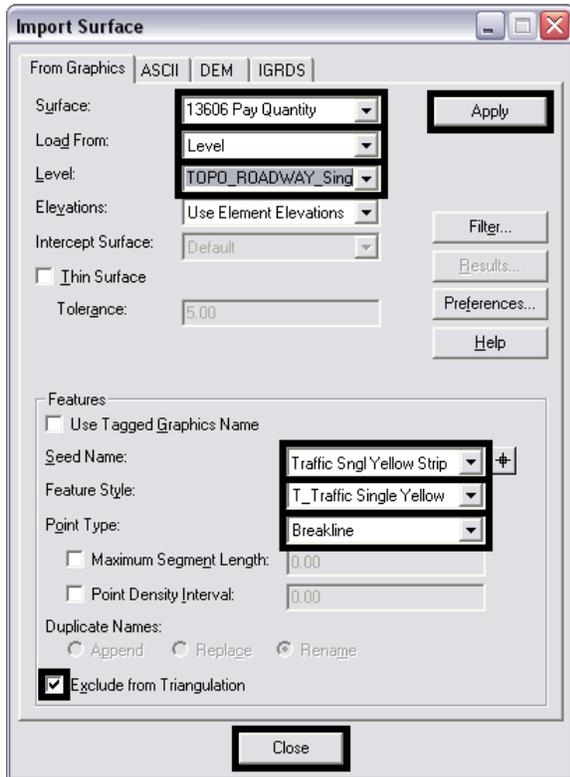


2. Using the **Surface** pull down menu, select the desired surface.
3. With the **Load From** pull down menu, select the desired method.

Note: If all of the elements on a particular level are to be imported, select **Level**.
4. If some elements on a level are to be imported and others are not, then select **Single Element**.
5. If **Load From** is set to **Level**, then with the **Level** pull down menu select the desired level. If **Load From** is set to **Single Element** this field is inactive.
6. In the **Seed Name** field, **key in** the desired name. This will be used to name the features imported from the graphic elements.

Note: this field may be populated if an existing surface is being used.
7. Use the **Feature Style** pull down menu to select the desired feature style.
8. Select the desired **Point Type** from the pull down menu. **Note:** when importing graphics for pay quantities, **Random** should be used for items paid for as each. **Breakline** is used for items whose quantity is figured from a linear measurement.
9. <D> the **Apply** button.

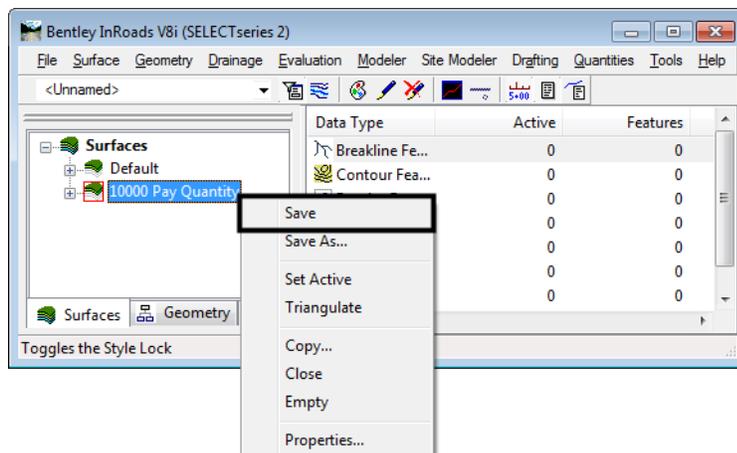
- a. If the **Load From** is set to **Level**, all elements on the selected level are imported.
- b. If **Load From** is set to **Single Element**, then <D> on the desired element. <D> a second time to **Accept** the selection.



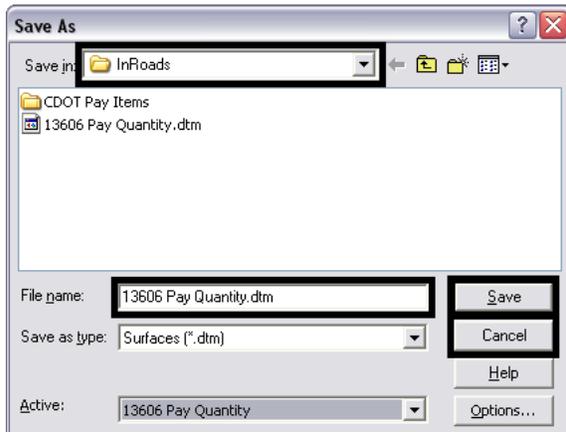
10. After all Levels and Elements are imported, <D> the **Close** button.

Saving The Surface

1. In the InRoads menu, <R> on the surface name in the left pane then select **Save** from the menu. If the file existed prior to importing data then the data is saved to that file and no further action is required.



2. If the file was new then the **Save As** dialog box will appear. Select the directory path using the **Save In** pull down menu.
3. In the **File Name** field, *key in* the desired name.
4. <D> on the **Save** button, then <D> on the **Cancel** button.



Using The Shapes Tool

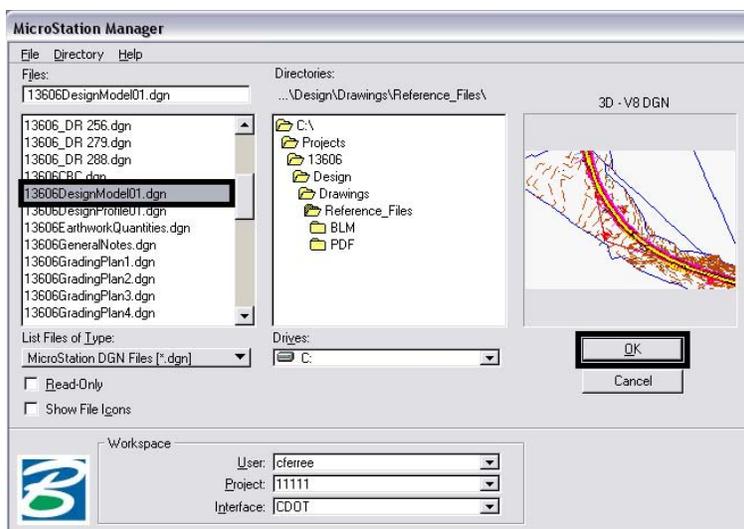
The Shapes Tool is used to create dtm features that define an area. The advantage of this tool is that it does not affect the graphic elements used to create the features. So, some of the same elements used to define an area feature can also be used to define linear features as well.

Creating A Working DGN file:

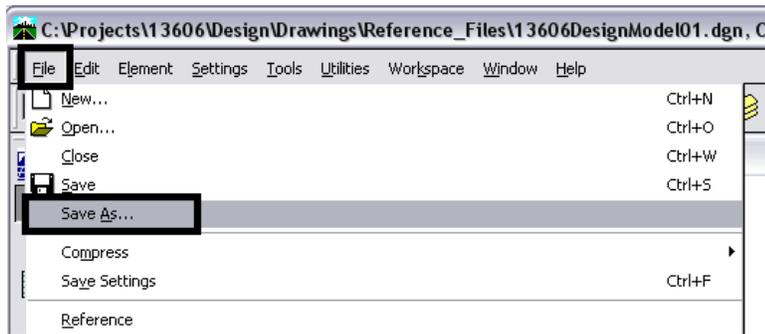
Because the *Shapes Tool* may require additional graphic elements to be added to the model file, or existing elements to be modified, a copy of this file should be used.

Creating A Copy of the DGN File

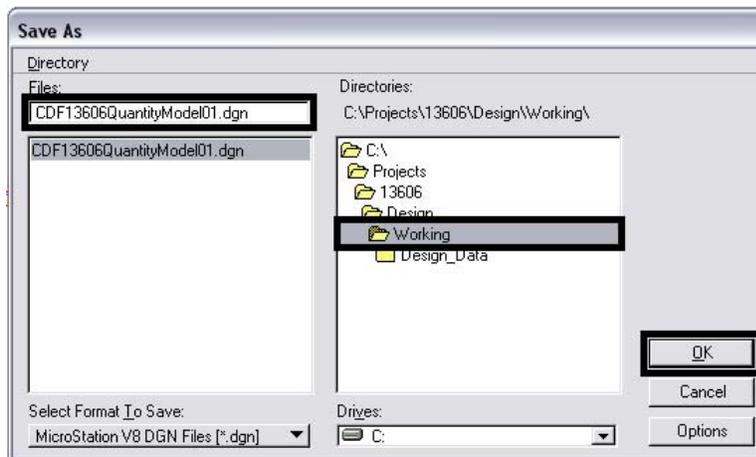
1. Start InRoads (and MicroStation). Set the directory path and highlight the desired file. Select **OK**.



2. Select **File > Save As** from the MicroStation Menu.



3. In the **Save As** dialog box, set the directory to the **Working** directory.
4. **Key in** the new name for the copied file and select **OK**. The copied file is now open in MicroStation.

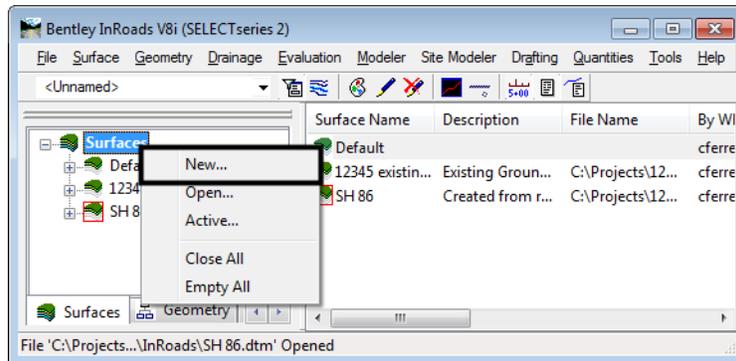


Preparations For Using The Shapes Tool:

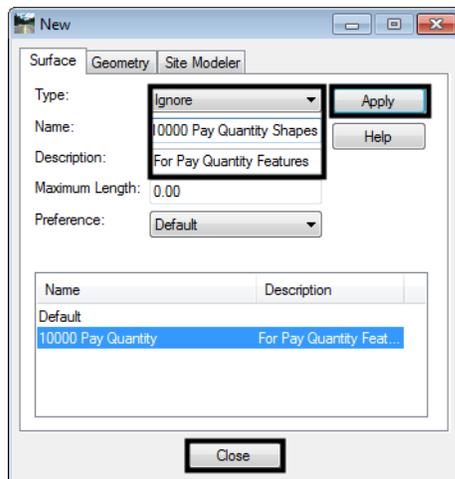
Creating A surface For Quantity Data

The design DTM will contain a large number of features that will not be used for quantity calculation. Using this surface could produce unwanted or erroneous quantity data. To avoid this problem a surface will be created to contain only pay quantity data.

1. In the InRoads menu, <D> on the bottom **Surfaces** tab. <R> on the word ‘**Surfaces**’ at the top of the left pane then select **New** from the menu.



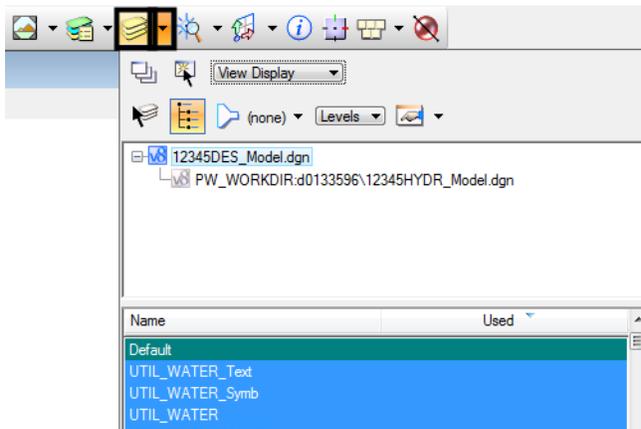
2. In the **Name** field of the **New** window, *key in* the desired name.
3. In the **Description** field, *key in* the desired description.
4. <D> the **Apply** button then <D> **Close**.



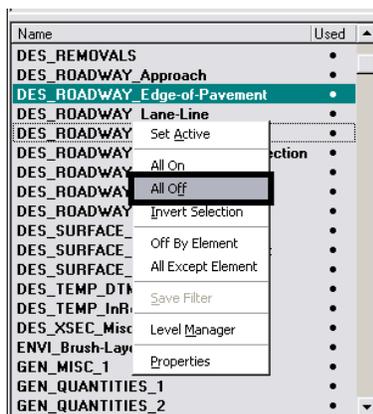
Setting The Level Display

1. The **Shapes Tool** works with all of the visible graphic elements. Therefore, it is necessary to turn off those levels that do not contain elements that will be used define the area feature.
2. Select the **Level Display**.

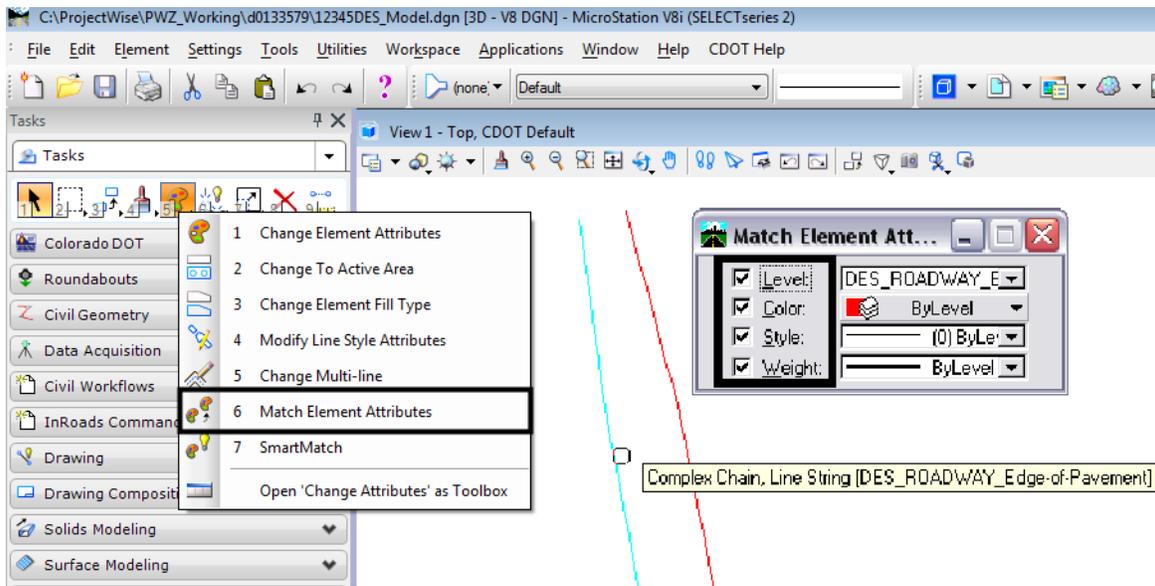
Note: if the down arrow next to the **Level Display** button is selected, the **Level Display** menu will be automatically dismissed when the cursor is moved off the menu.



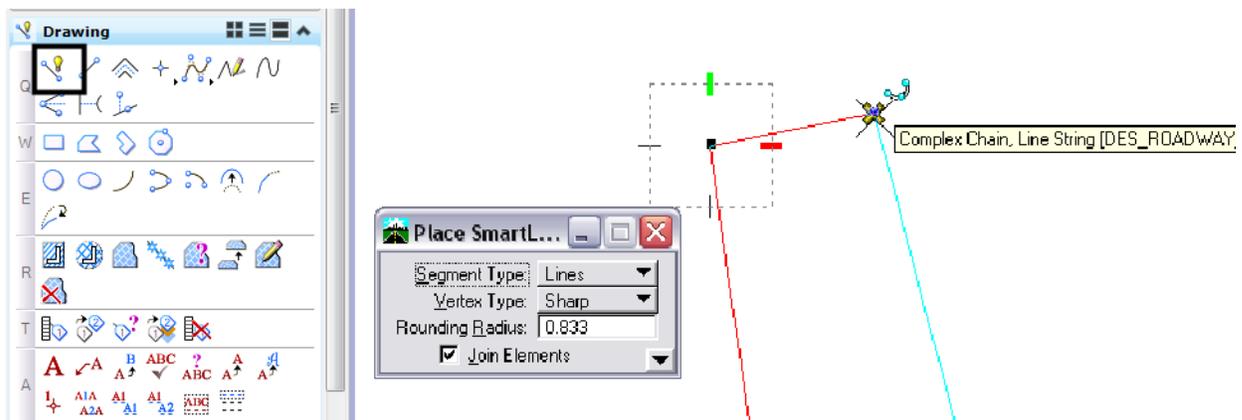
3. <R> on the desired level and select **Set Active** from the menu.
4. <R> on the **Level Display** and select **All Off** from the menu. This will leave only the desired elements displayed.



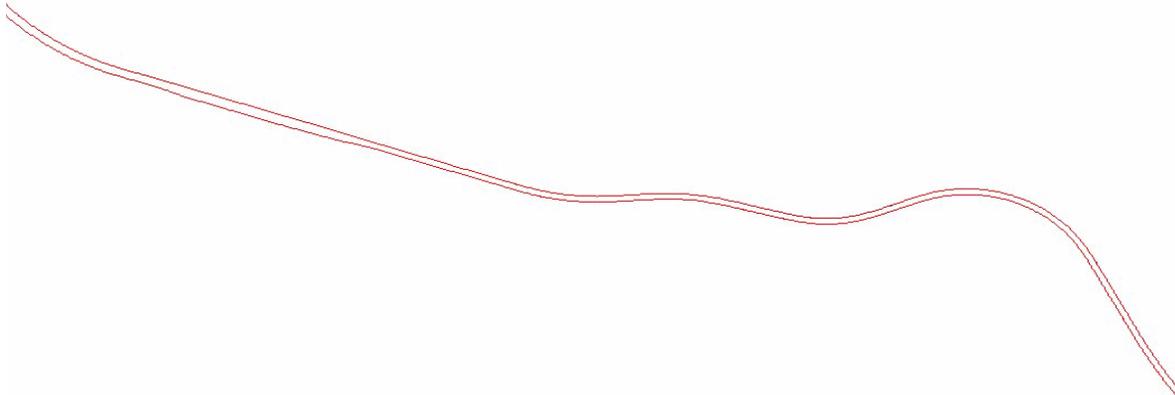
- Use the **Match Element Attributes** command. Turn on all of the check boxes. <D> on the desired element to match its attributes.



- Select the **Place Smartline** (or **Place Line**) command. <T> to the end of one of the elements that will form the area then <D>.
- <T> to the end of the next element that will form the area then <D>.

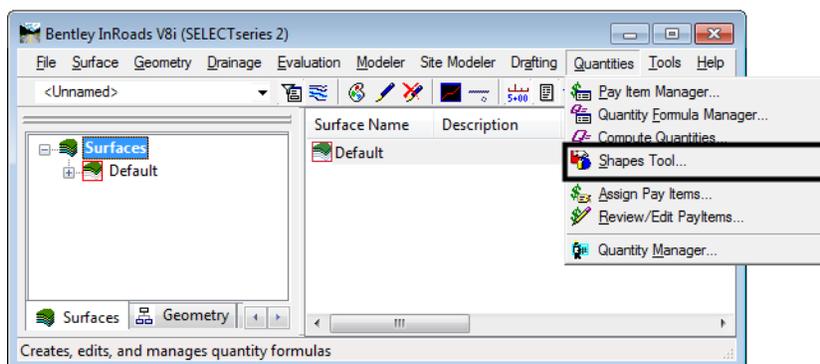


- Repeat this process until all of the gaps in the area are filled. Below is an example of a closed area.

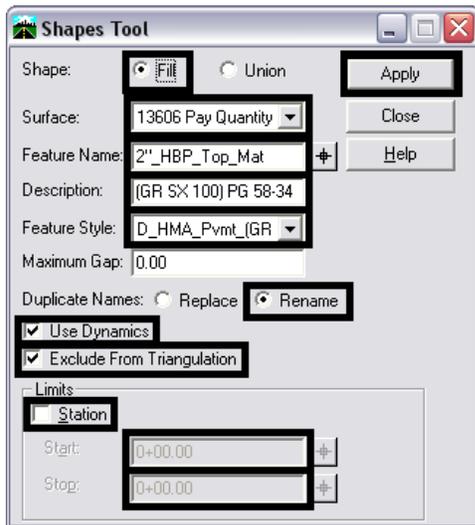


Creating The Area Feature

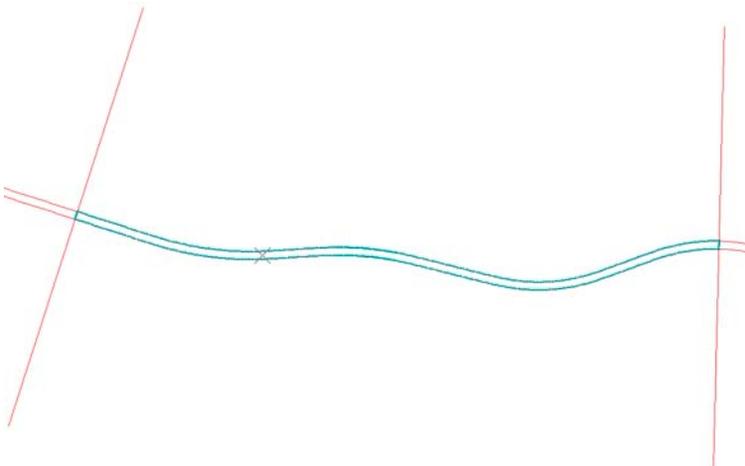
- From the InRoads menu, select **Quantities > Shapes Tool**. The **Shapes Tool** dialog box will be displayed.



- On the **Shapes Tool** dialog box, select **Fill** for the **Shape** entry.
- Using the **Surface** pull down menu, select the surface created above.
- In the **Feature Name** field, *key in* the desired feature name.
- In the **Description** field, *key in* the desired text.
- Using the **Feature Style** pull down menu, select the desired feature style.
- Select **Rename** for the **Duplicate Names** setting.

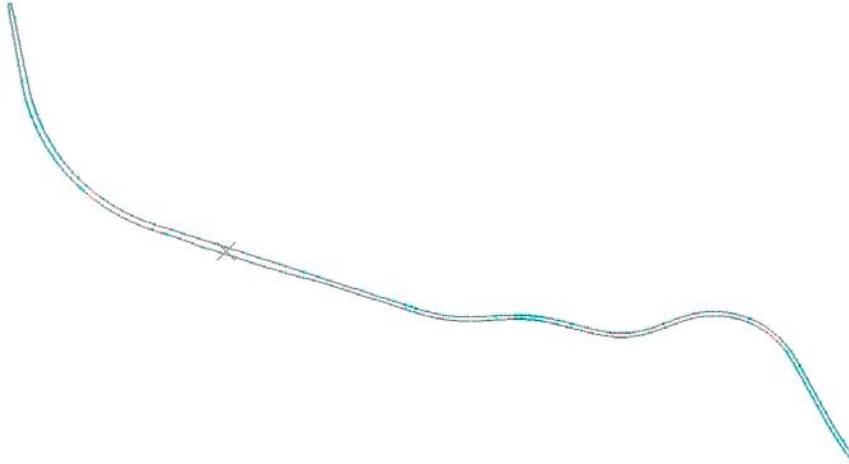
8. Toggle on **Use Dynamics** and **Exclude From Triangulation**.9. In the **Limits** area, toggle **Station** on if desired. If used, *key in* the **Start** and **Stop** stations in their respective fields.

Note: If station limits are used, temporary lines extending perpendicular to the active alignment 1,000 feet in either direction will be placed at the Start and Stop stations. These will be used to define areas both inside and outside the station limits.

10. Select the **Apply** button.

11. Move the cursor inside the desired area. Closed areas will highlight as the cursor is moved through them.

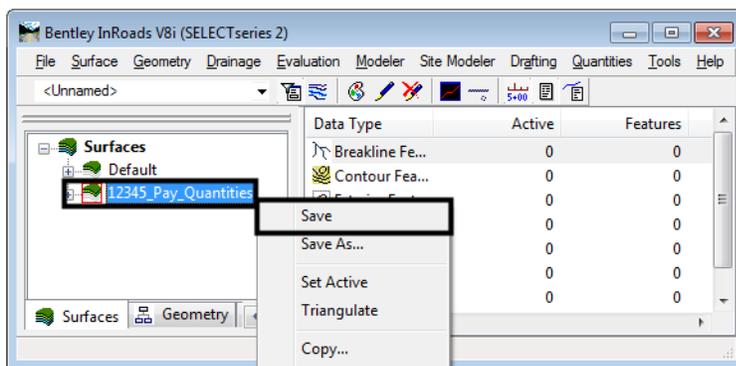
12. <D> inside the area to create the feature. <D> a second time to accept. If additional features are to be created using the same settings, these can be selected at this time. The first additional feature will have a '1' appended to its name. This will be incremented by 1 for each additional feature thereafter.



After the desired areas have been selected, <R> to re-display the **Shapes Tool** dialog box and then select **Close**.

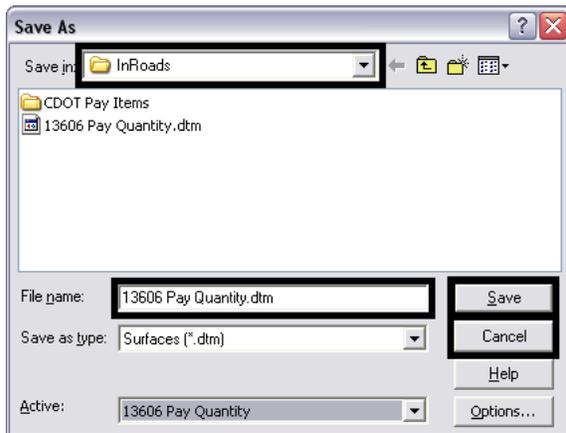
Saving The Surface

1. In the InRoads menu, <R> on the surface name in the left pane then select **Save** from the menu. If the file existed prior to importing data then the data is saved to that file and no further action is required.



2. If the file was new then the **Save As** dialog box will appear. Select the directory path using the **Save In** pull down menu.
3. In the **File Name** field, *key in* the desired name.

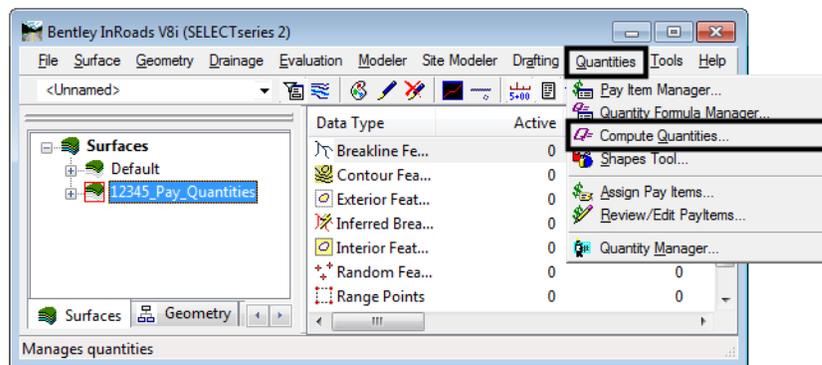
4. <D> on the **Save** button, then <D> on the **Cancel** button.



InRoads Compute Quantities

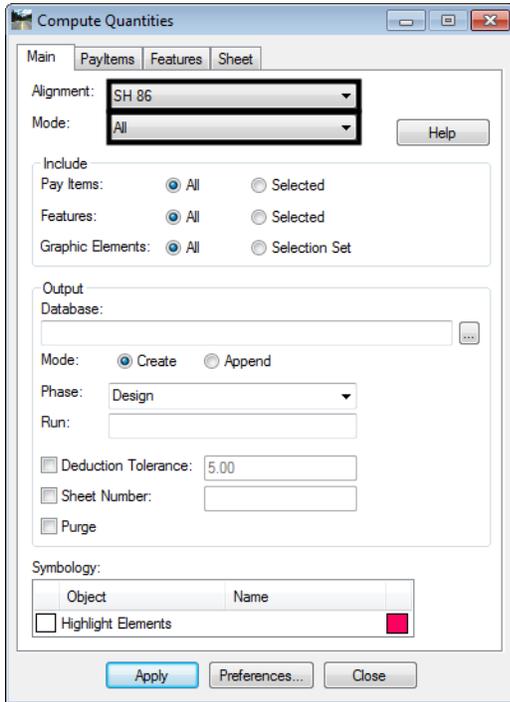
The compute Quantities command collects pay quantity data from a DTM and stores it in a database to be used with Quantity Manager. This command requires a surface with pay items assigned to the features and a geometry project with a horizontal alignment.

1. From the InRoads menu, select **Quantities > Compute Quantities**. This will display the **Compute Quantities** dialog box.

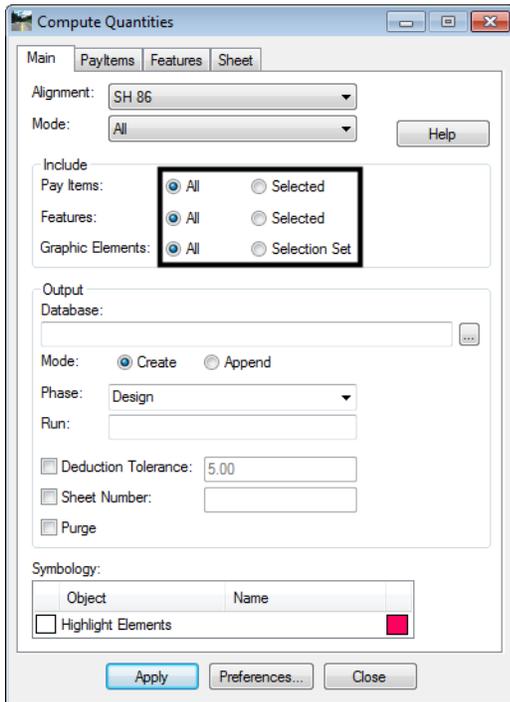


2. Select the desired alignment using the **Alignment** pull down menu. Quantities will only be calculated for features within the station range of the specified alignment.

- Using the **Mode** pull down menu, select either **All** or **Fence**. The **All** mode uses all features within the alignment, the **Fence** mode uses only those features that are within a defined fence.

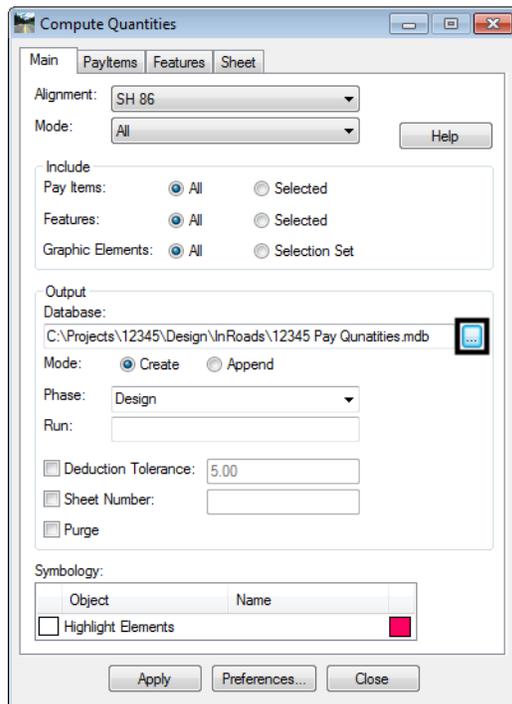


- In the **Include** area, <D> either the **All** or **Selected** radio button for **Pay Items**, **Features**, and **Graphic Elements**.



Note: If the **Selected** radio button is chosen, then the items to be processed must be identified on their respective tab. If the **All** radio button is selected all data of that type is processed and its tab is not used.

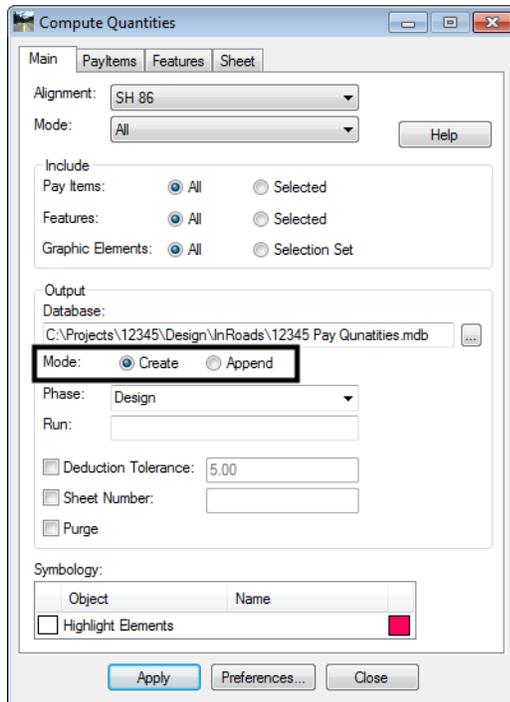
- In the **Output** area, <D> on the browser button next to the **Database** field. This will display the **Browse** window.



- Select the desired directory path from the **Save In** pull down menu.
- In the **File Name** field, *key in* the desired filename or select an available one from those listed.
- <D> on the **Save** button. This will dismiss the **Browse** window and fill in the **Database** field.

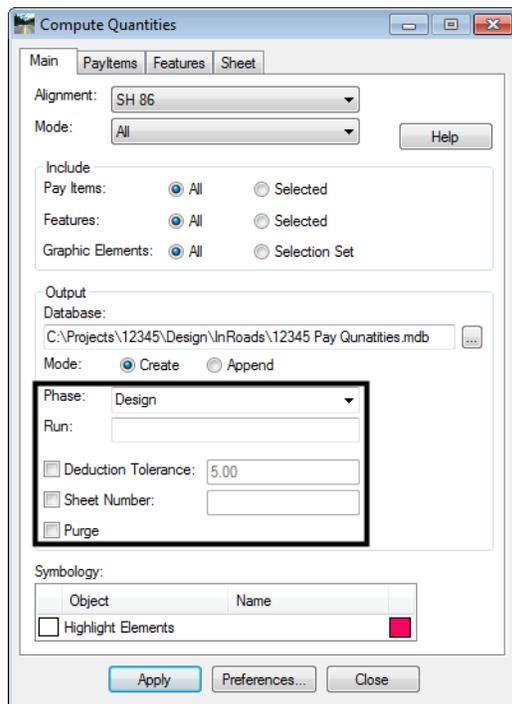


9. Select a **Mode**. Choose **Create** to make new file or to overwrite an existing file. Choose **Append** if adding additional data to an existing file.



10. Select a **Phase** from the combo box to the right. A new **Phase** can be created by *keying in* a name in the combo box. Phases are used to group quantities.
11. The **Run** field is another method of grouping quantities. If desired, *key in* a **Run** name in the field to the right.
12. <D> in the **Deduction Tolerance** check box to turn it on or off. The field to the right is used to define the distance at which features are considered coincident. *Key in* the desired value. For more information on pay item deductions see the “*Customizing The Pay Items Database*” workflow.
13. <D> in the **Sheet Number** check box to turn it on or off. When on, the field to the right is made active and a **Sheet Number** can be *keyed in*. This field is for informational purposes when quantities are tabulated on a per sheet basis.

14. <D> in the **Purge** check box to turn it on or off. When on, this option deletes pay quantities from the database if the feature used to calculate the quantity has been deleted from the DTM.



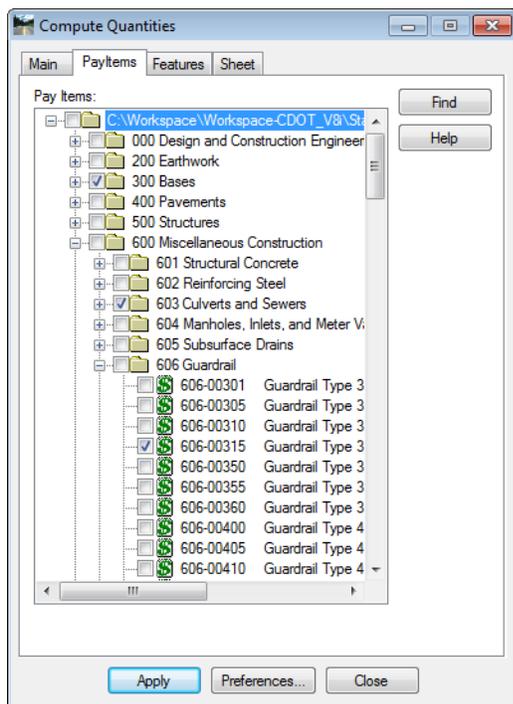
15. The **Symbology** area is used to set the parameters for highlighting elements that quantities were computed for. <D> on the check box in the **Display** column to turn the highlight on or off.

The Pay Items Tab

This tab is used if **Pay Items** in the **Include** area is set to **Selected**.

1. <D> on the **Pay Items** tab to bring it to the front.

2. Select the **Pay Items** to be computed by clicking in the check box to its left.

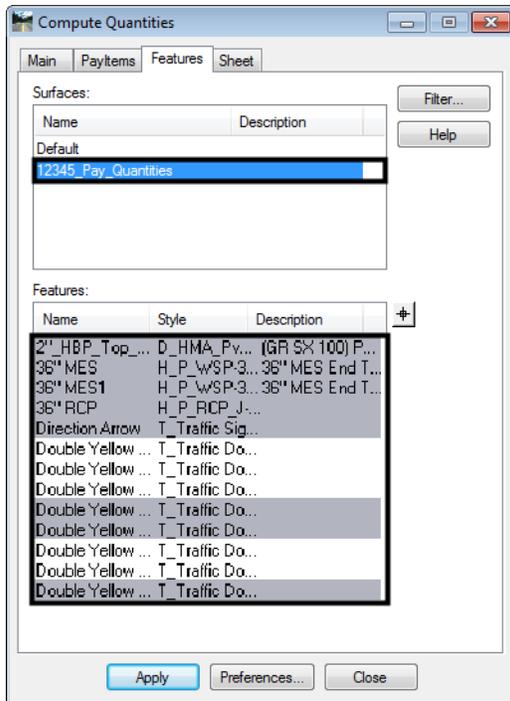


Note: All of the pay items in the list can be selected by selecting the ‘Root’ directory at the top of the list. If a Category is selected (‘300 Bases’ in the example above) then all of the items in that category and its sub-categories are selected. If a Sub-Category is selected (‘603 Culverts and Sewers’ above) then all of the items in that sub-category are selected. Finally, individual pay items can be selected (‘606-00350 Guardrail Type 3 above).

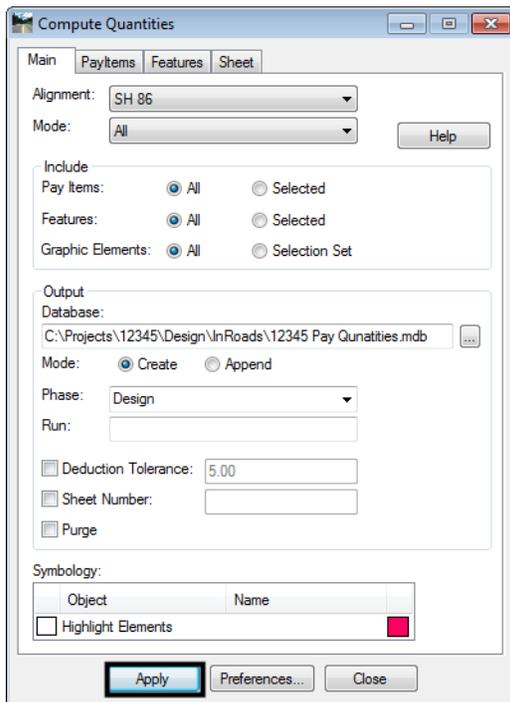
The Features Tab

1. This tab is used if **Features** in the **Include** area is set to **Selected**.
2. <D> on the **Features** tab to bring it to the front.
3. In the **Surface** area, <D> on the desired surface. Multiple surfaces can be selected by holding the **Shift** or **Ctrl** key and then clicking on the desired surfaces.
4. In the **Features** area, <D> on the desired **Feature**. A consecutive range of features can be selected by holding the **Shift** key then clicking on the first and last feature in the range. A number of individual features can be selected by holding the **Ctrl** key then clicking on the desired features.

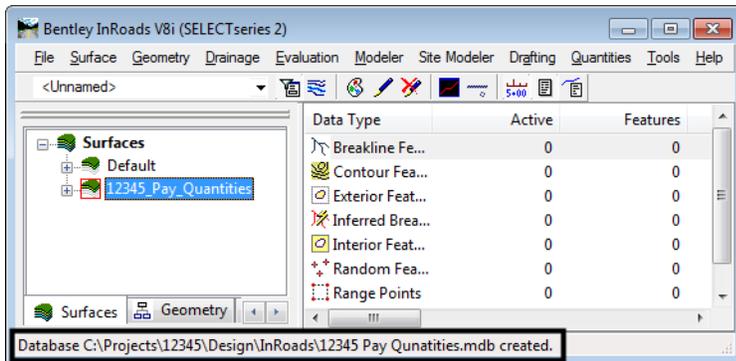
- The **Locator** button can be used to identify features from the graphic elements displayed. The **Ctrl** key can be used with this option, however, the **Shift** key can not. To use it, **<D>** on the **Locator** button then **<D>** on the desired graphic element.



- <D>** the **Apply** button to calculate the quantities.



- When processing is completed, a message stating that the *.mdb file has been created will appear in the lower left corner of the InRoads interface.



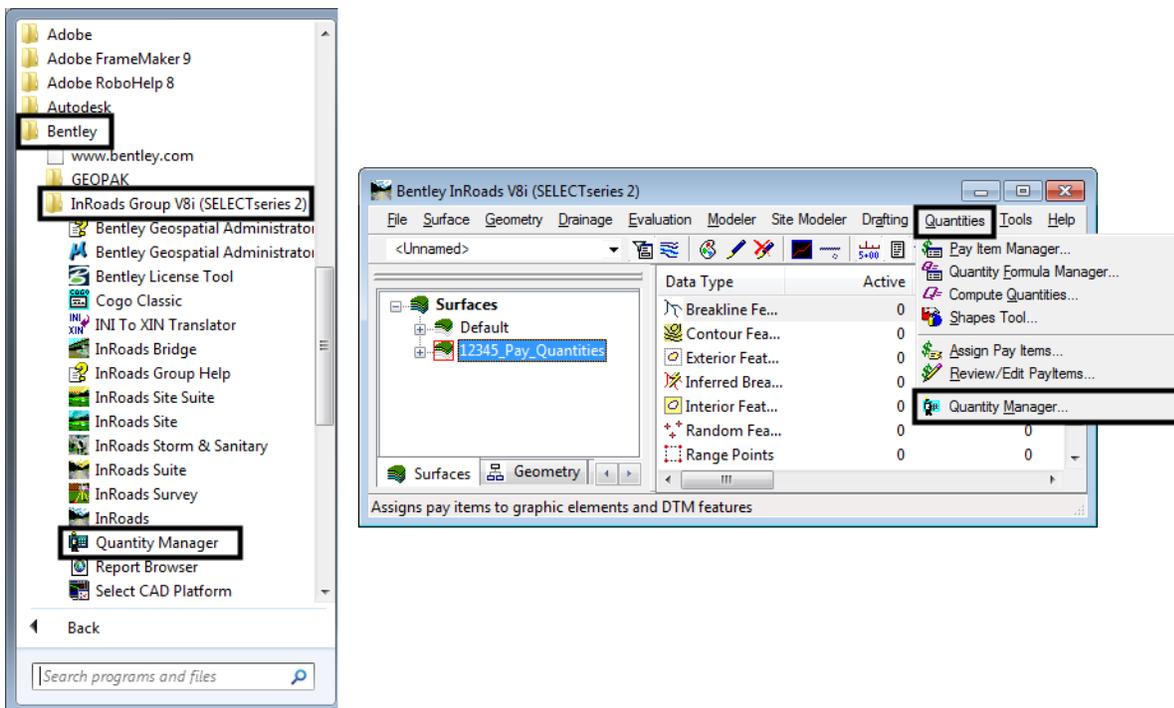
- <D> the Close button to dismiss the Compute Quantities dialog box.

Working With Quantity Manager

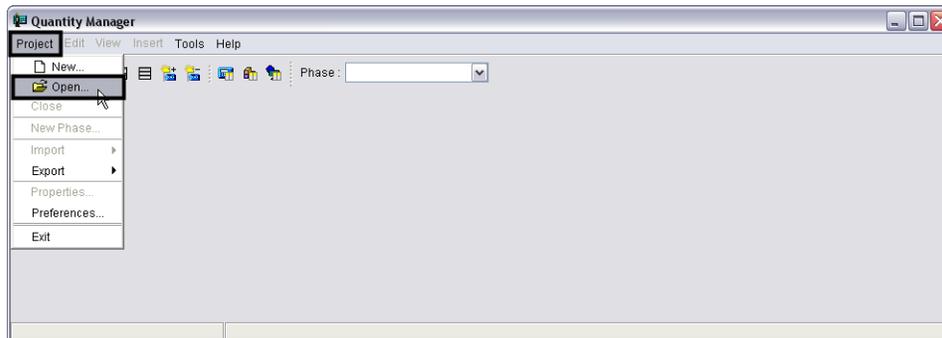
Quantity Manager is a “Stand Alone” interface with the pay quantity database created by the InRoads **Compute Quantities** command. It is used to update the database with quantities not computed by InRoads and to create reports on the quantity data.

Opening Quantity Manager

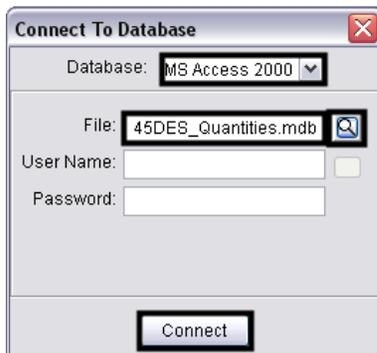
- Quantity Manager can be started from the InRoads menu by selecting **Quantities > Quantity Manager**. It can also be started from the Start menu by selecting **Start > All Programs > Bentley > InRoads Group V8i (SELECTseries 2) > Quantity Manager**. MicroStation and InRoads do not have to be running for Quantity Manager to work.



2. Select **Project > Open**. This option is used to load the database created by the InRoads **Compute Quantities** command. The **Connect to Database** window will appear.



3. Set the **Database** pull down to: **MS Access 2000**. This is the format used by the **Compute Quantities** command (SQL Server 2000 and Oracle formats can also be used by Quantity Manager).
4. In the **File** box, type in the directory path and file name of the desired file. The **Browse** button to the right of the field can be used to locate and select the desired file.
5. <D> the **Connect** button. (unless otherwise noted, the **User Name** and **Password** fields are left blank.) The database is now loaded into Quantity Manager and editing can begin.

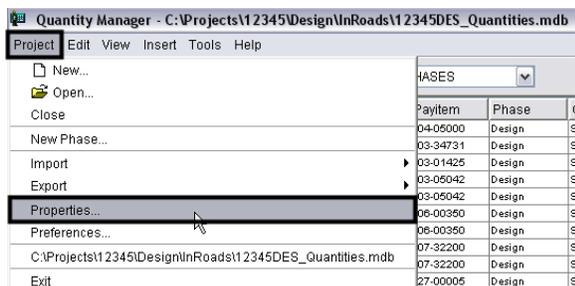


Properties And Preferences

Information about the project that is used by Trns*port is stored in the **Project Properties**. A data file that facilitates the manual entry of quantities is attached to through the **Project Preferences**. This information should be filled in after the project is opened the first time.

Properties Data

1. Select **Project > Properties** from the menu bar.

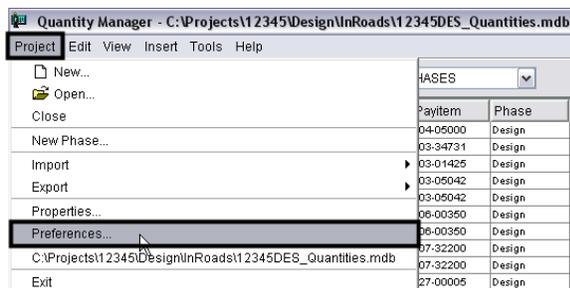


2. In the **Project Properties** dialog box, fill in the desired information for: **Project Number** (JPC Code), **Description** (optional), **Unit System**, and **Spec. Year**. This information is used when creating a data file to be used with Trns*port. After the data is entered, <D> the **OK** button.

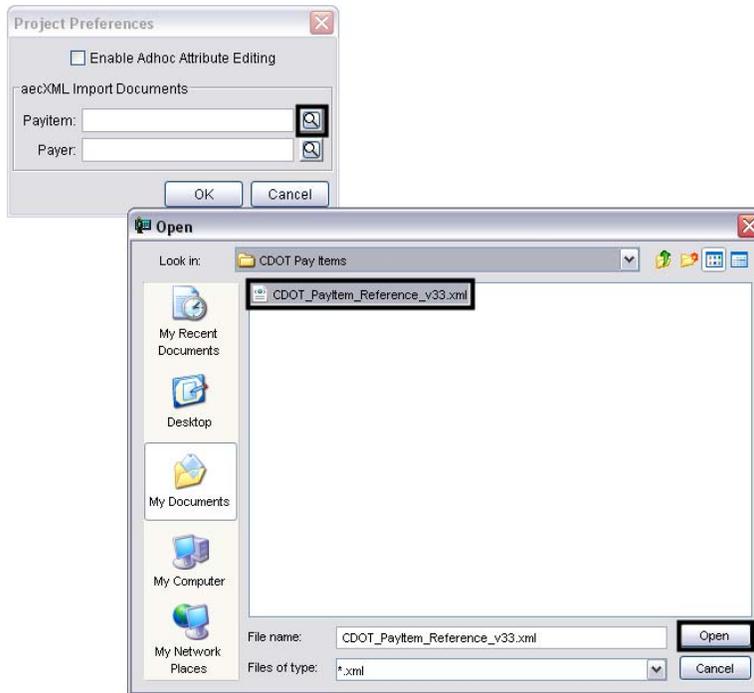


Preference Data

1. Select **Project > Preferences** from the menu bar.

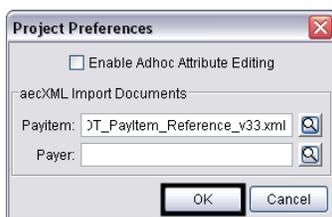


- From the **Project Preferences** dialog box, <D> the **Browse** icon for the Payitem field. Navigate to the **C:\Projects\JPC#\Design\InRoads\CDOT Pay Items** directory and select the **CDOOT_Payitem_Reference_v33.xml** file. <D> the **Open** button.

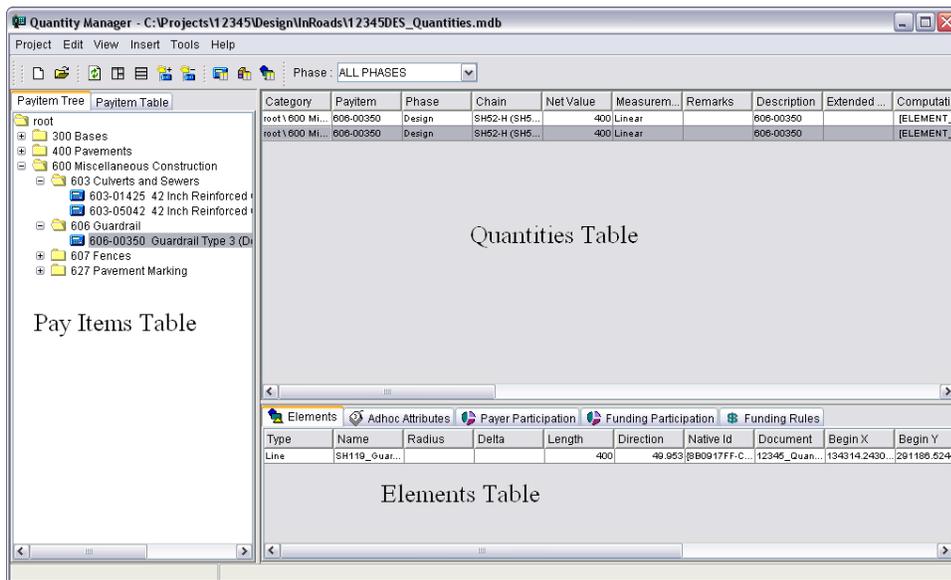


Note: This file contains a searchable pay item code list that will allow users to select pay item data from the file instead of manually keying in the information.

- <D> the **OK** button from the **Project Preferences** dialog box. This will dismiss the **Project Preferences** dialog box.



- The data stored in the pay quantity database is now displayed in the **Quantity Manager** window. The window is divided into three parts; the **Pay Items Table**, the **Quantities Table**, and the **Elements Table**. The **Pay Items** table is used to add, edit, and delete **Pay Items** and **Categories** within the database. It is also used to add additional quantities. The **Quantities Table** is used to add, edit, and delete specific quantities within the database. The **Elements Table** is for informational purposes only.



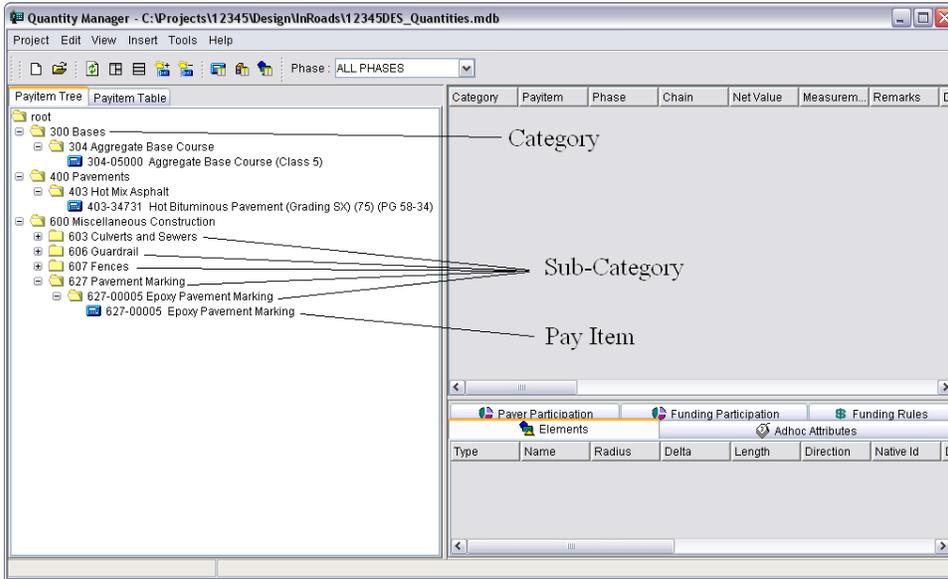
The Pay Item Table

The majority of the work done in **Quantity Manager** will be accomplished through the **Pay Item Table**. It is used to add or delete categories and pay items and can also be used to add quantity data to new or existing pay items within the pay quantity database.

The **Pay Item Table** is broken down into two basic types of data; **Categories** and **Pay Items**. **Categories** (and **Sub-Categories**) are used to divide the pay item data up into manageable pieces. They work much like the folders in the project directory structure, with the pay items organized by the first three digits of the pay item code. **Sub-Categories** are used to further divide pay items.

The pay item contains data on each element that had a quantity calculated for it using its pay item code. It also contains quantity data that was added manually to the database.

The illustration below identifies **Categories**, **Sub-Categories**, and **Pay Items** within the **Pay Item Table**'s tree view.



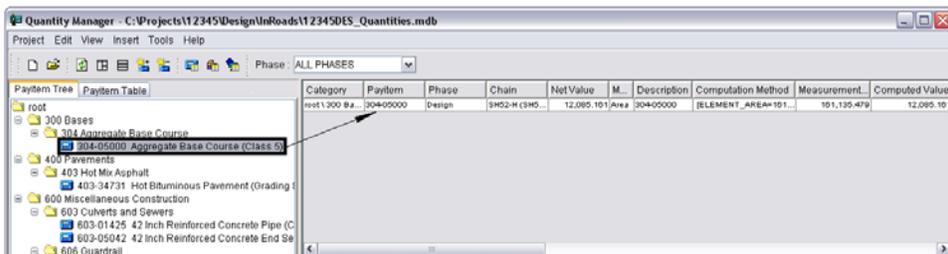
Information can be displayed within the **Pay Item Table** in two ways; the **Payitem Tree** and the **Payitem Table**. The **Payitem Tree** (illustrated above) shows only the **Category** and **Pay Item** names. The **Payitem Table** displays data specific to each pay item code used in the database. Below is an illustration of a sample **Payitem Table**:

Category	Total Cost	Total Net...	Payitem	Description	Unit	Unit Cost	Total Rounding	Lump Sum	Document	DEFAULT PAYER	DEFAULT FUNDING
root\300 Bases\304 Aggregate Base Course	0.0	12,085.161	304-05000	Aggregate B...	TON	0	0	<input type="checkbox"/>			0
root\400 Pavements\403 Hot Mix Asphalt	0.0	12,085.161	403-34731	Hot Bitumino...	TON	0	0	<input type="checkbox"/>			0
root\600 Miscellaneous Construction\603 Culverts and Sewers	0.0	120,603.014	2503-01425	42 Inch Rein...	LF	0	0	<input type="checkbox"/>			0
root\600 Miscellaneous Construction\603 Culverts and Sewers	0.0	2,603.05042	42 Inch Rein...	42 Inch Rein...	EACH	0	0	<input type="checkbox"/>			0
root\600 Miscellaneous Construction\606 Guardrail	0.0	600,606.00350	606-00350	Guardrail Ty...	LF	0	0	<input type="checkbox"/>			0
root\600 Miscellaneous Construction\607 Fences	0.0	5,159.401	607-32200	Fence Wood ...	LF	0	0	<input type="checkbox"/>			0
root\600 Miscellaneous Construction\627 Pavement Marking	0.0	41,107.627	00005	Epoxy Pave...	GAL	0	0	<input type="checkbox"/>			0

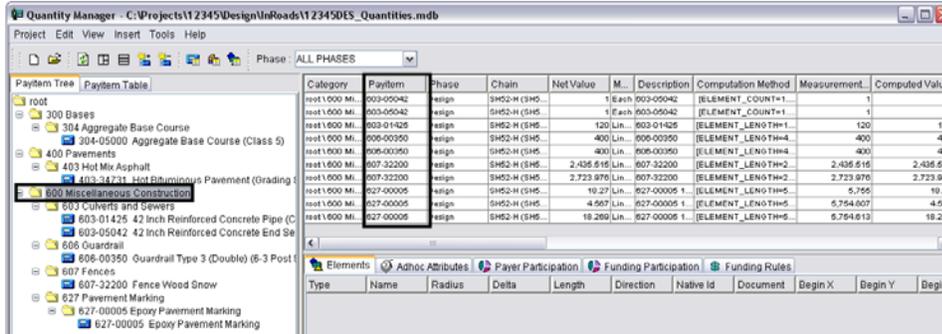
Because the **Payitem Tree** is generally easier to work with, it will be used throughout this workflow.

Displaying Pay Item Information

1. Expand the **Pay Item Tree** to show the desired pay item. <D> on the desired pay item. The data for that pay item is displayed in the quantity table.



- To show all of the items within a category or sub-category, <D> on the category in the pay item tree. All items within the category are displayed. In the example below, by selecting category 600, the pay items in subcategories 603,606,607,and 627 are displayed.

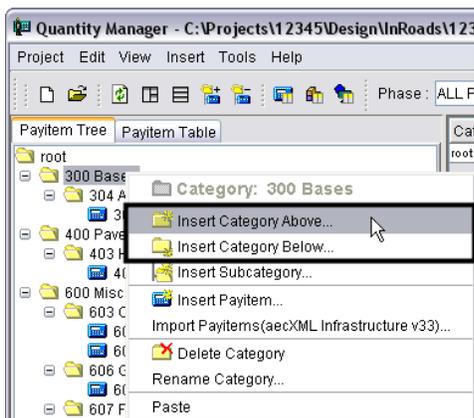


- Items from multiple categories can be displayed by holding the **Shift** or **Ctrl** key and selecting the desired categories or items.

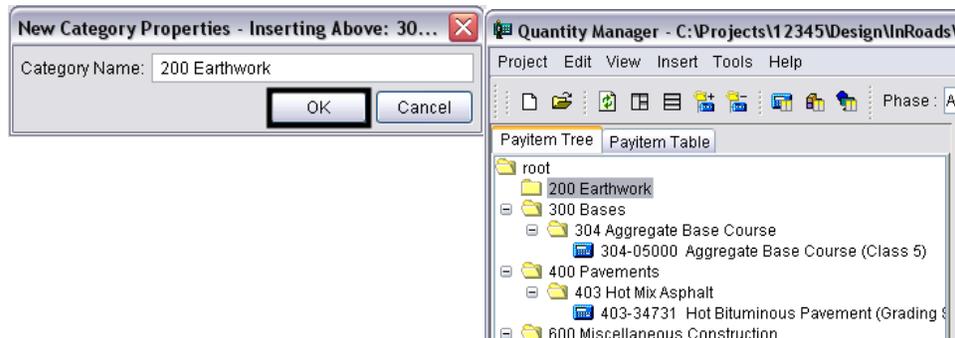


Adding Data To The Database

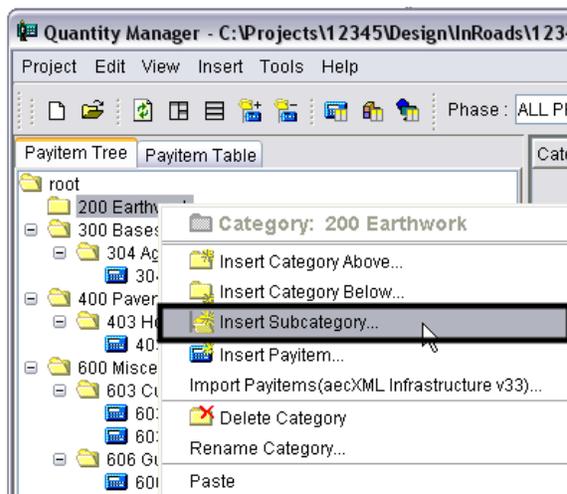
- Quantities for earthwork and many lump sum items will not be included in the dtm and, therefore, not incorporated into the database by the **Compute Quantifies** command. To include these additional **Categories, Sub-Categories, and Pay Items** may need to be added to the database.
- To add a new category <D> on the category next in sequence to the one to be added.
- Right Click** and select **Insert Category Above...** or **Insert Category Below...** This displays the **New Category Properties** dialog box.



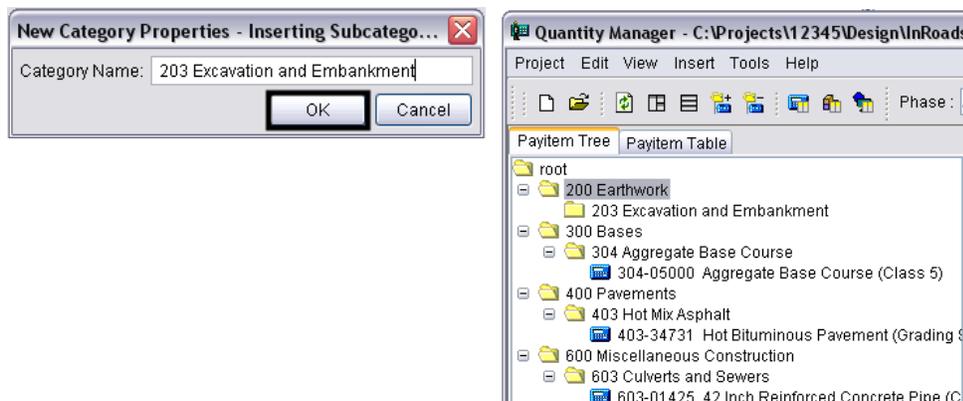
- In the **New Category Properties** dialog box, **key in** the desired category name. Select **OK** to create the new category.



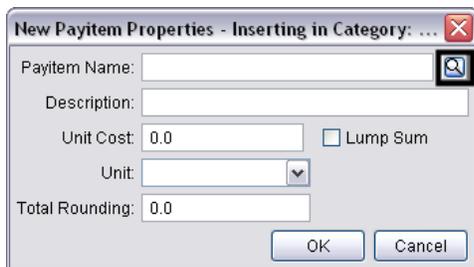
- Note:** A new category can not be placed above or below the **Root** category they must be placed as sub-categories.
- To add a new sub-category <D> on the category that will contain the new sub-category.
- Right Click and select **Insert Subcategory...** This displays the **New Category Properties** dialog box.



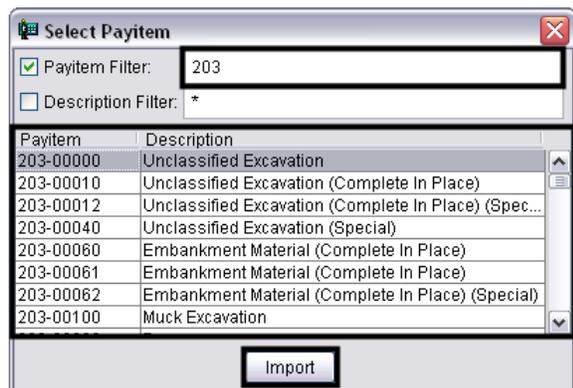
- In the **New Category Properties** dialog box, **key in** the desired category name. Select **OK** to create the new category.



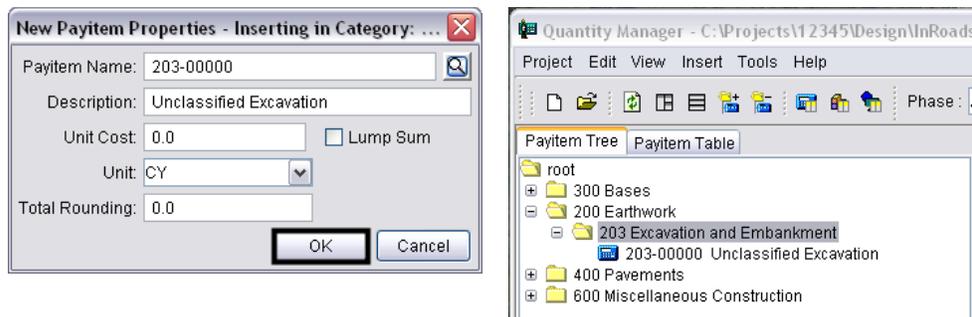
- To add a new pay item <D> on the pay item next in sequence to the one to be added (or <D> on the category the pay item is to be added to).
- Right Click** and select **Insert Payitem Above...** or **Insert Payitem Below...** (or **Insert Payitem...** if a category was selected above). The **New Payitem Properties** dialog box appears.
- Select the **Search** icon next to the **Payitem Name** field. This displays the **Select Payitem** dialog box.



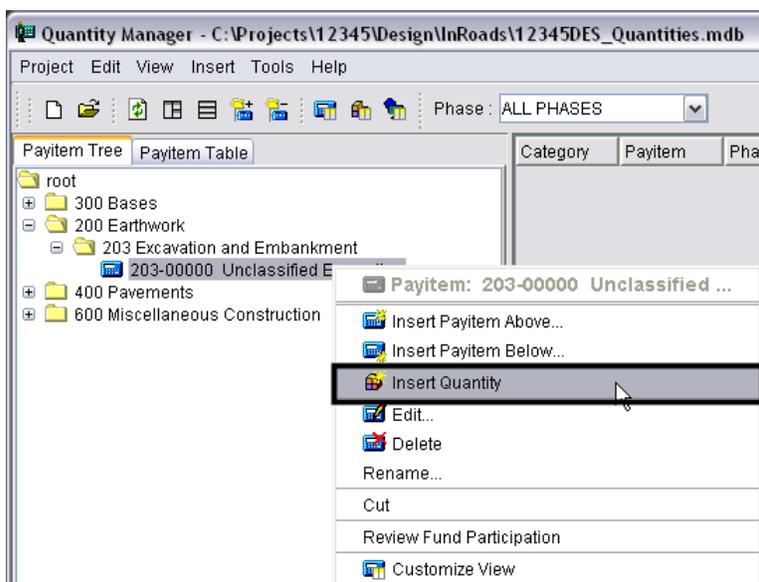
- Key in** the desired value in the **Payitem Filter**. This will greatly reduce the number of items that will have to be scrolled through.
- <D> on the pay item to be used, then select the **Import** icon.



14. The **Select Payitem** dialog box is dismissed and the **New Payitems Properties** dialog is populated with the selected data. Select the **OK** icon and the pay item is added to the **Pay Item Tree**.



15. To add a **Quantity** to a pay item <D> on the pay item then **Right Click**.
16. From the **Right Click** menu select **Insert Quantity...** The **New Quantity Properties** dialog box is displayed.



Only the **Measurement Basis**, **Computed Quantity**, and **Phase** are required fields. The others may be filled in as desired so that the data included with the manually entered quantity will match those of the ones imported from InRoads.

17. Select the desired **Measurement Basis**. This is how the feature would have been measured if there was one. There are three options; **Area**, **Linear**, and **Each**. Items measured by volume (Tons, Gallons, Cubic Yards, etc.) or area (Square Feet or Square Yards) should be set to **Area**. Those measured in Linear Feet or Linear Yards should be set to **Linear**. Items listed as Each or Lump Sum should use **Each**. Use the pull down menu to select the desired entry.
18. Select the desired **Measurement Value**. This equates to the area of a shape feature, the length of a line feature, and the number of points in a random feature. For a Lump Sum payitem this should be 1. This number is not used for any calculation. It is here to make this payitem record consistent with those imported from the DTM. **Key in** the desired value.

19. **Key in** the desired **Computed Quantity**. If a formula was utilized, this field is the result of the computation. Using a pavement quantity example, a formula computing tons from square feet could be utilized. In this case, the tonnage is the **Computed Quantity**. Entering data into this field auto-fills the **Rounded Quantity** with the same value. **Key in** the desired value.
20. **Key in** the desired **Rounded Quantity**. Some payitems use a **Rounding Factor** which is applied to the **Computed Quantity**. If the quantity being entered uses a rounding factor, change the number in this field to the rounded computed quantity. For example, concrete pipe is rounded to 2 foot increments. An 83 foot long pipe would be rounded to 84 feet. **Key in** the desired value.
21. Select the desired **Deduction Quantity**. The quantity of some payitems may be reduced by the presence of another payitem. While the payitem causing the reduction is not listed here, the amount of the reduction is. **Key in** the desired value.
22. **Key in** the desired **Sheet Number**. This is the name of the sheet upon which the quantities are located. This can be useful when computations are tabulated for individual sheets.
23. **Key in** the desired **Run Name**. This is a user-defined name. The run name is a grouping mechanism to permit segregation of quantities under the same payitem. It could be used to represent quantities of different stages or different alternatives.
24. Select the desired **Phase**. To assign the quantity to a particular phase.

Note: If this data is to be exported to Trns*port the **Phase** must be set to **Design**.
25. **Key in** the desired **Remarks**. Key-in field for remarks is limited to 256 characters.
26. **Key in** the desired **Description**. Key-in field for the Description is limited to 256 characters.
27. **Key in** the desired **Extended Description**. Key-in field for the Extended Description is limited to 256 characters.

New Quantity Properties - For Payitem: 203-00000

General | Location | Adhoc Attributes

Measurement Basis: Area

Measurement Value: 12431.56

Computed Quantity: 12431.56

Rounded Quantity: 12432

Deduction Quantity: 0.0

Net Quantity: 12432.0

Sheet Number:

Sheet Name:

Run Name:

Phase: Design

Date / Time: 2008-01-16 07:50:01

Remarks:

Description:

Extended Description:

Create

Close

Phase

Set Current

Required fields

Note: It is not required to enter location data. However, this information may be used when generating some reports.

28. Select the **Location** tab. This tab is used to identify the location of the quantity in relation to an alignment.
29. Select the desired **Baseline Chain** from the pull down menu. This is the alignment to be measured from.

Note: Minimum and Maximum Stations are used to set a boundary around the quantity. The station numbers do not represent the beginning or end of a feature, but the lowest and highest station at which the quantity would occur. The same can be said about the offsets, they represent denote the furthest distance to the left and right of the alignment that the quantity occurs.
30. **Key in** the desired **Minimum Station** number.

Note: Station numbers should be computed as if there is no station equation.
31. **Key in** the desired **Minimum Offset**. Left of the alignment is negative, right of the alignment is positive.
32. Select the desired **Region**. This is used if the alignment has a station equation. This option is usually selected automatically when the station number is entered.
33. **Key in** the desired **Maximum Station** number.
34. **Key in** the desired **Maximum Offset**.

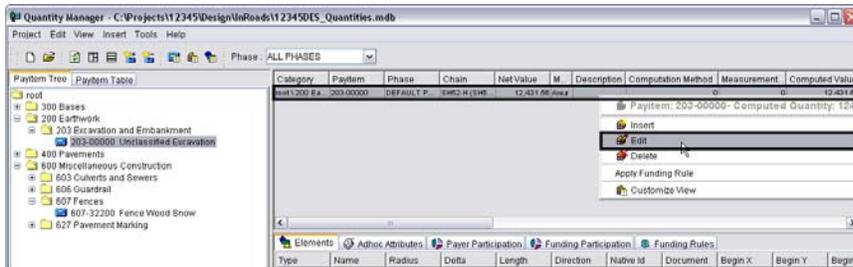
The screenshot shows a software dialog box titled "New Quantity Properties For Payitem: 203-00000". It has three tabs: "General", "Location", and "Adhoc Attributes". The "Location" tab is selected. The "Baseline Chain" is a dropdown menu showing "SH52-H (SH52-H)". Below this are two sections: "Minimum Station" and "Maximum Station". Each section has a "Station" text box and a "Region" dropdown menu. In the "Minimum Station" section, the "Station" box contains "984.255870064815" and the "Region" dropdown is set to "1". In the "Maximum Station" section, the "Station" box contains "13500.0" and the "Region" dropdown is set to "1". On the right side of the dialog, there are two buttons: "Create" and "Close".

35. Select the **Create** icon to complete the quantity.

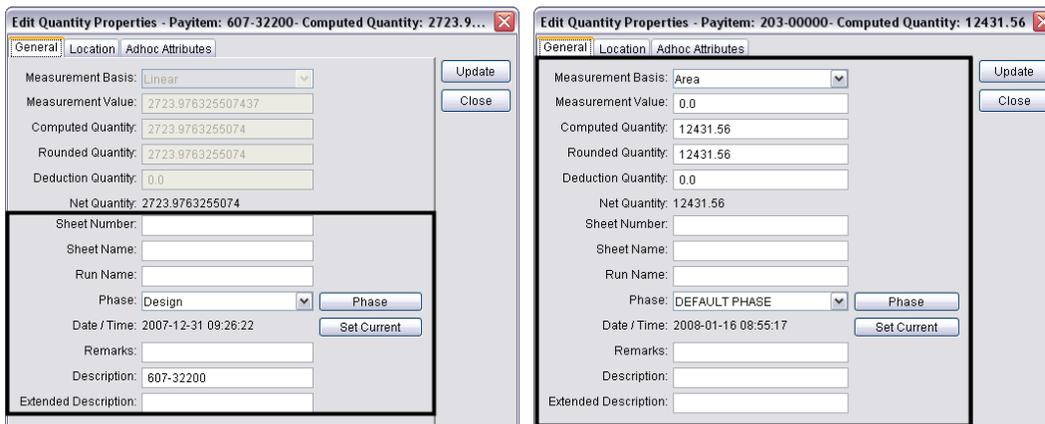
Editing Quantities

Note: The quantity value of pay items imported from InRoads can not be changed in **Quantity Manager** only those entered manually can.

1. To edit a quantity, <D> on the quantity in the **Quantities Table**, then **Right Click** and select **Edit** from the menu.



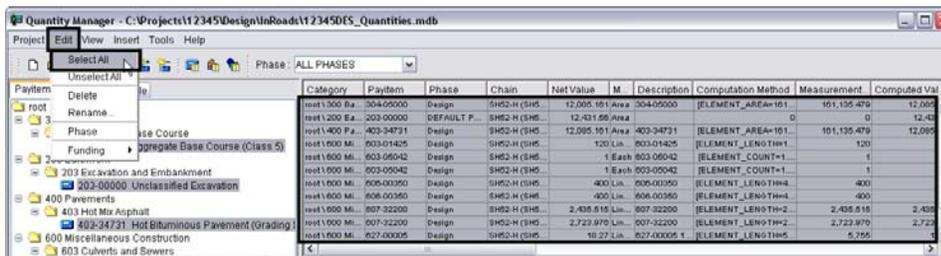
2. This displays the **Edit Quantity Properties** dialog box. This dialog box is the same as the **New Quantity Properties** dialog box. The illustration on the left shows the fields that can be edited for a quantity imported from InRoads. The illustration on the right shows fields that can be edited for a quantity that is manually entered.



Creating A Report

Reports are used to display the quantity data in a meaningful way.

1. Display the quantities to be reported on in the **Quantities Table**. This can be done by selecting pay items from the **Pay Item Table** (hold the **Shift** or **Ctrl** to select multiple pay items) or **Select Edit > Select All**.
2. **Highlight** the desired quantities in the **Quantities Table**.



3. Select **Tools > Reports > Create** to open the **Create Report** window.
4. Select the desired **Report Style** from the pull down menu. The **Style** name describes the type of information to be contained in the report.

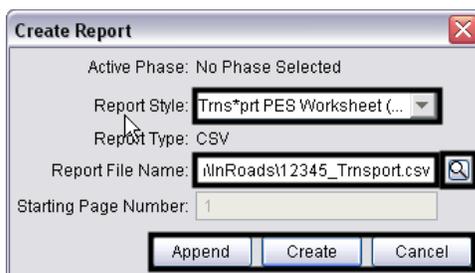
5. **Key in** the directory path and filename for the **Report File Name**. The 'search' button can be used to select the directory path and filename if desired.

Some report styles use the **Starting Page Number** to automatically number the pages of the report. If this field is active, the desired page number can be keyed in.

6. The three buttons at the bottom of the window determine how the information will be stored. Select **Append** to add the data to an existing file.

Note: This button is not available if the report type is PDF.

7. Select **Create** to create a new file or overwrite an existing file. **Cancel** closes the Create Report window without processing any data. No report is created.



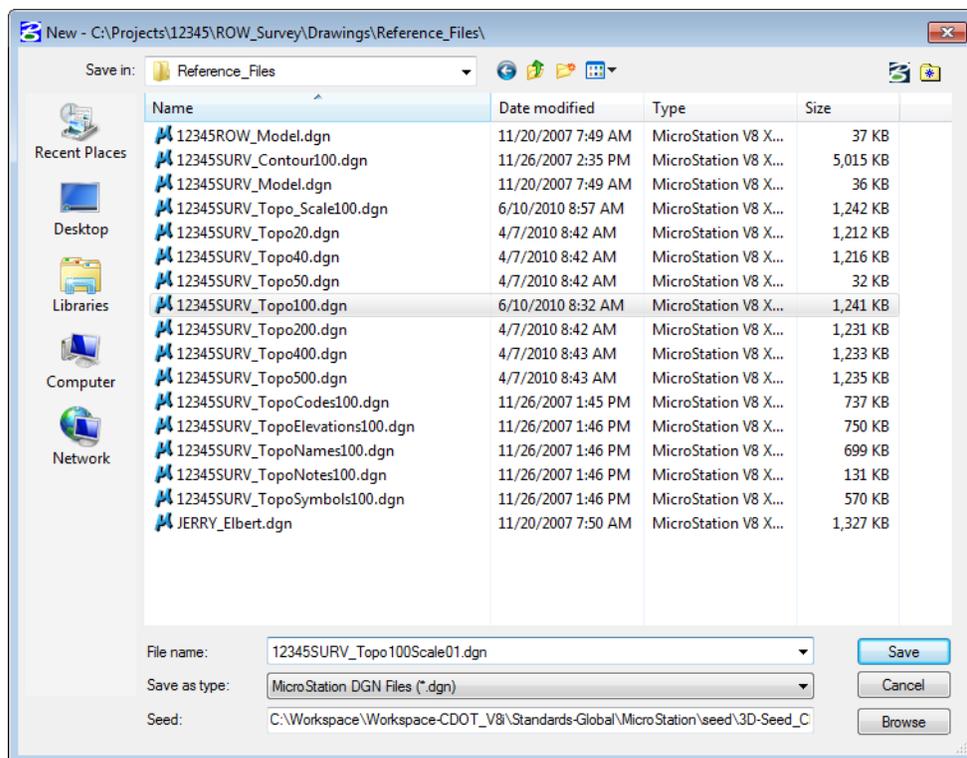
Workflow IR 12 - Exporting Fieldbook Files

This document guides you through saving survey fieldbook information to separate MicroStation files for ease of referencing and level control.

Exporting a Fieldbook File

Creating a new file

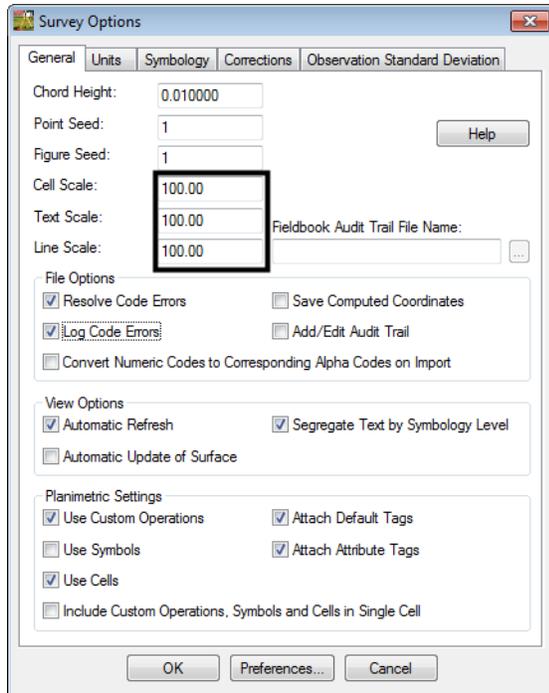
1. From the MicroStation pull-down menu select **File > New**. The **New** dialog will appear.
2. *Navigate* to the project directory folder **ROW_Survey\Drawings\Reference_Files**.
3. At the bottom of the dialog box verify that the seed file is set to **3D-Seed_CDOT.dgn**.



Note: If **3D-Seed_CDOT.dgn** is not the seed file specified, <D> **Select** button and chose navigate to **C:\Program Files\Workspace-CDOT\Standards-Global\MicroStation\seed** and select **3D-Seed_CDOT.dgn** from the **Select a Seed File** dialog box.

4. Key in the name of the file to be created in the **Files** field: **12345SURV_Topo100Scale01.dgn**
5. <D> **OK** in the **New** dialog. The **New** dialog will close and the file **12345SURV_Topo100scale01.dgn** will open.
6. Disable the view display of dynamic survey graphics shown on the screen. Toggle off the View Planimetrics icon  or any other symbols, names, codes, etc. that may be enabled, using the toggles in the **View Survey Data** toolbar.

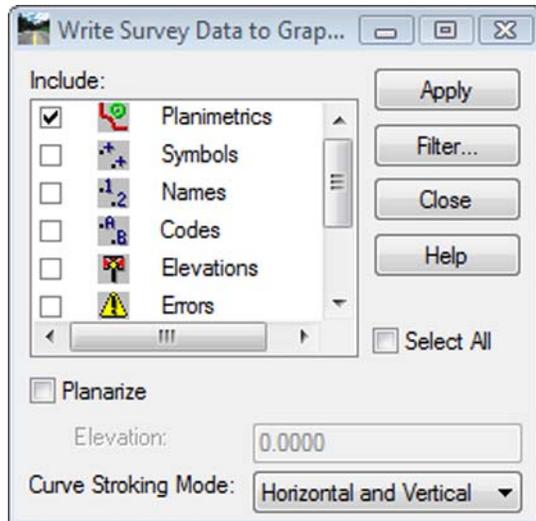
7. Verify the correct fieldbook is active. The active fieldbook is indicated by a red box around the fieldbook icon in the InRoads workspace pane.
8. To modify the scale as it relates to cells, text, and linestyles select **Tools > Survey Options**. The **Survey Options** dialog will appear.
9. On the **General** tab verify the Scales for **Cell**, **Text**, and **Line** are set as shown below.
10. Verify the check box labeled **Segregate Text by Feature Level** is checked on.



Note: Segregate Text by Feature Level, if checked on, will save the symbols, point names, codes, notes, errors, and elevations to the same level as the survey feature.

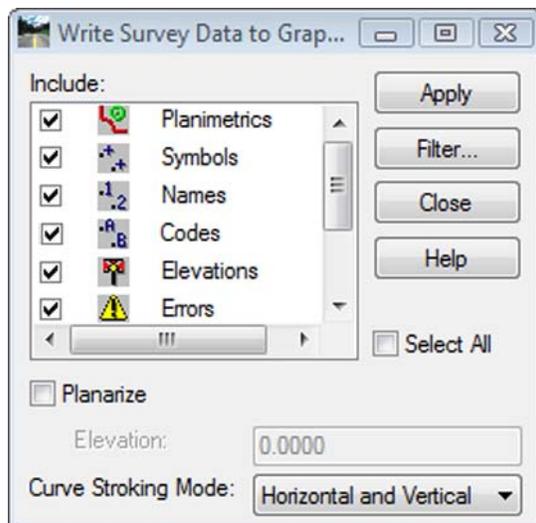
11. <D> **OK**. The **Survey Options** dialog will close.

12. Once the settings have been verified or changed, write the survey data to graphics. From the InRoads menu select **Survey > View Survey Data > Write Survey Data to Graphic**. The **Write Survey Data to Graphics** dialog will open.



Note: If dynamic graphics were toggled on, those same components would be toggled on in the **Write Survey Data to Graphics** dialog.

13. Check the **Select All** check box.



14. Set **Curve Stroking Mode** to *Horizontal Only*.
15. <D> **Apply**. The graphics will be created in the design file.
16. <D> **Close**. The Survey fieldbook data has been written to the design file.

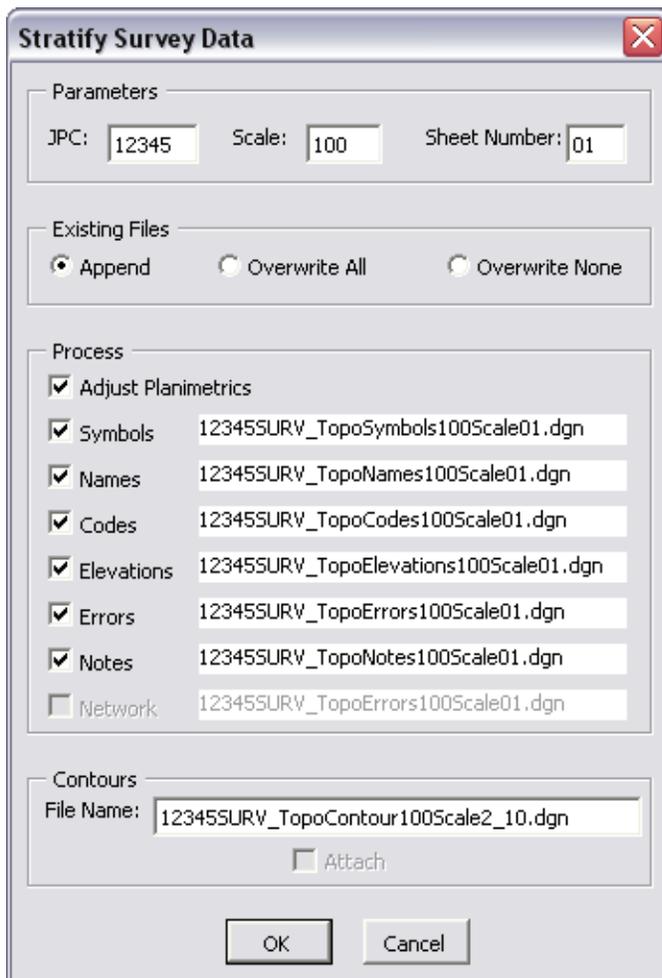
17. Verify all dynamic View Survey Data icons are toggled off.



18. **Fit** the view of the contents of the design file within MicroStation.

19. Review the results to verify the data has been written to the design file and are level stratified.

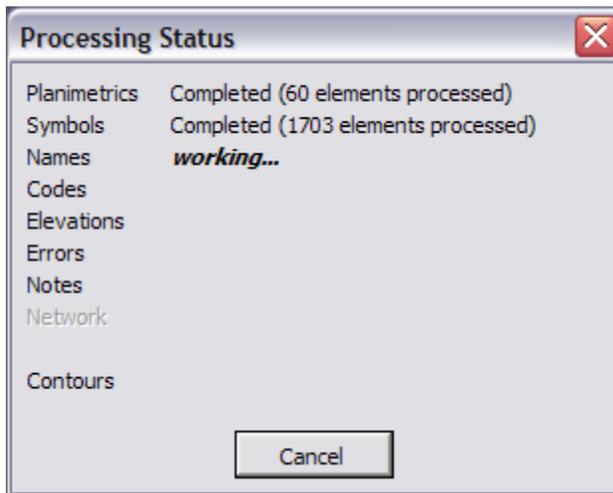
20. From the CDOT Menu pull-down select **Add On's > Stratify Survey**. The **Stratify Survey** dialog will appear.



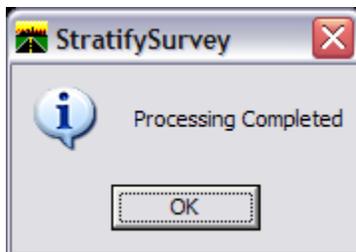
Note:

- ◆ Under *Existing Files*, the **Append** option will add or merge the new data into an existing file. A new file will be created if the file does not already exist.
- ◆ Under *Existing Files*, the **Overwrite All** option will create a new file, deleting any previously existing file.
- ◆ Under *Existing Files*, the **Overwrite None** option will disable the processing option for a file if the file already exists.

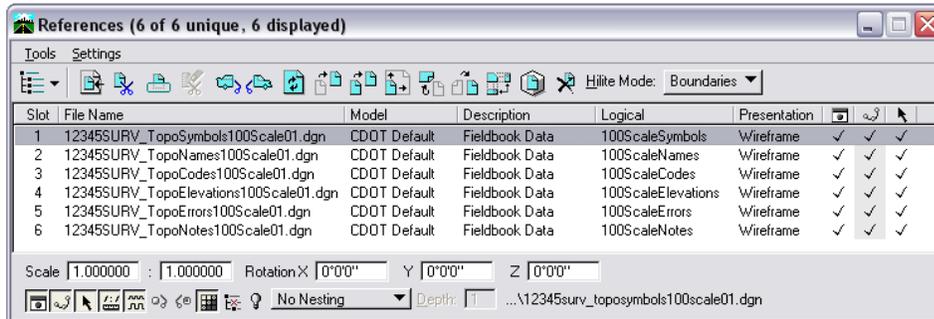
- ◆ The **Process** option **Adjust Planimetrics** will resize the planimetrics text (if necessary) and convert the grouped text strings to view independent cells in order to allow for viewing this text in any 3D view.
21. Verify the **JPC**, **Scale**, and **Sheet Number** entries are correct. Altering any of those values will automatically alter the output file names. If the **Attach** check box in the Contours section is grayed out, the contour file does not exist. You may edit the name specified in the **File Name** field to enter the name of an existing contour file.
 22. <D> **OK** button to start the process.
 23. As the data is being moved to the appropriate reference file a **Processing Status** dialog provides an update on the progress. You may <D> **Cancel** at any time to stop the processing, if necessary.



24. When completed, a **Processing Completed** message is displayed. <D> **OK** to exit the program.

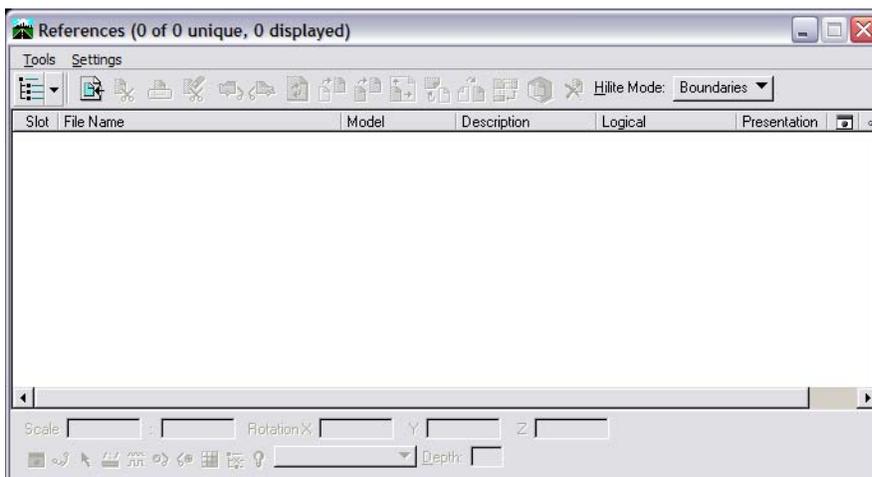


25. The fieldbook data has now been stratified into separate reference files. The planimetrics will be in the master design file with all of the symbols, names, codes, etc., attached as reference files. To view these attachments select **File > Reference** from the MicroStation pull-down menu.

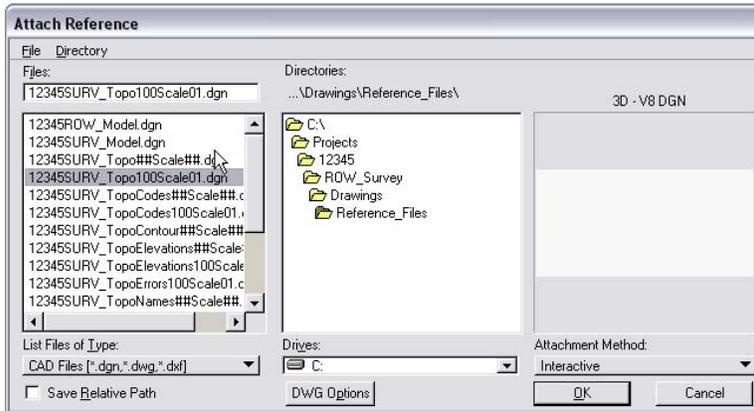


Roadway Design referencing Survey Topo files

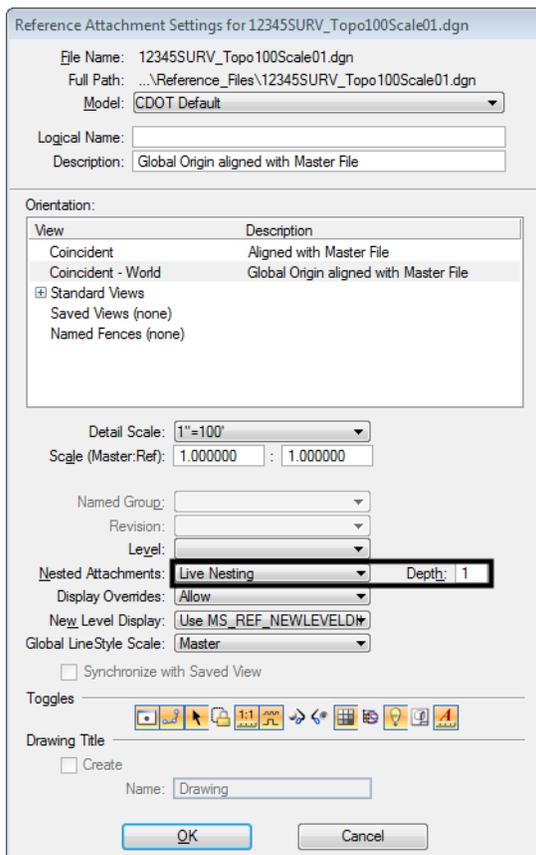
1. By using nested references, the designers can attach one Survey Topo file and have all the additional references attach as well.
2. From the MicroStation pull-down menu select **File > Reference**. The **References** dialog will appear.



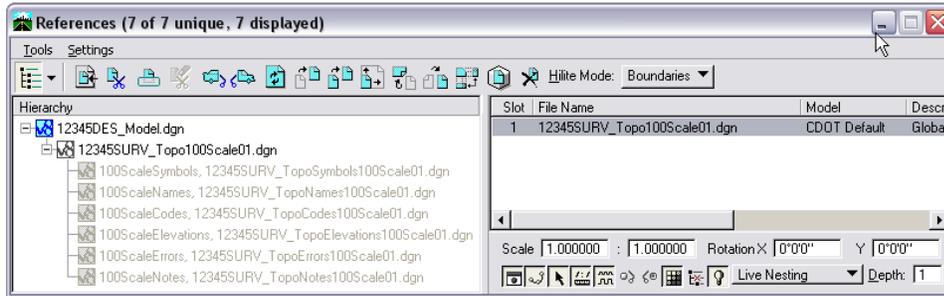
- From the **References** pull down menu select **Tools > Attach**. The **Attach Reference** dialog will appear.



- Set the directory to **C:\Projects\12345\ROW_Survey\Drawings\Reference_Files**
- Select the file **12345SURV_Topo100Scale01.dgn** and **<D> OK**. The **Reference Attachment Settings** dialog will appear.
- From the **Nested Attachments** drop down list, select **Live Nesting** and set the **Depth** to **1**.



- 7. <D> OK. The Survey Topo file will attach along with the fieldbook nested attachments.



Workflow IR 13 - Editing Feature Styles for Display in Cross Sections

This document guides you through the process of setting a feature style to display in cross sections. Displaying a feature in cross sections allows the designer to see the relative position of the features and to annotate individual features.

Note: The changes made using this workflow occur in the XIN file. If you wish to save these changes past the current login session, the XIN file must be saved to a different location. Use the Save As option and store the file in the project directory.

In this example, we wish to display the T_Edge of Parking Lot features in the cross sections to see if our toe of slope encroaches into the parking lot.

Workflow Outline

Opening Style Manager - Style Manager is the interface used to edit the xin file, where the feature style definitions are stored.

- ◆ Commands Used: **Tools > Style Manager** - Used to display the Style Manager dialog box.
- ◆ **Edit Style** - An alternate method for displaying the Style Manager dialog box. This button is found on the Update Cross Section > Crossing Features leaf of the Cross Section dialog box.

Selecting a Style to Edit - Within the Style Manager dialog box, there are some items that can make locating the desired Style easier to find. This step is skipped when the Edit Style button is selected from the Cross Section dialog box.

- ◆ Commands Used: **Show Styles with Properties > Include Surface** - This option is used to remove any non-surface feature styles from the Features list.
- ◆ **Edit** (button) - Used to display the Edit Style dialog box. This is where feature style data is modified.
- ◆ **Surface Features** - This is the leaf of the Edit Style dialog box where the first changes are made.

Editing the Style - Changing the Style's display settings allows the feature to be displayed in the cross section set. Editing the Named Symbology allows the user to determine how that feature is displayed.

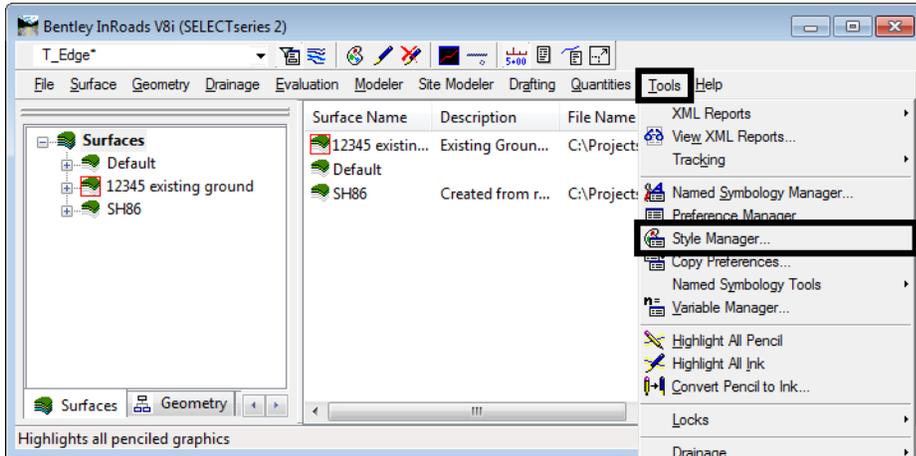
- ◆ **Make Style Settings Changes** - Use the toggles to turn on the Cross Section Display. This sets the style so that the feature can be displayed.
- ◆ **Make Symbology Settings Changes** - These determine how the feature will look when displayed in the cross section set. These changes are made to the Named Symbology attached to the Feature Style.
 - Commands Used: **Surface Feature > Symbology** - This is the leaf of the Edit Style dialog box that provides access to the Named Symbology editor.
 - **Edit the Symbology** - Select the Symbology type to edit (either Default Point or Cross Section Point). Make changes in the Point Symbology dialog box.

Opening the Style Manager and Selecting a Style to Edit

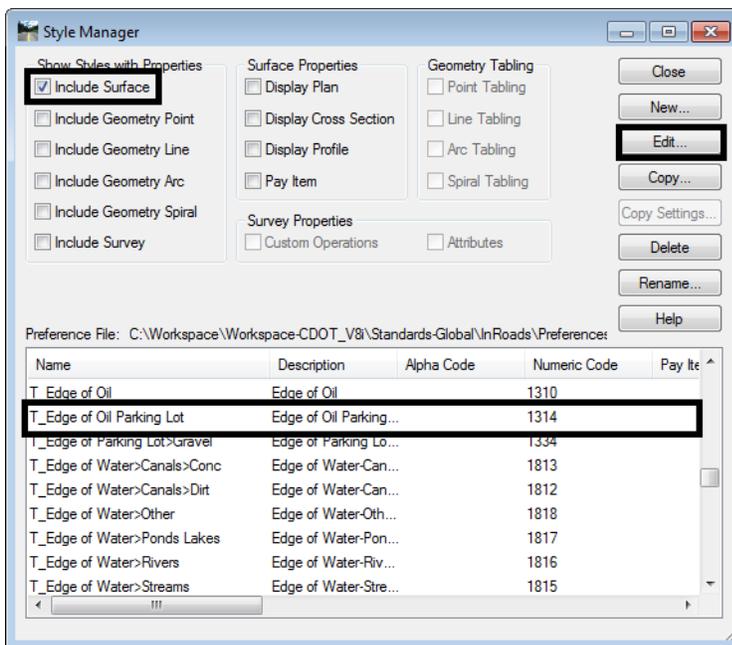
The display settings for features is accessed through the **Style Manager**. There are various ways to open Style Manager, depending on which dialog boxes are open. Here, opening the Style Manager from the InRoads main dialog box and from the Cross Sections dialog box is described.

Opening the Style Manager from the Main InRoads Dialog Box

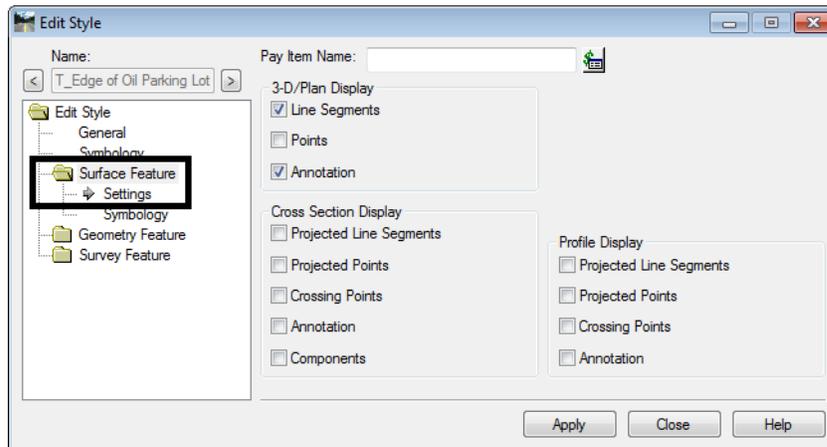
1. From the InRoads main menu, select **Tools > Style Manager**. This displays the *Style Manager* dialog box.



2. In the *Style Manager* dialog box Show **Styles with Properties** area, toggle on **Include Surface**. This filters out all styles that are not surface styles, reducing the number of items in the style list to search through.
3. In the styles list at the bottom of the dialog box, highlight the desired style (in this example **T_Edge of Oil Parking Lot**)
4. **<D>** the **Edit** button to display the *Edit Style* dialog box. You can also **<D>** **<D>** on the style in the list to open the dialog box.



- In the **Edit Style** dialog box, expand the **Surface Feature** folder.



This takes us to the point where the style will be edited.

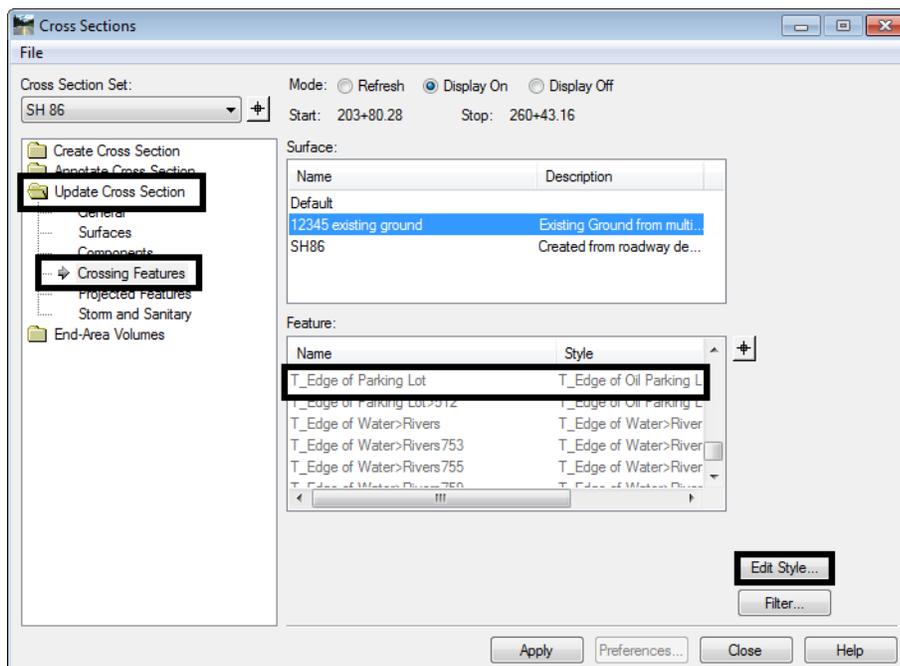
Opening Style Manager from the Cross Sections Dialog Box

Usually, you will discover that a particular feature is not set up for display in cross sections or profiles when you are using the Update Cross Sections or the Update Profile commands. Because of this, InRoads has provided access to the Style Manager directly from the Cross Sections and Update Profile dialog boxes.

In this example, the Cross Sections dialog box is used.

- In the **Cross Sections** dialog box, expand the **Update Cross Section** folder and select **Crossing Features**.
- In the **Surfaces** area, highlight the surface that has the features to be displayed (in this example **12345 Existing Ground** is used).
- In the **Feature** area, highlight the desired feature (in this example **T_Edge of Parking Lot** is used).
- Notice that the feature is grayed out. This indicates that the feature cannot be displayed in cross section.

5. <D> the **Edit Style** button. This displays the *Edit Style* dialog box.

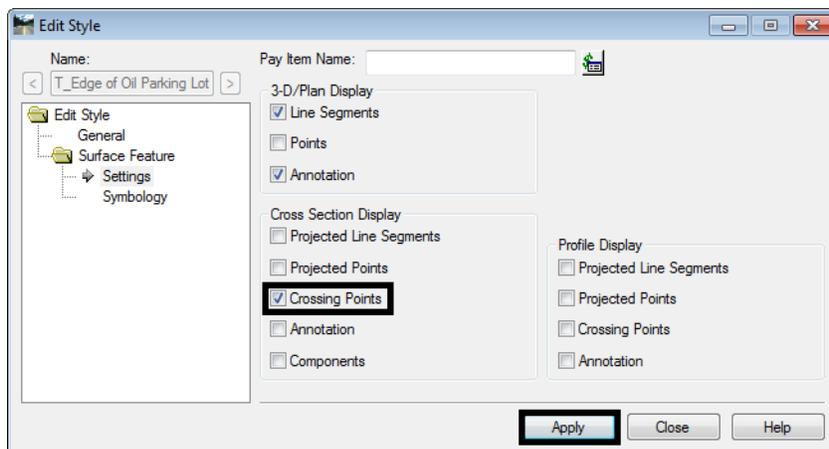


This method takes you directly to the *Surface Feature* folder of the *Edit Style* dialog box.

Editing the Style

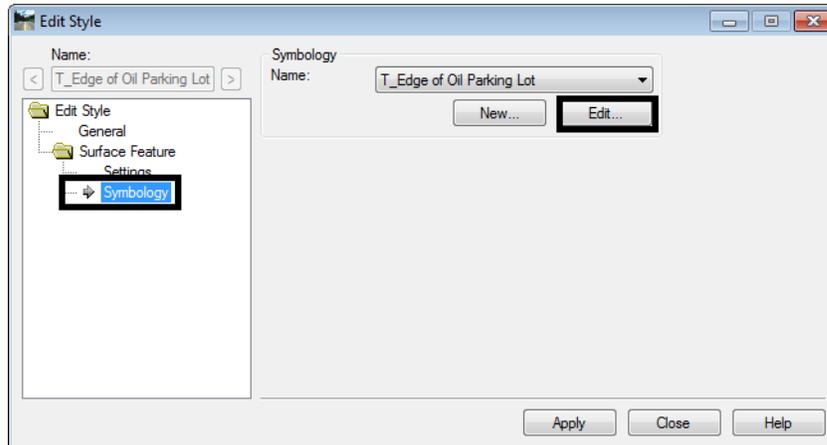
Two settings are required for the feature to be displayed; the display option must be toggled on and the Named Symbology must be set up.

1. In the *Edit Style* dialog box, toggle on the desired display option (in this example **Crossing Points** from the *Cross Section Display* area is used).
2. <D> the **Apply** button. This saves the setting to the XIN file.

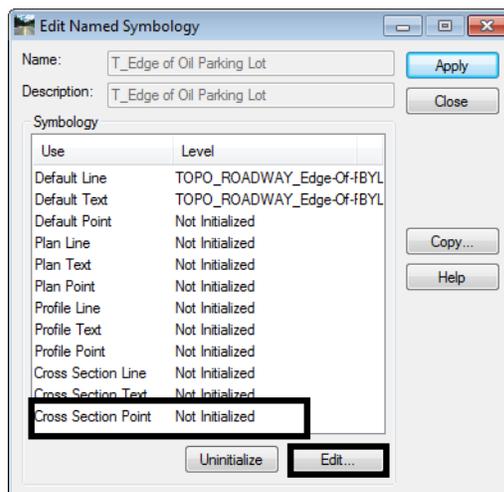


This allows the feature to be displayed in the cross section but does not setup the symbology for its display. The steps below describe how to set up the symbology.

3. Highlight the **Symbology** in the **Edit Style** explorer.
4. **<D>** the **Edit** button in the **Symbology** area of the dialog box. This displays the **Edit Named Symbology** dialog box.

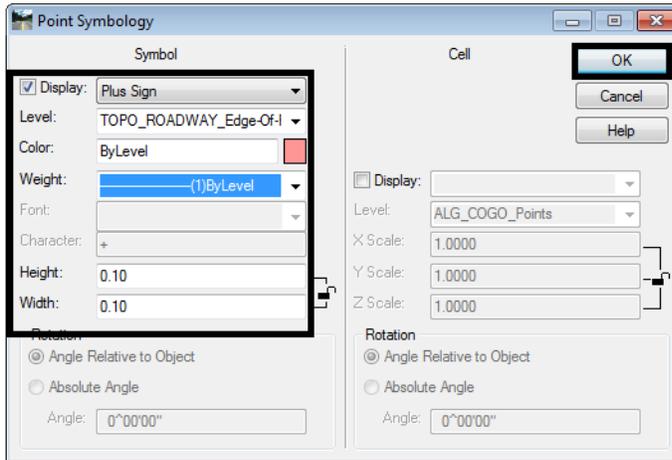


5. In the **Edit Named Symbology** dialog box, highlight **Cross Section Point** from the Symbology list and **<D>** **Edit**. This displays the **Point Symbology** dialog box.

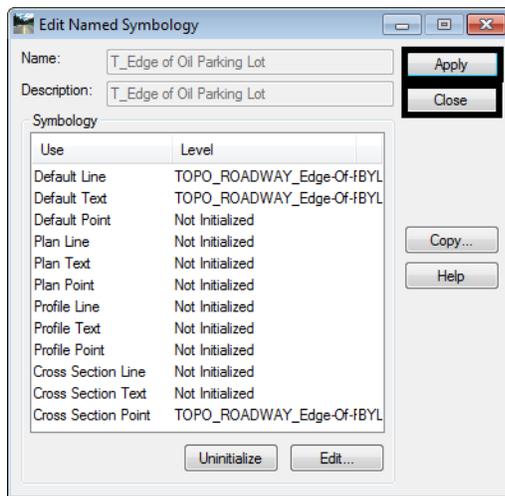


6. In the **Point Symbology** dialog box, toggle on the desired Display option (in this example **Symbol Display** is used).
7. Select the desired **Symbol** or **Cell** used for the feature display (in this example the **Plus Sign** is used).
8. Select the desired **Level** for the feature (in this example **TOPO_ROADWAY-Edge-Of-Parking-Lot** was used)
9. Set the **Color** and **Weight** to **By Level**.
10. Set the desired **Height** and **Width** for the symbol.

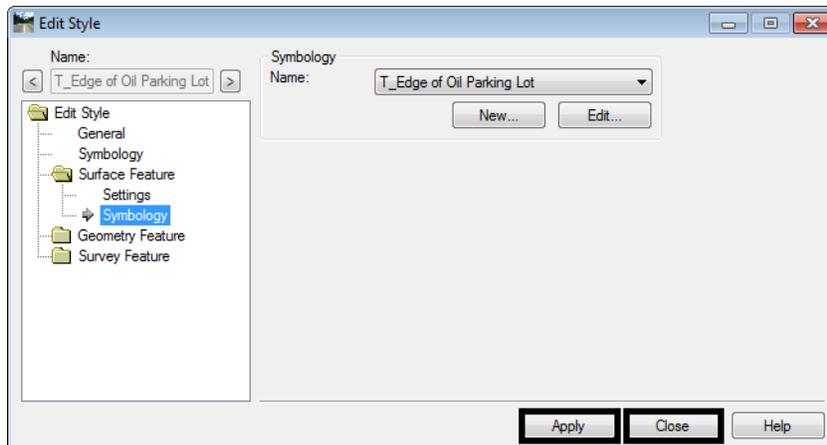
11. <D> the **OK** button to accept the changes. This dismisses the **Point Symbology** dialog box.



12. In the **Edit Named Symbology** dialog box, <D> **Apply** then <D> **Close**.



13. In the **Edit Style** dialog box, <D> **Apply** then <D> **Close**.



This completes the changes required in the XIN file. The features can now be added to the cross sections using the Update Cross Section command.

Note: This change will be available only until the next login on your computer. If you wish to save the change for future use, **Save As** the *CDOT_Civil.xin* file to your project directory.

Workflow IR 14 - Using InRoads Sight Visibility Tools

This document guides you through the use of the InRoads Sight Visibility Tools. There are two sight visibility tools available, Roadway Visibility and Surface Visibility. The Roadway Visibility tool analyzes sight distances along a roadway. The Surface Visibility tool evaluates the visibility from a given point on a surface.

The Roadway Visibility Tool

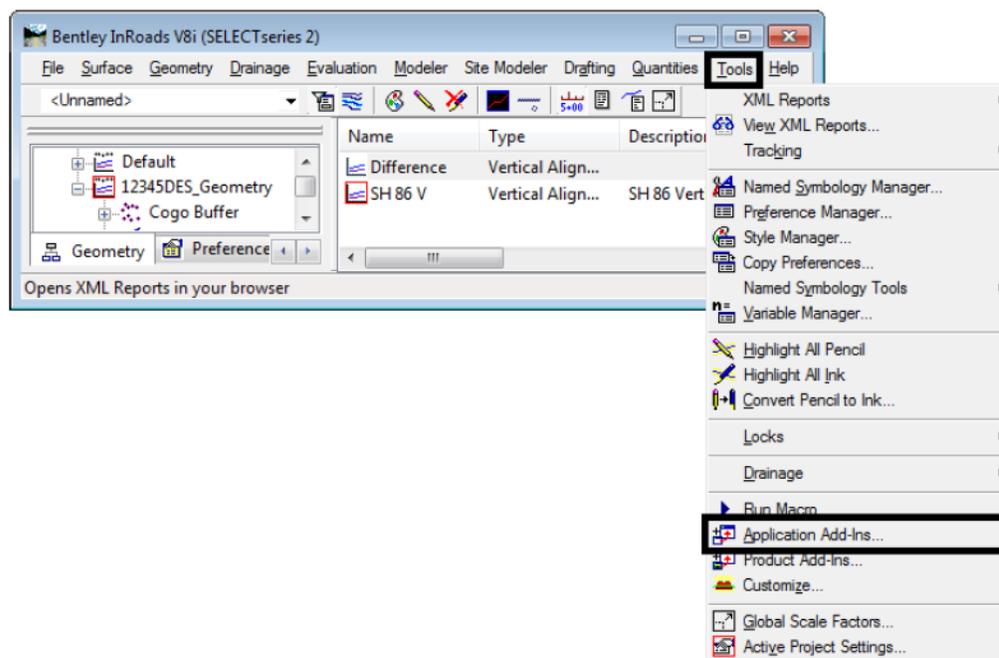
This tool is used to check sight distances along an alignment. The Roadway Visibility tool draws a line the length of the specified sight distance between two points of the alignment, at the specified elevation above the selected surface. It then checks the line against the surface to determine if it passes through the surface to reach its destination point.

Before using this tool, you will need an alignment and a surface created by merging the design surface to the existing surface. For help creating the merged surface, refer to [CDOT Workflow Creating Combined Surfaces](#). The steps below describe Roadway Visibility tool's set-up and function.

Adding the Sight Visibility Tools to the Menu

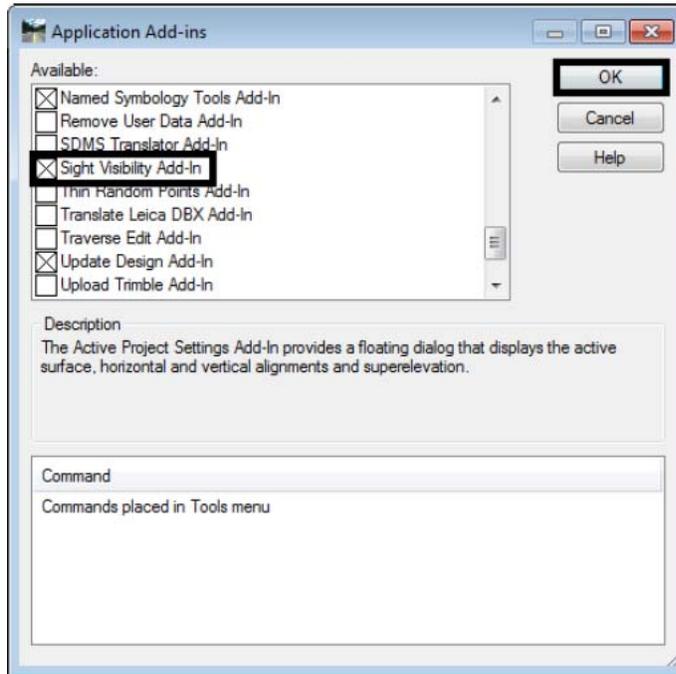
By default, the sight visibility tools are not available on the InRoads menu bar. To add them to the menu, follow the steps below.

1. Select **Tools > Application Add-Ins** from the InRoads main menu. This displays the **Application Add-Ins** dialog box.

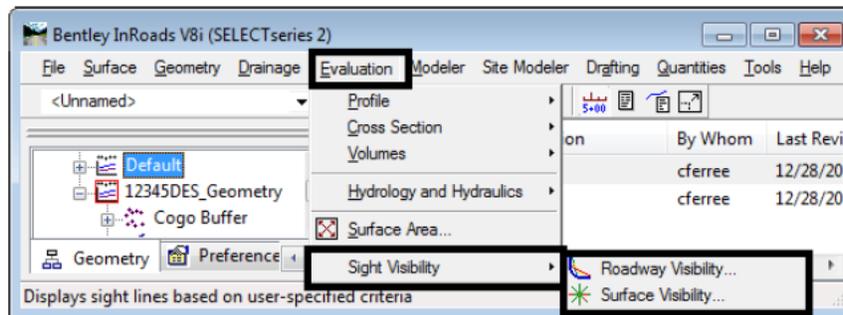


2. From the **Application Add-Ins** dialog box **Available** list, toggle on the **Sight Visibility Add-In**.

3. <D> **OK** to accept the change and dismiss the **Application Add-Ins** dialog box.

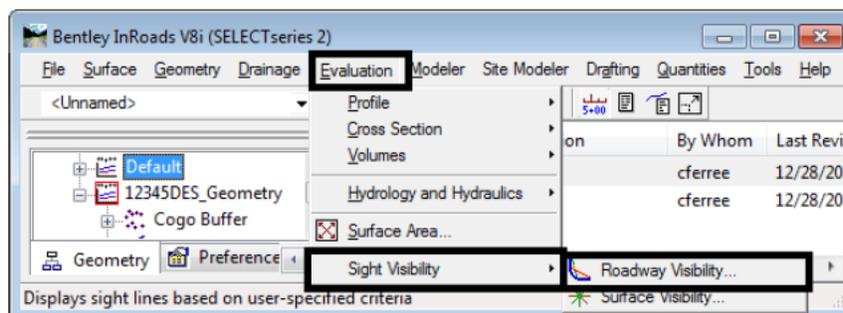


The **Sight Visibility** tools are added to the **Evaluation** menu.

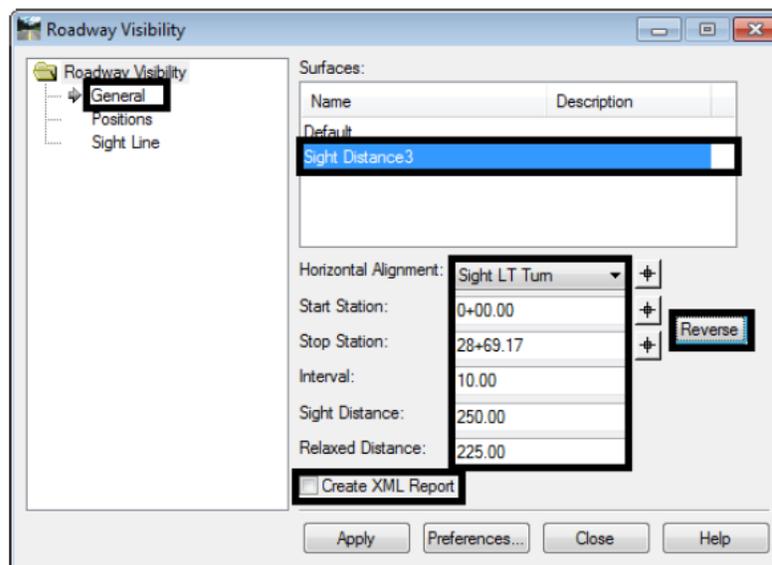


Using the Roadway Visibility Tool

1. From the InRoads main menu, select **Evaluation > Sight Visibility > Roadway Visibility**. This displays the **Roadway Visibility** dialog box.



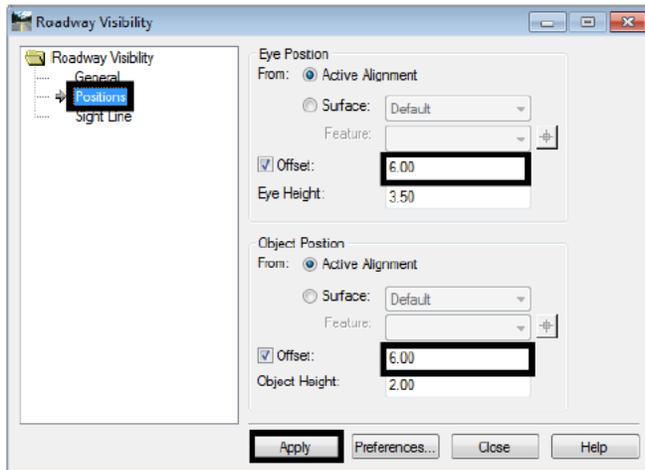
2. In the **Roadway Visibility** dialog box, select the **General** leaf.
3. In the **Surfaces** list, select the merged surface.
Note: If two or more surfaces are selected, InRoads will use the highest surface to base eye height and object height from. This could result in inaccurate readings in areas of cut.
4. Using the **Horizontal Alignment** drop down menu, select the desired alignment.
5. Key in the desired **Start Station** and **Stop Station** in their respective fields.
6. If the alignment runs in the opposite direction as the flow of traffic, <D> the **Reverse** button. This will make the command check the sight distance in the same direction as the flow of traffic.
7. In the **Interval** field, key in the desired value.
8. In the **Sight Distance** field, key in the desired value. See [Chapter 3 - Elements of Design](#) of the *CDOT Roadway Design Guide 2005* for information on computing sight distances and sight distance look up tables.
9. In the **Relaxed Distance** field, key in the desired value. This is the minimum allowable distance. It can be the same value as used in the Sight Distance field.
10. Toggle on **Create XML Report** to create a textual copy of the sight distance data.



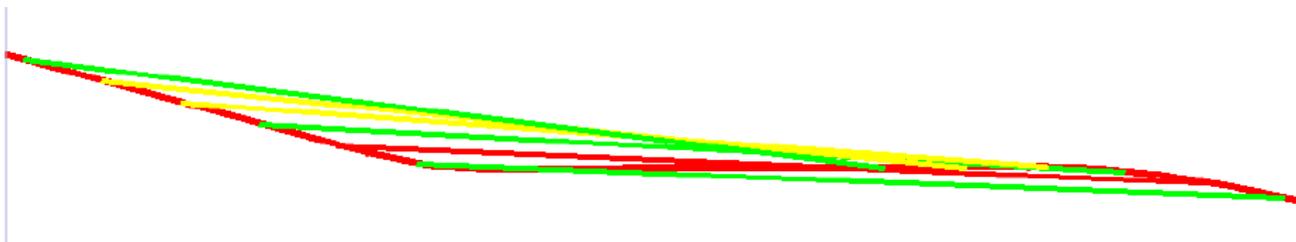
11. Select the **Position** leaf.
12. Set the **Offset** value in the **Eye Position** area so that it will be in the center of the driving lane to the inside of the curve.
13. Set the **Offset** value for the **Object Position** area so that it will be in the center of the driving lane to the inside of the curve.

Note: On 4 lane roads the eye and object position offset will have to change depending on the direction of the curve. This may require a different run of the command for each curve.

14. <D> the **Apply** button to execute the command.



A sample of the results are shown below:



- A green line meets or exceeds the **Sight Distance**.
- A yellow line meets or exceeds the **Relaxed Distance**.
- A red line does not meet either the **Sight Distance** or the **Relaxed Distance**.

Below is an example of the report created by the **Roadway Visibility** command:

Surface(s): sd			
Alignment Name: SH 86		Sight Distance: 2135.00	
Start Station: 223+00.00	Stop Station: 234+00.00		Relaxed Distance: 2000.00
Interval: 200.00			
Eye Position: From Alignment		Object Position: From Alignment	
Eye Height: 3.50	Object Height: 2.00		
Eye Offset: 2.00	Object Offset: 2.00		
Input Grid Factor: 1.00000000		Note: All units in this report are in feet unless specified otherwise.	

	Station	Offset	Elevation
Eye Position:	223+00.00	2.00	6630.73
Object Position:	244+52.27	2.00	6573.72
Obstruction:	No Obstruction		
Sight Distance:	3362.72		
Eye Position:	225+00.00	2.00	6628.83
Object Position:	246+51.23	2.00	6562.02
Obstruction:	245+89.44	-4.42	6563.96
Sight Distance:	2072.87		
Eye Position:	227+00.00	2.00	6625.96
Object Position:	248+48.84	2.00	6549.15
Obstruction:	247+84.92	-2.68	6551.46
Sight Distance:	2070.92		
Eye Position:	229+00.00	2.00	6622.13
Object Position:	250+45.00	2.00	6538.58
Obstruction:	No Obstruction		
Sight Distance:	Unlimited		
Eye Position:	231+00.00	2.00	6617.39
Object Position:	252+41.23	2.00	6536.78
Obstruction:	239+30.96	-19.86	6586.20
Sight Distance:	826.02		
Eye Position:	233+00.00	2.00	6611.72
Object Position:	254+40.08	2.00	6542.31
Obstruction:	No Obstruction		
Sight Distance:	2171.21		

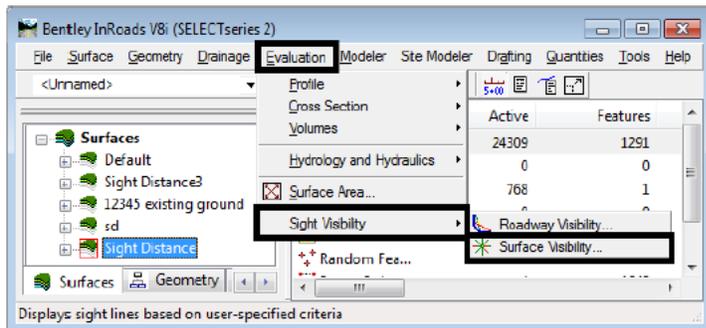
The entries in the report correspond to a line drawn in MicroStation.

Using the Surface Visibility Tool

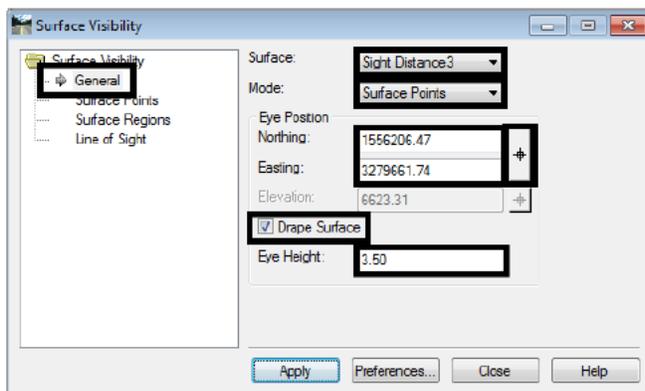
The Surface Visibility tool determines the visibility from a given point. There are three modes for this tool; Surface Points, Surface Regions, and Line of Sight. The Surface Points mode indicates what triangle vertices can be seen from the observation point. The Surface Regions mode draws lines radially from the observation point showing where sight is clear or blocked. The Line of Sight mode shows whether sight is clear or blocked between two points.

The steps below describe how to use the Surface Visibility tool.

1. From the InRoads main menu, select **Evaluation > Sight Visibility > Surface Visibility**. This displays the **Surface Visibility** dialog box.



2. In the **Surface Visibility** dialog box **General** leaf, select the desired **Surface** to be evaluated.
3. Select the desired **Mode** using the drop down menu.
4. Toggle on or off **Drape Surface** as desired. If **Drape Surface** is on, the base **Elevation** for the **Eye Position** is set to that of the **Surface** at the specified location.
5. Set the **Northing** and **Easting** (and **Elevation** if **Drape Surface** is not used) for the **Eye Position**. This can be done by key in or by using the locator button.
6. Key in the desired value for the **Eye Height**. This is the distance above the **Elevation** for the actual eye position.

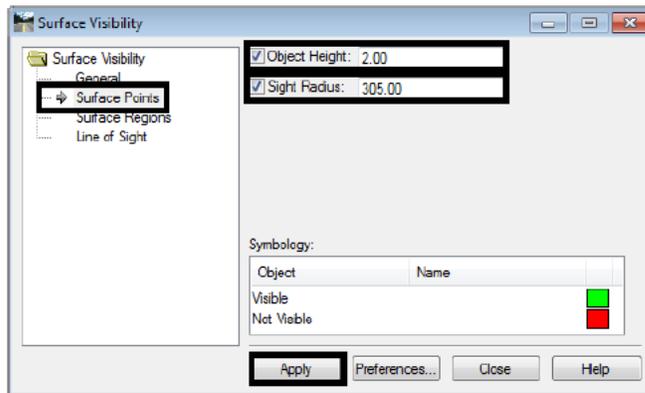


Surface Points Settings

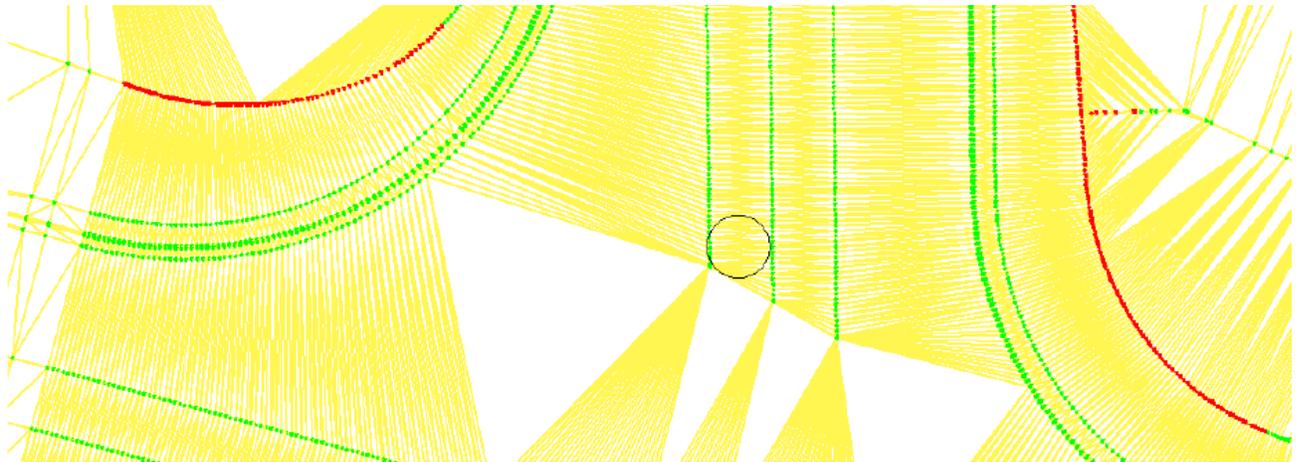
These settings are only used when the Mode is set to Surface Points on the General Leaf.

1. **<D>** the **Surface Points** leaf from the dialog box explorer pane.
2. Toggle on or off the **Object Height** as desired. If toggled on, key in the desired value. This is an elevation adjustment above the surface at the target location and represents the height of an object sitting on the surface at that location.

3. Toggle on or off the **Sight Radius** as desired. If toggled on, key in the desired value. This is the distance from the **Eye Position** that data is collected. If toggled off, the entire surface is evaluated.



4. **<D>** the **Apply** button to execute the command. The data is displayed in the MicroStation view. An example of the data is displayed below.



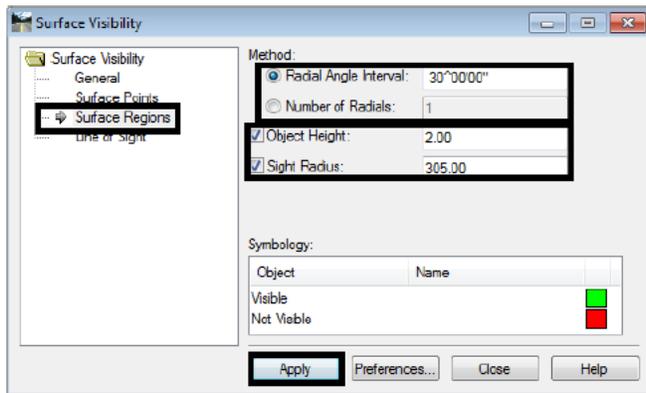
The green dots represent locations that can be seen from the **Eye Position**. Red dots represent locations that cannot be seen from the **Eye Position**. The locations evaluated are the triangle vertices of the selected surface that are within the **Sight Radius**.

Surface Region Settings

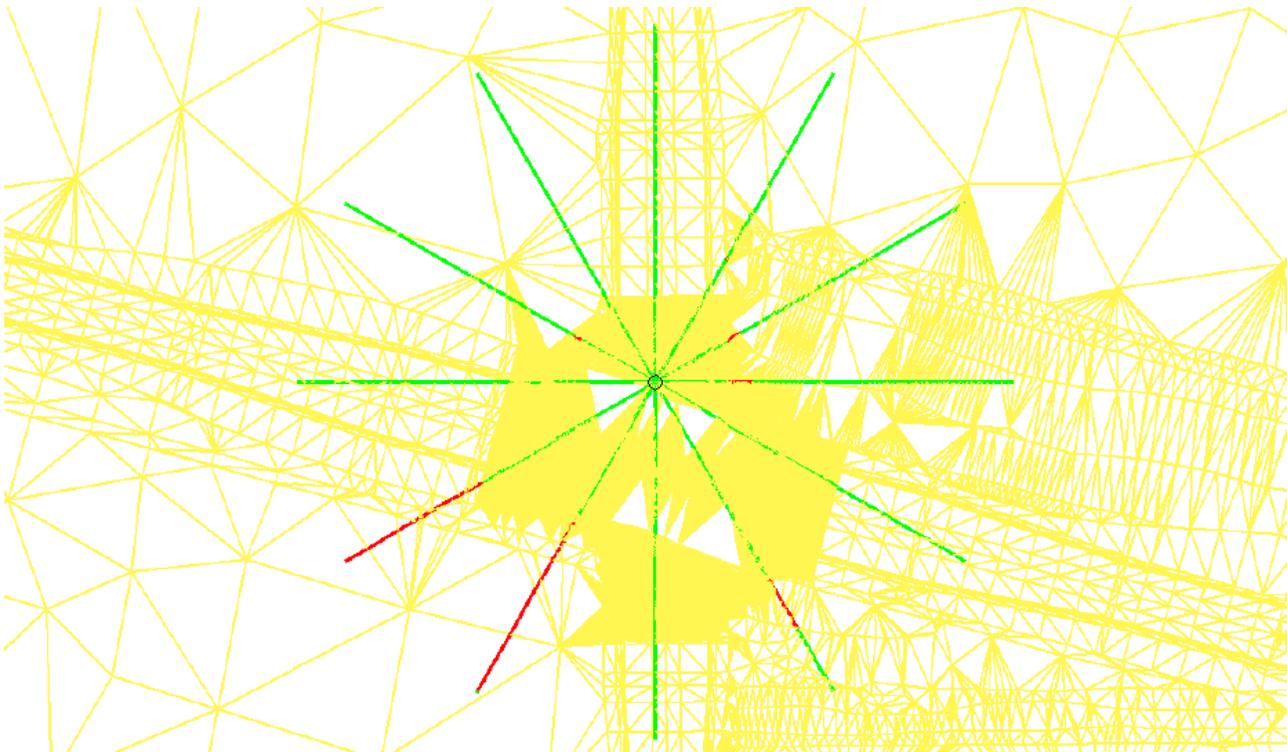
These settings are only used when the Mode is set to Surface Regions on the General Leaf.

1. **<D>** the **Surface Regions** leaf from the dialog box explorer pane.
2. In the **Method** area, select either **Radial Angle Interval** or **Number of Radials**. The **Radial Angle Interval** option places data lines radiating from the Eye Position in a circle at the specified angle interval. the **Number of Radials** option places data lines radiating from the Eye Position in a circle at angle intervals equal to $360/\text{Number of Radials}$ value. In each case, the first radial is
3. Toggle on or off the **Object Height** as desired. If toggled on, key in the desired value. This is an elevation adjustment above the surface at the target location and represents the height of an object sitting on the surface at that location. In each case, the first radial is placed at the MicroStation 0 angle (horizontally to the right from the **Eye Position** in a **Top** view).

- Toggle on or off the **Sight Radius** as desired. If toggled on, key in the desired value. This is the distance from the **Eye Position** that data is collected. If toggled off, the entire surface is evaluated.



- <D>** the **Apply** button to execute the command. The data is displayed in the MicroStation view. An example of the data is displayed below.



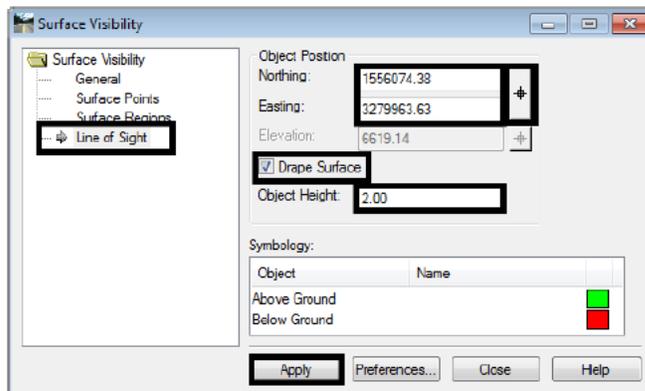
The green lines represent locations that can be seen from the **Eye Position**. Red lines represent locations that cannot be seen from the **Eye Position**. The locations evaluated are within the **Sight Radius**.

Line of Sight Settings

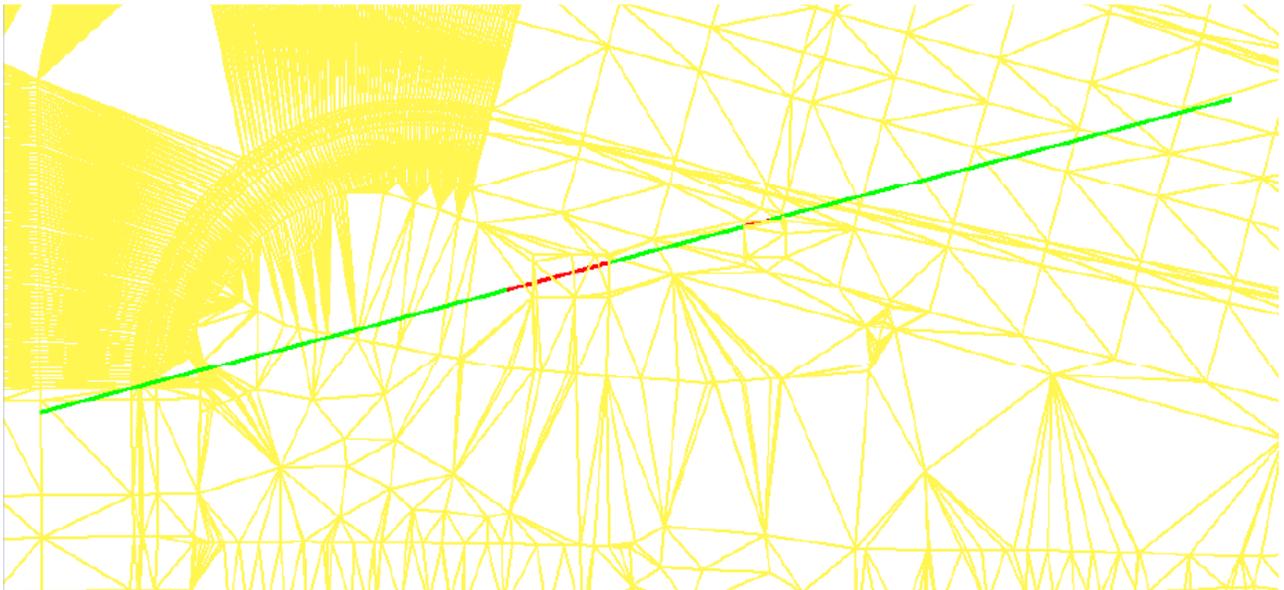
These settings are only used when the **Mode** is set to **Line of Sight** on the **General** Leaf.

- <D>** the **Line of Sight** leaf from the dialog box explorer pane.

2. Toggle on or off **Drape Surface** as desired. If **Drape Surface** is on, the base **Elevation** for the **Object Position** is set to that of the **Surface** (on the **General** leaf) at the specified location.
3. Set the **Northing** and **Easting** (and **Elevation** if **Drape Surface** is not used) for the **Object Position**. This can be done by key in or by using the locator button.
4. Key in the desired value for the **Object Height**. This is the distance above the **Elevation** for the actual object position.



5. <D> the **Apply** button to execute the command. The data is displayed in the MicroStation view. An example of the data is displayed below.



The green lines represent locations that are above the surface. Red lines represent locations that are below the surface.

Appendix

Enter all workflow document history information in a document control sheet as part of the appendix which would include what version the workflow was updated to and the date of the update

