

South Carolina Department of Transportation

# ROADWAY CADD MANUAL

Updated November 2019

**Design Automation Office** 



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## Disclaimer

The SCDOT makes this Roadway Cadd Manual available to the consulting community as a reference guide and for information only. This manual does not replace or supersede design standards, design manuals, or design policy that governs the development of roadway construction plans.

This manual is a work in progress subject to new technologies and processes, bug fixes, enhancements, etc. There is no one way to complete a set of plans in MicroStation and Geopak. The methods outlined here may be "preference" based and alternative solutions may exist. TBD (to be determined) in the index indicates that we are planning to develop additional documentation for these items at a later date.

Some processes are for internal SCDOT employees only and are shared to consultants as a reference or for information only. File paths may only work for internal SCDOT employees. File access to lidar tiles and aerial images may be available internally to SCDOT employees where a consultant may need to access NOAA, SCDNR, and county websites to obtain the same files.

SCDOT has adopted MicroStation and GEOPAK as its standard drafting and design software packages. The standards referenced in this manual have been developed and tested using the software versions listed on this page: <u>https://www.scdot.org/business/CADD-Design.aspx</u>

If you would like to contribute additional information to share with the Cadd community or any corrections that you may find, please contact us. We are always open-minded to new methods and willing to share information that will benefit SCDOT plan development.

Thank you!

## Trademarks

MicroStation is a registered trademark of Bentley Systems, Incorporated. GEOPAK is a registered trademark of GEOPAK Corporation, now a wholly owned subsidiary of Bentley Systems, Incorporated. © 2012 Bentley Systems, Incorporated.

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# **MicroStation Introduction**

## **Workspace**

SCDOT created custom workspaces to direct users to the most up to date standards and design resources necessary to complete a plan set. This includes cell libraries, line style and font resource files, configuration files, reference attachments, and Geopak preferences by discipline (Roadway, Bridge, Traffic). To access the workspace, double click on the MicroStation icon and select the correct workspace for your design environment. (Roadway design workspace is depicted below.)

User:	SCDOT_Design
Project:	SCDOT_Design 🔹
Interface:	NeallF 🔹

By default, the Consultant Workspace File Location is as follows: (can be customized for network) C:\SCDOT\SCDOT\_Design\

SCDOT Workspace File Location: \\nts\hq\CaddStandards\SCDOT-Bentley\Standards\SCDOT\_Design\

## **Seed Files**

A seed file is a template file that contains default settings and attributes such as: the global origin, color table, cell library attachments, working units, views, etc. for all newly created design files. SCDOT has both a seed2d.dgn and a seed3d.dgn file for working in both plan and 3d dimensions. There is also a motif.dgn that is used to generate plan and profile sheets. (Topo, profiles, cross sections will be in 2d design files. DTMs, contours, and volumes will be in 3d design files.)

To create a new MicroStation file, select the white paper icon (New File) in the upper right portion of the File Open dialog. In the lower portion of the dialog, browse to select your seed2d.dgn file as the template. Enter a file name and press **Save**.

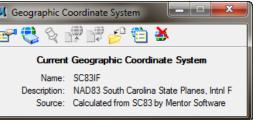
File Open - C:\	CADD\			
Look in:	CADD	•	G 🤌 🖻 🛄 -	

## **Geographic Coordinate System**

SCDOT seed files are set to the correct coordinate system for South Carolina. To verify this information, select **Tools > Geographic > Select Geographic Coordinate System** (GCS) from the top menu bar. The default is SC83IF – NAD83 South Carolina State Planes, International Feet.

Geographic		1	Select Geographic Coordinate System	📕 Geogra
Groups	ø	<u>2</u>	Global Positioning System (GPS)	🚰 😍
Levels •	2	<u>3</u>	Export Google Earth (KML) File	

To set the GCS to SC83IF, press the "From Library" button (2<sup>nd</sup> icon) to expand the folders Library > Projected > North America > United States of America > South Carolina > SC83IF. Right click on SC83IF to Add to Favorites. With SC83IF highlighted, press OK to accept.





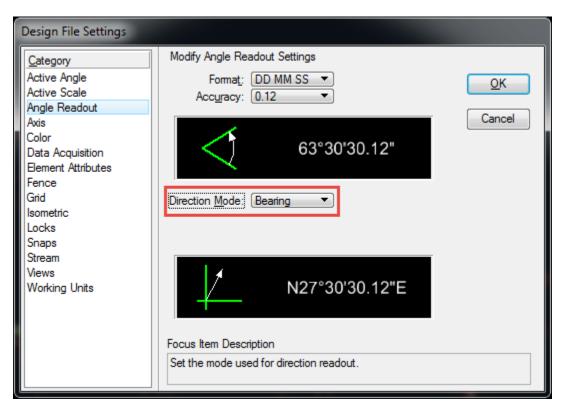
## **Color Table**

The SCDOT Color Table can be accessed from **Settings > Color Table**. This file is contained in the Workspace folder **MSfiles > data > SCDOT\_color.tbl**.



## **Design File Settings**

The Design File Settings allow access to angle readout, highlight colors, locks, snaps, and working units, etc. Select **Settings > Design File** and highlight Angle Readout. Set the Direction Mode to Bearing.





Task Menu

🚽 Copy

.....F Move

Civil Accudraw Project Manager

•

Highlight Color. The Element Highlight and Selection Set Color are set to Bright Pink and Bright Aqua by default. This will help you visualize elements when you are zoomed out.

Design File Settings	
Category Active Angle Active Scale Angle Readout Axis Color Data Acquisition	Modify Color Settings         Element Highlight Color:         Drawing Pointer Color:         Selection Set Color:         Cancel
Data Acquisition	

Highlight Working Units. Verify that the Master Units are set to Feet, the sub unit is set to Inches and the resolution is set to 12000 per Distance Foot.

Working resolution defines how many units of resolution are going to be used to make up a specific unit of measure. The resolution setting defines the worst-case accuracy for the design environment, which occurs at the very outer limits of the (very large)working area/volume.

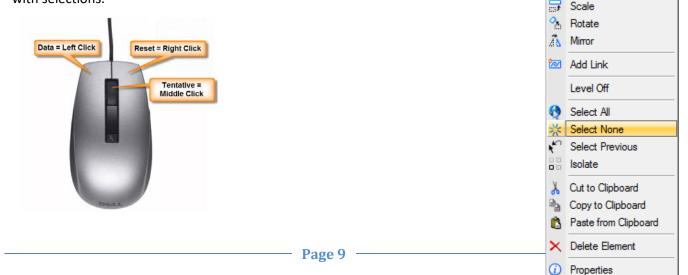
Master Unit: Feet Sub Unit: Inches

Design File Settings	
Category Active Angle Active Scale Angle Readout Axis Color Data Acquisition Element Attributes Fence	Modify Working Unit Settings         Linear Units       QK         Format:       MU       ▼         Master Unit:       Feet       Label:       It       Cancel         Sub Unit:       Inches       Label:       in       Cancel         Accuracy       0.123       Custom
Grid Isometric Locks Snaps Stream Views Working Units	Advanced Settings Resolution: 12000 per Distance Foot Working Area: 1.42159E+008 Miles Solids Area: 67.7867 Miles Solids Accuracy: 3.57914E-006 Feet <u>E</u> dit

Resolution: There are 12 inches per 1 foot (12 sub units per 1 master unit) and there are 1000 Positional units per Sub Unit, thus 12 x 1000 = 12,000 parts per foot. Press **OK** to close the dialog.

## **Button Assignments**

The mouse is used in MicroStation to data point, tentative snap, and reset. Pressing and holding the right mouse button in the design file brings an additional pop-up menu with selections.





To set the Button Assignments, select **Workspace > Button Assignments**. Press the **Remap Buttons** button. In the center of the dialog, highlight the **Tentative - Middle Button** row. Hover the mouse over the Button Definition Area and press the middle button on the mouse to set to tentative. Press **OK** twice to accept these settings and to close the dialog.

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Buttons	Invoked by	*	
Data	Left Button	=	<u>0</u> K
Tentative	Middle Button		
Reset	Right Button		Cancel
XButton 1	Button 16		
XButton 2	Button 4		Default
XButton 3	Button 5	•	Dordan
Button Definition	Area	Click here	with the
Press the button you want to use for < You can use any mouse button or		middle bu set to ter	

There are additional button assignments that can be set on the previous menu by toggling on/off the Ctrl/Alt/Shift plus the mouse click. (Example: Shift + Data allows the user to pan scroll in the design file.)

Ele         Buttons         Qtd       At       Shift       Data       Remap Buttons         Button:       Shift+Data       Action: pan scroll       Shift+Data       Action:       Shift+Data         Button:       Action:       pan scroll       Cti+Data       Match element fromcursor         At+Data       match element fromcursor       At+Data       Match element fromcursor         At+Tentative       buttonaction tentative; accudraw setorigin       At+Tentative       Lutonaction 3ddata         Chrl+Reset       inputmanager menu main       Chrl+Reset       inputmanager currenttask         At+Reset       mol keyin elementinfo element quickinfo fromcursor       XButton 1       rotate view drag         Chrl+XButton 1       rotate view drag       Chrl+XButton 1       notate view fromcursor         At+XButton 1       rotate view fromcursor       At+XButton 1       rotate view fromcursor	Button Assignment	is:\Road\Users_V8i\NealIF\SCDOT.btnmenu
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Ctrl+XButton 1 navigate swivel At+XButton 1 rotate view fromcursor		
Alt+XButton 1 rotate view fromcursor		-
	AIT+ABUTTON	rotate view fromcursor
<u>Q</u> K Cancel		QK Cancel

## **Viewing Tools**

The View Control Toolbox allows you to navigate and manipulate views in the active design file. Tools available include: View Attributes, View Display Mode, Adjust View Brightness, Update View, Zoom In, Zoom Out, Window Area, Fit View, Rotate View, Pan, View Previous, View Next, Copy View, Clip Volume, and Clip Mask as depicted below. There are additional View Control tools in a 3d design file.



A view is a window area that allows you to set up your display preferences for the design file. MicroStation allows you to set up to eight (8) views. You can control these with the View Groups tool box in the bottom left corner.

Page 10

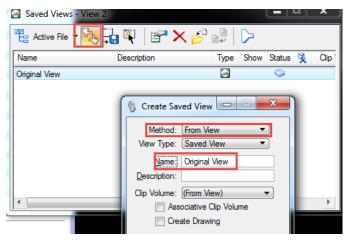




To save the settings for a View, select **File > Save Settings**. This will retain your levels on/off, line weights on/off, etc.

You can also create Saved Views by selecting **Utilities > Saved Views**.

Press the two-hand icon and enter a name. If selecting by Method – From View – ensure you are zoomed all the way out. Data click in the design file to create.



Turn on or off levels as necessary, and repeat these steps for the different views required. This allows you to quickly revert back to a drawing or plotting view if levels have been turned on or off by others accessing the file.

Double click to activate a particular view from the list. Data click on the View window to apply it to any of the 8 different views. This allows you to keep all levels to be plotted in lplot on in View 1, and to turn on/off levels in other views to not affect plotting. Iplot is defaulted to plot from View 1.

Views can be adjusted manually or by using the options under **Window** at the top of MicroStation's menu bar. There are options to Cascade, Tile or Arrange the View windows. All of your open views and dialogs are listed in this menu. If a **dialog is missing or hidden** from view, click it in the drop down to bring it to the front.

<u>Wi</u> ndow	<u>H</u> elp	CADconform	<u>A</u> xiom
<u>V</u> iews	;		+
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Task	<u>N</u> aviga	tion in Views	
✓ View	ToolBo	x	
<u>1</u> Viev	v 1, EJ	F	
<u>2</u> Viev	v 2, EJ	F	
<u>3</u> Viev	v 3, EJ	F	
<u>4</u> Viev	w 4, EJ	F	
<u>5</u> Mic	rosoft C	Office Importer	
<u>6</u> Proj	ect Exp	olorer	
<u>7</u> Plac	ce Sma	rtLine (Tool Sett	ings)
<u>8</u> Tas	ks		



## **View Attributes**

The View Attributes are used to set how attributes are displayed in the design file. The Display Style allows different viewpoints to review 2d and 3d drawings such as Wireframe, Illustration, and Smooth. Most drawings are set to Wireframe.

Common attributes to review include:

Constructions – temporary lines drawn in to a file that allow the user to snap to a certain location. These lines do not plot.

Level Overrides – everything showing up "white" in the drawing? This is most likely turned on.

Line Styles – this should always be on. If all lines are solid lines this is most likely turned off.

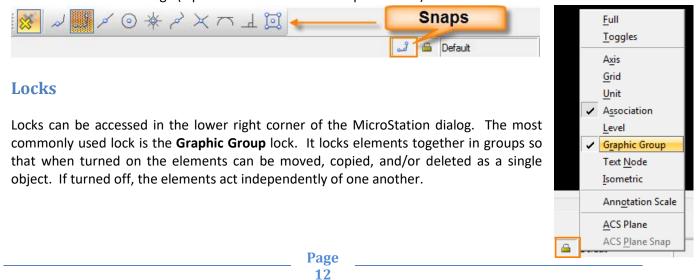
Line Weights – this varies between on/off. Line weights should be on to plot. However, viewing the thick lines in a drawing is difficult and is generally turned off while drafting.

Text – if placing text and nothing is

showing up on placement, this is most likely turned off.

## **Snaps**

Snap modes are utilized to connect design elements at key locations by hovering over elements and using Accusnap, or by using the tentative snap. There are snaps for Keypoint, Nearest, Midpoint, Center, Origin, Bisector, and Intersection. You can access the snap button bar in the lower right corner of the MicroStation dialog. (Tip: Double click to set a snap as active.)



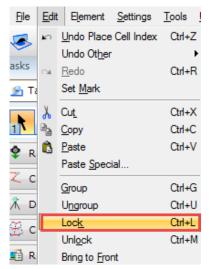
📕 View Attributes - View 1	
View Number: 1 🗸 🖳	
Presentation	#≡ ^
Display Style: (Wireframe Display)	<b>-</b> ♀
💫 ACS Triad	🐼 Fast Cells
Background	🖹 Fill
Boundary Display	I Grid
Camera	🍓 Level Overrides
->> Clip Back	Line Styles
Clip Front	E Line Weights
😟 Clip Volume	🕐 Markers 🗸 🗸
Constructions	Patterns
i Default Lighting	🔯 Tags
Dimensions	A Text
💴 Data Fields	¹→ Text Nodes
Displayset	Transparency
Global Brightness: 👾 🔸	► 🖗
View Setup	*
Saved Views: Select 🖵 🔂	- 9
Models: Default 💌	

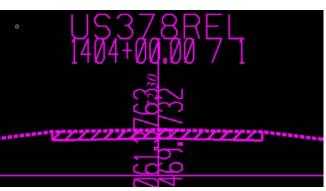




To create a group of elements, use the Element Selection tool to select the objects and then select **Edit > Group** from the top menu bar.

To lock a group of elements, use the Element Selection tool to select the objects and then select **Edit > Lock**. This is commonly used when generating existing cross sections in Geopak. Once the elements are locked, you can process additional runs of proposed cross sections and easily delete all newly modified elements without having to reprocess the existing. Select **Edit > Unlock** to unlock the elements.





## **File Compress and Repair**

The File Compress Options is used to purge empty and unused data resources as well as deleted elements from the open DGN file. Select **File > Compress > Options**.

Compress Optio	ons	
Select	Action	Alias
	Delete Empty Cell Headers Delete Empty Text Elements Delete Text Elements Containing Only Spaces Delete Pre 8.11 Render Setup Entries Delete Unused Named Shared Cells Delete Unused Named Shared Cells Delete Unused Line Styles Delete Unused Dimension Styles Delete Unused Dimension Styles Delete Unused Text Styles Delete Unused Text Styles Delete Unused Netsed Attachment Levels Delete Unused Multi-line Styles Delete Unused Element Templates	EMPTY_CELL EMPTY_TEXT SPACE_TEXT RENDER_SETUP SC_NAMED SC_ANON LINESTYLES DIMSTYLES TEXTSTYLES LEVELS LEVELS LEVELTABLES MLINESTYLES ELEMENTTEMPLATES
Include Refe	rences	
Compress	<u>O</u> K	Cancel

This series of key-ins may help repair a corrupted dgn file. Enter the following in the key-in dialog:

> mdl load verifydgn verifydgn verify verifydgn repair

Check on all of the options and press the **Compress** button to complete the operation.

Press OK to close the dialog.

Be careful if you check on Include References as this may make modifications to other designers' files referenced to this drawing.

😁 Key-in			×
verifydgn repair			•
vba vectoricon verifydgn version view ∢ ►	verify	All	•
verifydgn repair verifydgn verify mdl Ioad verifydgn go= G0=			



## **Workspace Preferences**

Workspace preferences are used to set user preferences that control how MicroStation operates. The following are a few common settings that SCDOT utilizes:

## Workspace > Preferences > Operation

Open Two Application Windows: Uncheck. This keeps all of your toolbars and view windows in one screen that can be stretched across two monitors.

Save Settings on Exit: Check or uncheck. When checked on, if you turn levels on or off, the view settings will be saved upon exit. If this is not your file, please do not save settings on exit. The owner of the file will need to reset levels and it may affect their plotting. It is recommended to turn this off by default and use Ctrl +F or File > Save Settings to save the settings manually.

Automatically Save Design Changes: Check On. This saves changes to the design file repeatedly while work is being done to ensure you do not lose any important changes.

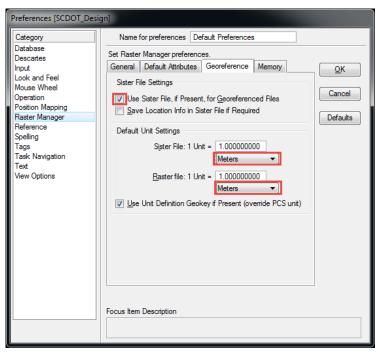
Preferences [SCDOT_Designation]	gn]	
Category         Database         Descartes         Input         Look and Feel         Mouse Wheel         Operation         Postion Mapping         Raster Manager         Reference         Spelling         Tags         Task Navigation         Text         View Options	Name for preferences         Set Operational Preferences.         Open I wo Application Windows         Save Settings on Exit         Automatically Save Design Changes         Compress File On Exit         Enter into Untitled Design         Display Broken Associations with Different Symbology         Reset Aborts Fence Operations         Optimized Fence Clipping         Display Active Level in All Views         Viewing Tools Apply to Active View         Use Snap Mode from Preferences         Resource Cache:         1024	QK Cancel Defaults
<u></u>	1	

## Workspace > Preferences > Raster Manager

On the Georeference tab, check on Use Sister File for tif files, topo maps, etc. that have a different Geographic Coordinate System than the SC83IF. The **sdw** (sister) file needs to be in the same folder as the tif file to provide the necessary georeferenced information.

Change the Units to Meters or Feet depending on the units of the raster file. Press OK.

These settings allow you to reference raster image files with different coordinate systems without modifying your SC83IF project survey.





## Workspace > Preferences > Task Navigation

On the Task Navigation option, set the Presentation to Dialog and select the size of icons. Press OK to accept. This option provides the Tasks and Main toolbars on the left in MicroStation.

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Roundabouts	* ^
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Print Preparation	*
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## Workspace > Preferences > View Options

On the View Options, check on Show View ToolBox (Top/Bottom) and check on Scroll Bars on View Windows. Additional options on this menu allow you to toggle on the Black or White Background. Press OK to accept the modifications.

Preferences [SCDOT_Desi	gn]	
Category Database Descartes Input Look and Feel Mouse Wheel Operation Position Mapping Raster Manager Reference Spelling Tags Task Navigation Text View Options	Name for preferences       Default Preferences         Set View Window Look/Layout Preferences.         Show View ToolBox       Top         Scroll Bars on View Windows         Black Background -> White         Preserve Aspect Ratio of Views         Fast Visible Edges         Anti-alias Lines:       Off         Update Refresh Frequency (secs):       1.0         Frame Rate for View Tools (frames/sec):       5.0         Gamma Correction:       1.70	<u>Q</u> K Cancel Defaults



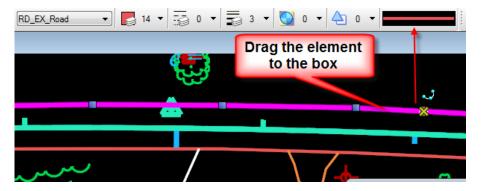
## **Element Attributes**

Element Attributes are the settings for level, color, style, and weight for the drawn elements in your MicroStation design file.

Attributes						
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	Active Level	Color	Weight		Priority	Preview
			Line Style	Trans	parency	

SCDOT projects utilize Level Names for each category of design elements like RD\_EX – existing design elements, RD\_PD – proposed design elements, RD\_XS – cross section design elements, etc. See the Primary Tools Section below for additional information on Level Names.

To quickly match symbology, with the Element Select tool active, left mouse click on an element and hold and drag into the Symbology Preview window. The new settings will change for the Level Name, Line Weight, Color, and Line Style.



The Primary Tool bar contains some of the most important buttons that you will use in MicroStation. The Models, References, Raster Manager, Point Clouds, Saved Views, Level Manager, Level Display, Element Information, Items, Markups, Project Explorer, AccuDraw, Key-in, and Popset buttons are all included on this tool bar.

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## Reference Files

*Reference files* are design files that can be attached to the active design file. These files can be displayed, snapped, clipped and plotted, but cannot be modified. Reference files can be attached by selecting **File > References** from the top menu bar in a MicroStation file or by selecting the icon on the Primary Toolbar.



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15	$\checkmark$	s79reloc2dx.dgn	Default	S79RELOC2 - 11+00.00	GEOPAK_xssheet_0015
16	$\checkmark$	s79reloc2dx.dgn	Default	S79RELOC2 - 11+50.00	GEOPAK_xssheet_0016

By selecting **Tools > Attach** on the References dialog, another dialog box will appear that will allow the user to attach a particular reference file. The dialog also allows the user to preview the file.

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	📕 2proline3.d	gn	2/8/2012 12:48 PM	Bentley MicroStati	66 KB		
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	🔏 drainstr.dgr	n	12/3/2009 2:16 PM	Bentley MicroStati	42 KB		
	🔏 ecds_borde	r.dgn	12/3/2009 2:18 PM	Bentley MicroStati	51 KB		
	🛃 ecds-1.dgn		1/28/2010 5:05 PM	Bentley MicroStati	66 KB		
	🔏 ecltts11.dgr	n	12/20/2011 8:49 AM	Bentley MicroStati	120 KB		
	🔏 engref.dgn		1/28/2010 5:05 PM	Bentley MicroStati	33 KB	-	
	File name:	2proline.dgn			-	Open	
	Files of type:	All Files (*.*)			•	Cancel	

Reference files can also be accessed through the References dialog. These tools allow the user to attach, move, and manipulate the reference files.

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Display, snap, and locate columns are represented by iconic buttons at the bottom of the References menu and are activated for all references by default. Use these buttons to turn features on / off for selected reference files.

The Reference dialog also allows the user to **Activate** a reference file and to **Exchange** – meaning to go to the reference attachment so that editing can take place.

Live Nesting allows attached references to have other references attached to them. The number of "nests" that you designate are similar to the number of layers of reference attachments.

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Georeferenced is turned on when coordinates in the reference file need to be reprojected to the coordinates in the active design file. This is common with metric to english attachments.

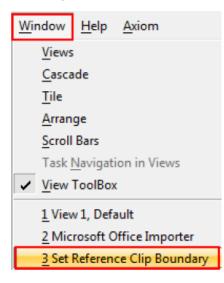
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#### **Reference Clip Boundary by Fence**

To re-clip a reference file to extend the boundaries on a cross section sheet, draw a fence around the area of the reference attachment that you want to extend the clip to. In the reference dialog, highlight that reference attachment. Select **Clip Boundary**. Set the Method to **Active Fence** and data point in the fence region to accept.

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9	S77Reldx.dgn	Default		GEOPAK_xssheet		Wireframe	$\checkmark$	$\checkmark$	$\checkmark$		
10	S77Reldx.dgn	Default		GEOPAK_xssheet		Wireframe	$\checkmark$	$\checkmark$	$\checkmark$	Use References Dialog List	
11	S77Reldx.dgn	Default	S77REL - 167+00.00	GEOPAK_xssheet		Wireframe	$\checkmark$	$\checkmark$	$\checkmark$		
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If the small dialog is missing, select Window from the top menu bar and highlight the tool dialog that you are looking for. You can activate the dialogs here no matter what tool you are using in MicroStation and Geopak.





The following is a list of the Reference Border sheets maintained in the SCDOT Workspace for plan production:

Reference File Name	Description	Last Updated	Attachment Scale	Comments
2proline_20.dgn	Double Profile Sheet 20:1	3/27/2014	1:1	Included in geopaksheets_In.cel
2proline_50.dgn	Double Profile Sheet 50:1	3/27/2014	1:1	Included in geopaksheets_In.cel
01_Index_Layout_Sheet.dgn	Index Layout Sheet	4/6/2017	1:1	Included in geopaksheets_In.cel
04_Property_Strip_Map.dgn	Property Strip Map Sheet	4/6/2017	1:1	Included in geopaksheets_In.cel
05_Drainage_Data_Sheet.dgn	Drainage Data Sheet	4/6/2017	1:1	Included in geopaksheets_In.cel
05_Reference_Data_Sheet.dgn	Reference Data Sheet	4/6/2017	1:1	Included in geopaksheets_In.cel
05_Reference_Data_StationOffset.dgn	Station Offset Data Sheet	4/6/2017	1:1	Included in geopaksheets_In.cel
05_Staking_Plan_Sheet.dgn	Staking Plan Sheet	4/6/2017	1:1	Included in geopaksheets_In.cel
06_Drainage_Plan_Sheet.dgn	Drainage Plan Sheet	9/5/2017	1:1	Included in geopaksheets_In.cel
06_Plan_Profile_Sheet_20.dgn	Plan Profile Sheet 20:1 Scale	9/5/2017	1:1	Included in geopaksheets_In.cel
06_Plan_Profile_Sheet_50.dgn	Plan Profile Sheet 50:1 Scale	9/5/2017	1:1	Included in geopaksheets_In.cel
06_Plan_Sheet_20.dgn	Plan Sheet 20:1 Scale	9/5/2017	1:1	Included in geopaksheets_In.cel
06_Plan_Sheet_50.dgn	Plan Sheet 50:1 Scale	9/5/2017	1:1	Included in geopaksheets_In.cel
06_Profile_Sheet_20.dgn	Profile Sheet 20:1 Scale	9/5/2017	1:1	Included in geopaksheets_In.cel
06_Profile_Sheet_50.dgn	Profile Sheet 50:1 Scale	9/5/2017	1:1	Included in geopaksheets_In.cel
A_border1.dgn	Border Sheet w/ Title block	3/27/2014	1:1	
A deset des	Moving Items, Removal &	2/27/2014	1:1	Discontinued; use new Excel Sheet
A_dem1.dgn	Disposal, New Fence Sheet	3/27/2014	1:1	template
A_ecds_border.dgn	Erosion Control Data Sheet	3/27/2014	1:1	Discontinued; use new Excel Sheet
A second day	Reference Data Sheet	2/27/2014	4.4	Discontinued; Use new 05* Series
A_engref.dgn	Border	3/27/2014	1:1	sheets listed above
A_mi2.dgn	Moving Items Sheet	3/27/2014	1:1	Discontinued; use new Excel Sheet
Drainage_dualplanpipe.dgn	Dual Plan Sheet w/ Pipe	6/30/2016	1:1	Replaces altpipe sheets
Drainage_planpipe.dgn	Plan Sheet w/ Pipe Chart	6/30/2016	1:1	Replaces altpipe sheets
Drainage_planprofilepipe.dgn	Plan & Profile Sheet w/ Pipe	6/30/2016	1:1	Replaces altpipe sheets
Drainage_profilepipe.dgn	Profile Sheet w/ Pipe Chart	6/30/2016	1:1	Replaces altpipe sheets
bordersc.dgn	Border Sheet	3/27/2014	-	
C_PFRts1.dgn	"C" Project Field Review	3/27/2014	1:1	
cpr_SEQ1.dgn	Construction Summary of	3/27/2014	1:1	Discontinued; use new Excel Sheet
dfrts7.dgn	Design Field Review Title	8/19/2015	1:1	
ecltts13.dgn	Consultant Title Sheet	10/18/2016	1:1	
planref.dgn	Plan & Profile Sheet	3/27/2014	1:1	
prolong_50.dgn	Profile Grid for laying grade	3/27/2014	1:1	
PrwPFRts1.dgn	Preliminary Right of Way Field Review Title Sheet	3/27/2014	1:1	
qfolder_2007.dgn	Project Summary Sheet	3/27/2014	1:1	
rwdata3.dgn	Right of Way Data Sheet	3/27/2014	1:1	Discontinued; use new Excel Sheet
rwdata3_border.dgn	Right of Way Data Sheet Border Only	3/27/2014	1:1	Discontinued; use new Excel Sheet template
SCDOT Road Border 22x36.dgn	Border Sheet w/ Title block	3/27/2014	600:1	• -
SCDOT_Road_Border_Plan&Profile_22x36.dgn	Plan & Profile Sheet	3/27/2014	600:1	
sctyp1.dgn	Typical Section Border Sheet	3/27/2014	1:1	Discontinued; Use 03_Typical_Section cell in
std_form2.dgn	Summary of Estimated Quantities Sheet	3/27/2014	1:1	Discontinued; use new Excel Sheet template
std_form13.dgn	Title Sheet	10/18/2016	1:1	



## Raster Manager

Raster Manager is utilized to attach a rasterized image file in MicroStation. Attachments can be clipped, scaled, moved, or rotated while leaving the raster data intact.

To access Raster Manager, select **File > Raster Manager** from the top MicroStation toolbar or select the 3<sup>rd</sup> icon on the Primary Toolbar.

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To attach a raster, select File > Attach > Raster from the Raster Manager dialog.

🛃 Raster Manager	: 0 of 0 listed
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In the Attach Raster Reference dialog, Files of type can be toggled to other options including Common Raster Formats, Adobe pdf, JPEG, SID, and TIFF.

**Highlight** the raster file and select **Open**. Select a Level – **GN\_Raster** to place the raster on a level. (This level will need to be turned on to plot.) Press the **Attach** button.

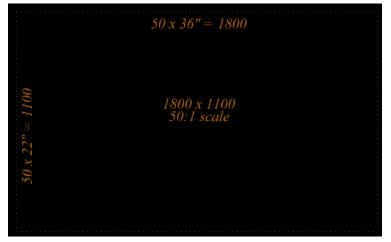
General		*
Level	GN_Raster	-
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Line Style	🔛 ByLevel	
Weight	ByLevel	
Class	Primary	
Priority	0	

**To attach plan sheets** or other drawings to scale from Plans Library, draw a box that is the Scale x Length by Scale x Width of paper.

Scale	Length	Width	Dimensions
20:1	36″	22"	720 x 440
40:1	36″	22″	1440 x 880
50:1	36″	22″	1800 x 1100
100:1	36″	22″	3600 x 2200



#### Example: 50:1 plan sheet – draw the box 1100 x 1800 (50 x 22" = 1100 by 50 x 36" = 1800)



For convenience in plotting multiple sheets with IPLOT, draw the box(es) on the RD\_SHT\_IplotSHP level.

When attaching the pdf or tiff file, check on **Place Interactively**. This will allow the file to be snapped to the upper left and lower right corner of the box drawn.

Name	Size	Item type	Date modified	Preview Attachment
Name Libraries Neal, Iris F. Computer Network 31125 i-26 EVD stuff 337790057.tiff Scans Workspace	Size 377 KB 2 KB 2 KB	Item type File folder File folder File folder File folder TIFF Image Doc Shortcut Shortcut	Date modified 8/18/2015 9:57 A 9/2/2015 12:14 P 8/19/2015 10:08 9/4/2015 4:28 PM 9/8/2015 11:39 A 9/3/2015 11:09 A 7/6/2015 11:05 A	Image: Second secon
	7.tiff [*.tif;*.tiff] s read-only	•	Open Cancel	

Use the MicroStation **measure tool** to measure a length of stationing in a tangent section to verify that the raster has been attached to scale.





**To clip a map**, draw a fence with the approximate center location. Select the **Clip** tool, toggle Method: **Fence** and Mode: **Clip Boundary**. Data clip to accept the clip.



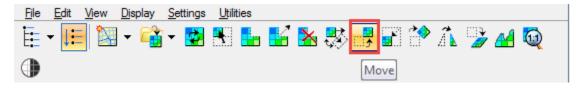
To modify a clip, highlight the raster file name in the Raster Manager dialog. Select the **Modify Clip** icon.

🔢 Raster Manager : 1 of 1 listed		
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	Modify Clip	
🕼 File Name	Description Logical Name	6
Generation     Generation		8

Drag the midpoints or corners of the clip to expand the clip limits.

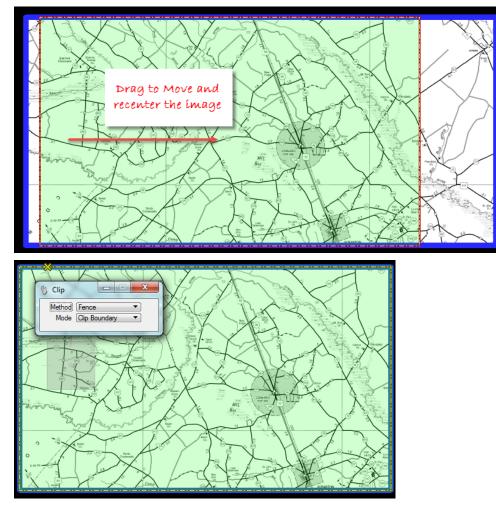


Select the **Move icon**. **Move** the raster to re-center the image in the clip location.



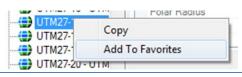


Draw a fence for the new boundary and select **Clip** to reclip the new extents of the raster.



**To attach a Mr. Sid file** that is in a different (metric) coordinate system to your state plans coordinate design file:

- Select File > Raster Manager
- Select File > Attach > Raster
- Navigate to the raster file (.sid) to be attached, highlight, and press **Open**
- **Highlight** the raster attachment file in the Raster Manager dialog
- Select Utilities > Coordinate System > Select from Library
- Navigate to the associated coordinate system. (Library > Projected > North America > United States of America > Others > UTM27-17) Highlight and right-click on this file and Add to Favorites. Highlight again and press OK to set it for the raster image.



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🔉 🍓 File Name	Coordinate System	Select From Library
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Page 23



#### To attach an aerial image, in Raster Manager

- Select File > Attach > WMS
- Navigate to <u>\\nts\hq\Aerial-Photos\6in</u>
   <u>Statewide Imagery\WMS</u>
- Highlight the Statewide WMS file and select
   Open
- Select Attach
- Fit View to review





Note: Aerial images are available to SCDOT employees only. Consultants may need to access aerials via county websites, Google Earth or alternative methods.

Note: Separate County ECW files are located in the ECW folder should the Statewide file be unavailable and are attached by selecting **File > Attach > Raster**.

\\nts\hq\Aerial-Photos\6in Statewide Imagery\ECW

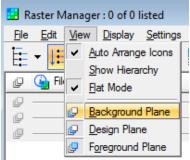
►	Aerial-Photos + 6in Statewide Imagery + ECW	•
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	lers	8/20/2015 2:46 PM
	Abbeville_2011.aux	8/22/2014 8:51 AM
L	Abbeville_2011.ecw	8/12/2014 2:14 PM
L	Aiken_2007.aux	8/22/2014 8:51 AM
-	Aiken_2007.ecw	8/12/2014 3:18 PM

## Common Issues with Raster Files:

If the Raster files are not showing in the Raster Manager dialog (and/or file), check that the Background, Design, and Foreground Plans are turned on under the **Raster Manager > View** dialog. Raster images are attached to planes for layering affects. One of these may be turned off in the file.

Also, check that the **level** assigned to the Raster files is **turned on** if the image is not displaying in the design file or not plotting.

If the file is **"greyed" out** in the Raster Manager dialog, it has most likely been attached using the Reference dialog. The raster should be detached from the Reference dialog and reattached using Raster Manager.





## Level Manager

The Level Manager is used to maintain uniformity among different disciplines and users. A dgnlib called "RoadDesignLN.dgnlib" has been developed to save SCDOT standard levels and symbology for SCDOT plans. The level name format is as follows:

Category\_Classification\_Disposition

The Category and Classification are two (2) or three (3) letter codes used to group levels in categories. The different codes are listed below:

Category	Description
СО	Construction
RD	Road Design
SU, UC	SUE or Utility

Classification	Description	Number Range
НС	Horizontal Control	100-114,214,1625
EX	Existing Design	115-169,215,222
SU, UC	SUE – Subsurface Utilities	170-213,216, 900-920
PD	Proposed Design	184,226-374,1050-1061
ТХ	Text	375-394
SHT	Sheet – Borders	302, 400-418
DTM	DTM – Geopak Features	425-462
COGO	COGO – Geopak Features	475-481
DDB	DDB – Geopak Features	500-509
SMD	SMD – Geopak Features	515-516
DSG	Design Services Group	525-528
XS, XE	Cross Section Elements	549-617
Sketch	Misc. Drawings & Notes	650-659
GPK	Geopak	675-677
НҮ	Hydraulics	700-775
QTY	Quantities	850-872
AR	Architecture	950-961
GT	Geotechnical	1200-1212
EV	Environmental	1300-1312
СО	Construction	1400-1503

Each classification has a corresponding MicroStation filter to better facilitate setting the active level and turning on/off levels. Levels can be sorted by LevelName or number.

All level names consist of alphanumeric characters only. No special characters or spaces are used other than the underscore character "\_".

SCDOT's standard user configuration is set so that the individual CADD users will not be permitted to create levels. Ten sketch levels have been established to allow users to draw items that would not normally be shown on a set of SCDOT construction plans. If you have any requests for additional levels,



they will be handled and approved by the Preconstruction Support Design Automation Group to be considered as a standard.

In general, most curvilinear features will have a level. This will allow users to take advantage of MicroStation V8's ByLevel attributes feature to set the proper symbology for an element when the level is selected. There are, however, a few exceptions to this rule as detailed below:

\*The active cell cannot be set a part of the ByLevel functionality so we have elected to group like cells on the same level. For example, all existing electric utility cells are placed on the level RD\_EX\_UT. Also cells should be placed without the ByLevelStyle so they will not take on that level line style.

\*The Levels RD\_EX\_RD, RD\_EX\_Veg, and RD\_EX\_Driveway will not use ByLevelStyle so that multiple linestyles can be placed on the same level, thus a paved road solid line vs. dashed dirt road line can both be drawn on the RD\_EX\_RD level. Similarly, multiple custom line styles can be placed on the RD\_EX\_Veg to facilitate the use of tree, woods and shrub lines on the same level. This was done to keep from creating numerous levels for like items. RD\_EX\_DV\_Gov has similar characteristics to allow multiple linestyles for designation of divisional boundaries.

\*Rather than create a level for each pipe size, all new storm sewer lines are grouped on one level RD\_PD\_DR\_Pipe. Use the GEOPAK Design and Computation Manager or Geopak Drainage to facilitate placement of these MicroStation elements with attributes so individual pay items can be computed later.

## **Horizontal Control**

The following levels are used to draw horizontal alignment centerlines, curve data to include bearings, control points, reference points, equalities, beginning and ending notes, station tic marks, station numbers, relocations, and all other features related to the projects horizontal control.

∆ Name	Number	<u>s</u>			Description
RD_HC					
RD_HC_CI	100	149	0	6	Survey Centerline
RD_HC_Data	101	149	0	<u> </u>	Curve Data
RD_HC_Data_Tic	102	149	0	<u> </u>	Tic Marks
RD_HC_Points	103	149	0	<u> </u>	Point Cell,Circle and Text for Horiz. Alignments
RD_HC_TX_Sta20	104	149	0	2	Station numbers 20 scale
RD_HC_TX_Sta50	105	149	0	<u> </u>	Station numbers 50 scale
RD_HC_TX_StaOther	106	149	0	2	Station numbers other scale
RD_HC_txCode	107	0	0	0	Survey Code for RD_HC_Data
RD_HC_CL_Rel	108	18	RELOCATION LINE	6	Relocation Centerline
RD_HC_Data_Rel	109	18	0	0	Relocation Curve Data
RD_HC_Data_Tic_Rel	110	18	0	<u> </u>	Relocation Tic Marks
RD_HC_TX_Rel_Sta20	111	18	0	<u> </u>	Relocation Station numbers 20 scale
RD_HC_TX_Rel_Sta50	112	18	0	<u> </u>	Relocation Station numbers 50 scale
RD_HC_TX_Rel_StaOther	113	18	0	<u> </u>	Relocation Station numbers other scale
RD_HC_Survey	114	149	0	<u> </u>	Survey Control
RD_HC_Survey_txCode	214	0	0	0	Survey Control Text
RD_HC_Survey_ELEV	1625	173	0	0	Survey Control Text Elevation



# **Existing Design Levels**

The following levels are used to draft all existing surveyed elements including buildings, bridges, concrete structures, driveways, pipes, property lines, fence, right of way, vegetation and any other existing features surveyed in the field.

Δ	Name	Number	6				Used	Description
_	RD_EX				-			
	RD_EX_Bldg	115		6	0			Building Outlines
	RD_EX_Bldg_txCode	116				0		Survey Code for RD_EX_Bldg
	RD_EX_BldgApp	117				2		Building Appurtenances
	RD_EX_BldgApp_txCode				0	0		Survey Code for RD_EX_BldgApp
	RD_EX_BldgChurch	119			0	6		Church, Synagogue and Mosques
	RD_EX_BldgChurch_t	120			0	0		Survey Code for RD_EX_BldgChurch
	RD_EX_BldgSchool	121			0	6		School
	RD_EX_BldgSchool_tx				0	0		Survey Code for RD_EX_BldgSchool
	RD_EX_Bridge	123		27	0	2		Existing Bridges
	RD_EX_Bridge_txCode	124				0		Survey Code for RD EX Bridge
	RD_EX_Conc	125		221		2		Existing Concrete Median/Curb&Gutter/Sidewalk
	RD_EX_Conc_txCode	126			0	0		Survey Code for RD_EX_Conc
	RD_EX_Dam	127		223	0	<u> </u>		Existing Dams
	RD_EX_Dam_txCode	128			0	0		Survey Code for RD_EX_Dam
	RD_EX_Driveway	129		81	0	<u> </u>		Existing Driveways
	RD_EX_Driveway_txCode	130		0	0	<u> </u>		Survey Code for RD_EX_Driveway
	RD_EX_DR_ErosCtrl	131		113	0	2		Existing Erosion Control Items
	RD_EX_DR_ErosCtrl_t				0	0		Survey Code for RD_EX_DR_ErosCtrl
	RD_EX_DR_Inlet	133		106	O	<u> </u>		Existing CATCH BASINS
	RD_EX_DR_Inlet_txCode	134		0	0	<u> </u>		Survey Code for RD_EX_DR_Inlet
	RD_EX_DR_Pipe	135		106	PIPE EXIST	<u> </u>		Existing Storm System Pipes (all types)
	RD_EX_DR_Pipe_txCode	136		0	O	<u> </u>		Survey Code for RD_EX_DR_Pipe
	RD_EX_DV_Gov	137		87	<u> </u>	<u> </u>		City/ Town Limits
	RD_EX_DV_Prop	138		0	R/W OR PROPERTY LINE	<u> </u>		Property Lines
	RD_EX_DV_Prop_txCode	139		0	0	0		Survey Code for RD_EX_DV_Prop
	RD_EX_DV_PropPin	140		0	0	<u> </u>		Concrete Marker
	RD_EX_DV_TX_Gov	141		87	0	<u> </u>		City/County/State Text Identification
	RD_EX_DV_TX_Prop	142		0	0	<u> </u>		Property Owner Text/Tract # Identification
	RD_EX_Fence_ChLk	143		6	FENCE LINE	<u> </u>		Existing Chain Link/Woven Wire Fence
	RD_EX_Fence_ChLk_t	144		0	0	0		Survey Code for RD_EX_Fnce_ChLk
	RD_EX_Fence_Other	145		245	FENCE LINE	<u> </u>		Existing Fence (Non-Chain Link/Woven Wire)
	RD_EX_Fence_Other	146		0	0	0		Survey Code forRD_EX_Fnce_Other
	RD_EX_GuardRail	147		22	EX GR RT	<u> </u>		Existing GUARDRAIL
	RD_EX_GuardRail_tx	148			0	0		Survey Code for RD_EX_GrRail
	RD_EX_H20	149	_	1	0	2		Pond,Lake,Creek, Stream & River Banks
	RD_EX_H2O_txCode	150			0	0		Survey Code for RD_EX_H2O
	RD_EX_H20_BlueLn	151		190	0	2		Existing BlueLine Stream
	RD_EX_H20_BlueLn_t				0	0		Survey Code for RD_EX_H2O_Blue
	RD_EX_H2O_WetLd	153			WETLAND	2		Existing Wet Land
	RD_EX_H2O_WetLd_t				0	0		Survey Code for RD_EX_H2O_WetLd
	RD_EX_Misc	155			0	2		Misc. Points/Shots & North Arrows
	RD_EX_Misc_txCode	156			0	0		Survey Code for RD_EX_misc
	RD_EX_RailRoad	157	_	7	RAIL ROAD LINE	2		Rail Road Tracks
	RD_EX_RailRoad_txCode				0	0		Survey Code for RD_EX_RailRoad
	RD_EX_Road	159		14	0	<u> </u>		Existing Edge of Pavement
	RD_EX_Road_txCode	160			0	0		Survey Code for RD_EX_Road
	RD_EX_RW	161			R/W OR PROPERTY LINE			Existing Right of Way Lines/Easement Lines
	RD_EX_RW_TxCode	162		0	0	0		Survey Code for RD_EX_RW
	RD_EX_RW_TX	163			0	2		Existing Right of Way Text
	RD_EX_UT	164		3	0	2		Existing Utilities & PUPS Lines-SCDOT Location Survey
	RD_EX_UT_txCode	165	_	0	0	0		Survey Code for RD_EX_UT
	RD_EX_VEG	166		2	0	2		Trees and Shrubs- All Types and Sizes
	RD_EX_VEG_txCode	167			0	0		Survey Code for RD_EX_VEG
	RD_EX_VEG_TZ	168	_	158	0	2		Zoned Trees- Unique Vegetation Zoned by Types and Sizes
	RD_EX_VEG_TZ_txCode			_	0	0		Survey Code for RD_EX_VEG_Z
	RD_EX_Control_Access	215		5		2		Existing Control Access
	RD_EX_Easement	222	г	10	1 EASEMENT -	<u>2</u>	(00)	Existing Property Easement
	RD_EX_Pavement_Mark RD_EX_Survey_Limits	223 224		0		2 5	(none) (none)	Existing Pavement Markings Project Survey Limits
	no_ex_ouvey_dinits	224	-	124	U		(none)	Project Survey Limits



## **Existing SUE – Subsurface Utility Design Levels**

The following levels are used to draft all existing surveyed Subsurface Utility (SUE) elements including electrical lines, boxes, manholes, gas lines, meters, valves, vents, underground water appurtances, powerpoles, lightpoles, guy wires, telephone poles, sanitary sewer, sweep limits, communication lines and any other existing utilities surveyed in the field.

Δ	Name	Number	5			1	Used	Description
	RD_EX_SU							
	RD_EX_SU_Dbank	170	1	)4	— O	2		Duct Bank Lines -Sue Survey
	RD_EX_SU_TX_Dbank	171	1	4 —	— O	2		Text for Duct Bank Lines
	RD_EX_SU_Dbank_TxCode	172	0		— O	0		Survey Code for RD_EX_SU_Dbank
	RD_EX_SU_Elec	173	1	.7 —	— O	2		Underground Elec. Lines -Sue Survey
	RD_EX_SU_TX_Elec	174	12	7 —	— O	2		Text for Underground Elec. Appurtances
	RD_EX_SU_Elec_TxCode	175	0		0	<u> </u>		Survey Code for RD_EX_SU_Elec
	RD_EX_SU_Eoi	176	2	. —	— O	<u> </u>		End of Information-Sue Survey
	RD_EX_SU_Gas	177	2	31 —	— O	<u> </u>		Underground Gas Lines-Sue
	RD_EX_SU_TX_Gas	178	2	31 —	— O	<u> </u>		Text for Underground Gas Appurtances
	RD_EX_SU_Gas_TxCode	179	0		— O	<u> </u>		Survey Code for RD_EX_SU_Gas
	RD_EX_SU_H2O	180	1	5 —	— O	<u> </u>		Underground Water Lines-Sue Survey
	RD_EX_SU_TX_H20	181	1	5 —	— O	<u> </u>		Text for Underground Water Appurtances
	RD_EX_SU_H2O_TxCode	182	0		- 0	0		Survey Code for RD_EX_SU_H20
	RD_EX_SU_H2OTank	183	1		— O	2		Existing Water Tank/Tower-Sue Survey
	RD_EX_SU_H2OTank_TxCode	185	0		0	0		Survey Code for RD_EX_SU_H2OTank
	RD_EX_SU_Misc	186	2	. —	— O	2		Misc. Underground Lines-Sue Survey
	RD_EX_SU_TX_Misc	187	2	. —	— O	<u> </u>		Text for Underground Misc. Appurtances
	RD_EX_SU_Misc_TxCode	188	0		0	0		Survey Code for RD_EX_SU_Misc
	RD_EX_SU_Nonpot	189	19	)4 —	0	2		Nonpotable Water Lines -Sue Survey
	RD_EX_SU_TX_Nonpot	190	19	)4 ——	0	2		Text for Nonpotable Water Lines
	RD_EX_SU_Nonpot_TxCode	191	0 🗌		0	0		Survey Code for RD_EX_SU_Nonpot
	RD_EX_SU_Ovhd	192	12	.7 —	0	<u> </u>		All Overhead Lines-SUE Survey
	RD_EX_SU_TX_Ovhd	193	4		0	<u> </u>		Text for All Overhead Lines
	RD_EX_SU_Ovhd_TxCode	194	0		0	0		Survey Code for RD_EX_SU_Ovhd
	RD_EX_SU_Pole	195		.7 —	0	<u> </u>		Existing Poles-Sue Survey
	RD_EX_SU_TX_Pole	196	4		0	-		Existing Pole Text Descriptions - Sue Survey
	RD_EX_SU_Pole_TxCode	197			0	0		Survey Code for RD_EX_SU_Pole
	RD_EX_SU_Sewer	198	19		0	2		Underground Sanitary Sewer Lines -Sue Survey
	RD_EX_SU_TX_Sewer	199	1	)4 —	0	<u> </u>		Text for Underground Sewer Appurtances
	RD_EX_SU_Sewer_TxCode	200			0	0		Survey Code for RD_EX_SU_Sewer
	RD_EX_SU_SwpLmt	201	8	SUE S	WEEP			Sweep Limit- Sue Survey
	RD_EX_SU_TX_SwpLmt	202	8		0	2		Sue Sweep Limit Text
	RD_EX_SU_Telecom	203	6		0	-		Underground Comm. Lines-Sue Survey
	RD_EX_SU_TX_Telecom	204	6		0	2		Text for Underground Telcom. Appurtances
	RD_EX_SU_Telecom_TxCode	205			0	0		Survey Code for RD_EX_SU_Telecom
	RD_EX_SU_THole	206	5		0	2		Test Holes-Sue Survey
	RD_EX_SU_TX_THole	207	5		0	2		Test Hole Text Labels
	RD_EX_SU_Thole_TxCode	208	0		- 0	-		Survey Code for RD_EX_SU_Thole
	RD_EX_SU_Tifc	209	12		- 0	2		Traffic Control -Sue Survey
	RD_EX_SU_TX_Trfc	210	12	9	— 0	2		Text for Traffic Control Sue
	RD_EX_SU_Tifc_TxCode	211			— 0	0		Survey Code for RD_EX_SU_Trfc
	RD_EX_SU_TX_H2OTank	216	19		— 0	2		Text for Existing Water Tank/Tower
	RD_UC_AbnRmv	212	3		— 0			Utility Coordination Abandon Remove Utilities
	RD_UC_Reloc	213	3		— O			Utility Coordination Relocate Utilities



## **Proposed Design Levels**

The following levels are to draft all proposed design construction elements for the completion of plans. This section of levels include proposed centerline and alternates, proposed edges of travel way, lane lines and arrows, earth shoulder, asphalt removal, limits of construction, detours, NPDES lines, erosion control items, proposed drainage, guardrail, ditches, shoulders, proposed right of way, sidewalk, valley gutter and all other proposed design elements.

Δ	Name	Number	ú			12	Used	Description
	RD_PD							
	RD_PD_Final_TrvIWay	184	2	3	0	6		Prop Design Edges of Travelway
	RD_PD_Final_Cl	226	2	3	0	6		Prop Design Centerline
	RD_PD_AsphRem	231	2	5	0	<u> </u>		Asphalt Pavement Removal & Notes
	RD_PD_ConcMed	234	1	68	0			Prop Design Concrete Median
	RD_PD_VG	262	1	6	0			Prop Design Valley Gutter
	RD_PD_ALT1_CL	300	7	5	0	6		Prop Design Centerline-Alternate 1
	RD_PD_ALT1_LnLine	301	7	5		6		Prop Design Lanes Lines&Arrows/Raddii-Alternate 1
	RD_PD_ALT1_TrvIWay	303	7	5	O	6		Prop Design Edges of Travelway-Alternate 1
	RD_PD_ALT1_TX	304	7	5	0	<u> </u>		Prop Design Text-Alternate 1
	RD_PD_ALT2_CL	305	1	5	0	6		Prop Design Centerline-Alternate 2
	RD_PD_ALT2_LnLine	306	1	5	3	6		Prop Design Lanes Lines&Arrows/Raddii-Alternate 2
	RD_PD_ALT2_TnTmp	307	1	5	0	<u> </u>		Prop Design Turn Template-Alternate 2
	RD_PD_ALT2_TrvIWay	308	1	5	0	6		Prop Design Edges of Travelway-Alternate 2
	RD_PD_ALT2_TX	309	1	5	0	<u> </u>		Prop Design Text-Alternate 2
	RD_PD_ALT3_CL	310	5	8	O	6		Prop Design Centerline-Alternate 3
	RD_PD_ALT3_LnLine	311	5	8		6		Prop Design Lanes Lines&Arrows/Raddii-Alternate 3
	RD_PD_ALT3_TnTmp	312	5	8	O	<u> </u>		Prop Design Turn Template-Alternate 3
	RD_PD_ALT3_TrvIWay	313	5	8	<u> </u>	6		Prop Design Edges of Travelway-Alternate 3
	RD_PD_ALT3_TX	314	5	8	0	<u> </u>		Prop Design Text-Alternate 3
	RD_PD_ALT4_CL	315	8	8	0	6		Prop Design Centerline-Alternate 4
	RD_PD_ALT4_LnLine	316	8	8		6		Prop Design Lanes Lines&Arrows/Raddii-Alternate 4
	RD_PD_ALT4_TnTmp	317	8	8	O	<u> </u>		Prop Design Turn Template-Alternate 4
	RD_PD_ALT4_TrvIWay	318	8	8	O	6		Prop Design Edges of Travelway-Alternate 4
	RD_PD_ALT4_TX	319	8	8	O	2		Prop Design Text-Alternate 4
	RD_PD_ALT5_CL	320	1	30	O	6		Prop Design Centerline-Alternate 5
	RD_PD_ALT5_LnLine	321	1	30		6		Prop Design Lanes Lines&Arrows/Raddii-Alternate 5
	RD_PD_ALT5_TnTmp	322	1	30	<u> </u>	<u> </u>		Prop Design Turn Template-Alternate 5
	RD_PD_ALT5_TrvIWay	323	1	30	0	6		Prop Design Edges of Travelway-Alternate 5
	RD_PD_ALT5_TX	324	1	30	0	<u> </u>		Prop Design Text-Alternate 5
	RD_PD_EarthShd	325	1	18	6	<u> </u>		Prop Design Earth Shoulder
	RD_PD_Final_LnLine	327	2	3		6		Prop Design Lanes Lines/Arrows/Radii-Final
	RD_PD_Final_TnTmp	328	2	3	O	<u> </u>		Prop Design Turn Template-Final
	RD_PD_Final_TX	330	2	3	O	<u> </u>		Prop Design Text-Final
	RD_PD_BCA	332	8	7	BCA	2		Prop Design Bridge Construction Access Line
	RD_PD_Bridge	333	2	8	O	<u> </u>		New Bridges (all)
	RD_PD_CstnLmt	335	2	0	2	<u> </u>		Proposed Limits of Construction Lines
	RD_PD_TX_CstnLmt	336	2	0	0	<u> </u>		Cut and Fill Text
	RD_PD_Detour	337	2	37	0	<u> </u>		Proposed Detours
	RD_PD_DR_Ditch	338	5	5	OUTFALL DITCH	<u> </u>		Proposed Roadway Ditch
	RD_PD_DR_ErosCtrl	339	5	5	NPDES	<u> </u>		Proposed NPDES lines
	RD_PD_DR_FlowCtrl	340	1	08	OUTFALL DITCH	<u> </u>		Proposed Flow Control Devices
	RD_PD_DR_Inlet	341	3	4	0	<u> </u>		Proposed CATCH BASINS & Inlets (All Types)
	RD_PD_DR_Joint	342	1	70	<u> </u>	<u> </u>		Proposed Tee Joint, Wye Joint ,Bends
	RD_PD_DR_Pipe	343	1	07	PIPE NEW1	<u> </u>		Proposed Pipes (all Sizes & Types)
	RD_PD_Fence	344	1	43	FENCE LINE NEW	<u> </u>		Prop Design New Fence (all types)
	RD_PD_FOC	345	6		FOC	0		Prop Design Face of Curb
	RD_PD_GeoTech	346	6		0	2		Proposed Geo-Technical Data/Notes
	RD_PD_GR	347	1	0	NEW GR LT	<u> </u>		Proposed GUARDRAIL
	RD_PD_MedBWall	348	1	7	0	<u> </u>		Median Barrier Wall Centerline-Plan View
	RD_PD_MedGR	349	1		0			Median Guard Rail Centerline-Plan View



# **Proposed Design Levels (continued...)**

RD_pd         Patem Lines # 1-Plan View           RD_PD_PatIn1         350         88         0         0         Patem Lines # 2-Plan View           RD_PD_PatIn3         352         214         0         0         Patem Lines # 2-Plan View           RD_PD_PaveDit         353         169         0         2         Prop Design Paved Shoulder           RD_PD_PaveShd         354         165         0         4         Prop Design Paved Shoulder           RD_PD_RW_TX         356         35         0         6         New Right of Way Text           RD_PD_SideStreet         357         28         0         1         Side Street Rag for Citeria           RD_PD_SuperShp1         388         4         0         0         Geopak SuperElevation Shapes #1           RD_PD_SuperShp3         360         6         0         0         Geopak SuperElevation Shapes #2           RD_PD_ValiCut         363         19         0         4         Prop Design Sidewalk           RD_PD_SW_CubRamp         365         19         0         2         Proposed Wall (Cit Section)           RD_PD_D_RM_TX         369         34         0         0         Text for Proposed Wall Cub Section)           RD_PD_Rep_TX	▲ Name	Numb	er 🔓			Used	Description
RD_PD_PatLn2         351         112         0         0         Pattern Lines # 2-Plan View           RD_PD_PatLn3         352         214         0         0         Pattern Lines # 2-Plan View           RD_PD_PaveDit         353         169         0         2         Prop Design Paved Dtch           RD_PD_PaveShd         354         165         0         4         Prop Design Paved Dtch           RD_PD_RW_TX         355         35         0         6         New Right of Way Teat           RD_PD_SuperShp1         358         4         0         0         Geopak SuperElevation Shapes #1           RD_PD_SuperShp1         358         4         0         0         Geopak SuperElevation Shapes #2           RD_PD_SuperShp3         360         6         0         2         Proposed Vall (Cut Section)           RD_PD_Walk0u         361         19         0         4         Prop Design Sidewalk           RD_PD_Walk1ii         364         91         0         2         Proposed Vall (Cut Section)           RD_PD_RMe_TX         367         107         0         Test for Proposed Pape (Dic Section)           RD_PD_RMe_TX         368         108         0         0         Test for Proposed Pape	RD_pd						
RD_PD_Patan3       352       214       0       0       Pattern Lines # 3-Plan View         RD_PD_PaveDit       353       169       0       2       Prop Design Paved Dtch         RD_PD_RW       355       0       2       New Right of Way Line         RD_PD_RW       355       0       2       New Right of Way Line         RD_PD_SuperShp1       356       0       2       New Right of Way Line         RD_PD_SuperShp1       356       0       2       New Right of Way Line         RD_PD_SuperShp1       358       0       0       Geopak SuperElevation Shapes #1         RD_PD_SuperShp2       359       7       0       0       Geopak SuperElevation Shapes #2         RD_PD_SW       361       19       0       4       Prop Design Sidewalk         RD_PD_WaliCut       363       66       0       2       Proposed Wall (Cit Section)         RD_PD_WaliCut       363       96       0       2       Proposed Wall (Cit Section)         RD_PD_P_WaliCut       363       96       0       107       0       108         RD_PD_P_R_Net_TX       369       34       0       0       Text for Proposed CATCH BASINS & Inlets (All Types)         RD_PD_P_R_	RD_PD_Pa	itLn1 350	88	0	0		Pattern Lines # 1-Plan View
RD_PD_PaveDt       353       169       0       2       Prop Design Paved Dtch         RD_PD_PaveShd       354       165       0       4       Prop Design Paved Dtch         RD_PD_RW       355       35       0       6       Power Right of Way Line         RD_PD_SteStreet       357       28       0       1       Side Street Rig for Citeria         RD_PD_SuperShp1       358       4       0       0       Geopak SuperElevation Shapes #1         RD_PD_SuperShp2       359       7       0       0       Geopak SuperElevation Shapes #1         RD_PD_SuperShp3       360       6       0       0       Geopak SuperElevation Shapes #3         RD_PD_SW       361       19       0       4       Prop Design Sidewalk         RD_PD_WalFill       363       86       0       2       Proposed Vall (Cit Section)         RD_PD_DW_WalFill       364       91       0       2       Proposed Nacetain Stapes #1         RD_PD_DR_Pipe_TX       367       107       0       0       Text for Proposed Row Cortrol Devices         RD_PD_DR_Inter_TX       369       34       0       0       Text for Proposed Row Cortrol Devices         RD_PD_DR_Inter_TX       369       4	RD_PD_Pa	itLn2 351	112	2 0	0		Pattern Lines # 2-Plan View
RD_PD_PaveShd       354       165       0       4       Prop Design Paved Shoulder         RD_PD_RW       355       35       0       6       New Right of Way Line         RD_PD_SideStreet       357       28       0       1       Side Street Ray for Citeria         RD_PD_SuperShp1       358       4       0       0       Geopak SuperElevation Shapes #1         RD_PD_SuperShp2       359       7       0       0       Geopak SuperElevation Shapes #2         RD_PD_SuperShp3       360       6       0       0       Geopak SuperElevation Shapes #3         RD_PD_SW       361       19       0       4       Prop Design Sidewalk         RD_PD_WaliFili       364       91       0       2       Proposed Wall (Cut Section)         RD_PD_PWaliFili       364       91       0       2       Proposed Vall (Cut Section)         RD_PD_DSW_CutbRamp       365       19       0       4       Prop Design Sidewalk Cutb Ramps         RD_PD_DR_WaliFili       364       91       0       7       2       0       7         RD_PD_DR_DR_MotAl_TX       368       108       0       0       Text for Proposed Chiro Cortrol Devices         RD_PD_DR_INE_TX       3	RD_PD_Pa	atLn3 352	214	u —— 0	0		Pattern Lines # 3-Plan View
RD_PD_RW       355       35       0       6       New Right of Way Line         RD_PD_RW_TX       356       35       0       2       New Right of Way Text         RD_PD_SuperShp1       358       4       0       0       Geopak SuperElevation Shapes #1         RD_PD_SuperShp2       359       7       0       0       Geopak SuperElevation Shapes #2         RD_PD_SuperShp3       360       6       0       0       Geopak SuperElevation Shapes #3         RD_PD_SW       361       19       0       4       Prop Design Sidewalk         RD_PD_SW       361       19       0       4       Proposed Wall (Cut Section)         RD_PD_WallFill       364       91       0       2       Proposed Wall (Cut Section)         RD_PD_RVepTX       367       107       0       0       Text for Proposed Flow Control Devices         RD_PD_DR_RvepTX       367       107       0       0       Text for Proposed Flow Control Devices         RD_PD_DD_RVepTX       368       108       0       0       Text for Proposed Flow Control Devices         RD_PD_DD_RVepTX       367       107       0       0       Text for Proposed Flow Control Devices         RD_PD_DD_RVepTX       361 <td>RD_PD_Pa</td> <td>aveDit 353</td> <td><b>16</b>9</td> <td>)0</td> <td>2</td> <td></td> <td>Prop Design Paved Ditch</td>	RD_PD_Pa	aveDit 353	<b>16</b> 9	)0	2		Prop Design Paved Ditch
RD_PD_RW_TX       356       35       0       2       New Right of Way Text         RD_PD_SideStreet       357       28       0       1       Side Street Rig for Citeria         RD_PD_SuperShp1       358       4       0       0       Geopak SuperElevation Shapes #1         RD_PD_SuperShp2       359       7       0       0       Geopak SuperElevation Shapes #2         RD_PD_SuperShp3       360       6       0       0       Geopak SuperElevation Shapes #2         RD_PD_SW       361       19       0       4       Prop Design Sidewalk       RD         RD_PD_WallCut       363       86       0       2       Proposed Wall (Cit Section)       RD         RD_PD_Namp       361       19       0       4       Prop Design Sidewalk Curb Ramps       RD         RD_PD_DR_Pipe_TX       367       107       0       0       Text for Proposed Plow Control Necces         RD_PD_DR_Revict_X       368       108       0       0       Text for Proposed All Cut BaSINS & Intest (All Types)         RD_PD_Diveway       371       29       0       3       Proposed Control Access         RD_PD_Diveway       371       29       0       3       Proposed Driveway <t< td=""><td>RD_PD_Pa</td><td>weShd 354</td><td>165</td><td>5 <b>——</b> O</td><td></td><td></td><td>Prop Design Paved Shoulder</td></t<>	RD_PD_Pa	weShd 354	165	5 <b>——</b> O			Prop Design Paved Shoulder
RD_PD_SideStreet       357       28       0       1       Side Street Rag for Citeria         RD_PD_SuperShp1       358       4       0       0       Geopak SuperElevation Shapes #1         RD_PD_SuperShp2       359       7       0       0       Geopak SuperElevation Shapes #2         RD_PD_SuperShp3       360       6       0       0       Geopak SuperElevation Shapes #3         RD_PD_SW       361       19       0       4       Prop Design Sidewalk         RD_PD_WallCut       363       86       0       2       Proposed Wall (Cut Section)         RD_PD_WallCut       364       91       0       4       Prop Design Sidewalk Cutb Ramps         RD_PD_DR_Pley_TX       367       107       0       0       Text for Proposed Pipes (all Sizes & Types)         RD_PD_DR_Inter_TX       368       108       0       0       Text for Proposed Chtroth Devices         RD_PD_DChrinet_TX       369       34       0       0       Text for Proposed Chtroth Access         RD_PD_DR_Inter_TX       369       34       0       0       Text for Proposed Chtroth Access         RD_PD_Dreway       TX       372       29       0       3       Proposed Driveway         RD_PD	RD_PD_R	N 355	35	0	6		New Right of Way Line
RD_PD_SuperShp1       358       4       0       0       Geopak SuperElevation Shapes #1         RD_PD_SuperShp2       359       7       0       0       Geopak SuperElevation Shapes #2         RD_PD_SuperShp3       360       6       0       0       Geopak SuperElevation Shapes #3         RD_PD_SW       361       19       0       4       Prop Design Sidewalk         RD_PD_WallCut       363       86       0       2       Proposed Wall (Cut Section)         RD_PD_WallFill       364       91       0       4       Prop Design Sidewalk Cut Ramps         RD_PD_RN_CutbRamp       365       19       0       4       Prop Design Sidewalk Cut Ramps         RD_PD_RN_NotAt_TX       368       108       0       0       Text for Proposed Flopes (all Sizes & Types)         RD_PD_OR_Inlet_TX       369       34       0       0       Text for Proposed CATCH BASINS & Inlets (All Types)         RD_PD_Ontway       371       29       0       3       Proposed Driveway       All Types)         RD_PD_Netway       371       29       0       3       Proposed Driveway Text       All Types)         RD_PD_Notway       371       21      2       2       Proposed Driveway Text	RD_PD_R	W_TX 356	35	0	2		New Right of Way Text
RD_PD_SuperShp2       359       7       0       0       Geopak SuperElevation Shapes #2         RD_PD_SuperShp3       360       6       0       0       Geopak SuperElevation Shapes #3         RD_PD_SW       361       19       0       4       Prop Design Sidewalk         RD_PD_WalCut       363       86       0       2       Proposed Wall (Cut Section)         RD_PD_WalFill       364       91       0       4       Prop Design Sidewalk Cutb Ramps         RD_PD_DR_Pipe_TX       367       107       0       0       Text for Proposed Vall (Fill Section)         RD_PD_DR_Pipe_TX       367       107       0       0       Text for Proposed Pipes (all Sizes & Types)         RD_PD_DR_Intet_TX       369       34       0       0       Text for Proposed CATCH BASINS & Inlets (All Types)         RD_PD_DR_Intet_TX       369       34       0       0       Text for Proposed CATCH BASINS & Inlets (All Types)         RD_PD_Onteway       371       29       0       3       Proposed Diveway Text         RD_PD_Slope_Over       373       12      2       2       Proposed Slope Override         RD_PD_PatLn4       1050       75       0       3       Proposed Slope Override	RD_PD_Si	deStreet 357	28	0	1		Side Street Flag for Criteria
RD_PD_SuperShp3       360       6       0       0       Geopak SuperElevation Shapes #3         RD_PD_SW       361       19       0       4       Prop Design Sidewalk         RD_PD_WallCut       363       86       0       2       Proposed Wall (Cut Section)         RD_PD_WallFill       364       91       0       2       Proposed Wall (Cut Section)         RD_PD_WallFill       364       91       0       4       Prop Design Sidewalk Cuth Ramps         RD_PD_WallFill       364       91       0       4       Prop Design Sidewalk Cuth Ramps         RD_PD_DR_Pipe_TX       367       107       0       0       Text for Proposed Pipes (all Sizes & Types)         RD_PD_DR_Inlet_TX       368       108       0       0       Text for Proposed Row Control Devices         RD_PD_DR_Inlet_TX       369       34       0       0       Text for Proposed Row Control Devices         RD_PD_Droway       371       29       0       3       Proposed Driveway         RD_PD_Diveway_TX       372       29       0       3       Proposed Driveway Text         RD_PD_ALTI_InTimp       374       75       0       3       Prop Design Tum Template-Alternate 1         RD_PD_PatLn6	RD_PD_Su	iperShp1 358	4	0	0		Geopak SuperElevation Shapes #1
RD_PD_SW       361       19       0       4       Prop Design Sidewalk         RD_PD_WallCut       363       86       0       2       Proposed Wall (Cut Section)         RD_PD_WallFill       364       91       0       2       Proposed Wall (Cut Section)         RD_PD_SW_CurbRamp       365       19       0       4       Prop Design Sidewalk Curb Ramps         RD_PD_DR_Vipe_TX       367       107       0       0       Text for Proposed Pipes (all Sizes & Types)         RD_PD_DR_Inlet_TX       369       34       0       0       Text for Proposed Control Devices         RD_PD_Driveway       371       29       0       3       Proposed Driveway       Ext for Proposed Slope Control Access         RD_PD_Driveway       371       29       0       3       Proposed Driveway       Ext for Proposed Slope Override         RD_PD_Attn1       1050       75       0       3       Proposed Slope Override       Ext for Proposed Slope Override         RD_PD_PatLn4       1050       75       0       0       Pattern Lines # 4-Plan View         RD_PD_PatLn5       1051       76       0       0       Pattern Lines # 4-Plan View         RD_PD_PatLn6       1052       91       0 <td< td=""><td>RD_PD_Su</td><td>iperShp2 359</td><td>7</td><td> 0</td><td> 0</td><td></td><td>Geopak SuperElevation Shapes #2</td></td<>	RD_PD_Su	iperShp2 359	7	0	0		Geopak SuperElevation Shapes #2
RD_PD_WallCut       363       86       0       2       Proposed Wall (Cut Section)         RD_PD_WallFill       364       91       0       2       Proposed Wall (Fill Section)         RD_PD_SW_CuteRamp       365       19       0       4       Prop Design Sidewalk Cute Ramps         RD_PD_DR_Pipe_TX       367       107       0       0       Text for Proposed Pipes (all Sizes & Types)         RD_PD_DR_HowCut_TX       368       108       0       0       Text for Proposed CATCH BASINS & Inlets (All Types)         RD_PD_DR_IowCut_TX       369       34       0       0       Text for Proposed CatCH BASINS & Inlets (All Types)         RD_PD_Dreveway       371       29       0       3       Proposed Driveway         RD_PD_Driveway       371       29       0       3       Proposed Slope Overide         RD_PD_Driveway_TX       372       29       0       3       Proposed Slope Overide         RD_PD_AtIT_TnTmp       374       75       0       3       Proposed Slope Overide         RD_PD_PatIn5       1051       76       0       0       Pattern Lines # 5-Plan View         RD_PD_PatIn5       1051       76       0       0       Pattern Lines # 5-Plan View <t< td=""><td>RD_PD_Su</td><td>iperShp3 360</td><td>6</td><td> 0</td><td> 0</td><td></td><td>Geopak SuperElevation Shapes #3</td></t<>	RD_PD_Su	iperShp3 360	6	0	0		Geopak SuperElevation Shapes #3
RD_PD_WallFill       364       91       0       2       Proposed Wall (Fill Section)         RD_PD_SW_CurbRamp       365       19       0       4       Prop Design Sidewalk Curb Ramps         RD_PD_DR_Pipe_TX       367       107       0       0       Text for Proposed Pipes (all Sizes & Types)         RD_PD_DR_HowCtrl_TX       368       108       0       0       Text for Proposed Row Control Devices         RD_PD_OR_Inlet_TX       369       34       0       0       Text for Proposed Row Control Devices         RD_PD_Control_Access       370       130      3       2       Proposed Control Access         RD_PD_Diveway       371       29       0      2       2       Proposed Driveway         RD_PD_Diveway_TX       372       29       0      2       2       Proposed Slope Overide         RD_PD_Slope_Over       373       12      2       2       Proposed Slope Overide         RD_PD_PatLn5       1051       76       0       0       Pattem Lines # 4-Plan View         RD_PD_PatLn5       1051       76       0       0       Pattem Lines # 4-Plan View         RD_PD_DatLn6       1052       91       0       0       Pattem Lines # 6-Plan View	RD_PD_SV	N 361	<b>1</b> 9	0			Prop Design Sidewalk
RD_PD_SW_CurbRamp3651904Prop Design Sidewalk Curb RampsRD_PD_DR_Pipe_TX36710700Text for Proposed Pipes (all Sizes & Types)RD_PD_DR_RowCut_TX36810800Text for Proposed Row Control DevicesRD_PD_DR_Inlet_TX3693400Text for Proposed CATCH BASINS & Inlets (All Types)RD_PD_Control_Access37013032Proposed Control AccessRD_PD_Driveway3712903Proposed DrivewayRD_PD_Driveway_TX3722903Proposed Driveway TextRD_PD_Driveway_TX3722903Proposed Slope OverrideRD_PD_ALT1_TnTmp3747503Prop Design Tum Template-Atternate 1RD_PD_PatLn410507500Pattern Lines # 4-Plan ViewRD_PD_PatLn510517600Pattern Lines # 5-Plan ViewRD_PD_DatichBtm1053622Prop Design Tum Template-Atternate 1RD_PD_DiteRthm1053622Prop Design Ditch BottomRD_PD_TiePt105412002Prop Design Tie PointRD_PD_SuperShp410572906Prop Design New Edge of PavementRD_PD_Gearing_Grubbing105898CLEARGRUB1Proposed Linits of Clearing and GrubbingRD_PD_BOC10608002Prop Design Back of Curb	RD_PD_W	allCut 363	86	0	2		Proposed Wall (Cut Section)
RD_PD_DR_Pipe_TX       367       107       0       0       Text for Proposed Pipes (all Sizes & Types)         RD_PD_DR_RowCri_TX       368       108       0       0       Text for Proposed Row Control Devices         RD_PD_DR_Inlet_TX       369       34       0       0       Text for Proposed Row Control Devices         RD_PD_Drevenvay       371       29       0       3       Proposed Control Access         RD_PD_Driveway       371       29       0       3       Proposed Driveway         RD_PD_Driveway       371       29       0       3       Proposed Driveway         RD_PD_Diveway       371       12      2       2       Proposed Slope Overide         RD_PD_PatLT1_TnTmp       374       12      2       2       Proposed Slope Overide         RD_PD_PatLn4       1050       75       0       3       Prop Design Tum Template-Attemate 1         RD_PD_PatLn6       1052       91       0       0       Pattern Lines # 4-Plan View         RD_PD_TichBtm       1053       6      2       2       Prop Design Tite Plant         RD_PD_NewEOP       1055       23       0       6       Prop Design New Edge of Pavement         RD_PD_NewEOP	RD_PD_W	allFill 364	91	0	2		Proposed Wall (Fill Section)
RD_PD_DR_HowCtrl_TX36810800Text for Proposed Row Control DevicesRD_PD_DR_Inlet_TX3693400Text for Proposed CATCH BASINS & Inlets (All Types)RD_PD_Control_Access37013032Proposed Control AccessRD_PD_Driveway3712903Proposed DrivewayRD_PD_Driveway_TX3722903Proposed Driveway TextRD_PD_Slope_Over3731222Proposed Slope OverrideRD_PD_ALT1_TnTmp37475033Prop Design Tum Template-Alternate 1RD_PD_Pat.n41050750	RD_PD_SV	N_CurbRamp 365	19	0			Prop Design Sidewalk Curb Ramps
RD_PD_DR_Inlet_TX3693400Text for Proposed CATCH BASINS & Inlets (AII Types)RD_PD_Control_Access37013032Proposed Control AccessRD_PD_Driveway3712903Proposed Control AccessRD_PD_Driveway_TX3722903Proposed DrivewayRD_PD_Slope_Over373122Proposed Slope OverrideRD_PD_ALT1_InTmp374750	RD_PD_DI	R_Pipe_TX 367	107	70	0		Text for Proposed Pipes (all Sizes & Types)
RD_PD_Control_Access       370       130      3       2       Proposed Control Access         RD_PD_Driveway       371       29       0       3       Proposed Driveway         RD_PD_Driveway_TX       372       29       0       3       Proposed Driveway         RD_PD_Slope_Over       373       12      2       2       Proposed Slope Overide         RD_PD_ALT1_TnTmp       374       75       0       3       Prop Design Tum Template-Alternate 1         RD_PD_PatLn4       1050       75       0       0       Pattern Lines # 4-Plan View         RD_PD_PatLn5       1051       76       0       0       Pattern Lines # 5-Plan View         RD_PD_PatLn6       1052       91       0       0       Pattern Lines # 6-Plan View         RD_PD_DitchBtm       1053       6      2       2       Prop Design Ditch Bottom         RD_PD_NewEOP       1055       23       0       6       Prop Design New Edge of Pavement         RD_PD_SuperShp4       1057       29       0       0       Geopak SuperElevation Shapes #4         RD_PD_PaintMed       1059       88       0       1       Proposed Design Painted Median & Hatching         RD_PD_BOC       1060 <td>RD_PD_D</td> <td>R_FlowCtrl_TX 368</td> <td>108</td> <td>3 0</td> <td> 0</td> <td></td> <td>Text for Proposed Flow Control Devices</td>	RD_PD_D	R_FlowCtrl_TX 368	108	3 0	0		Text for Proposed Flow Control Devices
RD_PD_Driveway3712903Proposed DrivewayRD_PD_Driveway_TX3722903Proposed Driveway TextRD_PD_Slope_Over3731222Proposed Slope OverideRD_PD_ALT1_TnTmp3747503Prop Design Tum Template-Altemate 1RD_PD_PatLn410507500Pattern Lines # 4-Plan ViewRD_PD_PatLn510517600Pattern Lines # 5-Plan ViewRD_PD_PatLn610529100Pattern Lines # 6-Plan ViewRD_PD_DitchBtm1053622Prop Design Ditch BottomRD_PD_TiePt105412002Prop Design Tie PointRD_PD_NewEOP10552306Prop Design New Edge of PavementRD_PD_SuperShp410572900Geopak SuperElevation Shapes #4RD_PD_Clearing_Grubbing105898CLEARGRUB1Proposed Limits of Clearing and GrubbingRD_PD_BOC10608002Prop Design Back of Curb	RD_PD_DI	R_Inlet_TX 369	34	0	0		Text for Proposed CATCH BASINS & Inlets (All Types)
RD_PD_Driveway_TX3722903Proposed Driveway TextRD_PD_Slope_Over3731222Proposed Slope OverrideRD_PD_ALT1_TnTmp3747503Prop Design Tum Template-Alternate 1RD_PD_PatLn410507500Pattern Lines # 4-Plan ViewRD_PD_PatLn510517600Pattern Lines # 5-Plan ViewRD_PD_PatLn610529100Pattern Lines # 6-Plan ViewRD_PD_DitchBtm1053622Prop Design Ditch BottomRD_PD_TiePt105412002Prop Design Tie PointRD_PD_NewEOP10552306Prop Design New Edge of PavementRD_PD_SuperShp410572900Geopak SuperElevation Shapes #4RD_PD_Clearing_Grubbing105898CLEARGRUB1Proposed Limits of Clearing and GrubbingRD_PD_BOC10608002Prop Design Back of Curb	RD_PD_Co	ontrol_Access 370	130	)3	2		Proposed Control Access
RD_PD_Slope_Over3731222Proposed Slope OverrideRD_PD_ALT1_TnTmp3747503Prop Design Tum Template-Altemate 1RD_PD_PatLn410507500Pattern Lines # 4-Plan ViewRD_PD_PatLn510517600Pattern Lines # 5-Plan ViewRD_PD_PatLn610529100Pattern Lines # 6-Plan ViewRD_PD_DitchBtm1053622Prop Design Ditch BottomRD_PD_TiePt105412002Prop Design Tie PointRD_PD_NewEOP10552306Prop Design New Edge of PavementRD_PD_SuperShp410572900Geopak SuperElevation Shapes #4RD_PD_Clearing_Grubbing105898CLEARGRUB1Proposed Design Painted Median & HatchingRD_PD_BOC10608002Prop Design Back of Curb	RD_PD_Dr	iveway 371	29	0	3		Proposed Driveway
RD_PD_ALT1_TnTmp       374       75       0       3       Prop Design Tum Template-Atemate 1         RD_PD_PatLn4       1050       75       0       0       Pattem Lines # 4-Plan View         RD_PD_PatLn5       1051       76       0       0       Pattem Lines # 4-Plan View         RD_PD_PatLn6       1052       91       0       0       Pattem Lines # 6-Plan View         RD_PD_DitchBtm       1053       6      2       2       Prop Design Ditch Bottom         RD_PD_TiePt       1054       120       0       2       Prop Design New Edge of Pavement         RD_PD_NewEOP       1055       23       0       6       Prop Design New Edge of Pavement         RD_PD_SuperShp4       1057       29       0       0       Geopak SuperElevation Shapes #4         RD_PD_Clearing_Grubbing       1058       98       CLEARGRUB       1       Proposed Limits of Clearing and Grubbing         RD_PD_BOC       1060       80       0       1       Proposed Design Painted Median & Hatching	RD_PD_Dr	iveway_TX 372	29	0	<u> </u>		Proposed Driveway Text
RD_PD_PatLn4       1050       75       0       0       Pattern Lines # 4-Plan View         RD_PD_PatLn5       1051       76       0       0       Pattern Lines # 5-Plan View         RD_PD_PatLn6       1052       91       0       0       Pattern Lines # 5-Plan View         RD_PD_DitchBtm       1053       6      2       2       Prop Design Ditch Bottom         RD_PD_TiePt       1054       120       0       2       Prop Design Tie Point         RD_PD_NewEOP       1055       23       0       6       Prop Design New Edge of Pavement         RD_PD_Easement       1056       85       EASEMENT       2       Prop Easement Property         RD_PD_SuperShp4       1057       29       0       0       Geopak SuperElevation Shapes #4         RD_PD_Clearing_Grubbing       1058       98       CLEARGRUB       1       Proposed Limits of Clearing and Grubbing         RD_PD_BOC       1060       80       0       1       Proposed Design Painted Median & Hatching	RD_PD_Sl	ope_Over 373	12	2	2		Proposed Slope Override
RD_PD_PatLn5       1051       76       0       0       Pattern Lines # 5-Plan View         RD_PD_PatLn6       1052       91       0       0       Pattern Lines # 6-Plan View         RD_PD_DitchBtm       1053       6      2       2       Prop Design Ditch Bottom         RD_PD_TiePt       1054       120       0       2       Prop Design Tie Point         RD_PD_NewEOP       1055       23       0       6       Prop Design New Edge of Pavement         RD_PD_SuperShp4       1057       29       0       0       Geopak SuperElevation Shapes #4         RD_PD_Clearing_Grubbing       1058       98       CLEARGRUB       1       Proposed Limits of Clearing and Grubbing         RD_PD_BOC       1060       80       0       1       Proposed Design Painted Median & Hatching	RD_PD_AL	.T1_TnTmp 374	75	0	3		Prop Design Turn Template-Alternate 1
RD_PD_Patch6       1052       91       0       0       Pattern Lines # 6-Plan View         RD_PD_DitchBtm       1053       6      2       2       Prop Design Ditch Bottom         RD_PD_TiePt       1054       120       0       2       Prop Design Tie Point         RD_PD_NewEOP       1055       23       0       6       Prop Design New Edge of Pavement         RD_PD_SuperShp4       1057       29       0       0       Geopak SuperElevation Shapes #4         RD_PD_Clearing_Grubbing       1058       98       CLEARGRUB       1       Proposed Limits of Clearing and Grubbing         RD_PD_PaintMed       1059       88       0       1       Proposed Design Painted Median & Hatching         RD_PD_BOC       1060       80       0       2       Prop Design Back of Curb	RD_PD_Pa	itLn4 1050	75	0	0		Pattem Lines # 4-Plan View
RD_PD_DitchBtm       1053       6      2       2       Prop Design Ditch Bottom         RD_PD_TiePt       1054       120       0       2       Prop Design Tie Point         RD_PD_NewEOP       1055       23       0       6       Prop Design New Edge of Pavement         RD_PD_Easement       1056       85       EASEMENT       2       Prop Easement Property         RD_PD_SuperShp4       1057       29       0       0       Geopak SuperElevation Shapes #4         RD_PD_Clearing_Grubbing       1058       98       CLEARGRUB       1       Proposed Limits of Clearing and Grubbing         RD_PD_PaintMed       1059       88       0       1       Proposed Design Painted Median & Hatching         RD_PD_BOC       1060       80       0       2       Prop Design Back of Curb	RD_PD_Pa	itLn5 1051	76	0	0		Pattem Lines # 5-Plan View
RD_PD_TiePt       1054       120       0       2       Prop Design Tie Point         RD_PD_NewEOP       1055       23       0       6       Prop Design New Edge of Pavement         RD_PD_Easement       1056       85       EASEMENT       2       Prop Easement Property         RD_PD_SuperShp4       1057       29       0       0       Geopak SuperElevation Shapes #4         RD_PD_Clearing_Grubbing       1058       98       CLEARGRUB       1       Proposed Limits of Clearing and Grubbing         RD_PD_PaintMed       1059       88       0       1       Proposed Design Painted Median & Hatching         RD_PD_BOC       1060       80       0       2       Prop Design Back of Curb	RD_PD_Pa	itLn6 1052	91	0	0		Pattem Lines # 6-Plan View
RD_PD_NewEOP       1055       23       0       6       Prop Design New Edge of Pavement         RD_PD_Easement       1056       85       EASEMENT       2       Prop Easement Property         RD_PD_SuperShp4       1057       29       0       0       Geopak SuperElevation Shapes #4         RD_PD_Clearing_Grubbing       1058       98       CLEARGRUB       1       Proposed Limits of Clearing and Grubbing         RD_PD_PaintMed       1059       88       0       1       Proposed Design Painted Median & Hatching         RD_PD_BOC       1060       80       0       2       Prop Design Back of Curb	RD_PD_Di	tchBtm 1053	6	2	2		Prop Design Ditch Bottom
RD_PD_Easement       1056       85       EASEMENT       2       Prop Easement Property         RD_PD_SuperShp4       1057       29       0       0       Geopak SuperElevation Shapes #4         RD_PD_Clearing_Grubbing       1058       98       CLEARGRUB       1       Proposed Limits of Clearing and Grubbing         RD_PD_PaintMed       1059       88       0       1       Proposed Design Painted Median & Hatching         RD_PD_BOC       1060       80       0       2       Prop Design Back of Curb	RD_PD_Tie	ePt 1054	120	)0	2		Prop Design Tie Point
RD_PD_SuperShp4       1057       29       0       0       Geopak SuperElevation Shapes #4         RD_PD_Clearing_Grubbing       1058       98       CLEARGRUB       1       Proposed Limits of Clearing and Grubbing         RD_PD_PaintMed       1059       88       0       1       Proposed Design Painted Median & Hatching         RD_PD_BOC       1060       80       0       2       Prop Design Back of Curb	RD_PD_Ne	ewEOP 1055	23	0	6		Prop Design New Edge of Pavement
RD_PD_Clearing_Grubbing       1058       98       CLEARGRUB       1       Proposed Limits of Clearing and Grubbing         RD_PD_PaintMed       1059       88       0       1       Proposed Design Painted Median & Hatching         RD_PD_BOC       1060       80       0       2       Prop Design Back of Curb	RD_PD_Ea	asement 1056	85	EASEMENT	2		Prop Easement Property
RD_PD_PaintMed 1059 288 0 1 Proposed Design Painted Median & Hatching RD_PD_BOC 1060 80 0 2 Prop Design Back of Curb	RD_PD_Su	iperShp4 1057	29	0	0		Geopak SuperElevation Shapes #4
RD_PD_BOC 1060 80 0 2 Prop Design Back of Curb	RD_PD_Ck	earing_Grubbing 1058	98	CLEARGRUB	1		Proposed Limits of Clearing and Grubbing
	RD_PD_Pa	aintMed 1059	88	0	1		Proposed Design Painted Median & Hatching
PD_PD_FOP 1061 214 0 6 Prop Design Edge of Payament	RD_PD_BO	C 1060	80	0	<u> </u>		Prop Design Back of Curb
	RD_PD_E0	P 1061	214	0	6		Prop Design Edge of Pavement

## **Hydraulic Design Levels**

The Hydraulic Design levels are intended to be used in the drainage design of a project which includes levels to be used by the Geopak Drainage program and also by the hydraulic designer. Land use, pipes, culverts, soils, text, discharges, storm sewers, bridge profiles, contours, and dummy nodes all have levels available for the proper depiction of drainage elements on the design plans.

Δ	Name	Number	ŝ			Used	Description
	RD_hy						
	RD_HY_Area_Bridge	700	145	0	0		Drainage Areas for Bridges
	RD_HY_Area_Bridge1	701	202	0	0		Drainage Areas for Bridges#1
	RD_HY_Area_Clvt	702	148	0	0		Drainage Areas for Culvert
	RD_HY_Area_Clvt1	703	170	0	0		Drainage Areas for Culvert#1
	RD_HY_Area_Clvt2	704	172	0	0		Drainage Areas for Culvert#2
	RD_HY_Area_Clvt3	705	175	0	0		Drainage Areas for Culvert#3
	RD_HY_Area_Dtch	706	147	0	0		Drainage Areas for Ditches
	RD_HY_Area_Dtch1	707	135	0	0		Drainage Areas for Ditches#1
	RD_HY_Area_Dtch2	708	137	0	0		Drainage Areas for Ditches#2
	RD_HY_Area_Dtch3	709	140	0	0		Drainage Areas for Ditches#3
	RD_HY_Area_Dtch4	710	1	0	6		Drainage Areas for Ditches#4
	RD_HY_Area_Dtch5	711	2	0	6		Drainage Areas for Ditches#5



# Hydraulic Design Levels (continued...)

∧ Name	Number	<b>1</b>			Used	Description
RD_HY						
RD_HY_Area_PreQ	712	149	· 0	0		Drainage Areas for Pre Discharges
RD_HY_Area_PreQ1	713	215	0	0		Drainage Areas for Pre Discharges#1
RD_HY_Area_PreQ2	714	217	0	0		Drainage Areas for Pre Discharges#2
RD_HY_Area_PreQ3	715	220	0	0		Drainage Areas for Pre Discharges#3
RD_HY_Area_PreQ4	716	1	0	6		Drainage Areas for Pre Discharges#4
RD_HY_Area_PreQ5	717	2	0	6		Drainage Areas for Pre Discharges#5
RD_HY_Area_PreQ6	718	3	0	6		Drainage Areas for Pre Discharges#6
RD_HY_Area_PreQ7	719	4	0	6		Drainage Areas for Pre Discharges#7
RD_HY_Area_PreQ8	720	5	0	6		Drainage Areas for Pre Discharges#8
RD_HY_Area_PreQ9	721	6	0	6		Drainage Areas for Pre Discharges#9
RD_HY_Area_PreQ10	722	7	0	6		Drainage Areas for Pre Discharges#10
RD_HY_Area_SS	723	146	0	_		Drainage Areas for Storm Sewers
RD_HY_Area_SS1	724	246	0			Drainage Areas for Storm Sewers#1
RD_HY_Area_SS2	725	250	0	-		Drainage Areas for Storm Sewers#2
RD_HY_Area_SS3	726	253	-	0		Drainage Areas for Storm Sewers#3
RD_HY_Area_SS4	727	3	-	6		Drainage Areas for Storm Sewers#4
RD_HY_Area_SS5	728	4	-	6		Drainage Areas for Storm Sewers#5
RD_HY_Area_SS6	729	5	-	6		Drainage Areas for Storm Sewers#6
RD_HY_Area_SS7	730	6		6		Drainage Areas for Storm Sewers#7
RD_HY_Area_SS8	731	7	-	6		Drainage Areas for Storm Sewers#8
RD_HY_Area_SS9	732	8	-	6		Drainage Areas for Storm Sewers#9
RD_HY_Area_SS10	733	9	0	-		Drainage Areas for Storm Sewers#10
RD_HY_Bridge_CL	734	150	0	-		Bridge Profile - Centerline
RD_HY_Bridge_Gmtry	735	153	0			Bridge Profile - Geometry
RD_HY_Bridge_LT	736	152	-	0		Bridge Profile - Left
RD_HY_Bridge_Plan	737 738	154		0		Bridge Profile - Plan View
RD_HY_Bridge_RT	739	108	-	6		Bridge Profile - Right Contours
RD_HY_Contour1 RD_HY_Contour2	735	108	-	6		Contours
RD_HY_Contour3	740	110	-	6		Contours
RD_HY_DumbNodes	741	157	-	7		Dummy Nodes
RD_HY_Gpkprofile	743	155	0			Geopak Drainage Profile
RD_HY_LandUse	744	159	0	-		Drainage Areas for Land Use
RD_HY_Misc	745	156	-	0		Misc. Drainage
RD_HY_Node_TX	746	248	-	2		Text for Hydro Nodes
RD_HY_Pipe_TX	747	253	-	2		Text for Hydro Pipes
RD_HY_PreArea_Clvt1	748	244	0	6		Pre Area Culvert 1
RD_HY_PreArea_Clvt2	749	79	0	6		Pre Area Culvert 2
RD HY PreArea Clvt3	750	128	0	6		Pre Area Culvert 3
RD_HY_PreArea_Clvt4	751	158	0			Pre Area Culvert 4
RD_HY_PostArea_Clvt1	752	247	0	6		Post Area Culvert 1
RD_HY_PostArea_Clvt2	753	59	0	6		Post Area Culvert 2
RD_HY_PostArea_Clvt3	754	134	0	6		Post Area Culvert 3
RD_HY_PostArea_Clvt4	755	153	0	6		Post Area Culvert 4
RD_HY_PreLandUse_Woods	756	37	0	6		Pre Land Use Woods
RD_HY_PreLandUse_OpenSpace	757	9	0	<b>—</b> 6		Pre Land Use Open Space
RD_HY_PreLandUse_Residential	758	91	0	6		Pre Land Use Residential
RD_HY_PreLandUse_Impervious	759	21	0	6		Pre Land Use Impervious
RD HY PreLandUse ComBus	760	231	0	6		Pre Land Use Com Bus
RD_HY_PostLandUse_Woods	761	37	0	6		Post Land Use Woods
RD_HY_PostLandUse_OpenSpace	762	9	0	6		Post Land Use Open Space
RD_HY_PostLandUse_Residential	763	91	0			Post Land Use Residential
RD_HY_PostLandUse_Impervious	764	21		6		Post Land Use Impervious
RD_HY_PostLandUse_ComBus	765	231	0			Post Land Use Com Bus
RD_HY_Soils_A	766	96		6		Soils A
RD_HY_Soils_B	767	99		6		Soils B
RD_HY_Soils_C	768	105		6		Soils C
RD_HY_Soils_D	769	107	-	6		Soils D
RD_HY_TX1	770	144		6		Text for Hydro
RD_HY_TX2	771	144		6		Text for Hydro
RD_HY_TX3	772	144		6		Text for Hydro
RD_HY_XS_Slope	773	3		2 2		Proposed Ditch Slopes
RD_HY_XS_Slope_TX	774 775	3 146	0	0		Text for Proposed Ditch Slopes
RD_HY_Area_SS_TX	113	140	U	U		Text for Drainage Areas for Storm Sewers



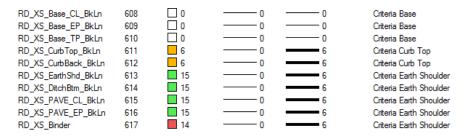
# **Cross Section Levels**

The cross section group of levels provides many options for drafting the existing and proposed cross section elements for the existing ground, existing base, and the proposed pavement, shoulders, sidewalk, etc. for the construction plans.

Δ	Name	Number	<u>i</u>		1	Used	Description
	RD_XE_Ground	549	4		6		Criteria Existing Ground
	RD_XS_Base	550	16	0	6		Criteria Base
	RD_XS_Box	551	134	0	<u> </u>		Drainage Box on XS
	RD_XS_Buildup	552	2	0	2		Criteria Buildup
	RD_XS_CurbBase	553	18	0	6		Criteria Curb Base
	RD_XS_CurbFront	554	7	0	6		Criteria Curb Front
	RD_XS_CurbTop	555	6	0	6		Criteria Curb Top
	RD_XS_Ditch	556	12	0	6		Criteria Ditch
	RD_XS_EarthShd	557	15	0	6		Criteria Earth Shoulder
	RD_XS_ExGround	558	4		6		Criteria Existing Ground
	RD_XS_ExPaveRet	559	4	0	<u> </u>		Criteria Existing Pavement (Retain) (Cross Hatched)
	RD_XS_ExRW	560	244	R/W OR PROPERTY LINE	<u> </u>		Criteria Existing Right of Way
	RD_XS_EwShp	561	0	0	0		Criteria EarthWork Shapes
	RD_XS_EwShp1	562	128	0	0		Criteria EarthWork Shapes#1
	RD_XS_EwShp2	563	101	0	0		Criteria EarthWork Shapes#2
	RD_XS_EwShp3	564	155	0	0		Criteria EarthWork Shapes#3
	RD_XS_Greenside	565	12	0	6		Criteria Greenside
	RD_XS_GR	566	10	0	6		Criteria GuardRail
	RD_XS_MatchLine	567	3	0	3		Criteria Match Line
	RD_XS_MedBbase	568	17	0	6		Criteria Median Barrier Base
	RD_XS_MedBWall	569	6	0	6		Criteria Median Barrier Wall
	RD_XS_Milling	570	3	2	6		Criteria Milling Symbolgy
	RD_XS_Misc_Line	571	14	0	1		Criteria Miscellaneous Line
	RD_XS_NewRW	572	2	0	3		Criteria New Right of Way
	RD XS NPDES	573	2	2	2		Criteria NPDES Line on XS
	RD_XS_OSBase	574	24	0	6		Criteria OutSide Base
	RD_XS_Pave	575	3	0			Criteria Pavement
	RD_XS_PaveOvlay	576	3	0			Criteria Pavement Overlay
	RD_XS_PaveOvlay_CP		234	0	0		Criteria Pavement Overlay -Control Points
	RD_XS_PaveShd	578	14	0	6		Criteria Paved Shoulder
	RD_XS_Pipe	579	50	0	3		Drainage Pipe on XS
	RD_XS_SideStreet	580	28	0	0		Pattern Line Side Street
	RD_XS_SW	581	7	0	6		Criteria SideWalk
	RD_XS_SWbase	582	16	0			Criteria Side Walk Base
	RD_XS_SWfront	583	152	0			Criteria Side Walk Front
	RD_XS_TieSlope	584	12	0			Criteria Tie Slope
	RD_XS_VG	585	17	0			Criteria Valley Gutter
	RD_XS_TX_Box	586	99	0	3		Drainage Box Text on XS
	RD_XS_TX_Ditch	587	134	-	4		XS Elevation Text- Ditch
	RD_XS_TX_Elev_EX	588	4	0			XS Elevation Text- Existing
	RD_XS_TX_Elev_PR	589	3	0	4		XS Elevation Text- Proposed
	RD_XS_TX_ExEOP	590	95	0			XS Elevation Text- Existing Edge of Pavement
	RD_XS_TX_EXEOP RD_XS_TX_MkPT	590	125	0	1		XS Text Marked Point
			3	0			XS Text Marked Forn
	RD_XS_TX_MatchLine RD_XS_TX_Misc	592 593	145	0			XS Text Miscellaneous
			-	-			XS Text - Notes
	RD_XS_TX_Notes	594 595	146				XS Text - NOTES XS Text - NPDES
	RD_XS_TX_NPDES RD_XS_TX_Offset	596	3	0			XS Text Offset
		597	<b>9</b> 9	0	3		Drainage Pipe Text on XS
	RD_XS_TX_Pipe RD_XS_TX_Profile	598	3	0			XS Text Profile
	RD_XS_TX_ShdSlope	598	2	0			XS Text Profile XS Text Side Slope
	RD_XS_TX_Slope	600	2				XS Text Slope
	RD_XS_TX_Station	601	3		5		XS Text Station
		602	2	0	3		XS Text Top of Curb
	RD_XS_TX_TOC RD_XS_TX_Warning	602	3	0	2		XS Text Top of Curb XS Text Warning
		603	2		3		XS Text Closure
	RD_XS_TX_Xsclose		79	0	3		XS Text Closure XS Driveway
	RD_XS_Driveway	605 606	79	0			XS Driveway XS Driveway Text
	RD_XS_TX_Driveway RD_XS_EXWetland	606	189	-	3		XS Driveway Text XS Wetland
	ND_V2_EVMetiand	007	- 169	v	3		V2 Merialia



## **Cross Section Levels (continued...)**



## **Text Levels**

The text levels are intended for all text labels applying to the existing or proposed design elements. All building notes, drainage, pipe, NPDES, profile notes, general construction notes, station offset text, title sheet text, typical sections, utilities, etc. are to be drafted on their respective text levels.

Δ	Name	Number	<u>s</u>		10	Used	Description
	RD_TX						
	RD_TX_Bldg	375	6	0	2		All Building Notes,Labels and Text
	RD_TX_Drainage	376	106	0	2		All Drainage, Pipe and NPDES Notes
	RD_TX_EndArea	377	183	0	2		Text for End Areas
	RD_TX_ErosCtrl	378	218	0	2		Text for Erosion Control Data
	RD_TX_Misc1	379	99	0	2		Miscellaneous Text #1
	RD_TX_Misc2	380	100	0	2		Miscellaneous Text #2
	RD_TX_PEShield	381	130	0	2		PE Shields
	RD_TX_Pipe_ElevEX	382	85	0	2		Pipe Text Existing Elevations
	RD_TX_Pipe_ElevPR	383	97	0	2		Pipe Text Proposed Elevations
	RD_TX_Profile	384	134	0	2		Profile Notes
	RD_TX_Qty	385	64	0	2		General Construction Notes/ Quantities
	RD_TX_RoadID	386	14	0	2		Road/Route Number or Name Text
	RD_TX_RW	387	231	0			Right of Way Data Text
	RD_TX_StaOff	388	200	0	2		Station Offset Text Label and Text
	RD_TX_TitleSht	389	4	0	2		Title Sheet Index//Notes/Labeling
	RD_TX_TypSect	390	30	0	2		Typical Sections TEXT
	RD_TX_Utilities	391	98	0	2		Text for Utilities
	RD_TX_Volume	392	143	0			Text for Volumes
	RD_TX_PESeal	393	130	0	2		PE Seal
	RD_TX_PESignature	394	<b>—</b> :	2 0	<u> </u>		PE Digital Signature Box for PDF

## **Sheet Levels**

The sheet levels are used for the reference border sheet elements and lplot is set to recognize a plot shape for the rotation and size of the plan sheets. Other sheet levels are used to designate Major and Minor Grids which help with the dithering of plotted plan sheets.

Δ	Name	Number	5		12	Used	Description
	RD_SHT						
	RD_SHT_lplotShp	302	35	1	0		lplot Border shape
	RD_SHT_Bndy	400	0	0	2		Border Sheet Outside Boundary
	RD_SHT_ID	401	0	0	<u> </u>		Border Sheet ID Cell
	RD_SHT_Logo	403	89	0	<u> </u>		Border Sheet Logos
	RD_SHT_MatchLine	404	0		<u> </u>		Match Line for Sheets
	RD_SHT_Misc1	405	0	0	0		Misc Border Sheets # 1
	RD_SHT_Misc2	406	4	0	0		Misc Border Sheets # 2
	RD_SHT_Misc3	407	28	0	0		Misc Border Sheets # 3
	RD_SHT_Misc4	408	18	0	0		Misc Border Sheets # 4
	RD_SHT_MjGrid	409	221	0			Border Sheet Major Grid Lines
	RD_SHT_MnGrid	410	221	0	<u> </u>		Border Sheet Minor Grid Lines
	RD_SHT_ShtClip	411	67	——— 3	<u> </u>		Geopak Sheet Clip Borders
	RD_SHT_SubGrid	412	221	1	0		Border Sheer Sub Grid Lines
	RD_SHT_Snap	413	4	2	2		Border Sheet Snap Lines
	RD_SHT_TX	414	152	0	<u> </u>		Border Sheet Text
	RD_SHT_Typical	415	198	0			Typical Sections Drawing
	RD_SHT_MjGrid_XS	416	221	0			Xsection Border Sheet Major Grid Lines
	RD_SHT_MnGrid_XS	417	221	0	<u> </u>		Xsection Border Sheet Minor Grid Lines
	RD_SHT_SubGrid_XS	418	221	1	0		Xsection Border Sheer Sub Grid Lines



# **Sketch Levels**

There are 10 sketch levels for design elements that do not have an assigned level and symbology.

Δ	Name	Number	<u>i</u>			Used	Description
	RD_SKETCH						
	RD_Sketch1	650	54	0	2		Misc. drawings& notes
	RD_Sketch2	651	64	0	<u> </u>		Misc. drawings& notes
	RD_Sketch3	652	74	0	<u> </u>		Misc. drawings& notes
	RD_Sketch4	653	84	0	2		Misc. drawings& notes
	RD_Sketch5	654	94	0	2		Misc. drawings& notes
	RD_Sketch6	655	104	0	<u> </u>		Misc. drawings& notes
	RD_Sketch7	656	114	0	<u> </u>		Misc. drawings& notes
	RD_Sketch8	657	124	0	<u> </u>		Misc. drawings& notes
	RD_Sketch9	658	134	0	<u> </u>		Misc. drawings& notes
	RD_Sketch10	659	144	0	2		Misc. drawings& notes

## **DTM Levels**

The DTM levels are used primarily by Surveys to show surveyed points and line work in a 3d design file. These features are mapped by the Geopak program. Breaklines, tin triangles and hull, lattices, major and minor contour lines, obscure areas, spot shots, and voids are depicted by these DTM levels.

Δ	Name	Number	<u>í</u>	::0		Used	Description
	RD_DTM						
	RD_DTM_BkLn1	425	14	0	2		Geopak DTM Feature-Break Lines # 1
	RD_DTM_BkLn2	426	119	1	<u> </u>		Geopak DTM Feature-Break Lines # 2
	RD_DTM_Bndy	427	2	<u> </u>	1		Geopak DTM Feature-Boundary
	RD_DTM_Final_Tin1	428	3	0	1		Geopak DTM Feature-Final Tin # 1
	RD_DTM_Final_Tin2	429	19	O	<u> </u>		Geopak DTM Feature-Final Tin # 2
	RD_DTM_Holes	430	0	<u> </u>	<u> </u>		Geopak DTM Feature-Holes
	RD_DTM_Islands	431	0	0	1		Geopak DTM Feature-Islands
	RD_DTM_Latt	432	153	<u> </u>	1		Geopak DTM Feature-Lattice
	RD_DTM_LattX	433	84	0	1		Geopak DTM Feature-Lattice X Lines
	RD_DTM_LattY	434	122	O	1		Geopak DTM Feature-Lattice Y Lines
	RD_DTM_Major1	435	17	0			Geopak DTM Feature-Major Contour Lines # 1
	RD_DTM_Major1_Lbl	436	17	O	2		Geopak DTM Feature-Major Contour Labels # 1
	RD_DTM_Major2	437	30	0			Geopak DTM Feature-Major Contour Lines # 2
	RD_DTM_Major2_Lbl	438	30	0	2		Geopak DTM Feature-Major Contour Labels # 2
	RD_DTM_Minor1	439	21	<u> </u>	1		Geopak DTM Feature-Minor Contour Lines # 1
	RD_DTM_Minor1_Lbl	440	21	0	1		Geopak DTM Feature-Minor Contour Labels # 1
	RD_DTM_Minor2	441	70	O	1		Geopak DTM Feature-Minor Contour Lines # 2
	RD_DTM_Minor2_Lbl	442	70	0	1		Geopak DTM Feature-Minor Contour Labels # 2
	RD_DTM_Obscure	443	191	<u> </u>	0		Geopak DTM Feature-Obscured Areas
	RD_DTM_Orig_Tin	444	2	0	<u> </u>		Geopak DTM Feature-Original Tin
	RD_DTM_Spot	445	144	0	0		Geopak DTM Feature-Spots
	RD_DTM_TinHull	446	0	0	0		Geopak DTM Feature-TIN Hull
	RD_DTM_Tri1	447	80	<u> </u>	2		Geopak DTM Feature-Triangle #1
	RD_DTM_Tri2	448	65	<u> </u>	2		Geopak DTM Feature-Triangle #2
	RD_DTM_Tri3	449	97	0	2		Geopak DTM Feature-Triangle #3
	RD_DTM_Tri4	450	145	<u> </u>	2		Geopak DTM Feature-Triangle #4
	RD_DTM_VertEdge	451	0	0	<u> </u>		Geopak DTM Feature-Lattice Vertical Edge
	RD_DTM_Void	452	0	O	2		Geopak DTM Feature-Voids
	RD_DTM_Spot_Elev	453	4	0	2		Geopak DTM Feature-Spot Elevation
	RD_DTM_BkLn_txCode	454	0	0	0		Geopak DTM Feature-Break Lines Text Code
	RD_DTM_Bndy1	455	5	<u> </u>	1		Geopak DTM Feature-Boundary-1
	RD_DTM_Bndy2	456	7	0	1		Geopak DTM Feature-Boundary-2
	RD_DTM_Design_SG	457	4	0	- 2	Geopak	DTM Feature-Break Lines # 1
	RD_DTM_Design_SG1	458	4	0	2		t DTM Feature-Break Lines # 1
	RD_DTM_Design_FG1	459	220	0	- 2		t DTM Feature-Break Lines # 1
	RD_DTM_Design_FG	460	220	0	- 2		CDTM Feature-Break Lines # 1
	RD_DTM_Design_FG2	461 462	220	0	- 2 - 2		: DTM Feature-Break Lines # 1 : DTM Feature-Break Lines # 1
	RD_DTM_Design_SG2	402	4	- U	2	Сеорак	COMPLEARING DIEAR LINES # 1



## **COGO Levels**

Cogo levels are Geopak Cogo features that depict visibility of chain, curve, easement, lines, parcel, point, and take elements.

▲ Name	Number 🛆		32	12	Description
RD_COGO_ChainVis	475	0 🗆	O	O	Geopak Cogo Feature
RD_COGO_CurveVis	476	0	O	O	Geopak Cogo Feature
RD_COGO_EaseVis	477		O	0	Geopak Cogo Feature
RD_COGO_LineVis	478	0 🗆	O	0	Geopak Cogo Feature
RD_COGO_ParcelVis	479	0	O	0	Geopak Cogo Feature
RD_COGO_PointVis	480	0 🗆	O	0	Geopak Cogo Feature
RD_COGO_TakeVis	481	0	O	0	Geopak Cogo Feature

## **DDB Levels**

The DDB Levels are utilized by the Geopak Design and Computation Manager and the Roadway Designer program to draft common design elements using the predefined symbology. These elements include elevation, grade, point, profile, station text, existing and proposed profiles and labels, strip grade elevations, and vertical curve labels.

Δ	Name	Number	ŝ			Used	Description
	RD_DDB						
	RD_DDB_ElevTX	500	18	O	<u> </u>		DDB Feature-Elevation Text
	RD_DDB_GradeTX	501	2	0	<u> </u>		DDB Feature-Grade Text
	RD_DDB_PointTX	502	0	0	1		DDB Feature-Point Text
	RD_DDB_Profile_Elev	503	18	0	2		DDB Feature-Profile Text
	RD_DDB_Profile_EX	504	4	3	6		DDB Feature-Existing Profile
	RD_DDB_Profile_Lbl	505	18	0	<u> </u>		DDB Feature-Profile Labels
	RD_DDB_Profile_PR	506	7	0	6		DDB Feature-Proposed Profile
	RD_DDB_StaTX	507	18	0	<u> </u>		DDB Feature-Station Text
	RD_DDB_StripGrade	508	6	0	<u> </u>		DDB Feature-Strip Grade Elevations
	RD_DDB_VCLbI	509	2	0	<u> </u>		DDB Feature-Vertical Curve Labels

## **SMD Levels**

The following SMD levels are used to show surveyed point locator shots and other miscellaneous surveyed shots from the existing survey. These levels are selectively turned off during plotting.

Δ	Name	Number $\triangle$	5	12	Description
	RD_SMD_Locator	515	O	0	SMD Point Locator
	RD_SMD_Misc	516	O	0	SMD - Miscellaneous

## **DSG Levels**

The DSG (Design Services Group) levels were created for the quality control process of checking quantities, drainage, buildup, and property of construction plans.

Δ	Name	Number $\triangle$			1	Description
	RD_DSG_CkQuantity	525	215	0	O	Design Services Group Quantities Check
	RD_DSG_CkDrainage	526	230	O	0	Design Services Group Drainage Check
	RD_DSG_CkBuildUp	527	246	O	O	Design Services Group Buildup Check
	RD_DSG_CkProp	528	<b>1</b> 65	O	O	Design Services Group Property Check



# **Quantity Levels**

These levels are provided to place the appropriate design elements used to calculate the quantities for the project. These levels include base course, clearing and grubbing, concrete for structures, drives, medians, sidewalks, erosion control, grading, guardrail, milling, asphalt, vegetation, reset fences, and any other commonly calculated quantity.

Δ	Name	Number	6			19	Used	Description
	RD_QTY							
	RD_QTY_Base_Course	850		19	0	<u> </u>		All Base Courses
	RD_QTY_Clear_Grub	851		75	0	<u> </u>		Clear & Grubbing
	RD_QTY_Conc4Struc	852		24	0	<u> </u>		Concrete for Structures
	RD_QTY_ConcDrive	853		74	0	<u> </u>		Concrete Drives
	RD_QTY_ConcMed	854		80	0	<u> </u>		Concrete Median
	RD_QTY_Curb_SW	855		20	0	2		Curb&Gutter-Sidewalk-Medians
	RD_QTY_Erosion_Crtl	856		17	0	<u> </u>		Erosion Control
	RD_QTY_Fine_Grading	857		7	0	2		Fine Grading
	RD_QTY_GR	858		10	0	2		Guardrail
	RD_QTY_Intermediate	859		7	0	2		All Intermediate Courses
	RD_QTY_Milling	860		20		2		Milling
	RD_QTY_PermVeg	861		194	0	2		Permanent Vegatation
	RD_QTY_Prime_Coat	862		5	0	2		Prime Coat
	RD_QTY_RemExAsph	863		245	0	2		Remove Existing Asphalt
	RD_QTY_RemExConc	864		155	0	2		Remove Existing Concrete
	RD_QTY_RemPave	865		25	0	2		Pavement Removal
	RD_QTY_Reset_Fence	866		6	FENCE LINE	2		Reset Fences
	RD_QTY_Steel4Struc	867		36	6	2		Steel for Structures
	RD_QTY_Super_Pave	868		7	0	2		Super Pave
	RD_QTY_Surf_Course	869		14	0	2		All Surface Courses
	RD_QTY_SW	870		165	0	2		Sidewalks
	RD_QTY_ConcPave	871		218	0	2		Concrete Pavement
	RD_QTY_Bridge	872		28	0	<u> </u>		Bridges & Approaches

# **Geopak Levels**

There are currently two Geopak levels designated for the green dotted profile cell and the cross section cell that are used to hold the intelligence of the design elements utilized by the Geopak program.

Δ	Name	Number	<u>i</u>		12	Used	Description
	RD_GPK						
	RD_GPK_Profile_Cell	675	2	1			Geopak Profile Cell
	RD_GPK_XS_Cell	676	2	1	<u> </u>		Geopak Cross Section Cell
	RD_GPK_XS_Text_Node	677	2	1	<u> </u>		Geopak Cross Section Text Nodes



## **Architectural Levels**

There are several Architectural Levels utilized for incorporating architectural design features into the roadway plans. The levels vary in color and line weight.

▲ Name	^	Number	<u>s</u>		1 12	Used	Description
RD_AR							
RD_AR	R_00	950	0	0	0		Architecture Levels
RD_AR	R_01	951	1	0	<u> </u>		Architecture Levels
RD_AR	R_02	952	2	0	<u> </u>		Architecture Levels
RD_AR	R_03	953	3	0	<u> </u>		Architecture Levels
RD_AR	R_04	954	4	0	<u> </u>		Architecture Levels
RD_AR	R_05	955	5	0			Architecture Levels
RD_AR	R_06	956	6	0	<b>——</b> 6		Architecture Levels
RD_AR	R_07	957	7	0	<b>—</b> 7		Architecture Levels
RD_AR	8_08	958	8	0	8		Architecture Levels
RD_AR	R_09	959	9	0	9		Architecture Levels
RD_AR	R_10	960	10	0	10		Architecture Levels
RD_AR	R_Text	961	0	0	0		Architecture Levels

## **Geotechnical Levels**

There are several Geotechnical levels utilized for incorporating geotechnical information into the roadway plans.

Δ	Name ^	Number	<u>í</u>			Used	Description
	RD_gt						
	RD_GT_57Stone	1208	84	0	2		Geotechnical 57 Stone
	RD_GT_BiaxialGrid	1205	32	4	<u> </u>		Geotechnical Biaxial Grid
	RD_GT_BorrowExcav	1203	84	0	<u> </u>		Geotechnical Borrow Excavation
	RD_GT_EQDrains	1204	16	0	6		Geotechnical EQ Drains
	RD_GT_GeoSeparator	1207	2	0	<u> </u>		Geotechnical Geo Separator
	RD_GT_MonitoringDevices	1211	134	0	6		Geotechnical Monitoring Devices
	RD_GT_Mucking	1201	130	0	<u> </u>		Geotechnical Mucking
	RD_GT_RetainingWall	1212	10	0	6		Geotechnical Retaining Wall
	RD_GT_Surcharge	1209	17	0	<u> </u>		Geotechnical Surcharge
	RD_GT_TXT	1200	30	0	<u> </u>		Architecture Levels
	RD_GT_UnclassExcav	1202	35	0	6		Geotechnical Unclassified Excavation
	RD_GT_UniaxialGrid	1206	32	3	<u> </u>		Geotechnical Uniaxial Grid
	RD_GT_WeldedWireForm	1210	32	0	<u> </u>		Geotechnical Welded Wire Form

## **Environmental Levels**

There are several Environmental levels utilized for incorporating environmental information into the roadway plans. These levels can also be used to complete Environmental Permits.

Δ	Name ^	Number			1 12	Used	Description
	RD_EV_Ditch	1312	36	3	<u> </u>		Environmental Non-Regulated Ditch
	RD_EV_ESA	1302	24	EVS_ESA	<u> </u>		Environmental Environmental Sensitive Area
	RD_EV_Hatch	1303	32	0	<u> </u>		Environmental Hatch patterns
	RD_EV_JDitch	1301	251	EVS_JD	<u> </u>		Environmental Jurisdictional Ditch
	RD_EV_JFlag	1306	251	0	0		Environmental Located Flag Numbers
	RD_EV_JTrib	1305	231	EVS_EJT	<u> </u>		Environmental Jurisdictional Tributary
	RD_EV_JW	1304	79	EVS_EJW	<u> </u>		Environmental Jurisdictional Wetlands
	RD_EV_OWater	1308	250	EVS_OW	<u> </u>		Environmental Open Water Within Jurisdictional Area
	RD_EV_Shades	1309	24	0	<b>0</b>		Environmental Color fills
	RD_EV_TNW	1307	141	EVS_TNW	<u> </u>		Environmental Traditionally Navigable Water/OCRM Critical Area
	RD_EV_TX	1300	250	<u> </u>	<u> </u>		Environmental Text for Plan Sheets
	RD_EV_TxCode	1310	0	<u> </u>	0		Environmental Survey Code Data & Text
	RD_EV_Working	1311	175	0	0		Environmental Non-Plotting Working Level



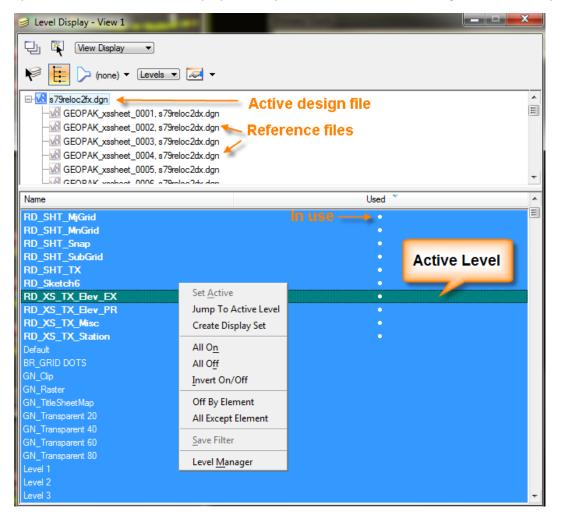
## Level Display

The Level Display is used to turn on or off levels in the active design file or in the reference attachments. It can be launched by selecting **Settings > Level >Display**, Ctrl + E, or from the Primary Tool bar.

The level highlighted in **green** is the active level. You can set the active level by double clicking on a particular level in the level display box. The "dot" indicates that a level is in use and contains elements. To turn the level on or off, click on the level once. The active level display cannot be turned off.

Right-clicking also provides additional controls such as All On or All Off, Off By Element and All Except Element.

There are also filters available to narrow down the list of available levels and a search filter to locate specific levels. You can also display levels by Views and save those settings as mentioned previously.





To turn on or off a level in all of the design files including references, collapse the list to the main design file. Toggle on or off the desired level display. This will be updated for all reference attachments.

To filter by entering a partial level name, change the filter toggle to Untitled. In the yellow box type part of the level name and press enter to filter those levels. (Switch back to none to see ALL Levels.)

🥩 Level Display - View 1		🥩 Level Display - View 1	
🖵 🙀 🛛 View Display 🔹		🖓 🏹 View Display 🔻	
None) 🔻 Levels	- 🖂 -		vels 💌 🖂 🗸
	Collapse files	⊕ 😡 r35391pf6.dgn List F	ilter: *Untitled
Name	Number	Name	Number
RD_EX_Driveway	129	road	
RD_EX_Driveway_txCode	130	Inv EX Road	159
RD_EX_Fence_Other	145	RD_EX_Road_txCode	160
RD_EX_Fence_Other_txCode	146	RD_TX_RoadID	386
RD_EX_GuardRail	147	RD EX RailRoad	157
RD_EX_GuardRail_txCode	148	RD_EX_RailRoad_txCode	158
RD_EX_H2O	149		
RD_EX_H2O_BlueLn	Turn on/off		
RD_EX_H2O_txCode	levels		
RD_EX_H2O_WetLd			
RD_EX_Misc	155		
RD_EX_Misc_txCode	156		
RD_EX_Road	159		
RD_EX_Road_txCode	160		

You can drag/drop column headers to modify the arrangement. It takes up less room to put the Used and Number before the Name/Description. You can also add columns by right-clicking and turning on items such as Color/Weight/Style.

Used	Number	Name	Description	=	Ξ	=	/	Save Layout
•	500	RD_DDB_ElevTX	DDB Feature-Elevation Text	18		_02		<ul> <li>Used</li> </ul>
•	501	RD_DDB_GradeTX	DDR Feature-Grade Text	2	_			
•	504	RD DDB Profile EX	Existing Profile	4		Right click to	Ľ	Number
•	505	RD DDB Profile Lbl	Drag/Drop to Profile Labels	18		add columns	<b>~</b>	<ul> <li>Name</li> </ul>
•	506	RD_DDB_Profile_PR	order columns Proposed Profile	7			/	Library
•	507	RD_DDB_StaTX	-Station Text	18		<u> </u>	~	Description
•	508	RD_DDB_StripGrade	DDB Feature-Strip Grade Elevations	6		— 0    —	-	Color
•	509	RD_DDB_VCLЫ	DDB Feature-Vertical Curve Labels	2		— 0    —		File
•	425	RD_DTM_Bkln1	Geopak DTM Feature-Break Lines # 1	14		— 0    —		Logical
•	430	RD_DTM_Holes	Geopak DTM Feature-Holes	0				Style
•	445	RD_DTM_Spot	Geopak DTM Feature-Spots	144				<ul> <li>Weight</li> </ul>
	452	PD_DTM_Void	Goopole DTM Footure Voide			_ 0 2	× 1	vveignt

# **Cell Libraries**

A cell is a small drawing, usually of a frequently used symbol, created in a MicroStation design file. Each cells is stored in a model to create a *cell library* with the file extension \*.cel. Currently, SCDOT roadway design utilizes the following cell libraries:

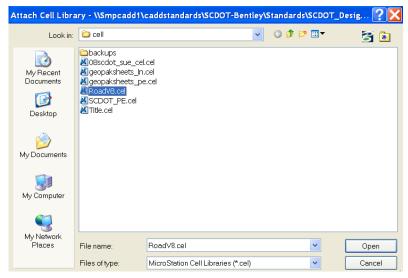
Cell Library Name	Cell Library Description
Title.cel	Contains title sheet borders for use with the mapping application (available
	internally to SCDOT only)
RoadV8.cel	Contains graphical cell elements used to draft roadway plans
Geopaksheets_In.cel	Contains cross section and plan/profile sheet borders for use with Geopak
	sheet composition tools



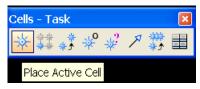
To access the cell library dialog, select **Element > Cells** from the top bar menu in a MicroStation design file.

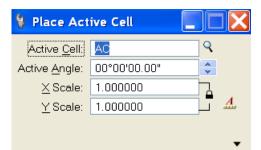
🛿 Cell Library: [\SCDOT_Design\WSfiles\cell\RoadV8.cel]						
<u>Fi</u> le						
Use Shared Cells Display All Cells In Path Display: Wireframe						
Name	Description	Туре	4. Where	^		
AC	AIR CONDITIONING UNIT	Grph	Lbry			
АН	ARROW HEAD	Grph	Lbry			
ALCON	ALIGNMENT CONTROL	Grph	Lbry		$/ \bigcirc$	
APIPE	ALTERNATE PIPE NOTES	Grph	Lbry			
BEND15	15 DEG PIPE BEND	Grph	Lbry			
BEND30	30 DEG PIPE BEND	Grph	Lbry			
BEND45	45 DEG PIPE BEND	Grph	Lbry			
BEND90	90 DEG PIPE BEND	Grph	Lbry			
ВМ	BENCH MARK	Grph	Lbry	~		
, ← Active Cells				_		
Placemer		r <u>o</u> int Ele	ment	<u>E</u> dit	Delete	
Terminato		ttern NC	INE	<u>C</u> reate	S <u>h</u> are	

To attach a cell library, choose **File > Attach** under the Cell Library File menu and the following dialog will appear. Highlight the cell library needed and press **OK**.



To place a cell, use the cell palette shown below. The size of the cells varies for the different drawing scales. Key in the following recommended values in the X and Y scale boxes for the project scale.





The cell toolbar can be accessed by going to Tools > Main > Cells

50:1 English = 1.000 20:1 English = 0.400



To replace a cell, select the Replace Cell icon. Select the Method for **Replace**. Select the Mode for Single cell or **Global** for all cells in drawing. Check on **Use Active Cell** and pick the new cell to replace the existing cell with. **Data click** on one of the cells to begin the process. Click **Yes** to accept the replacement of all cells in the drawing.

s ☆ ‡‡ <sub>*</sub> ‡ ∻° ∻' ↗ <mark>群</mark> ⊞	
Replace Cells      Method Replace      Mode Global	
Use Active Cell AH4 Use Fence: Void	

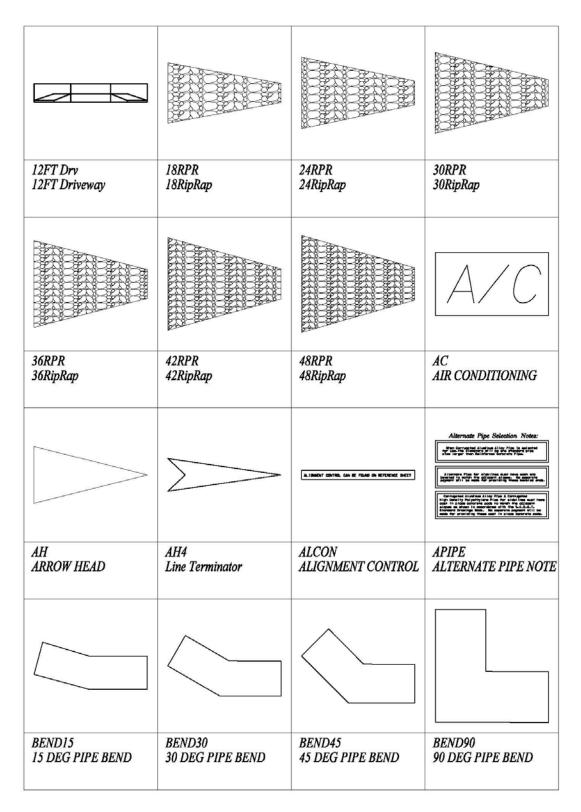
Alert	You are in Global replacemen replaced. Are you sure?	t mode. 19 cells will be
	Yes	No

At times it may be necessary to modify a cell or cell text. Select the **Drop Element** icon. The cell can be dropped into individual elements for this purpose by selecting options such as Line Strings/Shapes and Text. Click on the cell to drop. Edit the contents as necessary.

Main - Main Task	B
N □	<
😵 Drop Element	
Complex	
Dimensions To Geometry	
✓ Line Strings/Shapes	
Multi-lines	
<u>Shared Cells</u> <u> To Geometry</u> ▼	
V Text	
Application Elements	



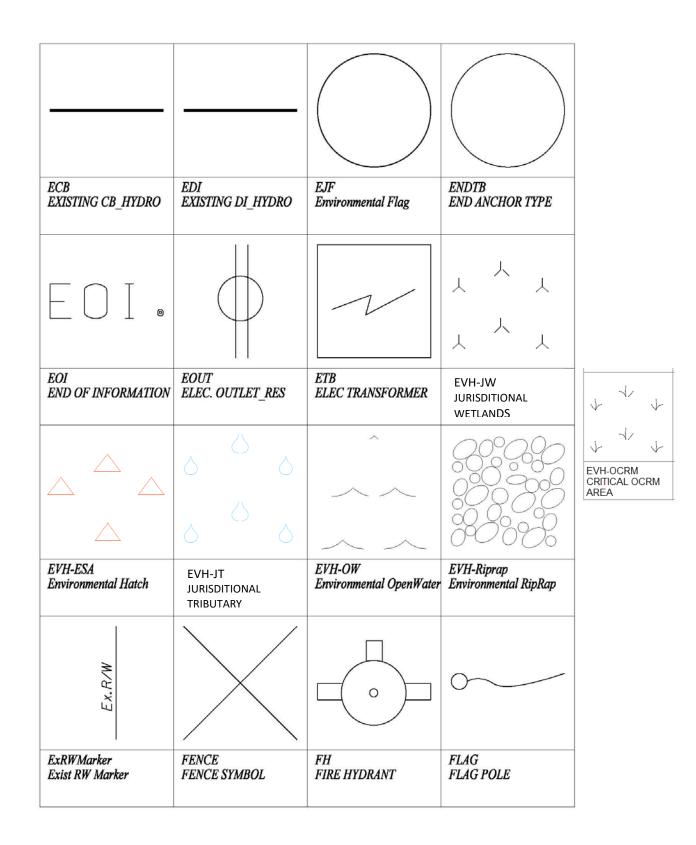
The cells depicted on the following pages are located in the RoadV8.cel library in the SCDOT Cadd Workspace:



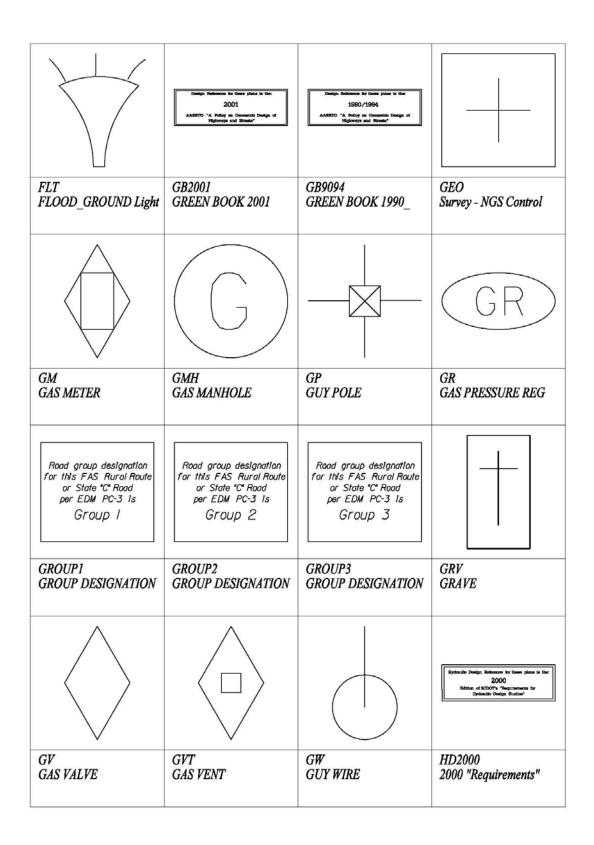


BM Survey - Bench Mark	C/A CA Control Access	CAP FILL CAP	CB CATCH BASIN	
CG CURB GUTTER	CHANGE CONSTRUCTION CHANGE	CL CENTERLINE SYMBOL	CM CONCRETE MARKER	
	CHANGE			
CNOTE1 CONST NOTE UPPER CULT IV AT E D F I E L D	CNOTE2 CONST NOTE LOWER	CNOTE3 RIPRAP CONST NOTE RIPRAP	$COL \\ COLUMN$	CP CONTROL POINT
CULT CULTIVATED FIELD	DB DUMMY CB OR TEE_	DI DROP INLET	DIRT DIRT SYMBOL	





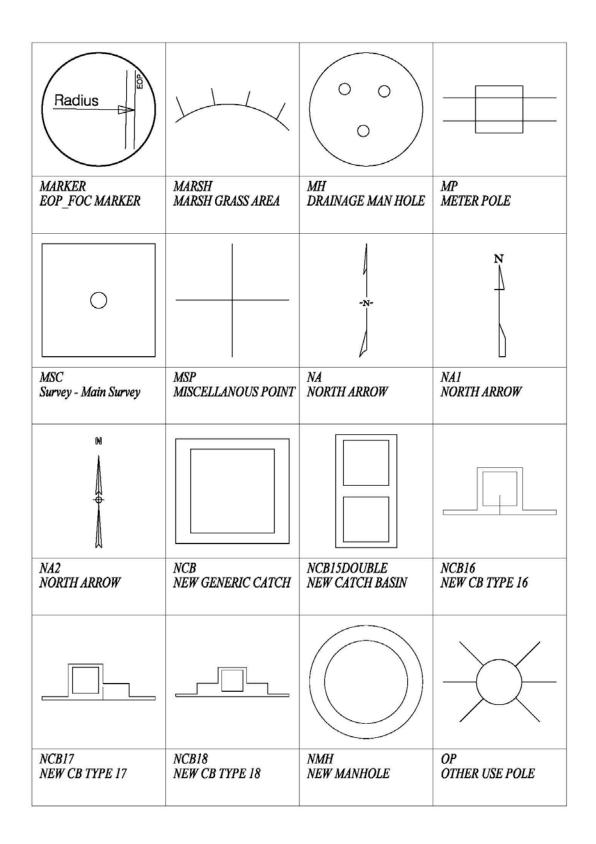






Ilpórnilo Dadya Melennos fa time picar is the 2009 Setten ef 2007 * "Augéricants for Ilbérnilo Dadya Station"	HYDROLDGY DATA: D.A.= sq.ml.= oc. D = ofs Vel. = ft/ssc including ft. Headwater 0100 ft/sc Vel. = ft/sc 0100 ft/sc Vel. = ft/sc 0100 ft/sc Vel. = ft/sc Vel. = ft/sc 00 Year H.W. Elev. = ft. 1ncluding ft. Headwater UVERTOPPING FLOOD: D = ofs Probability = %	HYDROLOGY DATA: D.A.= sq.mi.= ac. 0 = cfs Yel. = ft/ssc Typer H.W. Elev. = ft. Including ft. Headwater 0100 = ft/ssc 100 = der H.G. Elev. = ft. 100 der H.B. Elev. = ft. 100 der H.B. Elev. = ft. 100 der H.B. Elev. = ft. Probability = %	HYDROLDCY DATA: D.A.= gq.mi.= oc. 0 = cfs V= Yoor 14.8 Elev. = ft. 000 = cfs Vel = ft.so 100 Yeor H.W. Elev. = ft. 100 Yeor H.W. Elev. = ft. NDTE: Duto from Bridge Section Q= cfs ERTOPPING FLOOD: Probability = %
HD2009	HDATBC	HDATBC_Fill	HDATBR
2009 "Requirements"	HY DATA FOR BR	HY DATA FOR BR	HY DATA FOR BRIDGE
HYDROLOGY DATA: D.A.= sq.ml.= oc. 0 = cfs Yel.= ff/sec Yel = ff/sec Vel = ff/sec 100 'eor H.W. Elev. = ft. 100 'eor H.W. Elev. = ft. NDTE i Deto from Bridge Section 0 / ERTOPPING FLODDI - cfeRTOPPING FLODDI Probability = %	HYDROLOGY DATA: D.A.= sq.ml.= ac. D = cfs Yel. = ft/sec Yaor H.W. Elev. = ft. 0100 = cfs Yel = ft/sec 100 Year H.W. Elev. = ft.	HYDROLOGY DATA: D.A.= sq.mi.= oc. D = cfs Vel. = ft/sec Yaor H.W. Elev. = ft. 0100 = cfs Vel = ft/sec 100 Year H.W. Elev. = ft.	Project Contacts non Report Regues Redot Wenger: Design Group Occurrence
HDATBR_Fill	HDATPC	HDATPC_Fill	INFO
HY DATA FOR BRIDGE	HY DATA FOR PIPE	HY DATA FOR PIPE	PROJECT CONTACTS
	JB		
IP	JB	LARRW	LARRW2
Property Corner	JUNCTION BOX	LEFT TURN ARROW	LEFT TURN ARROW
	L/P	<b>* *</b>	
LB	LP	LSP	MAIL
LAYOUT BORDER Sheet	LIGHT POLE	CONSTRUCTION Layout	MAIL BOX

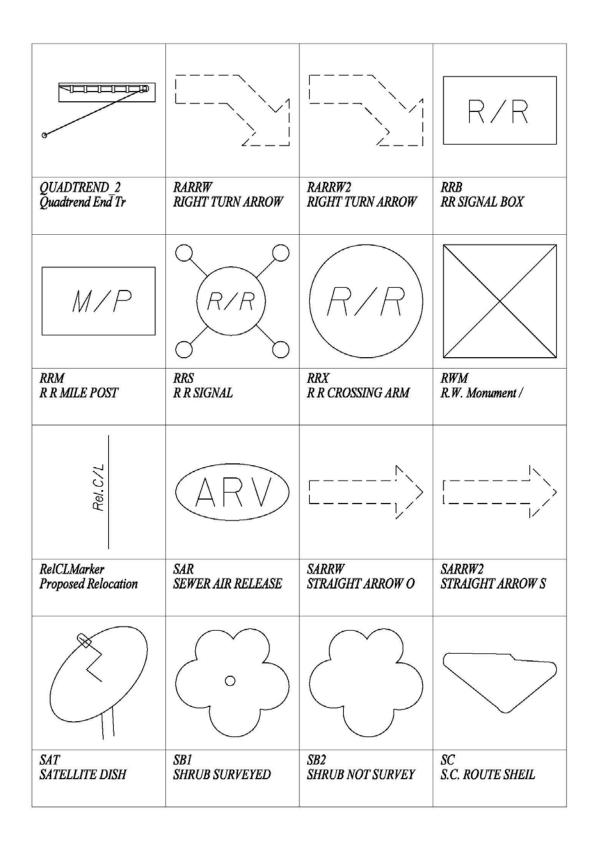




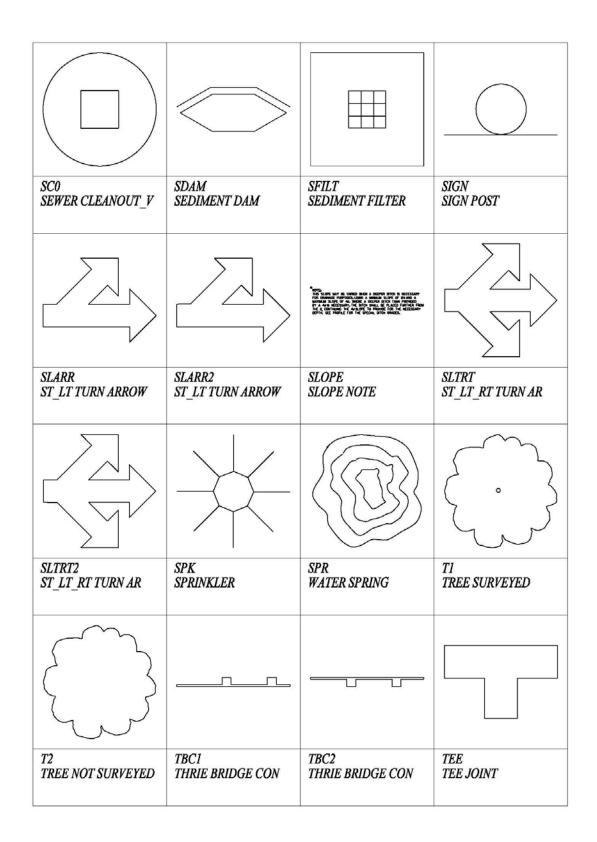


OPD	PAMPAS	PARKING LOT PARK	PBM
OUTLET PIPE DOWN	PAMPAS GRASS	PARKING LOT TEXT	Survey - Project
0		H	
PC POINT OF TAN OF	PCOR Property Calculation	PHH POWER HAND HOLD	PI POINT OF INTERSECT
	P	P	
PK PARKING METER	PLT POWER LINE TOWER	PM POWER MANHOLE	PP POWER POLE
0		NEW R/W	
PPIN Property Corner	PSC Survey - Primary	NEWRWMarker New Right of Way	QUADTREND 1 Quadtrend End T











	H		
TH	THH	TMH	TP
TEST HOLE	TELEPHONE HAND H	TELEPHONE MANHOLE	TELEPHONE POLE
		$\sum$	
TPP	TREELN	TSJB	TSP
TELEPHONE PEDEST	TREE LINE	TRAFFIC SIGNAL J	TRAFFIC SIGNAL P
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TV	TVHH	TYPETI	TYPET2
CABLE TV PEDESTA	CABLE TV HAND HO	TYPE T TREAT BEG	TYPE T TREAT END
		VAC	
UOT	US	VAC	WAR
UNDERGROUND OIL	US ROUTE SHEILD	VACUUM_COMMERCIAL	L WATER AIR RELEASE



		(W)	M
WELL WELL HOUSE	WM WATER METER	WMH WATER MAN HOLE	WMW WATER MONITORING
WQS WATER QUALITY ST	WTS WITNESS POST_UTI	WV WATER VALVE	WYE WYE JOINT
Wetland I			
WETLAND Wetland Marker			



#### Element Information

The Element Information tool allows the user to review settings on a design element. Changes to the element attributes can be made in this dialog.

<ol> <li>Element Information</li> </ol>		x
General		*
Description	Line	
Level	RD_XS_ExGround	
Color	ByLevel (4)	
Line Style	ByLevel (3)	
Weight	🔛 ByLevel (6)	
Class	Primary	
Template	None	
Transparency	0	
Priority	0	
Geometry		*
Extended		*
Raw Data		*

#### AccuDraw

AccuDraw provides you with the tools to produce precision drawing of complex geometry in MicroStation.

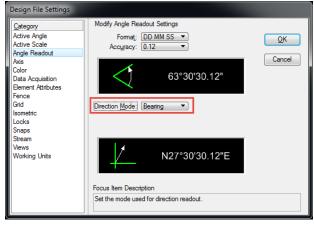
Page 53

Operation	Display (	Coordinates	
<ul> <li>✓ <u>A</u>uto La</li> <li>✓ <u>F</u>loating</li> <li>✓ <u>C</u>ontex</li> <li>✓ Smart <u>1</u></li> </ul>	g Origin t Sensitivity		<ul> <li>Auto <u>P</u>oint Placement</li> <li><u>St</u>icky Z Lock</li> <li>Always Show Compass</li> <li>Auto Focus Fields</li> </ul>
Defau	t Origin: View o	enter on acti	ive Z 💌

(If the drawing is not in true north orientation, the accudraw measurements may not appear accurate, simply use the keyin vi=top to rotate the drawing true north.)

To enter bearings in another quadrant, you can edit your settings as follows to allow you to save key-strokes when entering angles.

Select **Settings > Design File**. Tag the Angle Readout option and make sure the Direction Mode is set to **Bearing**.





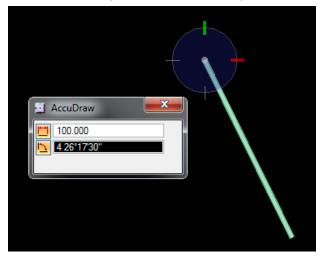
Select **Settings > AccuDraw** and turn off the check box for Context Sensitivity.

14	AccuDraw S	ettings		
	Operation	Display	Coordinates	
	Smart <u>I</u>	g Origin t Sensitivity Key-ins	w center on act	<ul> <li>Auto Point Placement</li> <li>Sticky Z Lock</li> <li>Always Show Compass</li> <li>Auto Focus Fields</li> <li>ive Z </li> </ul>

Make sure that AccuDraw is active and set to polar mode (press the space bar to toggle between Polar and Rectangular modes.) Polar mode activates the following shortcuts:

Quadrant 1 – North East Quadrant 2 – North West Quadrant 3 – South West Quadrant 4 – South East

Rather than key-in in S26^17'30"E, you can key-in 4 26^17'30: for the same results. You can also use a semi colon ";" in place of the carrot ^ symbol.



#### Key-in

The key-in dialog allows the user to use shortcut text commands to activate MicroStation commands.

(Example: Vi=top will rotate the drawing true North)

To access a list of key-ins, select Help > Contents. Select MicroStation V8i Help Keyin-in Index. You can search for key-ins by using the Find Field.

₩ <mark>-</mark> (	2	
vi=top		



## **Line Styles**

Custom *line styles* can consist of text and symbols that have been created in MicroStation. They can be accessed by selecting Elements > Line Styles > Custom from the top menu bar. Scroll through the line style options and double click on the style needed, or double click on the line display box to activate the attributes.



The line styles were developed for an English scale of 50:1. If using another scale, key-in the following values in the Scale Factor box of the line styles dialog.

50:1 English = 1.000 20:1 English = 0.400

Existing and new pipes are not drawn to scale. Therefore, the user may decide on a scale when using these. NPDES is typically scaled at 2.000 to make the text more legible.

Use the Change Attributes > Line Style tool to modify a selected line style such as NPDES.



Use the Shift tool from the Modify Line Style Attributes menu to center or modify line styles. Enter a value and click the line to accept. Click again if it still needs adjusting.

When drawing lines with text as part of their line type, it's not unusual to discover that the text is initially reading out backwards and upside-down. Rather than redrawing the line, use the **"Change Direction**" command in the Key-In dialog box.

Clicking the highlighted arrow on the line will reverse the direction of the line the text that is part of it. Any features or calculations based on line direction will be affected, too.





🖇 Modii	fy Line Style Attribu 📘 🔲 🗙
<b>\$</b> \$	s 😵 🖧 🕫 🐇 😽
	S <u>h</u> ift 5.000000 Shift bsolute

🛛 Key-in			Σ	3
				¥
change 🖌	dimension	<b>^</b>		_
changecase 📃	direction			
choose	element	=		
civil	fence			
civilcmd .	fill		, 	_
< <u> </u>	level	-	All	•
change direction choose element acbook influence;plac			Ē	* E
xy=50000,50000			t.mvba;vba run StationOffsetReport Patterns.mvba;vba run DrawPatterns	Ŧ



Style Name	Level Name	Description	Line Appearance
BCA	RD_PD_BCA	Bridge Control Access	BCA
CITY LIMIT	RD_EX_DV_Gov	City Limit/County Limit	
CLEARGRUB	RD_PD_Clearing_Grubbing	Clearing and Grubbing Limits	C/G
CLOUD	RD_Sketch1	Cloud	
EASEMENT	RD_EX_Easement	Existing Easement	EASEMENT
EASEMENT	RD_PD_Easement	Proposed Easement	EASEMENT
ELEC LINE ABOVE	RD_EX_SU_Elec	Existing Overhead Electrical	
ELEC LN UNDER	RD_EX_SU_Elec	Existing Underground Elec.	
EX GR LT	RD_EX_Guardrail	Existing Guardrail Left	<u> </u>
EX GR RT	RD_EX_Guardrail	Existing Guardrail Right	<del>- 5 5 5</del>
FENCE LINE	RD_EX_Fence_ChLk	Existing Chain Link Fence	
FENCE LINE	RD_EX_Fence_Other	Existing Other Fence	
FENCE LINE NEW	RD_PD_Fence	Proposed Fence	——————————————————————————————————————
FOC	RD_PD_FOC	Proposed Face of Curb	——FOC——
FIBER OPTIC	RD_EX_SU_Telecom	Fiber Optic Line	FOL
GAS LINE	RD_EX_SU_Gas	Gas Line	G
NEW GR LT	RD_PD_GR	Proposed Guardrail Left	
NEW GR RT	RD_PD_GR	Proposed Guardrail Right	· · · · ·
NPDES	RD_PD_DR_ErosCtrl	Proposed NPDES	
OUTFALL DITCH	RD_PD_DR_FlowCtrl	Proposed Outfall Ditch Flow Line	<b>&gt;</b>
OUTFALL DITCH	RD_PD_DR_Ditch	Proposed Outfall Ditch	
PHONE LINE A	RD_EX_SU_Telecom	Overhead Telephone	
PHONE LINE B	RD_EX_UT	Underground Telephone	
PIPE EXIST	RD_EX_DR_Pipe	Existing Pipe	
PIPE NEW1	RD_PD_DR_Pipe	Proposed Pipe 1	
PIPE NEW2	RD_PD_DR_Pipe	Proposed Pipe 2	
R/W OR PROPERTY LINE	RD_EX_RW	R/W Line	
R/W OR PROPERTY LINE	RD_EX_DV_Prop	Property Line	



Style Name	Level Name	Description	Line Appearance
RAILROAD LINE	RD_EX_Railroad	Railroad Line	
RELOCATION LINE	RD_HC_Data_Rel	Relocated Centerline	
SHRUB LINE	RD_EX_VEG	Shrub Line	00000000
STATE LINE	RD_EX_DV_Gov	State Line	
TR_RR	RD_EX_Railroad	Rail Road Tracks	-+-+-+-+-+++
TREE LINE	RD_EX_VEG	Tree Line	$\bigcirc \bigcirc $
WETLAND	RD_EX_H2O_WedLd	Wetlands	Wetlands
WOODED AREA LT	RD_EX_VEG	Wooded Area Left	
WOODED AREA RT	RD_EX_VEG	Wooded Area Right	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
EVS_TNW	RD_EV_TNW	Environmental - Traditionally Navigable Water/OCRM Critical Area	—— TNW ——
EVS_ESA	RD_EV_ESA	Environmental - Environmentally Sensitive Area	—— E S A ———
EVS_JD	RD_EV_JDitch	Environmental - Jurisditional Ditch	JD
EVS_EJT	RD_EV_JTrib	Environmental - Jurisdictional Tributary	J T
EVS_EJW	RD_EV_JW	Environmental - Jurisdictional Wetlands	JW
EVS_OW	RD_EV_OWater	Environmental - Open Water Within Jurisdictional	OW

### Fonts

MicroStation contains two types of fonts – TrueType and RSC fonts. **TrueType** fonts are delivered with Windows and are always solid in appearance. True Type fonts cannot have additional weights applied to them when plotting. These fonts also export more uniformly with other products. **RSC** fonts are MicroStation specific and weights must be applied for plotting.

Some of the most common fonts that SCDOT uses for plan production are:

#### **RSC** Fonts

151 arial This is 151 arial font.

#### 201 ClearviewHwy-2-W This is 201 Clearview-2-W font.

Ø font000 This is 0 font000 font, Ifont001

This is I font001 font. 23 font023

This is 23 font023 font.

43 font43 This is 43 font43 font.

190 times This is 190 times font.

203 timesi This is 203 times font. 3 USTN\_ENGNRG This is 3 USTN\_ENGNRG font.

# TrueType Fonts

#### TT Arial Black This is Arial Black font.

TT Comic Sans MS This is Comic Sans MS font.

TT Courier New This is Courier New font.

TT Symbol (Symbol) This is Symbol) for  $\xi$ 

TT Tahoma This is Tahoma font.

TT Times New Roman This is Times New Roman font. Font 107 will not display the "5" if it is the ending digit in text. Please use another font.

Font 203 timesi may display the "^" instead of the degree symbol. To correct, run option 6 in the Cadd Updates on your desktop (internal users) or consultants may add the MstnFontConfig.xml provided in the fonts.zip to the C:\ProgramData\Bentley\MicroSta tion V8i (SELECTseries) \WorkSpace \System \Fonts folder.



**Text Styles** are used to conveniently apply settings to standardize attributes for fonts including the font, Height, Weight, Justification, Spacing, and Background, etc. Elements placed with a text style are automatically updated when the style is modified. SCDOT has several text styles available in the CADD Workspace.

M Text Styles - Existing R/W Style TT Font	6.	100000 L 2	
St <u>v</u> le Vi <u>e</u> w			
📴 - 🛛 🖬 🖌 🖢 🖉 🕺	A		
Text Styles	*	General Spacing Under/Overline Background Advanced	
Style			
VEXisting R/W Style TT Font		Font: Times New Roma   Color: 23	
Se Moving Item Style		Height: 6.000 Bold	
Moving Item Style TT Font		Width: 5.000 T taics	
New R/W Style		Signt: 0'0'0'' Underline	
New R/W Style TT Font			
See Offset Elev Txt		Justification Left Top   Overline	
Print Preparation Text		✓ Fractions	
Property Owners Style		Vertical	
Property Owners Style TT Font Quantity Sheet Style		Full Justification	
Quantity Sheet Style TT Font	=		
Quitclaims Text			
S RD NAME			
Seference Points Style			
Seference Points Style TT Font			
So RW Data Style			
Se RW Data Style TT Font			
STA NAME		Existing R/W Style TT Font	
💞 STANDARD	-	Existing K/W Style 11 Pont	
A ALL ALL ALL	×		

For a public hearing display, you will need to reverse the background color of the text from white to black so the color table will print it correctly.

General Spacing Under/Overline Background Advanced	
☑ Background	
Fill Color: BG -	
How it appears in MicroStation	
Font background set to white	
<i>Font background set to black</i>	
How it appears in the PDF	1
	t i
Font background set to black	7
I ONI DUCKETOWNU SET TO DIUCT	



**Suggested Fonts....**The following chart depicts example levels, weights, and text height and widths for one plan production group. These standards can be adopted or modified as necessary to enhance legibility and standardization of plans.

						FOR 50	:1 PLOT
TITLE SHEET	LEVEL	COLOR	STYLE	WEIGHT	FONT	TEXT HEIGHT	1
INDEX OF SHEETS	RD SHT TX	152	BY LEVEL	BY LEVEL	151	7	7
COUNTY NAME IN PROJECT DESCRIPTION	RD TX TITLESHT	4	0	3	109	25	25
FILE#,PROJ#, PROJECT DESCRIPTION	RD TX TITLESHT	4	0	3	151	20	20
MAP DESCRIPTION	RD TX TITLESHT	4	0	1	151	8	8
TITLE BLOCK DATA	RD TX TITLESHT	4	0	1	151	6	6
NPDES PERMIT INFORMATION	RD SHT TX	152	BY LEVEL	4	1175	7	7
ENGINEER OF RECORD TEXT	RD TX TITLESHT	3	0	3	151	6	6
PROJECT MILEAGE INFORMATION	RD SHT TX	152	BY LEVEL	BY LEVEL	1024	6	6
EQUALITITES IN STATION	RD TX TITLESHT	4	0	1	151	8	8
RPG/GROUP (DESIGN INITIALS)	RD TX TITLESHT	4	0	1	151	8	8
TRAFFIC DATA	RD_TX_TITLESHT	3	0	1	1175	8	8
PROJECT BEGIN/END AND BRIDGE NOTES	RD_SHT_TX	152	BY LEVEL	BY LEVEL	151	8	8
	• – – – –						
							:1 PLOT
SUMMARY OF ESTIMATED QUANTITIES	LEVEL	COLOR	-	-	-	TEXT HEIGHT	
TITLE BLOCK DATA	RD_PD_FINAL_TX	254		BY LEVEL		4.5	4.5
QUANTITY TEXT	RD_PD_FINAL_TX		0	4	3	5	5
							<u> </u>
TYPICAL SECTION	LEVEL	COLOR	STYLE	WEIGHT	FONT	TEXT HEIGHT	TEXT WIDTH
TITTLE BLOCK DATA	RD PD FINAL TX	254	BY LEVEL	BY LEVEL	151	0.6	0.6
LANE DIMENSIONS	RD EX MISC	5	BY LEVEL	BY LEVEL	23	0.75	0.75
FINISHED GRADE POINT TEXT	RD EX MISC	6	BY LEVEL	BY LEVEL	23	0.5	0.5
CROSS SLOPE TEXT	RD EX MISC	2	BY LEVEL	2	23	0.75	0.75
PAVEMENT DESIGN CALL OUT LABELS	RD EX MISC	5	BY LEVEL	BY LEVEL	43		
TYPICAL SECTION STATION RANGE NOTES	RD_EX_MISC	4	0	4 3	0.8 0.8		
PAVEMENT DESIGN LEGEND	RD_EX_MISC	106	0	3	23	0.8	0.8
		1				FOR 50:1 PLOT	
R/W DATA	LEVEL	COLOR	STYLE	WEIGHT	FONT	TEXT HEIGHT	TEXT WIDTH
TITLE BLOCK DATA	RD PD FINAL TX	254	BY LEVEL	BY LEVEL	1025	6	6
TRACT #, PROPERTY OWNER, OBTAIN INFO, PERMISSIONS	RD PD FINAL TX	23	BY LEVEL	BY LEVEL	23	6.25	6.25
REVISION NOTES	RD PD FINAL TX	254	BY LEVEL	BY LEVEL	151	4.5	4.5
						FOR 50	:1 PLOT
PROPERTY STRIP MAP	LEVEL	COLOR	STYLE	WEIGHT	FONT	TEXT HEIGHT	TEXT WIDTH
TITLE BLOCK DATA	RD_PD_FINAL_TX	254	<b>BY LEVEL</b>	BY LEVEL	151	12	12
CENTERLINE LABELS	RD_EX_RW_TX	28	0	4	23	10	10
PROPOSED R/W LABELS	RD_PD_RW_TX	35	<b>BY LEVEL</b>	BY LEVEL	1	10	10
EXISTING R/W LABELS	RD_EX_RW_TX	4	<b>BY LEVEL</b>	BY LEVEL	1	10	10
TRACT NUMBERS	RD_EX_RW_TX	28	0	4	203	15	15
REVISION NOTES	RD_EX_RW_TX	28	0	4	1	10	10
SHEET DESCRIPTION BOX	RD_EX_RW_TX	28	0	4	23	20	20
		COLOR	CTVLE	WEIGUT	FONT		1 PLOT
GENERAL CONSTRUCTION NOTE		COLOR			-	TEXT HEIGHT	
TITLE BLOCK DATA PROJECT CONTACTS	RD_PD_FINAL_TX	254	BY LEVEL			5	5
	RD_TX_MISC1	99	0	2			5
INCLUSION QUANTITIES SHEET DESCRIPTION BOX	RD_TX_QTY RD_TX_MISC1	200 0	0	4	3 151	7.5 10	5 10

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						FOR 50	:1 PLOT
REFERENCE SHEET	LEVEL	COLOR	STYLE	WEIGHT	FONT	TEXT HEIGHT	TEXT WIDTH
TITLE BLOCK DATA	RD_PD_FINAL_TX	254	<b>BY LEVEL</b>	BY LEVEL	151	6	6
REFERENCE TEXT	RD_PD_FINAL_TX	23	<b>BY LEVEL</b>	BY LEVEL	151	6.25	6.25
SHEET DESCRIPTION BOX	RD_EX_RW_TX	28	0	4	23	20	20
REFERENCE DESCRIPTION TEXT (BENCH MARK, CURVE DATA)	RD_EX_RW_TX	28	0	4	151	10	10
						FOR 50	:1 PLOT
PLAN & PROFILE	LEVEL	COLOR	STYLE	WEIGHT	FONT	TEXT HEIGHT	TEXT WIDTH
GUARDRAIL NOTE	RD_PD_FINAL_TX	23	BY LEVEL	BY LEVEL	151	6	6
BRIDGE NOTE	RD_PD_FINAL_TX	23	BY LEVEL	BY LEVEL	151	6	6
EXISTING R/W LABEL	RD_EX_RW_TX	4	BY LEVEL	BY LEVEL	23	5	5
PROPOSED R/W TEXT	RD_PD_RW_TX	35	BY LEVEL	<b>BY LEVEL</b>	23	5	5
PROJECT BEGIN/END NOTES, TIE EQUALITY NOTES	RD_PD_FINAL_TX	23	BY LEVEL	6	151	7	7
PROPOSED DRAINAGE NOTES	RD_TX_DRAINAGE	106	BY LEVEL	3	151	5	5
ROAD NAMES SHOWN IN PLAN VIEW	RD_PD_FINAL_TX	149	0	4	23	7	7
TITLE BLOCK DATA	RD_PD_FINAL_TX	254	BY LEVEL	<b>BY LEVEL</b>	151	6	6
LANE WIDTH, TAPER AND STORAGE LABELS	RD_PD_FINAL_TX	23	BY LEVEL	<b>BY LEVEL</b>	151	6	6
CUT/FILL LABELS	RD_PD_TX_CSTNLMT	20	BY LEVEL	<b>BY LEVEL</b>	151	5	5
TRACT NUMBERS	RD_PD_FINAL_TX	254	BY LEVEL	<b>BY LEVEL</b>	23	8	8
EARTHWORK TEXT	RD_TX_VOLUME	143	BY LEVEL	6	151	7	7
MISC PROPERTY TEXT	RD_EX_BLDG	6	BY LEVEL	BY LEVEL	23	5	5
REVISION NOTES	RD_PD_FINAL_TX	254	BY LEVEL	BY LEVEL	151	6	6
UTILITY DATA	RD_PD_FINAL_TX	3	BY LEVEL	BY LEVEL	23	8	8

						FOR 5:1 PLOT	
CROSS SECTIONS	LEVEL	COLOR	STYLE	WEIGHT	FONT	TEXT HEIGHT	TEXT WIDTH
TITLE BLOCK DATA	RD_PD_FINAL_TX	254	<b>BY LEVEL</b>	BY LEVEL	151	0.5	0.5
BEGIN/END AND SUPERELEVATION NOTES	RD_SHT_TX	152	0	4	151	0.765	0.765
EXISTING ELEVATIONS	RD_XS_TX_ELEV_EX	2	0	6	151	0.8	0.8
PROPOSED ELEVATIONS	RD_XS_TX_ELEV_PR	7	0	4	151	0.9	0.9
CROSS SLOPES	RD_XS_TX_SLOPE	2	0	2	151	0.75	0.75
FILL SLOPES	RD_SHT_TX	4	0	2	151	0.75	0.75
CUT/FILL VOLUMES	RD_TX_VOLUME	143	0	5	151	0.8	0.8
CUT/FILL END AREAS	RD_TX_ENDAREA	183	0	5	151	0.8	0.8



## **GEOPAK Introduction**

GEOPAK is a comprehensive software package that covers every project phase from conceptualization to final quantities. The software works within the MicroStation graphic environment providing *true interactive design*. For example, a horizontal alignment can be created graphically; it can be calculated with the coordinate geometry component of GEOPAK or some interactive combination of the two. Dynamic on-screen design provides immediate interpretation of plan view geometrics for making design choices through visualization.

This section of the Cadd Manual highlights commonly used SCDOT Geopak processes. There is further documentation available in the Geopak Road I Training manual located on the website at: https://www.scdot.org/business/pdf/cadd/SCDOTCompleteRoadI.pdf

## **Geopak Files**

GEOPAK uses and/or creates files during the design process. The files are detailed in the table below:

Job###.gpk	This binary file is created when the user starts a coordinate geometry (COGO) session for the first time or through Project Manager and may be appended to during the design process. All coordinate geometry elements are stored in this file – points, chains, profiles, parcels, and survey chains. Multiple users can access this file at the same time, and only one file should be created for each project. The ### is the only variable in this name. It represents the last 3 digits of the job number (up to 3 alphanumeric characters) unique to a project and is defined by the user upon creation.
*.tin	A binary file containing triangular surfaces also known as the digital terrain model (DTM).
*.prj	Binary file resulting from the creation of a new project.
*.smd	This is the survey manager database file. This file is a database that contains all of the survey codes that are contained in the SCDOT Survey Code Manual. When asci files are coded accordingly, the smd file graphically draws the points, cells, lines, and includes/excludes points in the dtm file.
*.asc;*.txt;*.inp	An ASCII file is used for input for running GEOPAK processes. Name is user defined with a *.asc or *.txt extension. This file can be opened in Notepad and edited. Typical format is PNEZD, Point Number, North, Easting, Elevation, and Description for point files.
*.csv	A CSV file is comma separated value format that can be opened in Excel. It is useful to use excel to make multiple changes to the file prior to processing in GEOPAK. An ascii file extension can be changed to .csv to open in Excel and a .csv file extension can be changed to .asc or .txt to open in Notepad.



### **User Preferences**

Select **Applications > Geopak Road > User Preferences** to open the User Preferences dialog to customize settings for the design file.

The Working Directory tells Geopak where to look for the gpk file. This field is recommended to always be **BLANK** – Geopak will default to the working directory of the project when left blank. The gpk file and the design file should be located in the same folder when running processes in Geopak. (If Geopak hangs up in the middle of a process, this is a good place to check first to ensure that it has not been set to a different project location by mistake.)

10 User Preferences	
Unit System: English   Coordinates: NE  Direction: Bearing  Station: 12+34	Output Accuracy Distance: 99.1234 Station: 9+99(9).12 Angle Seconds: 9^9'9.12"
Working Directory:	۹.
<u>F</u> eature Preferences	Show this dialog at startup
COGO Preferences	
<u>O</u> K	Cancel

The **Output Accuracy** controls the number of decimal places in the different Geopak processes and reports. This includes the Coordinate Geometry (COGO) dialog that may be used to copy data from for plan sheet production.

Press the Feature Preferences button to review the current SMD location. Also, set the Plot Scale to 50.00 (or applicable scale). If you need to re-visualize elements such as pipe elevations, it is important to have the appropriate plot scale defined.

K Feature Preferences	
Feature Database: DOT_Design\G	eofiles\Database\SCDOTV8.smd 🔍 🚅
Apply Best Match Feature	Plot Scale: 50.00000
Use Shared Cells Point La	bel Redraw: Position by SMD Settings 🔻
ОК	Cancel

## **Road Tools**

The Road Tools menu bar can be activated by selecting **Applications > Geopak Road > Road Tools**. The toolbar can be docked for ease of access to Geopak's most commonly used tools for Roadway Design.

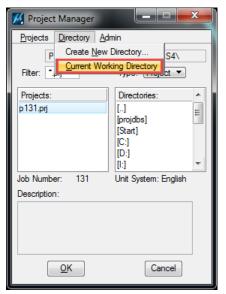


Select **File > Save Settings** for this tool to appear each time Geopak is activated.



## **Project Manager**

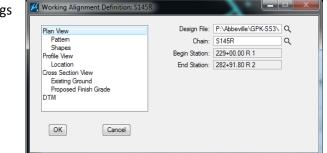
The **Project Manager** provides a workflow dialog to organize the Geopak processes for Roadway Plan Production. This tool saves project settings into a **\*.prj file** containing multiple alignments associated with their respective plan view, chains and stationing, shapes, profile, tin file, pattern lines, element symbology for cross sections so the user does not have to continuously complete dialogs with the same information.

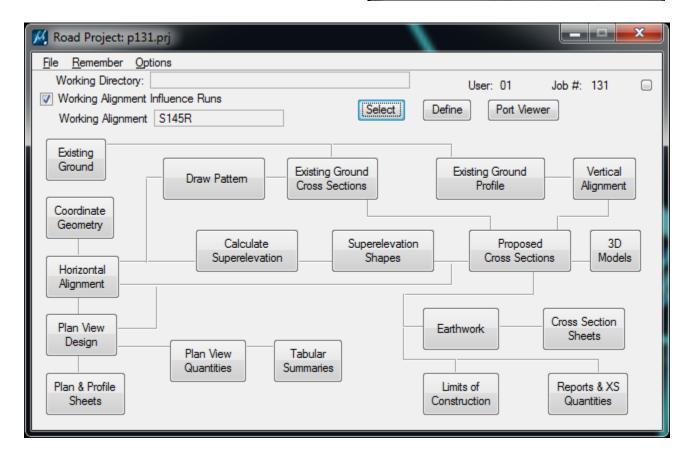


Select **Applications > Geopak Road > Project Manager** to open. Select **Directory > Current Working Directory** to ensure Geopak is pointing to the project location.

To create a new Working Alignment Run or to select an existing alignment run, press the **Select** button. Select **Run > New**.

To define settings per alignment run, press the **Define** button.







# **COGO (Coordinate Geometry)**

To access the COGO dialog, select **Applications > Geopak Road > Geometry > Coordinate Geometry**.

Press the magnifying glass to open the project **\*.gpk** file provided by the Surveys Office. Press the **OK** button to continue.

Coordinate Geometry	ſ
Project Name:	
Job: 131 🔍	İ
Operator Code:	I
Subject:	l
OK Cancel	

### **Chain and Profile Naming Conventions**

Disciplined folder and file naming conventions are a must for project organization. It is just as important to continue practices electronically in Geopak with Chain and Profile naming conventions. Electronic data is used by more than the original designer. Other design offices, construction inspectors, contractors, surveyors, and consultants access the electronic information during the life cycle of the project. It is imperative that consistent and logical naming conventions are followed. The electronic file name should also be carried to the plotted construction plans.

This information should be detailed in the EED\_index.xlsx file and kept up to date at all times.

Most chains are provided by Surveys and are named with the **Route number** or **Road name**. The same convention should be used with relocated chains by Roadway designers. (Example, SC52 relocated chain should be named SC52R.) Also, you should **NEVER** insert any special characters into the chain names like *#*, *@*, ^, etc. The chain name should be limited to less than **15 characters** as well.

Profiles should be named consistently to correspond (MATCH) with the chain. If you run multiple iterations of profiles, be sure to go back and clean up your gpk of the ones that are no longer applicable.

#### **Examples for Chains:**

SC52 – existing centerline alignment
SC52R – relocated centerline alignment
OFD1 – outfall ditch 1 existing centerline alignment
PINELN – existing centerline alignment
PINELNR – relocated centerline alignment

#### **Examples for Profiles:**

SC52EP – existing profile SC52CP – critical points profile SC52REP – relocated existing profile SC52RFP – relocated proposed profile SC52RCGLT – relocated proposed curb & gutter left profile SC52RCGLT – relocated proposed curb & gutter right profile

410



The Reference Data Sheet and Plan and Profile Sheets should contain both the route or road name and number. Ensure that the electronic chain or profile name is also listed in the plan sheets.

S-02-145	Relocated C	enterline (Sto	rm Branch Road)
Beginning chai	n S145R description		
Point 100	N 594,314.7210	00 E 1,738,836.53530	0 Sta 229+00.00
Course from 10	00 to PC S145R-1 S	67° 04' 58.79" E Dist	417.30317
	Curve Data		
Delta = Degree = Tangent = Length = Radius = External =	234+12.21 N 2° 48' 27.80" (RT) 1° 28' 46.34" 94.90400 189.77001 3,872.54320 1.16273	594,115.26890 E	1,739,308.31390
Long Chord = Mid. Ord. = P.C. Station P.T. Station		594,152.22426 E 594,074,07602 E	

Utilize **COGO Navigator** > **Describe** Chain to copy and paste the chain information from the output window into the Place Text dialog on the Reference Data sheet using the **Reference Points Text Style**.

Provide the electronic chain and profile names on the Plan and Profile sheets in the lower left corner of the plan sheet. The "common" names are labeled in the upper right corner and do not always tell the electronic data user if the alignment is relocated or existing on the plan sheet. The electronic names should help the user distinguish between the two.



*S145R & S145RFP S65R & S65RFP* 

 $250 \pm 00$ 

Common Route or Road names and numbers are labeled in the upper right corner of the Plan and Profile Sheets.

Electronic chain and profile names should be labeled in the lower left corner of the Plan and Profile Sheets.



#### **Point Naming and Ranges**

The Surveys Office provides the original project **gpk** file to roadway designers containing the existing project surveyed points imported into Geopak.

Control and alignments utilize the points beginning at point 1-999, etc. depending on the size and number of alignments on the project. Property corners and existing topography utilize the points beginning at point 1000-19999, etc. depending on the size and number of surveyed shots on the project.

The DTM file utilizes the points beginning at point 20,000 and higher.

Roadway designers should be **conscientious** when storing new points not to overwrite existing point numbers. Also, designers should utilize gaps in the point ranges and use a **prefix "R"** (R to designate it was stored by roadway) for storing new points. It is helpful to also add a **Description** when storing points for design.

By following this convention, the integrity of the original project gpk can be maintained by allowing any additional surveys to utilize the point gaps sequentially. (Example: The original survey used points 1-89 for the existing control. The additional survey A will begin at point 90.) *Designers should not use point 90 for storing new points.* This causes confusion and requires the Surveys Office to renumber points manually. It could potentially lead to the unintended overwrite of the points in the gpk at the time of the additional survey.

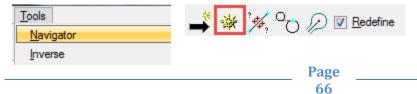
🥂 Store Po	oint	
Point Na	ame:	R500
🔽 Auto In		ient
Coordina		
North	ning:	593045.72201298 DP
East	ting:	1741373.7472454
	Sta	ation:
	Eleva	ation:
	PC	Code:
	Point	t Cell: Scale:
	Fea	ature:
V D	escrip	ption: Relocation Point 500
		Store Point

To review the points utilized in the current gpk file, type "list points" in the COGO Key-in and press Enter.

K Coordinate Geometry Job: 131 Operator:
<u>Fi</u> le <u>E</u> dit El <u>e</u> ment <u>V</u> iew <u>T</u> ools
<b>R 🔤 Z k + k / k (* k 1 k / k k / k k</b> / k 🖾 📥 📩
Temporary Visualization ▼       OFF (Feature) ▼       Browse       99.12345 ▼       9^9'9'9.12"       <
COGO Key-in: list points
<* 1 list points
**** POINTS USED **** 1-89, 100-106, 110-113, 200-202, 1000-1790, 1792-2622, 20000-20999, 21001-22000

### **COGO Navigator**

The COGO Navigator is one of the most frequently accessed tools in Geopak during design. To activate the dialog, select **Tools > Navigator** or select the "wheel" icon on the COGO toolbar.





On the **Navigator** dialog, points, curves, chains, and profiles can be added, deleted, modified, identified, visualized, printed or selected.



### **Redraw Visualized Elements**

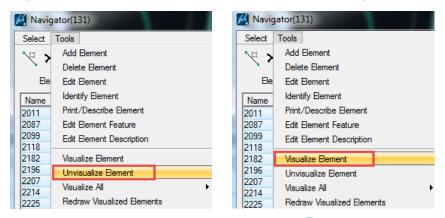
**Visualize drainage points with elevations** - If the description field was not turned on during the original survey process, the elevations may be missing for drainage items. To redraw with elevations, set the Visualization to **Permanent Visualization** on the COGO Dialog.

Coordinate Geometry Job: 131 Operator:
<u>File</u> <u>Edit</u> Element <u>Vi</u> ew <u>T</u> ools
File       Edit       Ejement       View       Tools         Image: Straight of the straight of t
Permanent Visualization   OFF (Feature)

On the Navigator dialog, toggle the Element to **Point**. Sort the Points by Feature. Scroll down and Shift + Click to highlight drainage codes (DI, CBN, P).

Navigator(131) Select Tools Soft by Feature & use Shift + Click to select drainage features Element : Point					
Name	Northing	Easting	Select Feature 1	Description	
2011	592247.2246	1741143.5162	Р	PB	
2087	592649.1179	1741234.9733	P	PA 18 RC	
2099	592746.8611	1741274.6389	P	PB	
2118	592853.5386	1741318.5563	P	PA 15 RC	
2182	592872.4734	1741327.2558	P	PB	
2196	592945.1536	1741357.0624	P	PA 18 RC	
2207	592963.8867	1741364.9792	P	PB	
2214	593040.0543	1741356.3986	P	PA 15 RC	
2225	593059.3071	1741364.3848	P	PB	
2235	593141.1610	1741398.3848	P	PA 15 RC	
2241	593160.4579	1741406.2541	P	PB	
2245	593243.1815	1741439.9986	P	PA 15 RC	

Select **Tools > Unvisualize Element** to remove the graphics for the highlighted points to avoid duplicates. Select **Tools > Visualize Element** to redraw the points with the elevations.





As an alternative to the above method for selecting a group of points by feature, you can use the Selection Set Tool to select the points by Feature.

Pick **Select > Selection Set** to open the dialog.

1	Mavigator(131)						
	Select Tools						
	Select All			N			
	Invert Selection			P\$ <mark>₿</mark>			
	Clear Selection				1		
	Selection Set			Easting	Select	Feature	Description
	51.14 (C.L. 1)		3953	1740053.0530	~	P	PA 15 RC
	Fit View (Selecti	on Set)	8783	1740063.5206	~	Р	PB
	1091	593279	7596	1740067.5584	~	Р	PA 15 RC
	1092	593250.	9612	1740083.8838	~	Р	PB
	1164	592972	7937	1740318.1061	~	Р	PA 15 RC
	1165	592949	1052	1740357.2464	~	P	PB
	1166	592936	3445	1740377.5964	~	Р	PA 15 RC

Toggle on **Feature** and check on **Match Whole Word Only**. Enter the **Feature code – P** and press the **Select** button to activate the Selection Set. Repeat to select additional point codes.

🥂 Selection Set Tool
Selection Basis : Name & Feature  Or  78 Highlighted Items
Name : 1 v to : 1 v
Feature : P Match Whole Word Only
Not Selection Criteria
Select

On the Navigator dialog, **sort by** the Select column to verify that only the P items are selected and not any Feature codes containing P, like CP, TP, PP, etc. Use the commands on the previous page to redraw the points with elevations.

#### **Describe Elements**

The Navigator tool can be used to describe chains, profiles, points, etc. in a text format in the COGO output window. This text can then be copied and pasted into MicroStation or saved out as a text file.

Toggle Element to **Chain**. **Highlight** a chain name and press the "paper" icon to **Print/Describe** the chain.

🔏 Navigator(131)	
Select Tools	
📉 🗙 📑 id	<b>4 📄</b> ⊳8
Element : Chain	▼_
Name	Feature
S91	
S65R	
00011	
S65	
S65	
S65 S145R	
S65 S145R S145	



Click the 1<sup>st</sup> line of the text in the output window and hold the Shift key. Scroll down to the last line to be copied and data click to select the passage. Right click and select **Copy**.

<u>File Edit Elem</u>	nent <u>Vi</u> ew <u>T</u> o	ols				
	lization  OFF	(Feature) 💌		( <sup>™</sup> ⁄ <b>∢</b> (+234 ) 99.1234 ▼ (		à <b>→</b>
	ESCRIBE CHAIN	5140N				
100 CUR S1	45R-1 CUR S1	45R-2 CUR 8	5145R-3	101 CUR S1459	-4 CUR 514	5R-5 CUR S145R
6 CUR S145R	-7 CUR S1459	R-8 CUR 5149	5R-9 100	5 102 103 104	105	
Beginning c	hain S145R o	lescription		Select All		
				Select None		
Point 100	1	J 594 31	14 72	Invert Selection	5353 Sta	229+00 00
Point 100	ł	1 594,31	14.72:		.5353 Sta	229+00.00
Point 100 Course from				Сору	.5353 Sta 417.3032	229+00.00
						229+00.00
				Сору		229+00.00
			7° 04	Copy Print		229+00.00
Course from Curve S145R	100 to PC 5	5145R-1 S 67	7° 04	Copy Print Process	417.3032	
Course from Curve S145R P.I. Stati	100 to PC 8 -1 on	5145R-1 S 67 234+12.21	7° 04 Cur *	Copy Print Process	417.3032	229+00.00 1,739,308.3139
Course from Curve S145R P.I. Statio Delta	100 to PC 8	234+12.21 48' 27.80"	7° 04 Cur *	Copy Print Process	417.3032	
Course from Curve S145R P.I. Stati	100 to PC 8	5145R-1 S 67 234+12.21	7° 04 Cur *	Copy Print Process	417.3032	

Set the level to **RD\_SHT\_TX**. Select the **Place Text** MicroStation tool. On the Place Text dialog, browse to select the **Reference Points Text Style**. In the Text Editor dialog, right click to **paste** the text into the dialog. **Data click** in the design file to place the text.

9 Place Text	M Text Editor - Word Processor
Method:       By Origin         Text Style:       ✓       Reference Points ▼  <	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$
	Point 100 N 594,314.7210 E 1,738,8 Course from 100 to PC S145R-1 S 67° 04' 58.79



## **Output Files**

Alternatively, after describing the chain, select **File > Input File Utility** on the COGO dialog. Change the toggle to **Output** and **enter** a file name. Press the **Apply** button. In the project directory, you will now have a file saved with an .O extension. This file can be opened in Notepad for review and later copied and pasted into MicroStation.

Koordinate Geome	M Input File Utility				×
<u>File E</u> dit El <u>ement</u>	File Name	Subject			
Preferences	S145R	[ None ]			
Input File <u>Ut</u> ility					
Input File <u>R</u> estore					
<u>D</u> atabase Utilities					
Import					
Export •					
	Output 🔹	Output File: S1			
E <u>xi</u> t		A	pply		
S145R131.0 - Notepad			1.000		
File Edit Format Vie	w Help				
Beginning chain SI	450 descriptio				
Point 100	N 594	,314.7210 E	1,738,836.53	53 Sta	229+00.00
Course from 100 to	D PC S145R-1 S	67°04'58.	79" E Dist 417	. 3032	
		Curve Da	ata		
		*			
Curve S145R-1 P.I. Station	234+12.2	21 N	594,115,2689	F	1,739,308.3139
Delta =	2° 48' 27.80	)" (RT)	554,115.2005	-	1,755,500.5155
Degree = Tangent =	1°28'46.34 94.904				
Length =	189.770	00			
Radius = External =	3,872.54				
External = Long Chord =	1.162 189.751				
Mid. Ord. =	1.162	24	504 452 2242	_	4 730 330 0007
P.C. Station P.T. Station	233+17.3 235+07.0		594,152.2243	E	1,739,220.9007 1,739,393.8119
c.c.		N	590,585.3414	E	1,737,712.9427

Page 70

## **Highlighting and Visualizing Elements**

The Navigator tool can quickly help you locate Geopak elements (chains and points) by temporary visualizing them to the screen. To utilize this feature, ensure that the **Default** level is turned on.

🥪 Level Display - View 1					
🖓 🙀 🚺 View Display 🔹					
None) 🔻 Levels 🔻	• 🖂 🗸				
142131pp.dgn	142131pp.dgn				
Used Name	Number	=			
Default	0	O			
RD_EX_Bldg	115	6			
<ul> <li>RD_EX_Bldg_txCode</li> </ul>	116	<b>0</b>			



Select **Tools > Settings** in the Navigator dialog. On the Settings dialog, check on **Single Click Highlight Visualized Element** and press **OK**. (If this is a very long project, it may benefit to also check on Single Click Window Center so it will zoom to the location on highlight below.)

📈 Navig	jator(131)	Settings
Select	Tools	Selection Set
N >	Add Element	Alert Prior to Clearing Selection Set
<b>`</b>	Delete Element	
Ele	Edit Element	Mouse Click Actions
Name	Identify Element	Single Click Highlight Visualized Element
S91	Print/Describe Element	Single Click Window Center Visualized Element
S65R	Edit Element Feature	Single Click Enables List Cell Editing
S65 S145R	Edit Element Description	Double Click Action : Edit Element
S145K	Visualize Element	Display Options
ROUND OFD2	Unvisualize Element	Point : All Points
OFD2	Visualize All	Area : Square Foot  99.12
	Redraw Visualized Elements	
	Clear Visualized Elements (Temporary)	OK Cancel
	Clear Visualized Elements (All)	
	Export Preferences	
	Export Selection	
	Settings	

Highlight the chain(s) in the Navigator dialog. Press the "paint brush" icon to **Visualize Element**. Click once more on the chain name to highlight the visualized element in the design file.

		N N N N
		🔀 Navigator(131)
		Select Tools
		📉 📉 🔁 🖬 📩 🖹 🖓
R 10	20	Element : Chain 🔻
		Name Feature
		S91
		S65R
		S65
		S145R
		S145 ROUNDABOUT
		OFD2
		OFD1



## **Database Utilities**

If the gpk file is slow to process or there is potential that the file is corrupted, there is an option in COGO to clean and compress the database. Select File > Database Utilities on the COGO dialog.

	Coordinate Geom	etry Job: 131
	<u>File Edit Element</u>	<u>Vi</u> ew <u>T</u> ools
	Preferences	+ / /
	Input File <u>U</u> tility	OFF (Fea
	Input File <u>R</u> estore	E CHAIN S14
1	Database Utilities	

Press the Validate button. Press the Clean and Compress button. Any elements modified will be listed in red. (A backup will automatically be placed in the working directory should you need to revert back.)

COGO Key-in: DATABASE CLEAN			
<* 3 DATABASE CLEAN	N		
Rebuild Database: P:\Abbev Record Type	ill\job131.gg Count	)k	
	(	🛛 Dat 🗖 🗖 📈	
Points	3725		
Point Feature	3709	Job: 131	
Chains	8		1
Curves	28	Validate	Į
Profile Header	30	Clean and Compress	
Profile Data	42 🕒		
Survey Chains	408		
Survey Chains Feature	408		
Survey Chains Points	408		
Project	1		
Data Sets	2		
Backup GPK before Compression	inh131 hak	9/9/2015 4:31 PM	B~K File
			2010/07/15
GPK after compression	iob131.apk	9/10/2015 8:36 AM	GPK File

job131.gpk

**Store Profile by Input or Excel** 

The format for a profile from an input or Excel file is the same. The beginning line is STORE PROFILE NAME and the ending line is END PROFILE. The input for the profile columns is VPI, VPI #, S, Station, E, Elevation, L, Length of Vertical Curve.

🗌 New	Text Docur	nent.txt - N	otepad	-		_	
File E	dit Forma	t View I	Help				
STORE	PROFILE	S145RFF	<b>)</b>				
VPI	1	S	25350.00	E	448.2899		
VPI	2	S	25450.00	E	447.6400	L	200
VPI	3	S	25900.24	E	449.0000		
VPI	4	S	25920.24	E	449.4200		
VPI	5	S	25921.74	E	449.7600		
VPI	6	S	25938.74	E	450.1000		
VPI	7	S	25940.24	E	450.1300		
VPI	8	S	25940.74	E	450.6300		
VPI	9	S	25989.74	E	450.6300		
VPI	10	S	25990.74	E	450.1300		
VPI	11	S	25991.74	E	450.1000		
VPI	12	S	26008.74	E	449.7600		
VPI	13	S	26010.24	E	449.4200		
VPI	14	S	26030.24	E	449.0000		
VPI	15	S	26150.00	E	447.4246	L	200
VPI	16	S	26425.00	E	446.4000	L	200
VPI	17	S	26575.00	E	443.9500		
END PF	OFILE						

2,337 KB

1.818 KB



You can achieve this format by editing and typing in notepad (more difficult) or just typing and using auto fill in Excel. It is also helpful to make small grade changes to profiles currently in the gpk in this manner.

In the profile text file, press the **Ctrl + A** to select all of the information. Right click and select **Copy**.

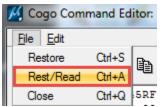
X	5	- (	Ŧ	_		_				
F	ile	Home	Inse	rt CoSign	Page Lay	yout For	mulas	Data		
ľ	ک ان ا	Cut Copy -		Calibri	* 11	· A A	=	= =		
Pa	ste .	Format Pa	ainter	BIU·	-	🕭 - <u>A</u> -		= =		
	Clipbo		G	F	ont	G.				
	A		-	- c		PROFILE S1	45RFI	p		
	A	В	С	D	E	F	G	н		
1	STORE			_	E C	F	9			
2	VPI	1	S	25350.00	E	448,2899				
3	VPI	2	s	25450.00	E	447.6400	L	200		
4	VPI	3	s	25900.24	E	449.0000				
5	VPI	4	s	25920.24	E	449.4200				
6	VPI	5	S	25921.74	E	449.7600		Calibri	- 11 - A	A <sup>*</sup> \$ - %
7	VPI	6	s	25938.74	E	450.1000		D Z		
8	VPI	7	s	25940.24	E	450.1300		BI	≣ 🌺 • <u>A</u> •	· <u>·</u> · · • • • • • • • • • • • • • • • • •
9	VPI	8	s	25940.74	Е	450.6300				
10	VPI	9	S	25989.74	Е	450.6300		👗 Ci	u <u>t</u>	
11	VPI	10	S	25990.74	Е	450.1300			ору	
12	VPI	11	S	25991.74	E	450.1000			ste Options:	
13	VPI	12	S	26008.74	E	449.7600			are optional	
14	VPI	13	S	26010.24	Е	449.4200				
15	VPI	14	S	26030.24	E	449.0000				
16	VPI	15	S	26150.00	E	447.4246	L	200		
17	VPI	16	S	26425.00	E	446.4000	L	200		
18	VPI	17	S	26575.00	E	443.9500				
19	END PR	OFILE								

On the COGO dialog, select **Edit > Editor**. Right click in the Editor dialog and select **Clear**. Right click again to select **Paste** to paste the information from the input or Excel file.

🔏 Coordinate Geor	📈 Cogo Com	mand Editor:	Untitled	K Cogo Command Editor: Untitled	4/4/4
<u>File</u> dit Element Clear	File Edit	¥ 🗈	<b>i</b> n	<u>Ble Edit</u>	~
	STORE PROF			STORE PROFILE S145RFP	48.2899
COGO <u>M</u> odify	VPI 1 S VPI 2 S VPI 3 S	25350.00 25450.00 25900.24	E 448 E 447 E 449	VPI 3 S 2 Undo E 44	47.6400 L 200 49.0000 49.4200
<u>R</u> ead All Type All	VPI 4 S VPI 5 S	25920.24	Undo 45	VPI 5 S 2 <u>H</u> edo E 44 VPI 6 S 2 <sub>Cut</sub> E 44	49.7600 50.1000 50.1300
Line Range	VPI 6 S VPI 7 S VPI 8 S	25938.74 25940.24 25940.74	<u>R</u> edo ۵۵ ۵۵ Cut ۵۵	VPI 8 S 2 <u>C</u> opy E 41 VPI 9 S 2 <u>Paste</u> E 41	50.6300 50.6300
Beg <u>E</u> ditor	VPI 9 S VPI 10 S	25989.74 25990.74	Copy 50	VPI 11         S         2         E         41           VPI 12         S         2         Select All         E         44	50.1300 50.1000 49.7600
	VPI 11 S VPI 12 S VPI 13 S	25991.74 26008.74 26010.24	Paste 50 Delete 45	VPI 14 S 2 Clear E 4	49.4200 49.0000 47.4246 L 200
	VPI 13 5 VPI 14 5 VPI 15 5	26030.24	Select <u>Al</u> l 15 Cl <u>e</u> ar 17		46.4000 L 200 43.9500
	א דמיא	26425 0		AND PROFIDE	



Select **File > Rest Read** to store the profile into the GPK file.



Open the **COGO Navigator** and verify that the profile was stored correctly. (Tools > Navigator or the "wheel" icon.)

📕 Navigator(131)
Select Tools
🔧 📉 📑 id 📥 🗎 🔊 Element : Profile
Name
S145RFP
S145RFP2
S145RTOCLEP
S145RTOCLFP

# **Profile to Excel (Text to Columns)**

At times, the profile stored in the gpk file may need edited at vpi's at specific stationing. The following shows how to take a profile elevation report from COGO to Excel for manipulation. You will manipulate the Excel file in the format above to re-import it as shown in the previous steps.

In COGO, select Element > Profile > Elevation

💯 Coordina	ate Geom	etry J	ob: 541	Oper	ator:				
<u>Fi</u> le <u>E</u> dit	Element	<u>V</u> iew	<u>T</u> ools						
	<u>P</u> oint			10	ç 🎢				
	<u>Li</u> ne			→ Lª	<b>`</b> ' (				
9^9'9.12"	<u>C</u> urve								
COGO Key-in	<u>S</u> piral			▶ <mark>'en</mark>	50 169+1				
	Chai <u>n</u>			•					
<*	P <u>ar</u> cel			۰ Le	SC24FP				
Elev at	Profile			•	Utility				
Elev at	Next A	واطات	Settings	=_					
Elev at	Ne <u>xi</u> A	valiable	Settings	_	Elevation Offset				
Elev at Elev at					Restation				
<i>(</i>	e El		X		Com				
SC24FF	•		•	-	statio				
Even S	tations			-	eleva				
	Begin: 169+14.47								
	- 1								
End:	End: 184+79.24								
Even	Even: 50								
	Compute Elevation								

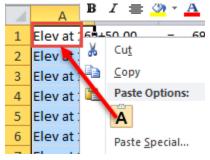
complete the dialog as shown below, specifying the desired even tationing required. Press the **Compute Elevation** to print the levations to the COGO window.



Highlight the text in the COGO window, right click to select Copy.

Elev	at	169+5	0.00	=	696.6825,	grade	= 2.6257,	On	tang betw	1	æ	2
Elev	at	170+0	0.00	=	697.9954,	grade	= 2.6257,	On	tang betw	1	£	2
Elev	at	170+5	0.00	=	699.3079,	grade	= 2.6120,	On	curve vpi	2		
Elev	at	171+0	0.00	=	700.5797,	grade	= 2.4752,	On	curve vpi	2		
Elev	at	171+5	0.00	=	701.7830,	grade	= 2.3383,	On	curve vpi	2		
Elev	at	172+0	Select All		702.9180,	grade	= 2.2014,	On	curve vpi	2		
Elev	at	172+5	Select None		704.0122,	grade	= 2.1877,	On	tang betw	2	S.	3
Elev	at	173+0	Invert Selectio		705.1060,	grade	= 2.1877,	On	tang betw	2	5	3
Elev	at	173+5		21	706.1999,	grade	= 2.1877,	On	tang betw	2	5	3
Elev	at	174+0	Сору		707.2938,	grade	= 2.1877,	On	tang betw	2	5	3
Elev	at	174+5	Print	_	708.3931,	grade	= 2.2318,	On	curve vpi	3		
Elev	at	175+0		_	709.5311,	grade	= 2.3200,	On	curve vpi	3		
Elev	at	175+5	Process		710.7131,	grade	= 2.4082,	On	curve vpi	3		

In Excel, paste the data into cell A1



With the text highlighted in Excel, select the Data tab. Press the Text to Columns button.

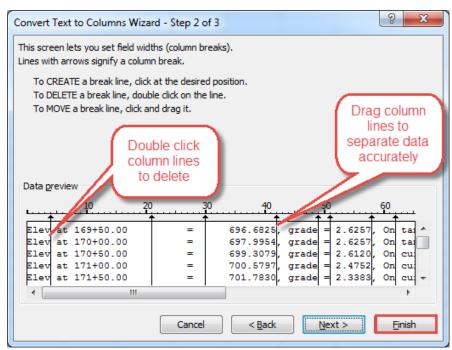
🔀	🚽 🍤 - (*	×   <del>-</del>									1000
F	ile Ho	me Inse	ert CoSig	n Page	Layout	Formulas	Data	Review	View Ad	d-Ins BI	uebeam ,
Fre				Existing	Refresh	Properties	_	iort Filter	K Clear Reapply	Text to	
Acc	ess Web Text Sources Connections All Connections All Connections All Connections Sort & Filter						Column	Duplicates			
	A1		• (*)	<i>f</i> ∗ Elev	at 169+50.	00 = 0	596.6825	5, grade = 2.6	5257, On tar	ng betw 1 8	& 2
	А	В	С	D	E	F	G	Н	I.	J	К
1	Elev at 16	lev at 169+50.00 = 696.6825, grade = 2.6257, On tang betw 1 & 2									
2	Elev at 17#+00.00 = 697.9954, grade = 2.6257, On tang betw 1 & 2										
3	Elev at 17	Elev at 17#+50.00 = 699.3079, grade = 2.6120, On curve vpi 2									
4	Elev at 17	+00.00									



#### Select Fixed Width and press the Next button.

If this is correct, choose Next, or choose the data type that best describes your data. Original data type Choose the file type that best describes your data: Delimited - Characters such as commas or tabs separate each field. Fields are aligned in columns with spaces between each field. - Fields are aligned in columns with spaces between each field. Preview of selected data: I Slev at 169+50.00 = 696.6825, grade = 2.6257, C Slev at 170+00.00 = 697.9954, grade = 2.6257, C Slev at 170+50.00 = 699.3079, grade = 2.6120, C Slev at 171+50.00 = 700.5797, grade = 2.4752, C Slev at 171+50.00 = 701.7830, grade = 2.4752, C	The Text Wizard has determined that your data is Fixed Width.									
Choose the file type that best describes your data: Delimited - Characters such as commas or tabs separate each field. • Fixed widthi - Fields are aligned in columns with spaces between each field. Preview of selected data: 1 Elev at 169+50.00 = 696.6825, grade = 2.6257, Grade =	If this is correct, choose Next, or choose the data type that best describes your data.									
Choose the file type that best describes your data: Choose the file type that best describes your data: Choose the file type that best describes your data: Choose the file type that best describes your data: Fixed width - Fields are aligned in columns with spaces between each field. Preview of selected data: $\frac{1 \text{ Slev at 169+50.00}}{2 \text{ Slev at 169+50.00}} = \frac{696.6825}{97.9954}, \text{ grade} = 2.6257, \text{ Grade} = $										
Opelimited - Characters such as commas or tabs separate each field.             • Fixed width             • Fields are aligned in columns with spaces between each field.             • Fixed width             • Fixed width             • Fields are aligned in columns with spaces between each field.             • Fixed width              • Fixed width <td></td> <td colspan="9"></td>										
Fixed width - Fields are aligned in columns with spaces between each field.          Preview of selected data:         1 Elev at 169+50.00       =       696.6825, grade = 2.6257, 0         2 Elev at 170+00.00       =       697.9954, grade = 2.6257, 0         3 Elev at 170+50.00       =       699.3079, grade = 2.6120, 0         4 Elev at 171+00.00       =       700.5797, grade = 2.4752, 0		field								
Preview of selected data: 1 Elev at 169+50.00 = 696.6825, grade = 2.6257, 0 2 Elev at 170+00.00 = 697.9954, grade = 2.6257, 0 3 Elev at 170+50.00 = 699.3079, grade = 2.6120, 0 4 Elev at 171+00.00 = 700.5797, grade = 2.4752, 0										
1       Elev at 169+50.00       =       696.6825, grade = 2.6257, 0         2       Elev at 170+00.00       =       697.9954, grade = 2.6257, 0         3       Elev at 170+50.00       =       699.3079, grade = 2.6120, 0         4       Elev at 171+00.00       =       700.5797, grade = 2.4752, 0		ach field.	s with spaces betweer	re aligned in colum	width - Fields ar	Elixed y				
1       Elev at 169+50.00       =       696.6825, grade = 2.6257, 0         2       Elev at 170+00.00       =       697.9954, grade = 2.6257, 0         3       Elev at 170+50.00       =       699.3079, grade = 2.6120, 0         4       Elev at 171+00.00       =       700.5797, grade = 2.4752, 0										
1       Elev at 169+50.00       =       696.6825, grade = 2.6257, 0         2       Elev at 170+00.00       =       697.9954, grade = 2.6257, 0         3       Elev at 170+50.00       =       699.3079, grade = 2.6120, 0         4       Elev at 171+00.00       =       700.5797, grade = 2.4752, 0										
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2         Elev at 170+00.00         =         697.9954, grade = 2.6257, 0           3         Elev at 170+50.00         =         699.3079, grade = 2.6120, 0           4         Elev at 171+00.00         =         700.5797, grade = 2.4752, 0										
2         Elev at 170+00.00         =         697.9954, grade = 2.6257, 0           3         Elev at 170+50.00         =         699.3079, grade = 2.6120, 0           4         Elev at 171+00.00         =         700.5797, grade = 2.4752, 0					ected data:	Preview of sel				
3 Elev at 170+50.00         =         699.3079, grade = 2.6120, 0           4 Elev at 171+00.00         =         700.5797, grade = 2.4752, 0										
4 Elev at 171+00.00 = 700.5797, grade = 2.4752, 0				=	169+50.00	1 Elev at				
	On 👘	= 2.6257, 0	697.9954, gra	=	169+50.00 170+00.00	1 Elev at 2 Elev at				
<pre>[5 giev at 1/1+50.00 = 701.7830, grade = 2.3383, 0</pre>	On O	= 2.6257, 0 = 2.6120, 0	697.9954, gra 699.3079, gra	=	169+50.00 170+00.00 170+50.00	1 Elev at 2 Elev at 3 Elev at				
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Cancel < Back Next > F	On O	= 2.6257, 0 = 2.6120, 0 = 2.4752, 0	697.9954, gra 699.3079, gra 700.5797, gra	= = =	169+50.00 170+00.00 170+50.00 171+00.00 171+50.00	1 Elev at 2 Elev at 3 Elev at 4 Elev at				

Double click to remove any columns. Drag the column lines to the desired column width to accurately separate the data. Press Finish.



The elevations and stations should now be in the correct columns. Use the format cells to increase/decrease the desired decimal places. Manipulate the Excel file as shown in the previous steps to restore the Profile into the gpk by Editor > Rest/Read.

	Α	В	С	D	E	F	G	Н		
1	Elev at	169+50.00	=	696.6825	, grade =	2.6257	, On tang	betw 1 & 2	Number	-
2	Elev at	170+00.00	=	697.9954	, grade =	2.6257	, On tang	betw 1 & 2	\$ - %	, €.0 .00 .00 →.0
3	Elev at	170+50.00	=	699.3079	, grade =	2.6120	, On curve	vpi 2	φ · 70	, 00 →.0
4	Elev at	171+00.00	=	700.5797	, grade =	2.4752	, On curve	vpi 2		
5	Elev at	171+50.00	=	701.7830	, grade =	2.3383	, On curve	vpi 2		
6	Elev at	172+00.00	=	702.9180	, grade =	2.2014	, On curve	vpi 2		

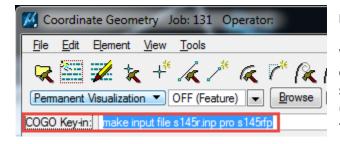


# **COGO Key-Ins**

COGO allows key-ins to perform the same functions as the toolbars. Some of the more popular commands are listed below.

LIST POI	Provides a list of point ranges contained in the GPK File
LIST CH	Provides a list of chains contained in the GPK File
LIST PRO	Provides a list of profiles contained in the GPK File
DES CH name	Describes the chain (where name is the name of the chain)
PRINT PRO name	Describes the profile (where name is the name of the profile)

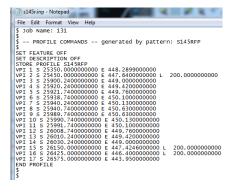
To make an input file of a profile for editing, enter the following and press the enter key.



#### MAKE INPUT FILE s145rfp.inp PRO s145rfp

Where s145rfp.inp is the name of the file to be created in the working directory and where s145rfp is the profile to be exported. (Interchange CH for PRO to export a chain to a text file.)

The sample input file below is available for editing in the project working directory. The edited file can be Rest/Read in the Editor of COGO as outlined above.



# **COGO Clear Dialog**

To clear the COGO output dialog, select View > Command Output > Clear.

📈 Coordinate Geom	etry Job: 131 Operator:	
File     Edit     Element       Image: Cogo Key-in     Image: Cogo Key-in     Image: Cogo Key-in	✓ <u>R</u> edefine <u>V</u> isualization	K ( <sup>™</sup> ≪ (+234 Browse 99.1234 ▼ (
	Error Alert	Detach Window
		✓ Window Navigation         ✓ Text Coloring         Qiear         Save Content As



# **CHAIN – STATION EQUATIONS**

To insert a Station Equation into a chain, select **Element > Chain > Station Equation** from the COGO dialog.

📈 Co	ordina	ate Geom	etry J	ob: 131	0	perator:
<u>Fi</u> le	<u>E</u> dit	Element	<u>V</u> iew	<u>T</u> ools		
	<b>\$</b>	<u>P</u> oint			×	
<u> </u>		Line			×	
Perm	anent	<u>C</u> urve			►	) 💌 <u>B</u> rowse 99.1
COGO	Key-in	<u>S</u> piral			×	
		Chai <u>n</u>			•	<u>Ut</u> ility
		P <u>a</u> rcel			Þ	Layout Offset
		Profile			Þ	<u>Station</u>
		Next Av	/ailable	Settings		Station Eguation
						Store •

Select the **Chain** from the drop down. Set the toggle to Back Station and enter the **Back Station**. Enter the **Ahead Station**. Enter a **Tangent Point** number with a "R" prefix to store a point. Press the **Insert Station Equation** button.

Use COGO Navigator to Describe the Chain in the output window to review the inserted **Station Equation**.

```
COGO Key-in: DESCRIBE CHAIN S770R
 C.C.
                                  Ν
                                          975,439.3583 E 2,126,274.4772
 Back
            = S 23° 58' 31.53" W
 Ahead
            = S 37° 22' 20.43" E
 Chord Bear = S 6° 41' 54.45" E
 Course from PT S770R-2 to R600 S 37° 47' 15.24" E Dist 25.5767
                                                            End
                                                                 Region 1
 ...\ Sta 68+63.05 (BK) = Sta 68+72.38 (AH)
                                                            Begin Region 2
                      N
                          974,846.4924 E 2,125,540.4001 Sta
 Point R600
                                                                   68+72.38
```



## **PROFILE - OFFSET**

The Profile Offset tool may be used to store a profile with a +/- vertical offset or to make a copy of an existing profile without modifying the stationing and elevations.

Select **Element > Profile > Offset** from the COGO dialog.

Select the **Source Profile** and enter a name for the **Target Profile** to be stored. Enter a *station range* and a *vertical offset*. Enter a

M Offset Profile		
Source Profile: EASTB_EP	💌 — Target	Profile: EASTB_OFF2
Begin Station	End Station	Vertical Offset
636+00.00	1458+24.47	0.167 🔁
		×
		Ð
<b>▲</b>		•
Begin Station: 636+00.00	End	Station: 1458+24.47
Vertical Offset: 0.167		
	Create Profile	

positive value to shift the profile up, negative to shift the profile down, and 0 to make a copy.

Press the Add button and then press the Create Profile button.

#### **PROFILE - RESTATION**

If you had a Profile stored in COGO that was based on the previous stationing of the Chain, the Profile will need to be updated. (Drawn alignments, profiles, shape files, existing, and proposed cross sections would also need to be revised.)

Select **Element > Profile > Restation** from the COGO dialog.

COORDINATION COORDINATION COORDINATION COORDINATION COORDINATION CONTINUES C	Atte Geometry Jo Element View Point Line Curve Spiral Chain Parcel Profile Next Available	Tools	Landon Landon	downs. Ente the <b>Restatio</b>	er a <b>Target</b> n Profile b	t Profile na outton.		ames from d	•
VPT VPC VPI 10 VPT	67+50.00 3 68+00.00 3	380.9633 396.0553 398.9300 401.5900	(AH)	232.9 SSD = 2563 3000 50.0000 50 Region 1 	F	<b>Profile</b> in t	he outp	ator to Desc out window t on Equation.	
VPI 11	69+59.33 4	106.9100	5.3200						

Ending profile S770R2FP description



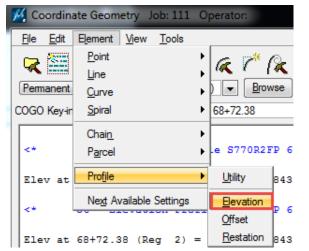
## **PROFILE - ELEVATION**

To find the elevation at the Back and Ahead Stations (or any station), **Key In** the following statement in the COGO Key-in and press **Enter**.

Elevation Profile S770R2FP 68+63.05 (Enter) Elevation Profile S770R2FP 68+72.38 (Enter)

Coordinate Geometry Job: 111 Operator:
<u>Fi</u> le <u>E</u> dit <u>Element</u> <u>Vi</u> ew <u>T</u> ools
│ 🖳 🌌 🗶 +* ´ゑ /* `ゑ (** `ゑ (/* `ゑ ゙
Permanent Visualization ▼         OFF (Feature)         ▼         Browse         99.1234         ♥ 9^9'9.12"         ✓         <>>>>
COGO Keyin: Elevation Profile S770R2FP 68+72.38
<* 35 Elevation Profile \$770R2FP 68+63.05
Elev at 68+63.05 = 402.2843, grade = 5.3200, On tang betw 10 & 11
<* 36 Elevation Profile \$770R2FP 68+72.38
Elev at 68+72.38 (Reg 2) = 402.2843, grade = 5.3200, On tang betw 10 & 11

Alternatively, select **Element > Profile > Elevation** from the top menu. Select the Profile from the drop down. Toggle Station and enter a station. Press the Compute Elevation button. The information will be printed in the COGO output dialog.



🎉 Profile El 😐 😐 💌			
S770R	2FP 💌		
Station	•		
Begin:	68+63.05 R 1		
End:	69+59.33 R 2		
Incren	nent: 100.000000		
Compute Elevation			

The following math shows how to verify the calculations for the profile and verify the elevations are correct on the profile sheet.  $y_2 = 0.0522/(2.05) + 208.02 = 402.28$ 

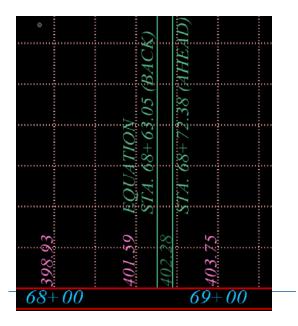
80

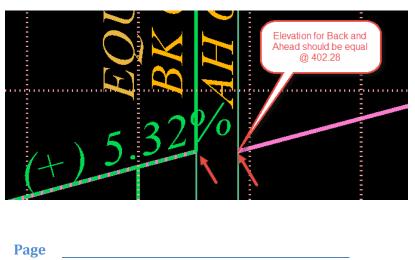
$$\frac{A}{A} \frac{Y}{X} = \frac{Y2 - 398.93}{6863.05 - 6800.00} = 0.0532 \text{ (solve for Y2)}$$

$$\frac{A}{A} \frac{Y}{X} = \frac{Y2 - 402.28}{6900.00 - 6872.38} = 0.0532 \text{ (solve for Y2)}$$

Y2 = 0.0532(63.05) + 398.93 = 402.28 Elevation at the Back Station 68+63.05 = 402.28 Elevation at the Ahead Station 68+72.38 = 402.28

Y2 = 0.0532(27.62) + 402.28 = 403.75 Elevation at Station 69+00.0 = 403.75







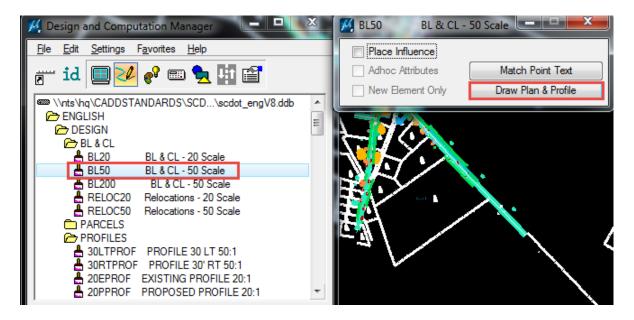
# D & C Manager

The **D & C Manager** is utilized to standardize graphical elements for drafting and pay item quantities. SCDOT uses it for graphically drawing and labeling horizontal alignments, labeling tract numbers, and pipe quantities. The Draw Profile Tool and the Draw Cross Section tools can also utilize the symbology. The **VBA Applications** are also made available through the D & C Manager for Station and Offset Text, Buildup, GPK Merge, Draw Pattern Lines, Drainage Patterns, and XS Pipes for Sidelines and Crosslines.

To access the D & C Manager, select **Applications > Geopak Road > Design & Computation Manager**. (It is also the 3<sup>rd</sup> icon on the Road Tools palette.)

Expand the English > Design > BL & CL folders to highlight the **BL50** and press the **Draw Plan & Profile** button.

ltem	Description	Label Scale
BL20	Existing Centerline at 20 Scale	20.00
BL50	Existing Centerline at 50 Scale	50.00
BL200	Existing Centerline at 200 Scale	200.00
RELOC20	Relocated Centerline at 20 Scale	20.00
RELOC50	Relocated Centerline at 50 Scale	50.00



Select the project gpk file by browsing and pressing the **OK** button.

Open Job	
Job:	111 Q
<u>O</u> K	Cancel



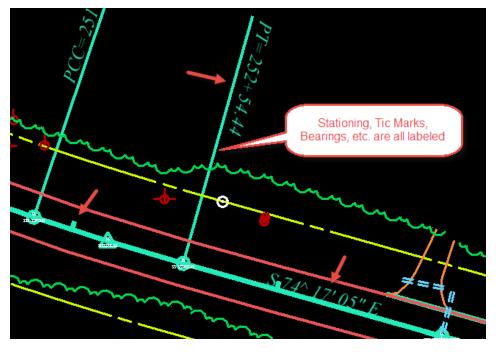
Toggle the Element Type to **Chains** and enter the **Label Scale** appropriately (50.00 for this example)

Click only **ONCE** on the chain to draw into the design file. (Clicking multiple times will result in duplicate elements.)

Toggle the Element Type to **Stationing** and click only **ONCE** on the chain name to draw the stationing into the design file.

**Repeat** these steps as necessary to draw all of the existing and relocated horizontal alignments into the design file. (Change the Item type to RELOC50 for relocated alignments at 50 scale.)

	M Draw Plan & Profile
BL & CL - 50 Scale	Item: BL50 BL & CL - 50 Scale
▼ Label Scale: 50	Element Type: Stationing Label Scale: 50
	Key-in Points:
<ul> <li>Une Direction Labels</li> <li>Line Length Labels</li> <li>Line Labels Only</li> <li>Curve Labels</li> <li>Curve Data</li> <li>Curve Labels Only</li> <li>Place Curve Data by DP</li> <li>Spiral Labels</li> <li>Spiral Labels</li> <li>Spiral Labels Only</li> <li>Place Spiral Data by DP</li> </ul>	Select Chain to Draw         OFD1         OFD2         ROUNDABOUT         S145         S145R         S65         S65R         S91         Tick Marks         Image: Control Point Labels         As Per Preferences
	<ul> <li>Label Scale: 50</li> <li>Line Direction Labels</li> <li>Line Length Labels</li> <li>Line Labels Only</li> <li>Curve Labels</li> <li>Curve Data</li> <li>Curve Labels Only</li> <li>Place Curve Data by DP</li> <li>Spiral Labels</li> <li>Spiral Labels Only</li> <li>Spiral Labels Only</li> </ul>



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# **VBA Applications**

VBA's provide automated tools to accomplish identification, calculation, and drafting tasks more quickly and effectively.

## **Station Offset Report**

The Station Offset Report process provides location data for onsite points using station and offset data from the nearest or most important road alignment. After identifying the desired points, the alignments of interest, and the corridor width around each alignment to check, the process will sort the points based on their presence in those corridors and produce an excel file containing location data for each.

#### Reviewing Alignments in COGO for the Station Offset Report

Files required for completing this process:

- "gpk" file
- "pp" file
- "sor" (newly created) design file

## To determine the chains priorities and maximum offsets (Default = 75') Open the project \*pp.dgn design file

Applications Window Help Axiom GEOPAK Deactivate GEOPAK . Map ۲ Training ROAD ۲ ROAD Tools SITE Project Manager SURVEY ۲ Corridor Modeling DRAINAGE WATER SEWER Site Modeling LANDSCAPE ۲ Active Chain Control Element Attributes About GEOPAK 3PC AdHoc Attribute Manager User Preferences Geometry Coordinate Geometry Design & Computation Manager Graphical Coordinate Geometry Quantity Manager Layout Alignments Horizontal Plans Preparation Design Multicenter Curve

**Open** the COGO menu (Applications > Geopak > Road > Geometry > Coordinate Geometry)

#### Browse and select the project "gpk" file and press OK

Coordinate Geometry	
Project Name:	
Job: 083 Q	
Operator Code:	
Subject:	
OK Cancel	
)	



On the COGO dialog, set the toggle to Temporary Visualization

K Coordinate Geometry Job: 083 Operator:	
<u>File E</u> dit El <u>ement Vi</u> ew <u>T</u> ools	
🔍 🚟 🗾 🗽 +* 🔏 🥂 🔍 (& (	ି*
🔆 🎋 🖓 🕞 🖉 🖪 Redefine Temporary Visualization	י ו

Select Tools > Navigator (or select the wheel on the toolbar)

ſ	📕 Coordinate Geometry Job: 083 Operator:
l	<u>Fi</u> le <u>E</u> dit <u>El</u> ement <u>Vi</u> ew <u>T</u> ools
L	🕞 🐖 🛒 👡 🥼 <u>N</u> avigator
l	
l	
	99.1234 • 9^9'9.12" Intersect

Change the Element toggle to **Chain**. Highlight all of the chains in the list and press the **Visualize** button (paintbrush) to draw the alignments into the file. Make sure the Default level is turned on.

1	Navigator(083)
	Select Tools
	🌂 🗙 🖪 id 📥 🗎 💖
+	> Element : Chain>
	Name
	S107
	S1500
	S1501
	S1502
	S152
	S384
	S496

**Tip:** Select **Tools > Settings** on the Navigator menu to turn on the following features, **Single Click Highlight** and **Single Click Center**.

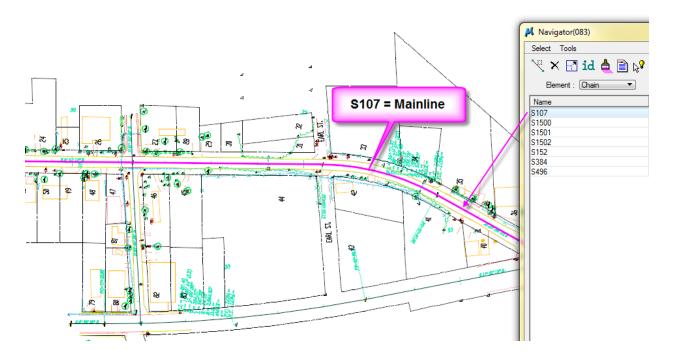
Settings		
Selection Set		
Alert Prior to Clearing Selection Set		
Mouse Click Actions		
<ul> <li>✓ Single Click Highlight Visualized Element</li> <li>✓ Single Click Window Center Visualized Element</li> <li>✓ Single Click Enables List Cell Editing</li> </ul>		
Double Click Action : Edit Element		



**Tip:** Select Settings > Design File > Color from the top MicroStation menu to make sure your element highlight color will stand out against the plan graphics.

<u>Settings</u> <u>T</u> ools <u>U</u> tilities	Design File Settings	
✓     Tool Settings       ↓↓     AccuDraw       Color Books       Color Table       Database       ▶	Category Active Angle Active Scale Angle Readout Axis Color	Modify Color Settings <u>E</u> lement Highlight Color: <u>D</u> rawing Pointer Color: <u>S</u> election Set Color: <u>S</u> election Set Color:

**Highlight** each chain individually to determine which is the mainline and side roads in order of importance to the project (or from left to right). Jot down the order if necessary.



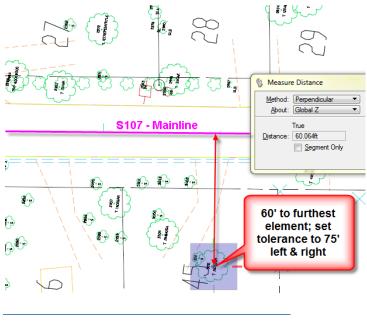
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#### Close the COGO menu.

# Reviewing Topo Elements for Inclusion in the Station Offset Report

Zoom into each alignment and measure the distance left and right to the majority of the topographic elements that will be included in the Station Offset Report, for example, large trees or utilities. Jot down this distance along with each alignment above. Be sure to include a little further out for a buffer zone to make sure you capture all of the necessary points.







# To run the Geopak VBA program for Station Offset Report

**Create** a new design file with the extension r#####\_so.dgn (or you can place it in your reference sheet file)

Applications	<u>Wi</u> r	ndow <u>H</u> elp <u>A</u> xiom	
GEOPAK		Deactivate GEOPAK	
Мар	•	Training	
		ROAD	ROAD Tools
		SITE SURVEY	Project Manager
		DRAINAGE	Corridor Modeling
		WATER SEWER LANDSCAPE	<u>Si</u> te Modeling Acti <u>v</u> e Chain Control
		About GEOPAK	Element Attr <u>i</u> butes 3PC AdH <u>o</u> c Attribute Manager
			User Preferences Geometry
			Design & Computation Manager

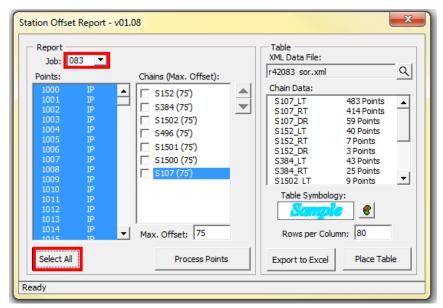
Open **D&C Manager** in Geopak (Applications > Geopak > Road > Design & Computation Manager)

**Expand** the VBA Applications folder, if needed, and double click on the **SOR** to activate the Station Offset Report tool. (English > VBA Applications > SOR)

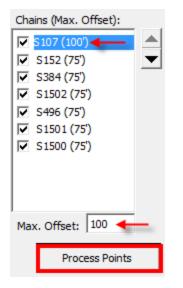
N Design and Computation Manager
<u>Fi</u> le <u>E</u> dit <u>S</u> ettings F <u>a</u> vorites <u>H</u> elp
产 id 🔲 🗾 🥐 💷 🐂 🖽 🖆
<ul> <li>\SMPCADD1\CADDSTANDARDS\SCDOT-BENTLEY\STANDARDS\SCDOT_Design\Geofiles\Database\scdot_engV8.ddb</li> <li>ENGLISH</li> <li>DESIGN</li> <li>BL &amp; CL</li> <li>PARCELS</li> <li>PROFILES</li> <li>XS</li> <li>COMPUTATION</li> <li>VBA APPLICATIONS</li> </ul>
SMOvie VBA - Review cross sections GPK Merge VBA - GPK Merge
Draw Patterns VBA - Draw pattern lines
XS Pipes VBA - Draw pipes in cross sections
Drainage Patterns VBA - Draw special pattern lines for drainage XS
SVDrawBuildup VBA - Compute and draw buildup in cross sections
S Report Settings Test - XS Report Settings
S Report Test - XS Report for Ditch Analysis
SOR Test - S-O-Reprot
🖹 DrainageLinkChange Test Drainage Link Change



Select the correct "gpk" number if multiple GPK files used for the project. Select points needed or press the Select All button under Points



**Highlight** and click each individual Chain <u>in the order</u> of mainline, left to right, or project importance. Enter the left and right **Max. Offset** distance for each alignment. Press **Enter** to accept the changed offset input. Use the **Up/Down** buttons to adjust the priorities.

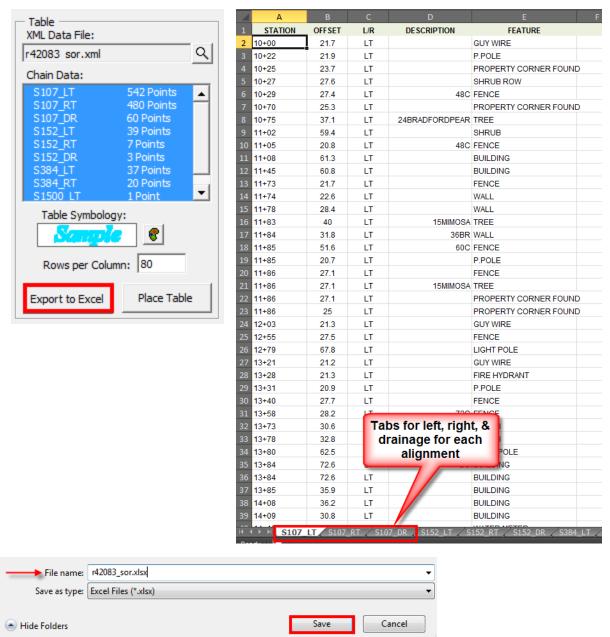


Press the **Process Points** button. You will be prompted to save a **project xml** report. **Enter** the file name and press **Save**.

>File name:	r42083_sor.xml	-
Save as type:	XML Files (*.xml)	
Hide Folders		Save Cancel



To review, press the **Export to Excel** button. Enter a file name and click <Save>. This excel file will give you tabs for each alignment with a left, right, and drainage report.



The tab for "None" reports all of the points that were not included in one of the alignment reports because they did not meet the station and offset criteria. You can review this information and determine its importance to the project. If points in the "None" tab are required, repeat Step 14 to extend Max. Offset and re-process.

А	В	С	D	E	F	G	Н
POINT #	NORTH	EAST	ELEV	CHAIN	STATIO	OFFSET	L/R
1014	753324.92	2200377.399	0	S384	9+04	1124.8	T
1016	753149.654	2200389.854	0	S384	8+86	950.1	T

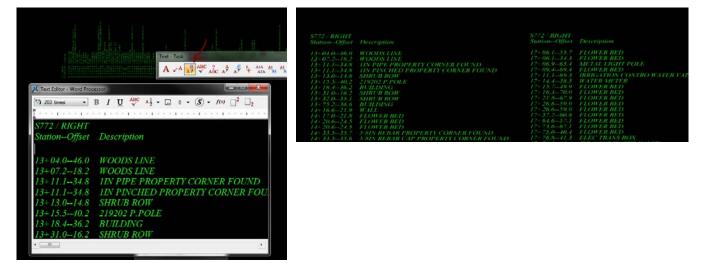


Select one Chain Data set to be placed on sheets. Adjust "Rows per Column" and text attributes in "Table symbology" if needed. Multiple Chain Data sets can be selected if you need to put into reference sheets.

Table XML Data File:	Text Drawing Attributes
r42083 sor.xml     Q       Chain Data:     S107_LT       \$107_LT     542 Points       \$107_LT     480 Points       \$107_LT     60 Points       \$152_LT     39 Points       \$152_RT     7 Points       \$152_RT     3Points       \$384_LT     37 Points       \$384_RT     20 Points       \$1500 LT     1 Point       Table Symbology:     €       Rows per Column:     80	Level: RD_TX_Misc1  Color: ByLevel (99) Weight: ByLevel (2) Style: ByLevel (0) Font: ENGINEERING TH: 5 TW: 5 OK Cancel
Export to Excel Place Table	

To place your text, press the **Place Table** button and Data Point in the design file.

One Text Note element will be created for each column in the table. The text note can be moved, copied, or rotated in MicroStation. To modify the station offset text in the column, use MicroStation "**Edit Text**" command. To split up the column, use MicroStation "**Copy**" and "**Edit Text**" commands. To convert column text note into individual station offset note, use MicroStation "Drop Element – Complex" command. (See pages 322 for additional information to place the text on a Reference Data Sheet – Station Offset border sheet.)



## **Buildup**

The Buildup process is used to correct slopes prior to new surfacing being applied. In this situation, the existing road is built up using paving material to the necessary elevation, rather than adding gravel or compacted fill.



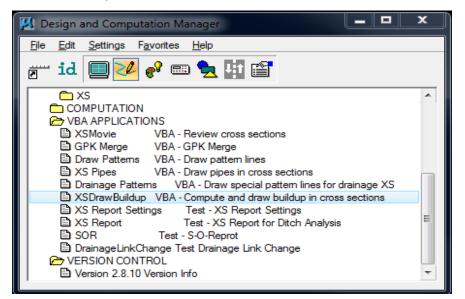
The Buildup VBA uses cross-section data from the DX.DGN files along with a Shape file defining the top of the buildup material to calculate the quantity of additional pavement required. This VBA works well for situations where the new roadway follows the centerline of the existing one, but requires significant time and effort to modify in cases where the new road deviates from the existing.

It is most useful, therefore, for projects such as road widening, shoulder paving, and other projects where the existing centerline is maintained.

## Running Buildup using the VBA application

Open a dx.dgn design file

Inside the design file open the "Design and Computation Manager" and double click the "XSDrawBuildup"

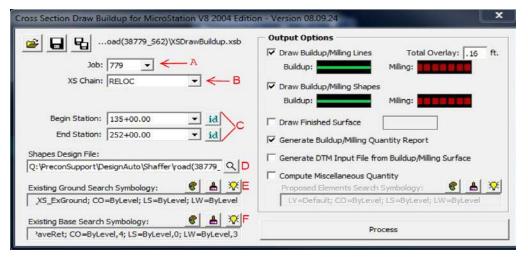


Once this is selected this Cross Section Draw Buildup dialog will Open

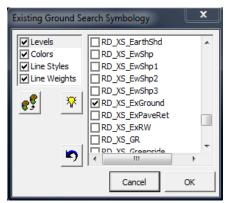
Cross Section Draw Buildup for MicroStation V8 2004 Editio	n - Version 08.09.24
Job: 779 V XS Chain: RELOC V Begin Station: 135+00.00 V id	Output Options         ✓ Draw Buildup/Milling Lines       Total Overlay: .16 ft.         Buildup:       Milling:         ✓ Draw Buildup/Milling Shapes         Buildup:       Milling:
Begin Station:         135+00.00         ▼         id           End Station:         252+00.00         ▼         id	Draw Finished Surface     Generate Buildup/Milling Quantity Report
Shapes Design File: Q:\PreconSupport\DesignAuto\Shaffer\road(38779_ Q	Generate DTM Input File from Buildup/Milling Surface
Existing Ground Search Symbology:	Compute Miscellaneous Quantity Proposed Elements Search Symbology: LV=Default; CO=ByLevel; LS=ByLevel; LW=ByLevel
Existing Base Search Symbology:	Process



This is the information you will need to fill out this palette window: A-F

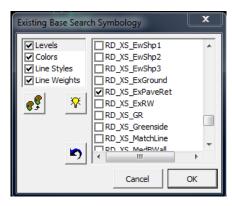


- A. GPK #
- B. Chain name
- C. Begin and End Station range
- D. Shape file the .dgn file providing the proposed pavement slopes for the dx.dgn file
- E. Existing Ground LV=RD\_XS\_ExGround; CO=ByLevel;LS=ByLevel;LW=ByLevel



Verify the correct element is selected

F. Existing Base – LV=RD XS ExPaveRet; CO=ByLevel,4;LS=ByLevel,0;LW=ByLevel,3



Verify the correct element is selected



Include your overlay amount in the "Total Overlay " box located at the top right of the palette window. In this case the overlay is .16 ft.

ļ	- Output Options	
l	output options	
	✓ Draw Buildup/Milling Lines	Total Overlay: .16 ft.
	Buildup:	Milling:

After the information has been selected, check the "Generate Buildup/Milling Quantity Report" on the right side of the palette and click the Process bar. This will generate a buildup.txt document with the amount of Buildup in Cubic Yards.

249+50.00	0.00	22.82	0.11	/020.01	17.54	0.44
			0.11	7076.08		
250+00.00	0.00	30.61	0.11	7206.96	18.25	0.60
251+00.00	0.00	40.07			17.60	0.93
252+00.00	0.00	39.29	0.11	7353.92	18.08	0.85
Total Milling Total Buildup	Volume = Volume =	= 0.11 CY = 7353.92 CY				

## Correcting for Altered Road Centerlines

In some situations the roadway will shift off the centerline of the existing roadway. In this situation the VBA needs to be manipulated into not following existing roadway for the relocated sections. To do this we use a combination of the "Place Fence" and "Change Attributes" tools.

A video explaining the process is located in the VBA Apps.zip file located on the internet at <u>https://www.scdot.org/business/CADD-Design.aspx</u>. See the pictures below for a before and after.

Before: 0.035 FT./FT. 0.035 FT./FT. 0.035 FT./FT.

After:





Once this is completed for each cross section that needs it, rerun the VBA. Here are the before and after pictures.

Before:

•		.08			
	0.035 FT./FT.	402	0.035 FT./FT.	1111	

After:



# **GPK Merge**

The GPK Merge process copies selected Cogo elements from one GPK file into another. It can overwrite or retain existing data as desired.

#### Combining GPK Data

Open the D&C Manager (Applications -> GEOPAK -> ROAD -> Design & Computation Manager on the menu bar), select English -> VBA Applications -> GPK Merge, and double click to start the macro.

<u>M</u> D	esign a	and Compu	utation Manager 📃 💻 💻	
<u>Fi</u> le	<u>E</u> dit	<u>S</u> ettings	F <u>a</u> vorites <u>H</u> elp	
2	id	🔲 🛃	e² 💷 🐂 🚻 🖆	
	\\nts\h	q\CaddStan	ndards\SCDOT-Ben\scdot_engV8.ddb	•
	ENGI			
	🛅 DE	SIGN		
	🛅 CO	MPUTATIO	N	
	🗁 VB.	A APPLICAT	TIONS	
	🖹 🗙	SMovie	VBA - Review cross sections	
	<b>b</b> 🖻 G	iPK Merge	VBA - GPK Merge	
	🖹 D	raw Patterns	s VBA - Draw pattern lines	
	🖹 🗙	S Pipes	VBA - Draw pipes in cross sections	
	🖹 D	rainage Patt	tems VBA - Draw special pattern lines :	
	E X	SDrawBuildu	up VBA - Compute and draw buildup in c	



In the Merge GPK Elements window, select the names of the GPK files you want to **copy from and to**. Click on the geometry elements you want to copy, using the **Shift and Control** buttons as you click to select multiple elements. The blue button above the elements list will select all elements of all types.

Source       Job: 779 ▼       Image: Job: 779 ▼         Job: 779 ▼       Image: Job: 779 ▼         Points       1       A         Lines       2       A         Curves       3       Ask Before         Curves       6       Ask Before         Spirals       6       7         Chains       9       Image: Curves         Profiles       9       Image: Curves         Parcels       10       Add Prefix         Indication       13       Image: Curves         Indication       14       Image: Curves         Indication       Image: Curves       Image: Curves         Indication       10       Image: Curves         Indication       11       Image: Curves         Indication       13       Image: Curves         Indication       Image: Curves       Image: Curves

On the right side of the window, select whether to automatically overwrite any common elements with the new copies or to confirm each overwrite by prompting you.

The Add Prefix option allows you to enter a prefix that will be added to every copied element. You can select one set of elements and copy them with a prefix being added, then select other elements to copy without one.

Click "**Merge Elements**" to merge the selected elements. Continue selecting and merging elements as required.

## **Draw Pattern Lines**

The Draw Patterns draws pattern lines in the \*sh.dgn or \*pat.dgn file as graphical representations of where cross-sections will be cut at specified intervals. (Please see also the information in the Cross Section chapter about width of corridor, special cross sections, and railroads.)

## Drawing Pattern Lines

Open the D&C Manager (*Applications -> GEOPAK -> ROAD -> Design & Computation Manager* on the menu bar), select *English -> VBA Applications -> Draw Patterns*, and double click to start the macro.

📕 Design and Computa	tion Manager
<u>File E</u> dit <u>S</u> ettings F <u>a</u>	vorites <u>H</u> elp
产 id 🔲 🗾	😭 🔃 🛃 🖉 📾 م
Vnts\hq\CaddStandal ENGLISH ENGLISH DESIGN COMPUTATION VBA APPLICATIO	rds\SCDOT-Ben\scdot_engV8.ddb
GPK Merge	VBA - Draw pattern lines
Drainage Pattern	VBA - Draw pipes in cross sections ns VBA - Draw special pattern lines : VBA - Compute and draw buildup in c



In the Draw Patterns window, enter the **Job number** of the project and select the **chain** of the road being crossed.

Fill in the **Begin Station** and **End Station** values (the start and end are automatically filled in) – change them if only a portion of the chain needs cross-sectioning.

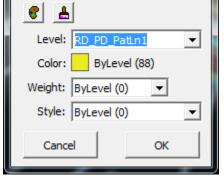
In the **Offset** section, indicate how far the cross-sections should extend to the left and right of the centerline chain. Ensure the left and right extend far enough to cover the project, especially if a railroad or other features need to be captured in the cross sections. (Typical values are 80 feet or 160 feet to fit on the  $5 \times 5$  or  $10 \times 5$  cross section sheets.)

In the **Increment** section, enter how much separation should occur between cross-sections on the straightline (tangent) sections of the road and the curved sections. The default values are **100 feet for the tangents** and **50 feet for the curves**.

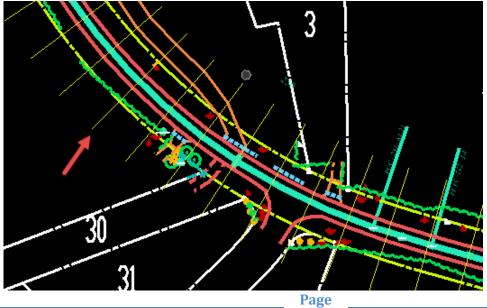
1	Draw Patterns		Double-click on
	Job:	131 💌	style. Press OK.
	Chain:	S145R 💌	Preferences
	Begin Station:	229+00.00	
	End Station:	282+91.80 R 2	S 🗕 🖉
	Offset		Level: RD
	Left: 80	Right: 80	Color:
	- Increment		Weight: ByLe
	Tangent: 100	Curve: 50	Style: ByLe
	Patterns	at Control Points	Cancel
		Draw Patterns	

Double-click on the box showing the symbology to change the style. Press **OK**.

х



Press Draw Patterns to produce the pattern lines.



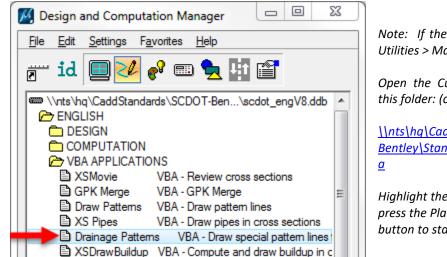


# **Drainage Patterns**

The Drainage Patterns VBA draws special pattern lines for road cross-sections specifically needed to show cross-line pipes. You will need the drainage project database file (\*.gdf); the drainage library if it is different from the standard (\*.dlb); the plan view dgn file including drainage (Tools > Update Pay Items) (\*pp); and a newly created \*xp.dgn file to draw the special cross sections.

## Drawing Special Pattern Lines

Open the D&C Manager (*Applications -> GEOPAK -> ROAD -> Design & Computation Manager* on the menu bar), select **English -> VBA Applications -> Drainage Patterns**, and double click to start the macro.



Note: If the VBA will not load in D&C, select Utilities > Macro > Project Manager at the top.

Open the CulvertPatternLines.mvba found in this folder: (change Files of Type to .mvba)

<u>\\nts\hq\CaddStandards\SCDOT-</u> <u>Bentley\Standards\SCDOT\_Desiqn\MSfiles\vb</u> a

Highlight the CulvertPatternLines vba and press the Play button. Press the Run button to start the VBA shown below.

In the **Culvert Pattern Lines** window, enter the **Job number** of the project and select the **chain** of the road being crossed. Click the magnifying glass next to the "Drainage Project" space and browse to the **.GDF file** for the project. Check the box marked "**Pattern Lines for Cross-Line Pipes**" and **enter 0** for the Pattern Line Offsets

Culvert Pattern Lines	×
Job: 283 🔻 Chain: GARLIN	GTN 🗾 🧏
Drainage Project:	
C:\Users\Holtzclajr\Desktop\39283_s548	_564\road\S-548 SW. Q
Pattern Lines for Cross-Line Pipes	C
Pattern Lines for Drainage Nodes	
Pattern Line Offsets	Tolerance: 1
Left: 0 Right: 0	Draw Pattern Lines

Open (or create) a \*xp.dgn file for the project. **Cut existing and proposed cross sections** using the new drainage pattern lines. Cross sections will be skewed.



## XS Pipes

The XS Pipes VBA program draws GEOPAK Drainage elements in cross section locations obtained from a GEOPAK Drainage file (.gdf).

Open the \*dx.dgn design file and select Applications -> GEOPAK -> ROAD -> Design & Computation Manager from the menu bar. Select **English -> VBA Applications -> XS Pipes** and double click to start the macro.

Į	🖉 Design and Computation Manager 👘 💷 💻	٢				
	<u>F</u> ile <u>E</u> dit <u>S</u> ettings F <u>a</u> vorites <u>H</u> elp					
	产 id 🔲 🗾 🥐 📼 🐂 🖽 😭					
\\nts\hq\CaddStandards\SCDOT-Ben\scdot_engV8.ddb						
	ENGLISH					
	DESIGN					
	C VBA APPLICATIONS					
	XSMovie VBA - Review cross sections					
	GPK Merge VBA - GPK Merge	=				
	Draw Patterns VBA - Draw pattern lines					
÷	XS Pipes VBA - Draw pipes in cross sections					
	Drainage Patterns VBA - Draw special pattern lines :					
	XSDrawBuildup VBA - Compute and draw buildup in c					
	SOR VBA - S-O-Reprot					
	XS Report Settings Test - XS Report Settings	-				
	S Report Test - XS Report for Ditch Anal					

On the **General** tab, select the Geopak COGO **Job** (.gpk) and **Chain**, then browse to select the **\*.gdf** file in the project folder.

Cross Section Side-Line Pipes	<b>×</b>
<b>e</b> 8	
General   Side-Line Pipes   Cross-Line Pipes	
Job: 390 - Chain: S33RELOC	•
Drainage Project File:	
Q:\PreconSupport\DesignAuto\Carlson\Berkeley	y_0039390_S33\CADD\S33_Smooth_DC
Tolerance: 1.0	
Honor XS Exaggeration	
	Process Cross Sections

The **Tolerance** field indicates the distance within which a drainage object will be considered to fall on a cross section. If a drainage object is farther away than the distance from the cross section location (pattern line) it will not be drawn on the cross section.

The **Honor XS Exaggeration** option is to distort the pipe drawn according to the exaggeration at which the cross section was originally drawn. (e.g. Cross section drawn in 10:5 scale results in ellipses drawn rather than circles for round pipes.)

The program provides icons across the top of the dialog to save and retrieve these setting. The file extension for XSPipes settings files will be **.xsp**. When the program starts it will automatically open the most recent settings file found in the current design file folder. When the program is closed the user will be prompted if they wish to save the settings.



### Drawing Side-Line Pipes in Cross Sections

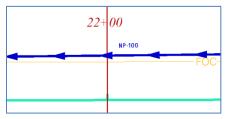
The first tab is used to draw **Side-Line Pipes** (longitudinal pipes) for all drainage pipes that cross the cross section pattern line. Users can select options to draw pipes that intersect the cross section (**Through Pipes**), end before the cross section (**Front Pipes**), or begin after the cross section (**Back Pipes**) with options to draw the outside of the pipe using a different line style.

Modify the options and press the **Process Cross Sections** button. (You can change the symbology by clicking the art palette and paint brush icons prior to processing.)

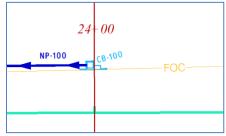
Cross Section Pipes (v11.10.06) - XSPipesApp.xsp	X
<b>e</b> 8	
General Side-Line Pipes Cross-Line Pipes	
🔽 Draw Through Pipes Symbology:	
✓ Draw Outside of Through Pipes	Line Style: ByLevel
✓ Draw Front Pipes Symbology:	•••• • •
Draw Outside of Front Pipes	Line Style: ByLevel
✓ Draw Back Pipes Symbology:	···· • • •
Draw Outside of Back Pipes	Line Style: ByLevel
Side-Line Pipe Label Draw Symbology: San	
	Process Cross Sections

Press the **Process Cross Sections** button and **Begin** to process the cross sections. Select **Yes** to save a \*.csv pipe report file. Pipe drawings in cross sections **should be reviewed by roadway and hydraulic engineers** after processing.

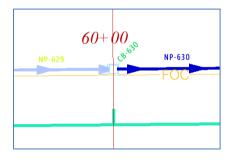
Through Pipe:

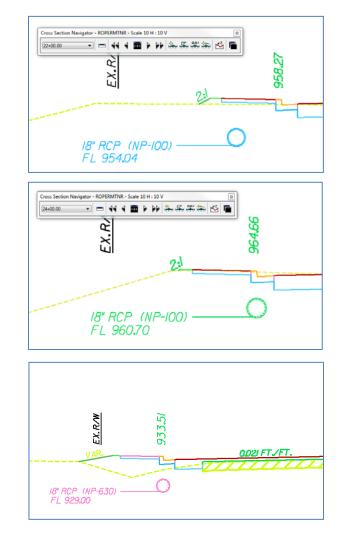


Front Pipe:



Back Pipe:



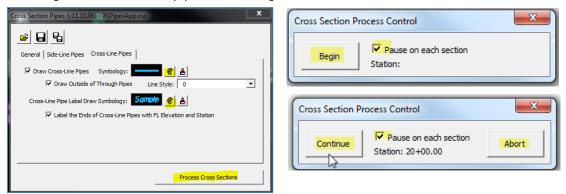


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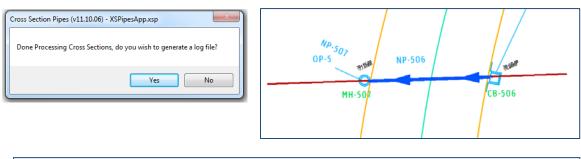


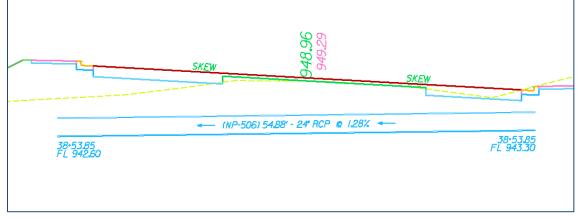
## Drawing Cross Line Pipes in Cross-Sections

The second drawing tab is used to draw **Cross-Line Pipes** for drainage pipes that cross the roadway alignment and have both begin and end points that fall within the tolerance of the cross section pattern line. Typically the special cross section will be created from pattern lines generated using the **Drainage Pattern Lines** VBA tool (See page 96 for more detail.) Users can set options to draw cross-line pipes including the outside of the pipe and labeling.



Once all settings have been established, users can click the **Process Cross Sections** button. If the user isn't in a design file containing cross sections for the indicated chain, they will be prompted to open the appropriate cross section file. If cross sections are found, a process dialog will appear. The user can click the **Begin** button to start processing the cross sections. If the **Pause** button is checked the first cross section will be processed and centered in the view. The user can review what has been drawn before continuing on to the next cross section or abort processing and return to the main dialog. If the **Pause** option is not checked every cross section will be processed in order and the user will be notified when it is complete. Select **Yes** to save a pipe report file in csv format.





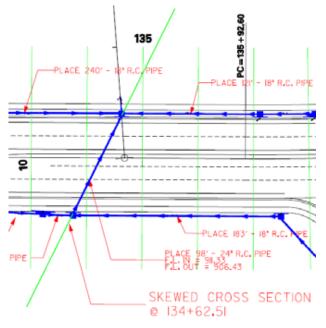


## Preparing Special Cross Sections

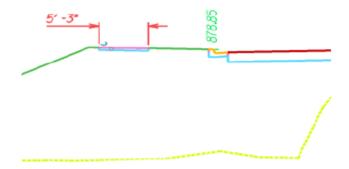
Open the DGN file that has the cross-line pipes. Draw drainage pattern lines along each cross line pipe using the MicroStation "draw line" command. Alternatively, use the **Drainage Patterns VBA** in the Design & Computation Manager as described above to create the needed pattern lines.

🧌 De	sign a	and Comp	utation	Manag	er				23
<u>Fi</u> le	<u>E</u> dit	<u>S</u> ettings	F <u>a</u> vorit	es <u>H</u> el	b				
2	id		• •	= <b>9</b>	<b>.</b> !	t [	Ĩ		
		q\CaddSta	ndards\	SCDOT-	Ben	\scdo	ot_er	ngV8.	ddb 🔺
	ENGL								
(	🛅 DE	SIGN							
(	🗅 CO	MPUTATIO	DN						
🧌	🗁 VB/	A APPLICA	TIONS						
	BX	SMovie	VB	A - Revie	word	oss se	ctior	าร	
	🖹 G	PK Merge	VB	A - GPK	Merge	е			=
	🖹 D	raw Patterr	ns VB.	A - Draw	patte	m line	es		
	_	S Pipes						section	ns
	_	rainage Pa							
		SDrawBuild							

Pattern lines should extend a minimum of 20 feet beyond each end of the cross line pipe or to the construction limits.



Cut existing and proposed cross sections in \*xp.dgn using special drainage pattern lines. Cross sections will be skewed.



Special cross section sheets for skewed pipe can be added at the end of the plans. Label these sheets XP1, XP2, etc.





# **Plans Preparation**

The Plans Preparation tools allow you to label and prepare sheet files for roadway construction plan production. This section includes information on Plan and Profile labeling, the Draw Profile tool, and Plan Sheet Clipper.

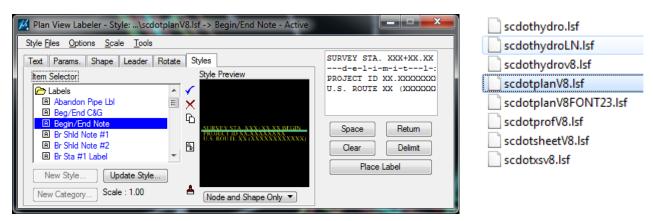
## **Plan Labeling**

Plan Labeling can be accessed by selecting **Applications > Geopak > Road > Plans Preparation > Plan View Labeling**. (Additional information can be found in Chapter 17 of the Geopak Road I Training Manual.)

Select the Job No (gpk), Chain, and Tin file.

Plan View Labeler - Style:\SCDO	Tplanv8.lsf -> Unnamed Style	
Plan View Labeler - Style:\SCDO         Style Files       Options       Scale       Tools         Text       Params.       Shape       Leader       Ro         Job No.:       131       Q         Element:       Point         Chain:       S145R       TIN File:       42131_SS4\42131.tin       Q         Label Feature       ***       ***       ***		Space Return Clear Delimit Place Label
	Not Available	

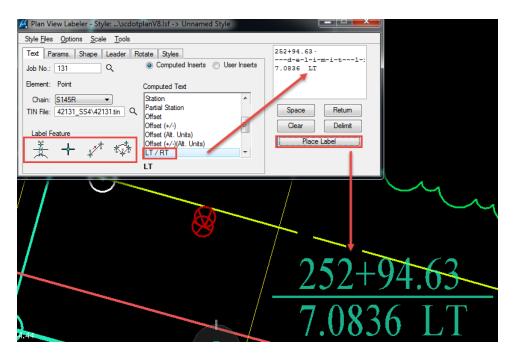
Select the **Styles** tab to review the available types in the SCDOTplanv8.lsf file. Pressing **Style Files > Open** will show the available style files for plan, profile, and cross section labeling. (Files in "LN or V8" format utilize True Type fonts. The "V8FONT23" contains the same styles except in the MicroStation RSC font23.)



Modify the **XX fields** manually with the appropriate text for stationing, length, or offset, etc.



After clicking the desired label style, select the **Text** tab again. Use the **Label Feature** to data point or select linear elements for labeling of YXZ Coordinates, Stations, or Offsets, etc. **Double clicking** in the Computed Text will add the calculated value into the Place Label dialog. Press the **Place Label** and follow the command prompts for leader information to place the labels in the design file.



## **DP Station Offset**

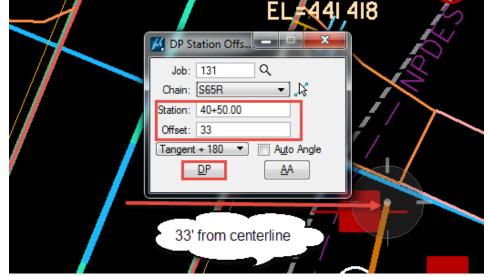
The DP Station Offset tool is useful when needing to offset graphical elements at a set station and offset from the horizontal alignment. An example could be transitional right of way or a site triangle at a particular station/offset.

To activate, select Applications > Geopak > Road > Plans Preparation > DP Station Offset.

Select the Job number (gpk) and Chain name. Enter a **Station** and **Offset**.

Activate the MicroStation **Place Line** command and press the **DP button** to begin drawing the line at the provided Station/Offset.





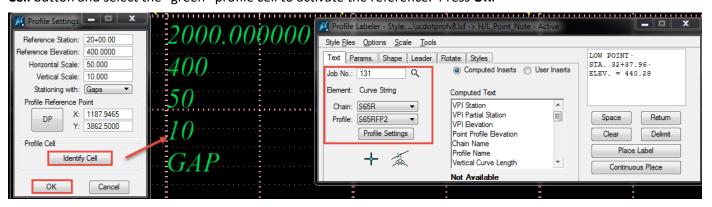


# **Profile Labeling**

Profile Labeling can be accessed by selecting **Applications > Geopak > Road > Plans Preparation > Profile Labeling**.

(Additional information can be found in Chapter 17 of the Geopak Road I Training Manual.)

Select the Job No (gpk), Chain and Profile names. Press the Profile Settings button. Select the Identify Cell button and select the "green" profile cell to activate the reference. Press OK.



Select **Styles** and select the desired style (H/L\_Point\_Note for High or Low Point example below).

Profile Labeler - Style:\scdotprofv8.lsf	-> H/L_Point_Note - Active	
Style <u>Fi</u> les <u>Options</u> <u>Scale</u> <u>T</u> ools		
Text Params. Shape Leader Rotate Item Selector	Styles Style Preview	LOW POINT · STA. 32+37.96 · ELEV. = 440.28
I Ex_Grade_Label II F/Grade_Label II RowLine_Label	LOW POINT STA, 212+67,38 ELEV. = 331.60	Space Return Clear Delimit
New Style         Update Style           New Category         Scale : 1.00	▲ [Node and Shape Only ▼]	Place Label Continuous Place

Click on the Text tab and press the Select Profile Element button.

**Data click** on the profile element (proposed pink line). The text information in the Label dialog will *automatically update* with the associated profile information.

Press the **Place Label** button and follow the command prompts to place the label and leader lines, etc.

#### SCDOT ROADWAY CADD MANUAL



Profile Labeler - Style:\scdotprofv8.lsf -> H/L_Point_Note - Active	
Style <u>Fi</u> les <u>O</u> ptions <u>S</u> cale <u>T</u> ools	5.0': V, C,
Text         Params.         Shape         Leader         Rotate         Styles           Job No.:         131         Q         © Computed Inserts         © User Inserts	LOW POINT. STA. 32+37.96. ELEV. = 440.28
Bernent:     Curve String     Computed Text       Chain:     S65R     VPI Station       Profile:     S65RFP2     VPI Partial Station       Profile:     Profile Settings     VPI Portial Station       Profile:     Point Profile Elevation     Elevation       VPI Devation     Point Profile Elevation     Elevation       VPI Devation     VPI Devation     VPI Devation       VPI Devation	Space Retum Clear Delmit Place Label Continuous Place
	C1 2 34%
LOW POINT	
$\left(\begin{array}{c} \text{STA. 32+37.96}\\ \text{ELEV.} = 440.28 \end{array}\right)$	
·····	
	VPI = 32 + 75.00

## **Draw Profile Tool**

The Draw Profile Tool is used to both create the existing profile against the tin file intersecting "triangles" and for adding the profile to the plan sheets. [The Existing Ground profile button on the Project Manager dialog and the D&C Manager are alternatives to this tool.] Benefits to utilizing the Draw Profile Tool compared to other options are the ability to draw multiple profiles at once, control stationing begin and end for each, and to update the profile with a button click.

(The process to utilize this tool is also explained in Chapter 8 of the Geopak Road I Training Manual.)

To access the Draw Profile Tool, select **Applications > Geopak Road > Plans Preparation > Draw Profiles**.

Draw Profile			×	
File Edit Update Options				
Job Number: 131  Chain: S65R	🖣 불 Label So	cale: 50.0000	00	
Surfaces COGO Projection				Ξ
Type Name Display Se	ttings	Draw		=
TIN 42131.tin 50EPROF				
			□ × ₽	12
				-
D				-
Details				-
42131.tin Method: Triangles	<i>م</i>			-
Display Settings	- Filter Tr	olerances		-
By Feature		ntal: 0.3000		-131 -865R
		nce: 0.1000	- 11	2000,000000
Feature: 50EPROF	Varia	nce: 0.1000		400
Station Limits	Offsets			50
Begin: 20+00.00 ***	Horizontal:	0.0000		<u>=10</u>
End: 58+51.02 R 2 +++	Vertical:	0.0000		GAP
Void				

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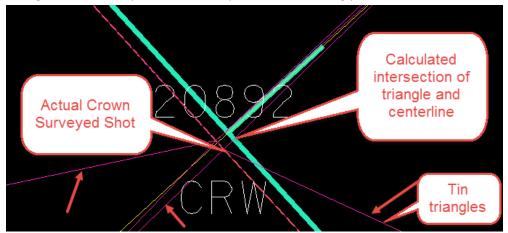
#### SCDOT ROADWAY CADD MANUAL



Place Profile Cell		
Station:	20+00.00	
Elevation:	400.0000	
Horizontal Scale:	50.000000	
Vertical Scale:	10.000000	
	Gap 🔻	
Cell Range		
Top Delta 🔻	50.0000	
Bottom Delta 🔻	0.0000	

When placing the "green" Profile cell, if the alignment contains a station equation, toggle the method to include "**Gap**". For the Elevation, set it to 30'-40' below your lowest elevation for the profile to be approximately centered on the plan sheets.

To create existing profiles against the tin file, select the **Surfaces** tab and the Method set to **Triangles**. This allows the profile to be calculated based on interpolation of the existing ground centerline. The centerline alignment and centerline profile are split pavement shots down the center of the roadway. The crown break of the pavement may not always be on center. Therefore it is best to utilize the triangle intersection points to best represent the existing profile elevations.



After completing the dialog as shown below for each existing profile (use the **"EP"** file naming convention), press the **Store to GPK** button on the lower right corner to store into the GPK file. Then press the **"X"** to delete the profile.

M Draw Profile	🔀 Store Profile
File Edit Update Options	🥂 Store Profile
Job Number: 131 🔹 🦓 🚪 Label Scale: 50.00000	- Profile Name: S665REP Select
Chain: S65R	Store Profile in GPK
Surfaces COGO Projection	Create Input File
	Operator Code
Type         Name         Display Settings         Draw           TIN         42131.tin         50EPROF         Image: Compare the set of t	File Name:
	File Name: Files
X	Create 3D Profile String
<u>8</u> ¢	
	Apply
Details	
42131.tin Q	
Method: Triangles	
Display Settings	-131 
By Feature Horizontal: 0.3000	-565R -2000.000000
Feature: 50EPROF  Variance: 0.1000	-400
Station Limits Offsets	50
■ Begin: 20+00.00 ↔ Horizontal: 0.0000	IO IGAP
End: 58+51.02 R 2 ** Vertical: 0.0000	
Void Void	
	Page
	Page

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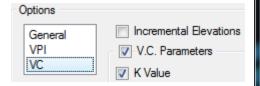


The **30' Left and Right Bridge** Profiles can also be created by selecting the appropriate symbology and the **Horizontal Offset**. (Note: If the existing centerline profile is ever really "jagged", this is a good place to check to make sure the centerline offset is set to zero.)

42131.tin Method: Triangles	۵	BL & CL BL20 BL & CL - 20 Scale
Display Settings By Feature Feature: 30LTPROF Station Limits	Filter Tolerances Horizontal: 0.3000 Variance: 0.1000	BL50 BL & CL - 50 Scale BL200 BL & CL - 50 Scale BL200 BL & CL - 50 Scale BRELOC20 Relocations - 20 Scale BRELOC50 Relocations - 50 Scale PARCELS
Begin:         20+00.00         +♦+           End:         58+51.02 R 2         +♦+           Void	Horizontal: -30.0000 Vertical: 0.0000	30LTPROF PROFILE 30 LT 50:1     30RTPROF PROFILE 30' RT 50:1     20EPROF EXISTING PROFILE 20:1     20PPROF PROPOSED PROFILE 20:1

S

Switch over to the COGO tab and redraw the **existing profile** with Horizontal and Vertical Axis Labels turned on (default settings), and **proposed profile** with strip grades at 50'. Check on the Station Equation if it exists for the alignment. On the VC tab, turn on the K Value.



If the profile changes grade in the gpk file, press the **Update Profile** button to update the profile changes.



Draw Profile	
File Edit Update Options	
Job Number: 131  Chain: S65R Unifaces COGO Projection	
Name Display Settings Draw	
S65RFP2 50PPROF 2 S65REP 50EPROF 2 X	
Details	
Profile: S65RFP2    Station Limits	
Vertical Offset:         0.0000         ■         Begin:         30+25.00         ←           ■         End:         42+00.00 R 2         ←         ←	
Display Settings	
by realule	
Options           General         Strip Grade Increment:         50.0000           VPI         Horizontal Axis Labels	
VC Vertical Axis Labels	
Station Equation	
54 <u>5</u> 2	
ake the necessary changes and	

To **update** the symbology of the profile, make the necessary changes and press the modify button on the middle right.

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Su	faces COGO	Projection	
	Name	Display Settings	Draw
	S65RFP2	50PPROF	2
	S65REP	50EPROF	☑
			×



# Plan/Profile Sheet Composition (Plan Sheet Clipper)

The Plan/Profile Sheet Composition tool allows the user to layout multiple plan and profile sheets in one process. For medium to large projects, it is ideal to utilize this tool for efficiency. On small projects, it is **still acceptable** (and preferred) to utilize referenced border sheets and referenced pp files.

[The steps to layout the plan and profile sheets are outlined in Chapter 18 of the Road I Training manual. There are a couple of modifications to those instructions that may be helpful explained below.]

**Replace Step 1 with this process:** To prepare to run the plan sheets, create a new design file \*cogo.dgn. Attach both the \*.pp.dgn and \*prof.dgn as references. The purpose of this \*cogo.dgn file is to contain the "sheet clip borders". You could run the process from the \*pp.dgn file, but often, when the "sheet clip borders" are drawn into the pp design file, the levels will start showing up on the plan/profile sheets. To avoid this, we typically create the \*cogo.dgn file. This \*cogo.dgn file can potentially be used for the IL1 – Index Layout Sheet preparation.

(Make sure when they are referenced, they are not on top of each other or the process will not work correctly. If they are in the same coordinate section of the dgn file, the profiles will need to be moved/redrawn to correct.)

For Step 7: Select the type of sheets that need to be created. Ensure the appropriate scale matches.



**For the Motif File Setup:** For the plan\_motif.dgn, attach the \*pp.dgn, \*prop.dgn, and any other design files needed to be show in the plans (examples: wetlands, utilities, sue, etc.). Turn on all the levels that are to be plotted and off the non-plot levels. Be sure to select **File > Save Settings.** 

Use the profile\_motif.dgn for both the profile and the tabular ports. Attach the \*prof.dgn to this file and turn on only the profile levels and the strip grade levels. The stationing and elevations will be recreated. Make sure these levels are turned off and be sure to select **File > Save Settings.** 

For the Auxiliary Sheet Annotations, change the Horizontal to -800.00 and the Vertical to 0.000.

In the \*pf.dgn files, check the level settings for the stationing and elevations. Commonly, the levels in the reference files may be turned on again. Turn these off again and select **File > Save Settings**. Only the stationing and elevation levels for the main \*pf.dgn should be turned on for plotting.

Open the planref.dgn file that was created in the working directory; add the title block information for County, Project ID, Route/Road, and Descriptions as necessary. Because this file is referenced to each sheet, the information will show on all plan and profile sheets.

Alternatively, you can pipe the title block information by selecting the text, selecting the copy command, then enter dx=0,x|y where x is the distance you want to move it and y is how many times to copy it.



,	,	. ,
Key-in		
tx=0,1150 6		



# **Cross Sections**

The Cross Section process is the most labor intensive part of the design and plan production process. There are several steps required to produce the plan sheets with graphics from cross sections, quantity calculation, and cross section sheets with the Cross Section tools. SCDOT currently utilizes **Criteria** files to draw proposed cross sections.

The Cross Section process contains several steps:

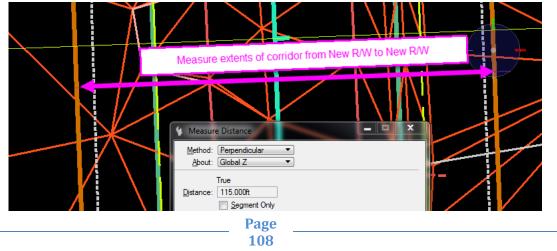
Existing Cross Sections	Superelevation	Proposed Cross Sections	Reports/Other	Plan Preparation
<ul> <li>Draw Pattern Lines from VBA</li> <li>Clean up EOP graphics</li> <li>Cut Existing Cross Sections using TIN file</li> <li>Draw Existing Pavement</li> <li>Lock Cross Sections</li> <li>Review with Navigator</li> </ul>	<ul> <li>Calculate Superelevation</li> <li>Create Edit Shape Files by Input File</li> <li>Critical Points</li> <li>Proposed Profile</li> <li>Edit/Analyze Superelevation shapes</li> </ul>	<ul> <li>Proposed graphics (pavement, sidewalk, v&amp;g, etc.)</li> <li>Cut Proposed Cross Sections</li> <li>Draw Right of Way limits</li> <li>Draw Ancillary Features</li> </ul>	<ul> <li>Calculate Earthwork &amp; EWBS</li> <li>Draw Limits of Construction lines</li> <li>NPDES lines</li> <li>Curb Profiles</li> <li>Seeding</li> <li>Multiline (GEN files)</li> <li>XS Pipes VBA</li> <li>Buildup VBA</li> </ul>	<ul> <li>Cross Section Sheet Composition</li> <li>Scaling Cross Sections</li> <li>Double Stacked Cross Section Sheets</li> <li>Cross Section Labeling</li> </ul>

# **Existing Cross Sections**

Existing cross sections are drawn utilizing the tin file provided by the Surveys Office with the "breakline" method. It is important to know the limits of the project to help determine the corridor width to define the pattern lines.

To determine the range of the corridor, **attach** the \*dtm.dgn file to the \*pp.dgn file (or \*pd.dgn if available).

Use the **Measure Distance > Perpendicular** tool to measure the extents of the outer limits of the corridor.



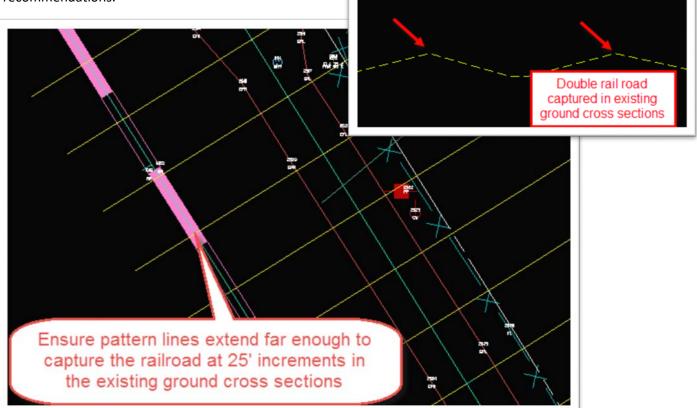


If the corridor width is less than 160' total (80' left and right), and is not expected to be extended during design, use **one to one (5:5) scale** to cut the cross section cells. [This is because the cross section border sheets are pre-labeled 80' left and right.]

If the corridor width is greater than 160' total, it is helpful to draw the existing cross section cells at **two to one (10:5) scale** upfront. There are options to scale the cross sections at a later point when necessary, but it requires additional steps each time a revision is made to the cross sections.

Also, if railroads are running parallel to the alignment, it is important to know the offset to **extend the pattern lines** to capture these details in the existing ground cross section. To provide the railroad with cross sections, you will need to draw additional pattern lines at **25' increments** compared to the

standard 50' in curve and 100' in tangent recommendations.



Utilize the VBA – Draw Pattern Lines (page 89) to draw the pattern lines for each alignment. Depending on the complexity of the project, pattern lines are typically drawn in the \*sh.dgn (shape) file or in a separate \*pat.dgn file. For each alignment, utilize the 6 - RD\_PD\_PatLn# lines to simply dialog completion during the process.

[It is also acceptable to use the same level, but different colors, however, you will need to make sure the color is modified on each alignment cross section run to match.]

Name	Number 1	<u>s</u>	::@
RD_PD_Pat			
RD_PD_PatLn1	350	88	<b>0</b>
RD_PD_PatLn2	351	112	0
RD_PD_PatLn3	352	214	0
RD_PD_PatLn4	1050	75	0
RD_PD_PatLn5	1051	76	0
RD_PD_PatLn6	1052	91	0

Scale	
Horizontal:	10.00000
Vertical:	5.000000



It is also helpful before processing the existing cross sections to know if there are any special geotechnical, structural, or hydraulic areas of interest that need to be included. Asking the appropriate groups ahead of time for these key stations will save time not having to draw cells at these extra stations in the future.

Pattern lines can be drawn at these key stations with the VBA tool or with the MicroStation Place Line tool as long as the symbology matches the other pattern lines for this alignment.

## Clean up Existing Edge of Pavement lines

The Geopak Criteria is written to handle the intersection of the pattern lines with symbology drawn in the \*pp.dgn or \*sh.dgn file. Certain criteria statements look for instances where the pattern lines intersect one time or multiple times.

Example: Existing Edge of Pavement lines must intersect the pattern lines an **even number of times**, two, four, etc. for the criteria to understand how to draw the existing pavement on the cross sections. (If the intersection is an odd number of instances, the Geopak cross section run will crash. When troubleshooting existing cross section runs, this is a good place to begin to identify the issue.)

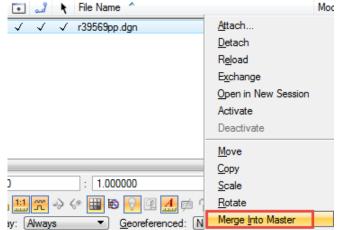
Attach the \*pp.dgn file as a **reference** to the \*sh.dgn file. (A separate eop.dgn file can be used.) **Turn** off all levels in the reference file except for the **RD\_EX\_Road** level. **Turn off** all levels in the \*sh.dgn file.



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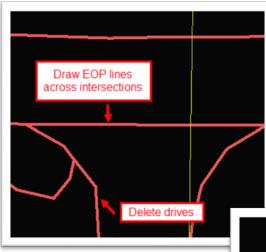
Copy the EOP elements into the active file by right clicking and selecting **Merge to Master** in the Reference Dialog. Data click in the design file to complete the merge.

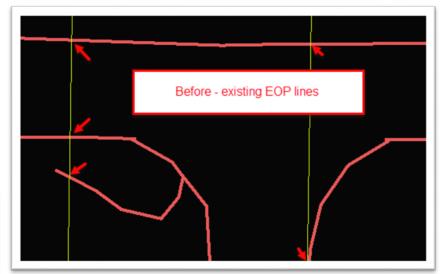
It is recommended to create a separate \*eop.dgn file (or in the \*sh.dgn) for the mainline and subsequent eop/sh files for the side roads.



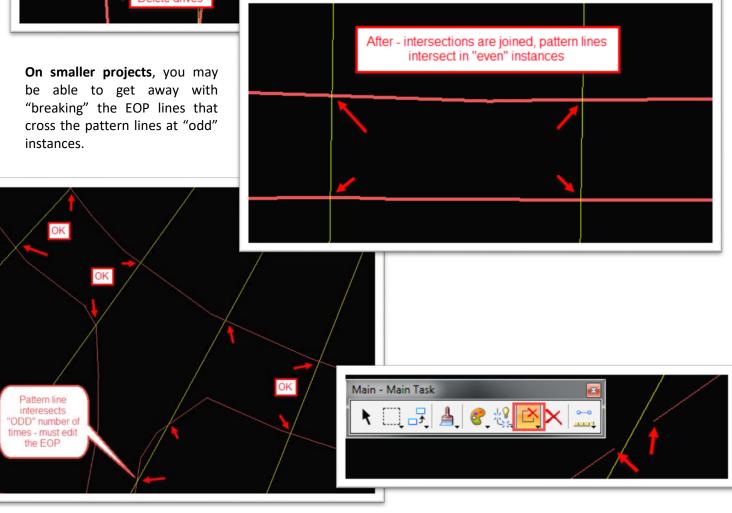


Scroll through and review the number of times the pattern lines intersect the existing edge of pavement lines. **Clean up** all of the areas that intersect in "odd" instances. If in a fork in the road or divided highway, the criteria will draw each of these pavement shapes as long as it is an even number of sides, two, four, etc.





**Edit** the existing edge of pavement graphics further to connect lines and arcs for the edge of pavement. **Remove** drives and **join** lines through intersections. Close the shapes at the beginning and end of the project.



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# Cut Existing Cross Sections

The Project Manager –Working Alignment Influence Runs plays a key role in the processing of cross sections. To avoid constantly resetting preferences for each alignment, it is ideal to update the Project Manager settings frequently.

Working Alignmer	it Definition SI	01					
Plan View		E	By Design File	]			
Pattern		He	orizontal Scale	: 5	Vertical	l Scale	: 5
Shapes Profile View			Design File:	C:\Users\r	 nealif∖Des	٩	
Location		<b>V</b>	Lv Names:	RD_PD_P	atLn1	1	
Cross Section View Existing Ground			Lv Numbers:			看	
Proposed Finish (	Grade		Colors:			111	Match
DTM			Styles:			1	
			Weights:			治	Display
OK	Cancel		Types:	3-4		1	Reset
			Placement:				

**XS Cells tab** - When utilizing the Cross Section workflows on the Project Manager dialog, the dialogs will have some of the setting pre-populated. If not utilizing Project Manager, complete the dialog as shown below with your project parameters.

M Draw Cross Sections - s101	
File Edit Update Options	
Job Number: 569  Chain: S101	Draw     DP Origin
XS Cells Surfaces	DP Origin
Pattern	Pre-populated
By DGN File	Q
Levels: RD_PD_PatLn1	
Colors:	🛅 🔽 Line 🔽 Line String
Styles:	Match Reset
Weights:	Display
Scale	
Horizontal: 5.000000	Horizontal: 1000.000
	Vertical: 500.0000
Number	of XS by Column: 20



**Surfaces tab** – On the Surfaces tab, select the project \*.tin file and set the method to Breaklines. Set the Feature to XS\_EXGround from the D&C Manager.

M Draw Cross Sections - s101     Image: State	Double click to set the text elevation symbology as shown below.
XS Cells Surfaces          Type Name       Display Settings       Method         TIN       39569.tin       XS_EXGround       BreakLines         Details       Image: Comparison of the string in the	Symbology Level: RD_XS_TX_Elev_EX Color: ByLevel Weight: (6) ByLeve Text Preferences Text Preferences Set Justification Th: 0.800 (2.34) R: 203 timesi Decimal: 2 TH/TW Fixed Angle: 90.000° Anchor Point Shift Horizontal: -0.100 Vertical: 2.000

Press the **Add** button to add the Surface to the list. (Multiple surfaces can be added for comparison of cross sections tin to tin. Settings can also be modified by selecting the "modify" button in the center.)

Press the **Draw** button to draw the existing ground cross sections in the \*dx.dgn file.

Update the Project Manager – Working Alignment – Define with the appropriate existing cross section information.

Working Alignment Definition: S101		Working Alignment Definition: S101
Plan View Pattern Shapes Profile View Location Cross Section View Existing Ground Proposed Finish Grade DTM OK Cancel	XS DGN File: C:\Users\nealf\Des File Chain: S101 Begin Station: 11+00.00 R 1 End Station: 46+00.00 R 1	Plan View         Pattern         Shapes         Profile View         Location         Colors:         ByLevel         Existing Ground         Proposed Finish Grade         DTM         ØK

#### Draw Existing Pavement

This step corresponds with the above instructions on ensuring the pattern lines and the edge of pavement lines intersect at the appropriate points to depict where existing pavement exists on the cross sections.



Proposed Cross Sections On the Project Manager dialog, select the **Proposed Cross Section** button and create a new run named **Road\_exp**. Open the run.

On the XS DGN File, Pattern, and Existing Ground, the menus should be pre-populated based on the Working Alignment. **Toggle** the check box Use Working Alignment Definition as appropriate. If necessary, complete the 3 dialog options per project requirements.

M Proposed Cross Sections	s - s101_exp
<u>Fi</u> le	
XS DGN File	XS DGN File: C:\Users\nealif\Desktop\ $Q$
Pattern	Tolerance: 0.100000
🥂 Proposed Cross Sections	s - s101_exp
<u>Fi</u> le	
XS DGN File	Use Working Alignment Definition
Pattern	By DGN File 🔻
K Proposed Cross Sections	s - s101_exp
<u>F</u> ile	
XS DGN File	Use Working Alignment Definition
Pattern	DGN File:
Existing Ground	

On the Shapes dialog, set to Shapeless.

🧏 Proposed Cross Section	ns - s101_exp
<u>Fi</u> le	
XS DGN File Pattern Existing Ground Shapes Shape Clusters	Use Working Alignment Definition

On the Shape Clusters dialog, set the Chain to the appropriate centerline (existing or relocated) and the Profile to the existing profile. Press the **Add** button.

<u>H</u> le				
XS DGN File Pattern	Chain S101	Tie/PGL 0.000000	Profile S101EP	
Existing Ground Shapes	5101	0.00000	STUTEF	Typical Thick
Shape Clusters Define DGN Variables				
Define Variables Plot Parameters	Chain: S101	<b>↓</b>	Profile: S101E	
Drainage		oply Profile at: []		
	Add	Modify Dele	ete Up	Down



Press the **Typical** button on the above dialog. Scroll down and select the **No. 83 Draw Existing Subbase** (Shapeless) typical and press the **Apply** button. (Press Ok to any dialog prompting shape vs. shapeless.)

K Typical Sections	
	STING SUBBASE Apeless)
Cell Description	Job Number: 569
NO.80A         OVERLAY W           NO.80B         OVERLAY W           NO.81         OVERLAY D           NO.82        /W LIN	Template Template Designed to Work with:          Apply to Left Roadway      Description
NO.82        W LIN           NO.83         DRAW EX.S           NO.84         DRAW WET           NO.85         DRAW ROU           NO.86         DRAW LM S	Range Apply to Whole Chain Begin Sta.: DP End Sta.: DP
	On Chain: S101 Select

On the Define DGN Variables dialog, highlight existing edge of pavement and **browse** to select the \*sh.dgn file cleaned up in previous instructions. Press the **Modify** button to accept the changes.

M Proposed Cross Section	ns - s101_exp	
<u>Fi</u> le		
XS DGN File Pattem Existing Ground Shapes Shape Clusters Define DGN Variables Define Variables Plot Parameters Drainage	Variable existing edge of pavement	DGN C\r39569sh.dg
Variable Name: existing DGN File: C:\Use	] edge of pavement s\nealif\Desktop\stuff\rr\r3956	Level Symbology 🔻
Search Criteria		
Lv Names: R	D_EX_Road 🛛 📩	
Lv Numbers:	1	
Colors:	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
Styles:	1	
Weights:	1	
Types:	1	Add
Match Di	splay Reset	Modify

Accept the defaults on the Define Variables dialog.



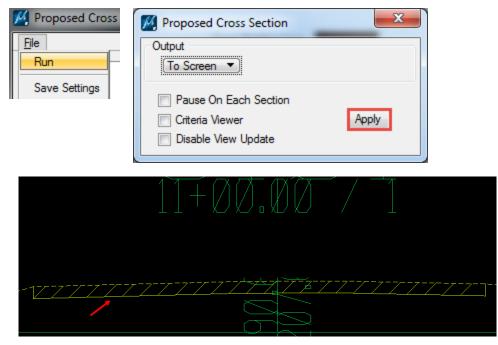
On the Plot Parameters tab, uncheck all of the items below Plot.

Plot Parameters	Baseline Name
Drainage	
Plot	
Pavement Thickness	1.0
📄 Fill Gaps between Clu	sters
Transition Definition	Apply Shi
Intersect between Clu	isters
Process Clusters as In	ndicated
Remove Skewed Effe	ect
Process Only Section Pavement Shapes	s with Existing Ground

Select **File > Save Settings** to save the dialog settings.

🔀 Proposed Cro
<u>Fi</u> le
Run
Save Settings

Select File > Run to process the existing pavement. Press the Apply button to process all.



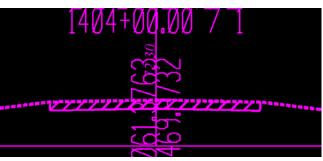


# Lock Existing Cross Section Elements

Fit View and press **Ctrl + A** on the keyboard to select all of the elements for existing ground, existing elevations, existing pavement, and cross section cells. Select **Edit > Lock** from the top MicroStation menu to lock the existing cross sections.

Once the elements are locked, you can process additional runs of proposed cross sections and easily delete all newly modified elements without having to reprocess the existing. Select **Edit > Unlock** to unlock the elements.

<u>Fi</u> le	<u>E</u> dit	Element	<u>S</u> ettings	<u>T</u> ools <u>I</u>
	n	Undo Place	Cell Index	Ctrl+Z
~		Undo Ot <u>h</u> er	·	+
asks	-	<u>R</u> edo		Ctrl+R
🔎 Ta		Set <u>M</u> ark		
	X	Cut_		Ctrl+X
1	Ð	Copy		Ctrl+C
🗣 R	Ô	<u>P</u> aste		Ctrl+V
• •		Paste <u>S</u> pec	ial	
ζc		Group		Ctrl+G
х́р		U <u>ng</u> roup		Ctrl+U
æ. c		Loc <u>k</u>		Ctrl+L
ц <u>.</u> , С		Unl <u>o</u> ck		Ctrl+M
💼 R		Bring to Fro	nt	



#### Cross Section Navigator

The Cross Section Navigator is utilized for reviewing the cross sections for any problems, making necessary edits, and for navigating during labeling, extending and trimming elements.

Select **Applications > Geopak > Road > Cross Sections > Navigator** to activate the tool. (There is also a "wheel" shaped icon on the Road Tools palette to activate.)

12 14 (4 <b>R</b> (4 ) 14 (2) (2) (2) (2) (2) (2) (2) (2) (2) (2)	
Cross Section Navigator - S101 - Scale 5 H : 5 V	
11+00.00 - 44 -	▶ 🛧 ८० 🕮 🏧 🖆 盾

The dialog provides information to the user if the cross section cells were cut at 5:5 or 10:5 in the header.

On the left side of the toolbar, there is a drop down to quickly jump to a particular station and VCR buttons to quickly navigate through and to the beginning/end and re-center the cross section in the View window.



# In addition to navigation, three of the provided buttons are commonly used for editing cross sections:

The DP Offset Elevation button allows the user to query the cross section by data pointing on a certain cross section element. The offset and elevation are returned.

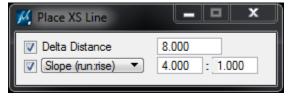
Cross Section Navigato	r - S101 - Scale 5 H : 5 V	×
11+00.00 -	〕 ━    44  4	
	🔀 DP Offset Elevation - S101	x
	Elevation         161.054         Cursor           Offset         17.562         X         Y         Offset         19.62	

[An element (place line) can also be placed at an elevation/offset by selecting the appropriate command, entering the elevation and offset and press the Send Data Point button.]

The DP Delta Distance Slope button allows the user to draw a line at a given horizontal distance and slope. This tool is used heavily when modifying ditch slopes to meet drainage elevations.



The Draw XS Line tool draws a cross section line at a specified length and slope.



The Navigator is also commonly used with the MicroStation Change Attributes and Modify toolbar.



## **Calculate Superelevation**

The SCDOT calculates superelevation both manually and with an excel spreadsheet in accordance with the SCDOT Highway Design Manual 2003 – Chapter 11. In Geopak, superelevation can be calculated using AASHTO tables and then modified for any variances to meet SCDOT requirements.

The SCDOT Superelevation spreadsheet is available internally for SCDOT employees only at: <a href="http://iwww.dot.state.sc.us/PreConstruction/Resources/DesignTools.aspx">http://iwww.dot.state.sc.us/PreConstruction/Resources/DesignTools.aspx</a>

The Geopak Superelevation Tools can be accessed by selecting **Applications > Geopak > Road > Cross** Sections > Superelevation Shape Manager Tools.

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In the Cadd Workspace, Geopak utilizes two files to generate automated superelevation:

\\nts\hq\CaddStandards\SCDOT-Bentley\Standards\SCDOT\_Design\Geofiles\SE\_tables\English

#### SCDOT\_RadiusTable\_e.csv

[4% e max	(]					
	20	25	30	35	40	45
r min NC	1443	2099	2875	3775	4801	5995
23000	NC	NC	NC	NC	NC	NC
20000	NC	NC	NC	NC	NC	NC
17000	NC	NC	NC	NC	NC	NC
14000	NC	NC	NC	NC	NC	NC
12000	NC	NC	NC	NC	NC	NC
10000	NC	NC	NC	NC	NC	NC
8000	NC	NC	NC	NC	NC	NC
6000	NC	NC	NC	NC	NC	NC
5000	NC	NC	NC	NC	NC	RC
4000	NC	NC	NC	NC	RC	RC
3500	NC	NC	NC	RC	RC	2.2
3000	NC	NC	NC	RC	2.1	2.4
2500	NC	NC	RC	RC	2.4	2.6
2000	NC	RC	RC	2.3	2.6	2.9
1800	NC	RC	2.1	2.4	2.7	3
1600	NC	RC	2.2	2.6	2.9	3.2
1400	RC	RC	2.4	2.7	3	3.4
1200	RC	2.2	2.5	2.9	3.2	3.6
1000	RC	2.4	2.7	3.1	3.8	3.8

#### SCDOT\_e.sep

scdot_e.sep	Notepad
File Edit For	rmat View Help
	RADIUS_TABLE
eEquation =	= SCDOT_RadiusTable_e.csv = NULL
eRminNCinte	erpolation = E_INTERPOLATE_WITH_NC
eSpeedInter	polation = E_LINEAR
	polation = E_LINEAR hcrement = 0.010000
runoffspira	aloption = LS_RUNOFF_ONLY
runoffLengt	hMethod = RUNOFF_EQUATION
	Name = NULL
lengthspeed	hEquation = (Wn*e)/0.5 Interpolation = E_LINEAR
eInterpolat	ion = E_LINEAR
runoffiengt	hRoundingIncrement = 0.100000
	nRoundingIncrement = 1.000000 = ACTUAL_LANE_WIDTH
	= ACTOAL_LANE_WIDTH outLengthMethod = TANGENT_RUNOUT_EQUATION
fixedLength	$n = 10\bar{0}.000000$
	= 2.08*Wa/0.5
	<pre>PROTATIONMETHOD = ROTATE_TO_MATCH_INSIDE_LANE Pr3Lanes = -1.200000</pre>
	$r_{4Lanes} = -1.500000$
adjustFacto	or5Lanes = -1.800000
	$r_{6Lanes} = -2.000000$
	pr7Lanes = -2.300000 pr8Lanes = -2.500000
	$r_{9Lanes} = -2.500000$
	or10Lanes = -2.500000
	pr11Lanes = -2.500000
	pr12Lanes = -2.500000
	Daga

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**Select** the first icon to activate "**Automated Superelevation**". This can be used to create the original INPUT file that will be used for the superelevation of the project. [Note – this file MUST be modified to meet SCDOT HDM standards.]

Superelevation S	hape Manag	ger Tools	×
Superelevation SI	🌯 💊	🍕 🏕 🍕	

Complete the top section of the dialog with the appropriate project information (gpk, chain, station range, and design speed, etc). Select the appropriate Superelevation chart to be used for your project.

💹 Automated S	Superelevation		
<u>Fi</u> le			
			Station Range
Job:	132 Q		Chain: S197 🔹 🖧
Design Speed:	30		Begin: 27+59.46 ++++
Transition ID:	Linear	•	End: 50+00.00 ++++
Preference File:	scdot_e	•	Facility: Undivided
e Selection:	4% e max	•	L Selection: Equation 💌

Select **File > Level Symbology** to set the symbology for the shapes.

📕 Superelevation 💷 😐	23
Dependent Shapes:	
Independent Shapes:	

On the bottom section of the dialog, select the **existing profile** and **offset**. Press the **New Lane** icon (top right) to add. Manually modify the % slope from -2.000 to **-2.0800** to meet SCDOT recommendations. Enter as many offsets and slopes as necessary for the number of lanes. (At least one shape must be dependent and one must be independent.) On the Right tab, **enter** the information and press the **New Lane** icon to add.

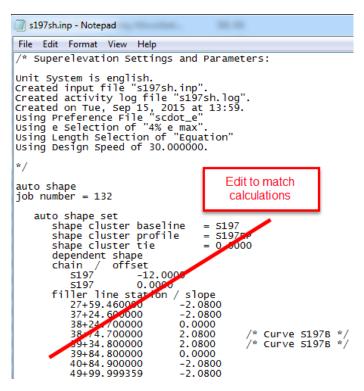
	Left		Right	
Profile: S19	7EP 🔻			
Tie: Offs	et 🔻	Offset:	0.0000	
% Slope	Offset	Offset	Dependent	
-2.0800	0.0000	-12.0000	V	
				<ul> <li>✓</li> <li>✓</li> <li>✓</li> <li>✓</li> <li>✓</li> </ul>
Create Inp	ut File: s197sh.inp	)		٩
	Generate Supe	erelevation Trans	itions	

Enter a file name for the Create Input File and press the **Generate Superelevation Transitions**.

**Close** the Text Editor and Automated Superelevation dialog.



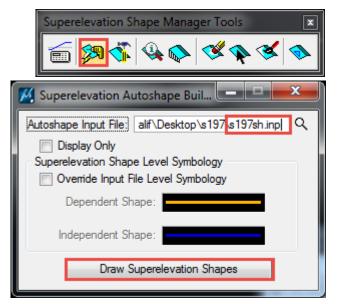
A **\*sh.inp** file has been created in the Windows Explorer project directory. **Open** this file in Notepad and **edit** the station ranges according to the manual SCDOT Superelevation calculations and Excel sheet which may differ from AASHTO. Select **File > Save** to accept the changes.



## **Create/Edit Shape Files by Input File**

After the \*sh.inp file has been modified, select the 2<sup>nd</sup> icon – "Autoshape Builder". Browse to select the **\*sh.inp** file. Press the **Draw Superelevation Shapes** button.

dependent shape chain / offset 5197 -12.00 5197 0.0000 filler line station 32+00.000000 38+24.700000 38+74.700000 39+34.800000 39+84.800000 40+84.900000 45+00.000000	) / slope -2.0800 0.0000 2.0800 /* Curve S197B */ 2.0800 /* Curve S197B */ 0.0000 -2.0800
auto shape set shape cluster baseli shape cluster profil shape cluster tie independent shape chain / offset S197 0.0000 5197 12.000 filler line station 32+00.000000 45+00.000000	) 00 / slope -2.0800





**Review** the shapes, stationing and slopes in the \*sh.dgn file.



#### **Critical Points**

Critical points are calculated to determine the minimum pavement quantity over existing pavement and to assist with a target elevation for developing the proposed profile. The highest elevation point of the existing pavement is determined between the EOP – left, centerline, and EOP – right and then the minimum thickness is added to this highest elevation. This ensures that the new pavement thickness for the project will provide satisfactory cover for the new road.

- Copy the \*sh.dgn file and rename the copy to \*shcp.dgn. **Open the \*shcp.dgn.** [The existing edge of pavement graphics and Superelevation shapes should be created for the existing profile in previous instructions.]
- Create a copy of the **\*dx.dgn** file and rename to **\*dxcp.dgn** file. [This file should contain the existing ground cross sections with the retain pavement drawn.]

If pavement design has not been received to date, assume a pavement design of 200 lbs for surface course and 200 lbs for intermediate course. **Assumed thickness = 0.32**. This is a good general starting point for developing the proposed profile.

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• In **Project Manager**, turn off Working Alignment Influence runs (or take the time to set up a \*cp run with appropriate information.)

🥂 Road Project: s-197.prj
<u>File Remember Options</u>
Working Directory:
Working Alignment Influence Runs

- Select the Proposed Cross Sections button and create a new run named \*cp.
- Select the \*dxcp.dgn for the XS DGN File

M Proposed Cross Sectio	ns - s197cp
<u>Fi</u> le	
XS DGN File	XS DGN File: top\s197 <mark>s197dxcp.dgn</mark> Q
Pattern	Tolerance: 0.100000

 Assign the Pattern attributes, BY DGN File, Chain, H/V Scale, browse to select the file, and match the pattern line symbology

🦉 Proposed Cross Sections - s197cp				
<u>Fi</u> le				
XS DGN File Pattern Existing Ground Shapes Shape Clusters Define DGN Variables Define Variables Piot Parameters Drainage	Use Working Alignment Definition By DGN File Chain: S197 Chain: S197 Horizontal Scale: 5 Vertical Scal			



• For Existing Ground, select the \*dxcp.dgn and match the existing ground symbology

🔏 Proposed Cross Sections - s197cp				
File				
XS DGN File Pattern Existing Ground Shapes Shape Clusters Define DGN Variables Define Variables Plot Parameters Drainage	Use Working Alignment Definition         DGN File:       rs\nealif\Desktop\s197 s197dxcp.dgn         Search Criteria         V       Lv Names:         Lv Numbers:       **         Colors:       **         Styles:       **         Weights:       **         Types:       **			

• For Shapes, select All in DGN and select the \*shcp.dgn file

🔏 Proposed Cross Sections - s197cp			
<u>Fi</u> le XS DGN File Pattern	Use Working Alignment Definition		
Existing Ground Shapes	DGN File: ealif\Desktop\s197\s197shcp.dgn		
Shape Clusters Define DGN Variables Define Variables Plot Parameters Drainage			

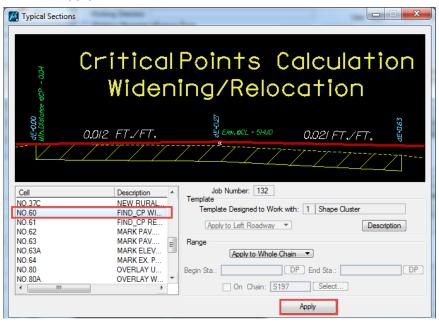
• For Shape Clusters, select the chain and the existing profile. Press the Add button

🧖 Proposed Cross Sectior	ns - s197cp			
File				
XS DGN File Pattem Existing Ground Shapes Shape Clusters Define DGN Variables	Chain S197	Tie/PGL 0.000000	Profile S197EP	Typical Thick
Define Variables Define Variables Plot Parameters Drainage	Chain: S197	Apply Profile at:	∛ Profile: S197El Tie ▼ 0.0000 elete Up	

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- Select Typical and scroll down to criteria No. 60
- Press the Apply to all chain



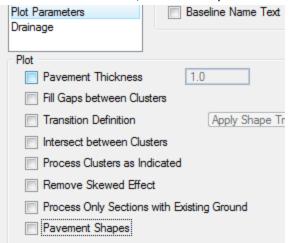
- On the Define DGN Variables dialog, set the exground to the \*dxcp.dgn file and press Modify
- Set the Existing Edge of Travel Lane to the \*shcp.dgn (or \*eop.dgn if exists) and press Modify

Proposed Cross Sections - s197cp	
XS DGN File       Variable       DGN         Pattern       exground       C\s197dxcp.dg         Existing Ground       Shapes       Shape Clusters         Define DGN Variables       Define Variables         Plot Parameters       Drainage         By file:       All	
Variable Name: existing edge of travel lane Level Symbology DGN File: C:\Users\nealif\Desktop\s197\s197shcp.dgn Search Criteria V Lv Names: RD_EX_Road 2 Lv Numbers: 2 Colors: 2	<ul> <li></li> <li><!--</th--></li></ul>
Styles:     **       Weights:     **       Types:     **   Add	Proposed Cross Sections - s197cp
On the Define Variables, set the thickness to 0.32 and press Modify	Lile         XS DGN File         Pattern         Existing Ground         Shapes         Shape Clusters         Define DGN Variables         Pilot Parameters         Drainage         By file:         All         Variable Name:         minimum overlay depth
Раде	Variable Name: minimum overtay depth Value: 0.32 Add Modify

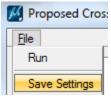
124



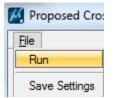
• On the Plot Parameters, turn off all options under Plot



• Select File > Save Settings



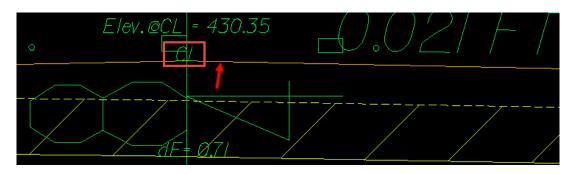
• Select File > Run



• Press the Apply button



• Use Cross Section Navigator to review the Critical point text on the cross sections.







# **Reports - Profile Report for Critical Points**

The Report tool is used to extract intersecting graphics, small pieces of text or other specified elements to generate a profile. The profile can be stored directly to the gpk and also exported to a \*inp file.

Select **Applications > Geopak > Road > Cross Sections > Reports** to access the Reports dialog. Select the **Profile Grade** button.

Multi-Line
Profile Grade
Radial Staking

Select the gpk file when prompted. Select the **Chain** and **Station Range**.

📕 Profile Grade Report	- 🗆 X
File	
Job: 132 Q Current Station: Chain: S197 -	32+00.00 R 1
	00.00.00 D 1
Begin Station: 32+00.00 R 1	32+00.00 R 1
End Station: 45+00.00 R 1	45+00.00 R 1

For the Existing Ground, select the magnifying glass. Toggle on Level Names and Match the Existing Ground symbology in the \*shdx.dgn file. Press the "X" to close and accept the settings.

🔏 Profile Grade Report	
File	🥂 Existing Ground Line 💻 😐 🗙
Job: 132 Q. Current Station: 32+00.00 R 1	V Names: RD_XS_ExGround
Chain: S197 -	Lv Numbers: 1
Begin Station: 32+00.00 R 1 32+00.00 R 1	Colors: 🚬 🎽
End Station: 45+00.00 R 1 45+00.00 R 1	Styles: *
Search Criteria	Weights:
Existing Ground Line: Display	Match Display Reset
Proposed Finish Grade: Display	
Display	
Report Options: Search Text	
Search Text	
Text Chain Profile Preference	
(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)	<u> </u>
<b>D</b>	

S197CP S197EP



For the Proposed Finished Grade, select the magnifying glass. Toggle on Level names and Match the "orange" RD\_XS\_PaveOvlay\_CP line. Press the "X" to close and accept the settings.

📕 Proposed Finish Gr 💶 💷 🖊 Profil	e Grade Report 📃 🗖 🗙
Lv Names: RD_XS_PaveOvlay	
	Job: 132 Q Current Station: 32+00.00 R 1
Colors:	
	tion: 32+00.00 R 1 32+00.00 R 1
In Mainhan 1	tion: 45+00.00 R 1 45+00.00 R 1
	Criteria
	Existing Ground Line: Display
Pr	pposed Finish Grade:
.@SL = 425,70 _ `	
Report C	Options: Search Text 💌
Search	Text
Tex	t Chain Profile Preference
	(2) (2) (2) (2) (2) (2) (2) (2) (2) (2)
In the Reports Option section:	Report Options: Search Text
<ul> <li>Set Report Options to Search Text</li> </ul>	Search Text
Set Text to CL	Text Chain Profile Preference
Check Store Profile and enter a name S197     stars into the only file	
<ul><li>store into the gpk file</li><li>Enter an Ascii file name s197cp.inp to write</li></ul>	ita an
input file	
Press the Add button	×
Press the Apply button	
	Text: CL
Use COGO Navigator, to review the newly stored p	orofile Store Profile: s197cp Station Chain: S197
*cp	Beginning Point Number:
🔣 Navigator(132)	
Select Tools	Pause on Each XS
📉 🗙 📑 id 📥 📄 🐶	ASCII File: s197cp.inp C
	Apply
Element : Profile	
Name	
OFDEP S125EP	
S125EP	
S125RFP	



CrestMin CrestMax

3.0

7.0

12.0

19.0

29.0

44.0

61.0

84.0

114.0

151.0

193.0

247.0

312.0

384.0

181.0

206.0

231.0

\_\_\_

3.0

7.0

12.0

19.0

29.0

44.0

61.0

84.0

114.0

151.0

193.0

247.0

312.0

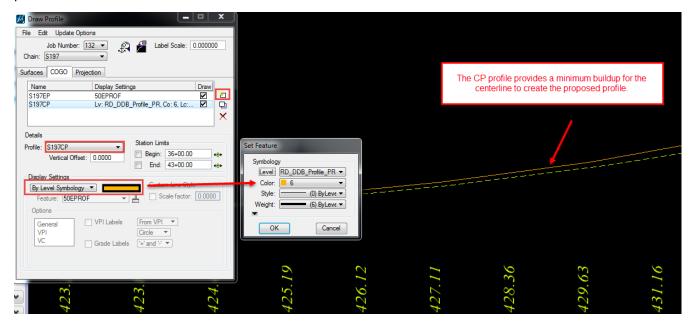
384.0

# **Draw Critical Point Profile**

Open the \*prof.dgn file for the alignment the \*cp profile was created for. Select Applications > Geopak > Road > Plans Preparation > Draw Profiles.

On the COGO tab, select the S197CP Profile. Set the Display Settings to By Level Symbology and complete the dialog as shown below. Press the **Add** button to draw the profile with the existing profile.

This critical point profile provides a minimum buildup for the centerline to begin creating the proposed profile.



# **Vertical Alignment Generator**

The Vertical Alignment Generator is used to graphically create, modify, and store the proposed profile by specifying grade, elevation, station values all while checking against AASHTO tables for SSD (stopping sight distance), DS (design speed), and K-Values. [See Chapter 12 of the SCDOT Highway Design Manual 2003. Additional documentation is included in Chapter of the Geopak Road I Manual.]

In the Cadd Workspace, the AASHTO Green Book 2001	K Value		
table is used for K Values. (aashto2001gb.kvl)	Speed	SagMin	SagMax
<u>\\nts\hq\CaddStandards\SCDOT-</u> <u>Bentley\Standards\SCDOT_Design\Geofiles\Profiles</u>	15 20 25 30 35 40 45 50 55 60 65	10.0 17.0 26.0 37.0 49.0 64.0 79.0 96.0 115.0 136.0 157.0	10.0 17.0 26.0 37.0 49.0 64.0 79.0 96.0 115.0 136.0 157.0

70

75

80

181.0

206.0

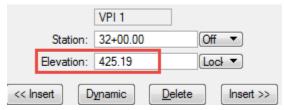
231.0



In Project Manager, with Working Alignment Influence Runs checked on, select the **Vertical Alignment** button. Select **File > Load Profile** and select the \*cp profile. Press **OK**.

buttonn belee		
Vertical	Profile Generator (K Value Table:	📈 Load Profile 💷 📼 💌
Alignment	File Tools Preferences	Profile: S197CP -
	Profile Cell Settings	<u>OK</u> Cancel
	K Value Table	
	Load Profile	
	Save Profile	

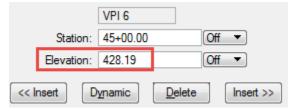
Enter the tie grade to existing pavement for the first station of the profile.



Use the Next, Insert, and Dynamic buttons to graphically create the proposed profile with vertical curves, careful not to drop below the minimum buildup line. [Ensure the vertical curves begin and end at even station numbers and the vertical curves are even lengths in multiples of 25.]

M Profile Generator (Active Profile: S	197CP, K Value Table: aashto2001GB.kvl)	
<u>Fi</u> le <u>T</u> ools		
VPI 2	VPI 3	VPI 4
Station: 33+00.00	Station: 37+00.00 Off 🔻	Station: 39+50.00
Elevation: 427.14	Elevation: 441.78 Off 🔻	Elevation: 449.00
Back Grade: 3.6600 Off	<pre></pre>	Fwd Grade: 2.8880 Off -
Length: 400.00		Length: 250.00
	Symmetrical Vertical Curve 🔻	
	Speed: 55  L: 100.00	
Station: 36+50.00 HP	Station: 37+50.00 K: 129.5337	Station: 37+50.00
Elevation: 439.95 HP Ele	evation: 443.22 SSD: 1447.67	Elevation: 443.22
Previous 1		▶ 6 <u>N</u> ext
-		
		Ensure the proposed profile doesn't
		dip below the CP line
=====		

Enter the tie grade to existing pavement for the end station of the profile.





Select **File > Save Profile As**. Enter the **FP** Profile name for the gpk file and the **FP.inp** name to write out an input file. Press **OK**. Close the dialog and select Yes to any prompts.

M Profile Generator (A	Save Profile As
File     Tools       Preferences     Profile Cell Settings	Profile: S197FP  Input File: S197FP.inp OK Cancel
<u>K</u> Value Table <u>L</u> oad Profile <u>Save Profile</u> Save Profile As	

## **Draw Proposed Profile**

Open the \*prof.dgn file for the alignment the \*fp profile was created for. Select **Applications > Geopak > Road > Plans Preparation > Draw Profiles.** 

On the COGO tab, select the **S197FP** Profile. Set the Display Settings to By Feature and select the 50PPROF from the D&C Manager. Enter 50.00 on the General tab for **Strip Grade**. Make sure **K-value** is check on the VC tab. Press the **Add** button to draw the profile with the existing profile. [The CP profile can be removed from the list at this point.]

🔀 Draw Profile	
File Edit Update Options	0
Job Number: 132 🗾 🤗 불 Label Scale: 0.000000	Options
Chain: (S197	General Incremental Elevations
Surfaces COGO Projection	VPI VC. Parameters
Name         Display Settings         Drawl           S197FP         50PPROF         Image: Comparison of the set	MC
S197EP 50EPROF 🗹 🖓	K Value
S197CP Lv: RD_DDB_Profile_PR, Co: 6, Lc:	
Details	
Profile: S197FP   Station Limits  D 1 22 09 09	
Vertical Offset: 0.0000 ■ End: 32+00.00 + +	
Display Settings	
By Feature  Custom Line Style	
Feature: 50PPROF Scale factor: 0.0000	
Options General Strip Grade Increment: 50.0000	
VPI Horizontal Axis Labels	
VC Vertical Axis Labels	
Station Equation	
	VPI = 39 + 50.00 $Ele_{V_{1}} = 449.00$
	$E_{1}e_{1}v_{1} = 449.00$
VPI 37+00.00	
Elev. – 441.78	) <u>2.89% L-1.4.09%</u>
	2222 - 224.09%
(+) 2.89%	
(+)3.66%	
(+)3.66% Land 10 57	K = 39
$\mathbf{S} = \mathbf{K} - \mathbf{I} \mathbf{S} \mathbf{U}$	<u>275' V.C.</u>
₩ <u>100' V.C.</u>	
	Page
	130



# **Edit/Analyze Superelevation Shapes**

There are additional tools on the Superelevation Shape Manager Tools dialog to analyze and modify shapes. The most commonly used ones are:

The **Shape Maker** tool manually creates shapes graphically by drawing irregular areas such as gore areas, turn lanes, etc. It is recommended to use an INPUT file for the majority of the project as this tool can be very time consuming to use.



The **Shape Analyst** tool provides information on any point within a superelevation shape.



🎉 Shape Ar	alyst	, <b>, , , , , , , , , , , , , , , , , , </b>	
<u>U</u> ser			
Job: 132	🔍 📃 Disp	olay Only 📃 Cro	oss Section
Elevation In	formation		
Chain :	S197 👻	PGL Elevation :	428.235
Profile :	S197FP	PGL Slope :	-3.24 %
Station :	44+98.61 R 1	Cross Slope :	-2.08 %
Offset :	-11.905061	Longitudinal Slope :	-3.24 %
Elevation :	427.985	Flow Slope :	3.85 %
	Extrapolate Fixe	d Slope :	0.000000 %
By Sta/	Offset	DP	Dynamic

The **Shape Selector** highlights or selects shapes based on a wide range of properties for the shapes.

Superelevation Shape Manager Tools			
E 🔊 🖑 🍕 🔊 🧐	≰ ⊗_		

🥖 Shape Selector	
Job: 132 Q Filter: Profile	Process: View  1
Hilite	Select

The **Shape Properties** tool provides information on any shape and allows the shapes to be modified individually or as a group. After creating the **proposed profile**, select the **Shape Properties** icon.

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Use the **ID button** to identify a single shape to modify. (Alternatively, select all of the shapes with the **Shape Selector** tool above.) **Toggle** on Baseline and Profile. **Select** the correct Chain and Proposed Profile for the shapes. Press the **Set or Set Entire Selection** button to modify the new associations.

Select Yes to accept the changes.

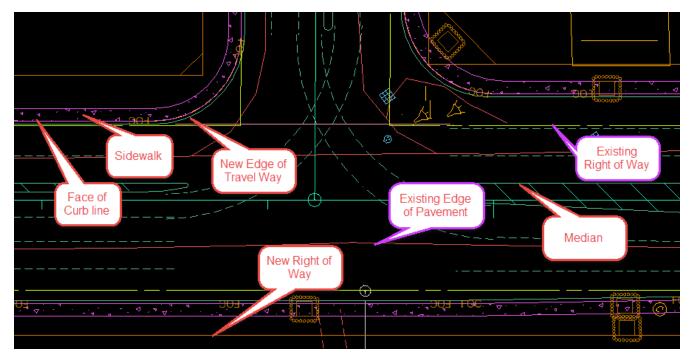
🎉 Shape Properti		x	η
Job: 132 C	2		
Shape Parameters			
✓ Baseline:	S197	•	2* 42' 40" W
Profile:	S197FP	•	
PGL Chain:	<select></select>	<b>-</b>	
Transition ID:	0	•	
Tie:	0.000000		
Class:	Dependent	•	
From Slope:	0.000000		
To Slope:	0.000000		
ID Set	Set Entire Sel	ection	



# **Proposed Graphics**

During preliminary design the majority of the proposed graphics for new right of way, new edge of travel way, medians, sidewalk, face of curb, and valley gutter lines, etc. should have been drawn in the \*pp.dgn file (or a \*pd.dgn file with the \*pp.dgn referenced). Existing graphics will also be utilized in the proposed cross section process.

The Geopak criteria files look for the plan view symbology for instruction on how to draw the proposed cross sections at the correct widths, slopes and with the correct elements such as curb and gutter and sidewalk.



# **Criteria Files**

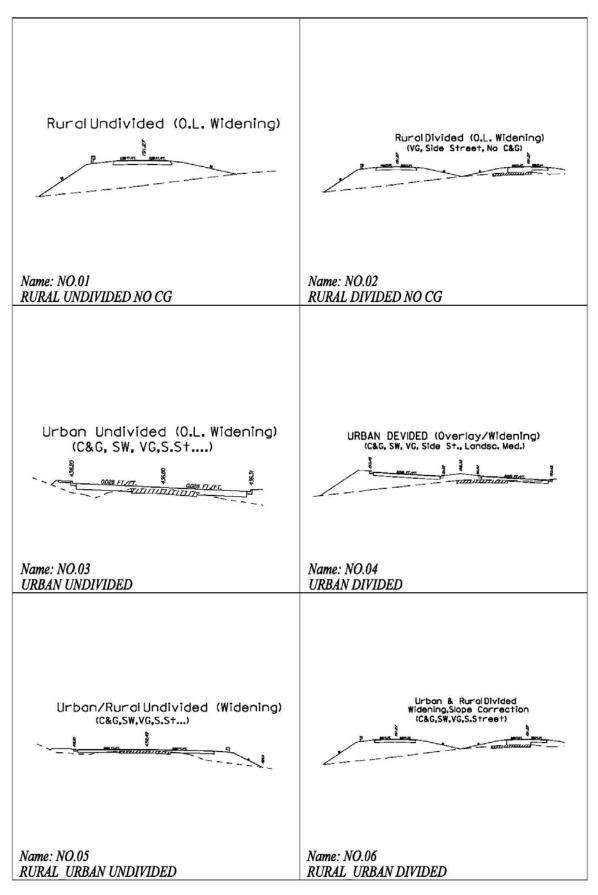
Criteria Files are ASCII files used for cross section design. Each criteria statement contains the criteria language for a separate roadway feature, and included information such as level symbology.

The Geopak Criteria files are located in the Cadd workspace folder: \\nts\hq\caddstandards\SCDOT-Bentley\Standards\SCDOT\_Design\Geofiles\Criteria\_E

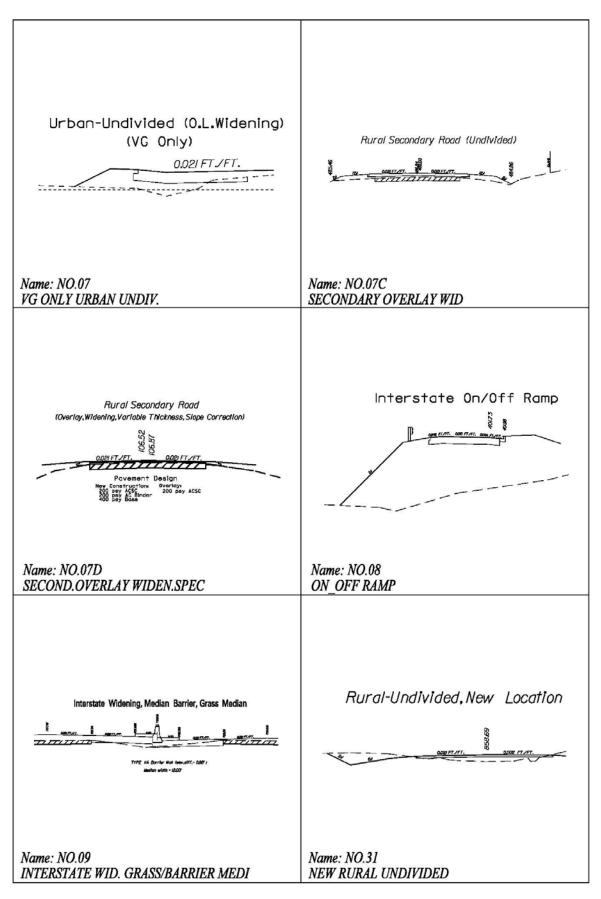
When a criteria file is selected, the files are copied to the local project directory to save project specific variables for pavement thickness, ditch widths, and plan view files, etc.

The following pages contain the criteria files available for SCDOT projects.

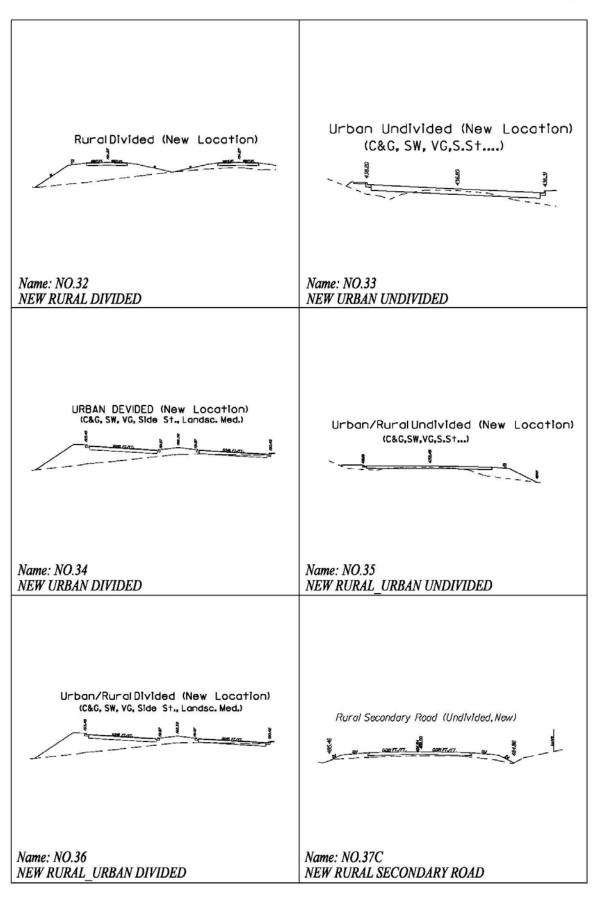




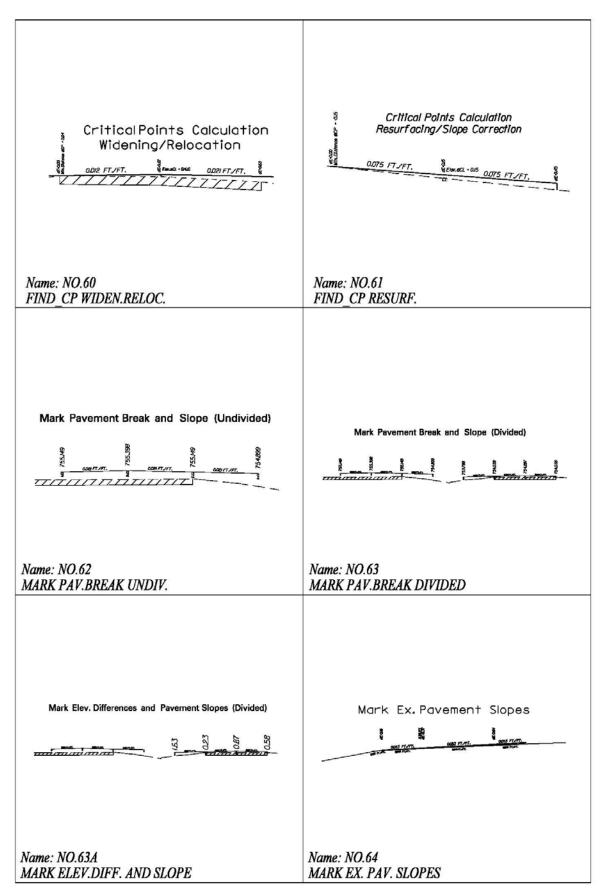




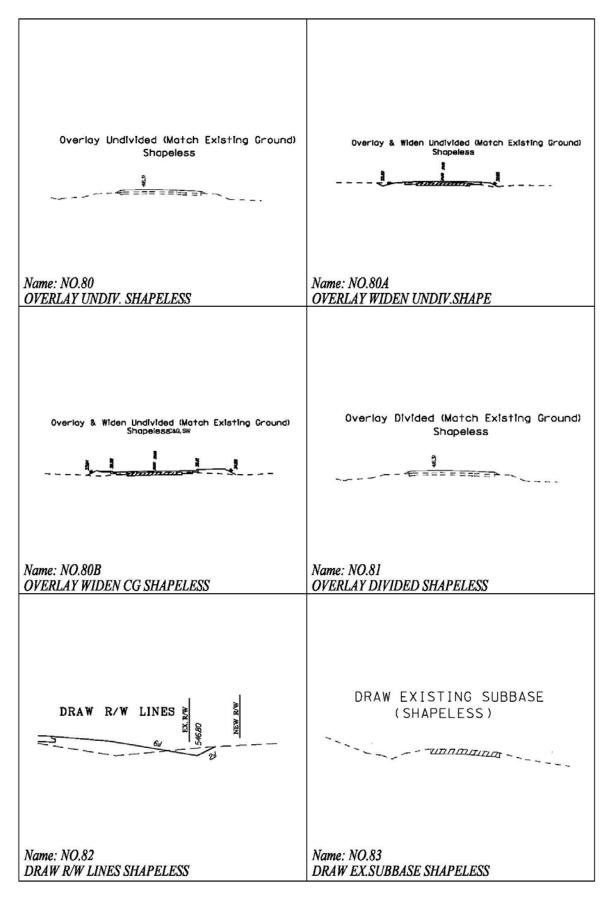




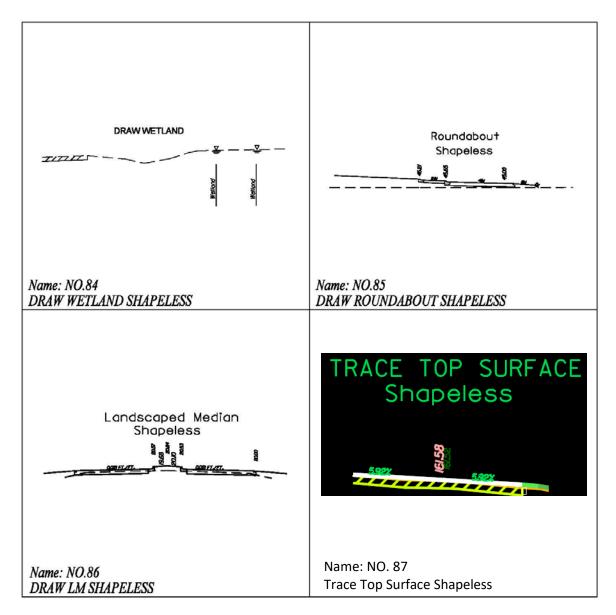












# Using Typical Section No. 05 (Urban/Rural Undivided) Widening with Cub & Gutter, Sidewalk, Valley Gutter options

Select the **Proposed Cross Sections** button in Project Manager.

Create a **Run > New**. In the **New Run Name** dialog, enter the Criteria File used for the alignment. If multiple typicals are used, enter additional information for criteria files, numbers, and stationing.

Run Modify	-	R to D to D to D	
Name:	s197		
Description	Criteria No. 5		
	<u>0</u> K	Cancel	
			Pag
			Page 138

To access this information later, highlight the Run and select **Run > Modify**.



Complete the **Proposed Cross Sections** dialog from top to bottom utilizing Working Alignment Influence runs when available.

XS DGN File:	Select the *dx.dgn file and tolerance set to 0.100
Pattern:	Toggle on Use Working Alignment Definition
Existing Ground:	Toggle on Use Working Alignment Definition
Shapes:	Toggle on Use Working Alignment Definition

```
Shape Clusters:
```

Select the Chain and Proposed Profile. Press the Add button.

📈 Proposed Cross Sectio	ns - s197			
<u>Fi</u> le				
XS DGN File Pattem Existing Ground	Chain S197	Tie/PGL 0.000000	Profile S197FP1	Typical
Shapes Shape Clusters Define DGN Variables				Thick Scan
Define Variables Plot Parameters Drainage	Chain: S197	Apply Profile at:	∛ Profile: <mark>S197F</mark> Tie ▼ 0.0000	
	Add	Modify De	elete Up	Down

Press the **Typical** button and scroll down to **highlight** the typical most applicable to the project. (If necessary, toggle to Apply to Stations and enter a station range to apply the typical. Apply to Whole Chain if the same typical runs from beginning to end.) Press the **Apply** button.

M Typical Sections		
Urba		alUndivided (Widening N,VG,S.St)
OF THE OF	0003 FT/FT.	55 67 67 67 67 67 67 67 67 67 67 67 67 67
Cell NO.01 NO.02 NO.03 NO.04	Description	Job Number: 132 Template Template Designed to Work with: 1 Shape Cluster Apply to Left Roadway
NO.04 NO.05 NO.06 NO.07 NO.07C NO.07D	RURAL_UR RURAL_UR VG ONLY U SECONDARY SECOND.OV	Range Apply to Whole Chain Begin Sta.: DP End Sta.: DP On Chain: S197 Select
		Apply



Define DGN Variables:

- Highlight Valley Gutter, browse to select the \*pp.dgn (or \*pd.dgn), and press Modify. Check that the symbology for the plan view graphics Valley Gutter line matches the Level Names and Colors specified – RD\_PD\_VG and ByLevel. If necessary, modify to match the plan symbology. If no VG exists, define the \*pp.dgn file anyway for the program to work – the criteria will skip this step if it does not find the necessary graphics. (This may also be your RD\_PD\_Final\_TrvIWay plan graphic.)
- Highlight Curb & Gutter, browse to select the \*pp.dgn (or \*pd.dgn), and press Modify. Check that the symbology for the plan view graphics Face of Curb line matches the Level Names and Colors specified – RD\_PD\_FOC and ByLevel. If necessary, modify to match the plan

Proposed Cross Sections - s197				
<u>Fi</u> le				
Unainage       By file:       Ali <ul> <li>Q</li> </ul> Variable Name:         VALLEY GUTTER         Level Symbology           DGN File:         C:\Users\nealf\Desktop\s197v42132pp.dgn         Q           Search Criteria         Values:         RD_PD_VG         C         Values:         Values:				
Styles:		is symbology an view graphics Modify		

symbology. If no C&G exists, define the \*pp.dgn file anyway for the program to work – the criteria will skip this step if it does not find the necessary graphics.

- Highlight Side Street in DGN, browse to select the \*pp.dgn (or \*sh.dgn or \*pd.dgn), and press Modify. Check that the symbology for the plan view graphics Side Street line matches the Level Names and Colors specified – RD\_PD\_SideStreet and ByLevel. If necessary, modify to match the plan symbology. This line is manually drawn across the intersections to be labeled in the cross sections as a side road tie in.
- Highlight Sidewalk, browse to select the \*pp.dgn (or \*pd.dgn), and press Modify. Check that
  the symbology for the plan view graphics Sidewalk line matches the Level Names and Colors
  specified RD\_PD\_SW and ByLevel. If necessary, modify to match the plan symbology. If no SW
  exists, define the \*pp.dgn file anyway for the program to work the criteria will skip this step if
  it does not find the necessary graphics.
- Highlight Existing Edge of Travel lane, browse to select the \*sh.dgn (or \*pd.dgn), and press Modify. Check that the symbology for the plan view graphics EOP line matches the Level Names and Colors specified – RD\_EX\_Road and ByLevel. If necessary, modify to match the plan symbology. Ensure this EOP line is the same line used to create the shape file and the retain existing pavement on the cross sections.

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Define Variables: **Highlight** the Variable, **enter** the correct value for the project, and press the **Modify** button to update for each.

Note: Pavement Thickness is the combined thickness for the surface, binder, and base. The Base Thickness is the base only.

Proposed Cross Sections - s197				
<u>F</u> ile				
XS DGN File Pattem	Variable milling thickness	Value 0	-	
Existing Ground Shapes Shape Clusters	pavement thickness base thickness	1.25 0.475		
Define DGN Variables Define Variables	shoulder width median shoulder width urban tie slope	8 8 2:1	-	
Plot Parameters Drainage	By file: All	Q		
Variable Name: base thickr Value: 0.475	ness		Q	
Add	Modify		~	



Note: To draw NPDES lines on XS or on Plan View, Change the 0 (no) to 1 (yes). Press the **Modify** button.

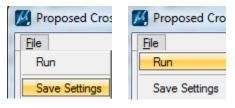
Proposed Cross Sections - s197					
<u>Fi</u> le	<u>Fi</u> le				
XS DGN File Pattern Existing Ground Shapes Shape Clusters Define DGN Variables Define Variables Plot Parameters	Variable ditch bottom width ditch profile It ditch profile rt median curb type draw npdes lines on xs draw npdes lines on plan view	Value 0 ditchlt ditchrt 1 0 1	4		
Drainage     By file:     All     Q       Variable Name:     draw npdes lines on plan view     Q       Value:     1     Q       Add     Modify					

# Plot Parameters: Toggle on **Pavement Shapes**. Set the Symbology for **Cross Section Lines** by double clicking on the symbology box. Toggle on **Line Text** and set the symbology by double clicking on the symbology box.

Proposed Cross Section:	s - s197	Set Feature
<u>F</u> ile		Symbology
XS DGN File Pattem Existing Ground Shapes Shape Clusters Define DGN Variables Define Variables	Cross Section Lines:	Level:       RD_XS_PaveOvlay         Color:       ByLevel         Style:       (0) ByLeve         Weight:       (6) ByLeve         OK       Cancel
Plot Parameters Drainage	Baseline Name Text	Set Feature
Plot Pavement Thickness Fill Gaps between Clus Transition Definition Intersect between Clu Process Clusters as In Remove Skewed Effe Process Only Sections	Apply Shape Transition Codes  sters dicated ct	Symbology Level: RD_XS_TX_Bev_PF Color: ByLevel Weight: (4) ByLeve Text Preferences Th: 0.800 Tw: 0.800 Tw: 0.800 Tw: 0.200 Tw: 0.200
Pavement Shapes	-	<u>O</u> K Cancel

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#### Select File > Save Settings and select File > Run



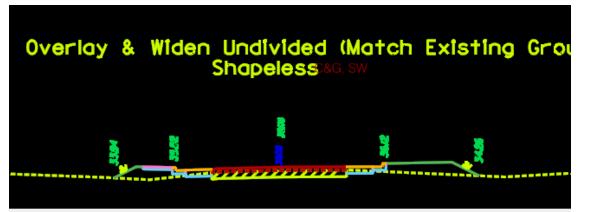


On the dialog, enter a \*prxs.txt name to **Output** the cross section file as an input statement to be edited at a later time. Press the **Apply** button to process the cross sections.

M Proposed Cross Section	×
Output	
To Log File ▼ s197_prxs.inp	
Pause On Each Section	
Criteria Viewer	Apply
Disable View Update	

#### Using Typical Section No. 80B "Overlay and Widen Undivided (Match Existing Ground Shapeless C&G SW"

Set up a run in the **Proposed Cross Sections** tab in Project Manager. The typical cell is name is "No. 80B'. This typical can be used in many different situations. In this example, typical 80B will be used to add 12' of new pavement with 10' sidewalks and C&G. This will be done on the left side of the road only. Below is a picture of typical 80B.



One of the benefits of typical 80B is the ability to match existing pavement slope. In this example the typical will match the existing pavement slope and add the new 12' of pavement with Sidewalk and C&G. The Shapes tab in the Proposed Cross Section run can be set to Shapeless. (the sh.dgn is required.)

🔀 Proposed Cross Sections - SC48 📃 💻 🗙				
Use Working Al	ignment Def	inition		
	Use Working Al	Use Working Alignment Def		

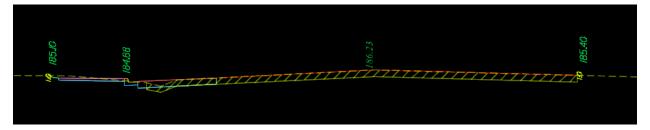
In the Define Variables tab, the designer has the ability to set tasks for specific needs of the project. In our situation, we need multiple tasks set. They are:

- a. Extend additional 12' feet of pavement to the left side of the roadway
- b. Set the sidewalk to 10', not the standard 5'
- c. No overlay, so set this to 0 (this is where you can set the overly thickness)
- d. New pavement thickness of 1.0'



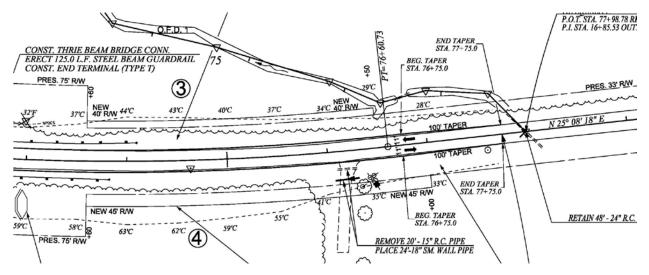
<u>Fi</u> le			
XS DGN File	Variable	Value	-
Pattern	overlay thickness	0	=
Existing Ground	milling thickness	0	=
Shapes	extent pavement width left	12	
Shape Clusters	extent pavement width right	0	
Define DGN Variables	pavement thickness	1.0	
Define Variables	base thickness	0.67	-
Plot Parameters Drainage	By file: All	Q	
Variable Name:			
Value:			Q
Add	Modify		

The end result of this Proposed Cross Section run is shown below.



# **Geopak Criteria to Place Right of Way on Cross Sections**

In the \*pp design file, draft and verify the existing and proposed new right of way lines on the appropriate levels, **RD\_EX\_RW** and **RD\_PD\_RW**.



Open the \*dx design file. Open the Project Manager file and select the **Proposed Cross Sections** button.

Select **Run > New** and enter a run name. Press **OK** to continue. Highlight the newly created run and press the **OK** button.

On the XS DGN File option, select the \*dx design file that you are currently in.



On the Pattern and Existing Ground options, select the **Use Working Alignment Definition** if defined. (Manually set them if they are not defined.)

On the Shapes option, set the drop down to Shapeless.

XS DGN File	🔲 Use Working Alignment Definitic
Pattern	Shapeless 🗸
Existing Ground	
Shapes	

On the Shape Clusters Option, select the Chain and Profile and press the Add button.

<u>Fi</u> le				
				_
XS DGN File	Chain	Tie/PGL	Profile	1
Pattern	S58	0.000000	S58FP	Typical
Existing Ground				
Shapes				Thick
Shape Clusters				
Define DGN Variables				_
Define Variables	Chain: S58	<b>1</b>	Profile: S58FF	>
Plot Parameters		•••	FIUNE. 330FF	
Drainage	, All All All All All All All All All Al	Apply Profile at: T	ie 🔽 0.000	000
	Add	Modify Dele	ite Up	Down

With the Chain highlighted at the top, press the **Typical** button. Scroll down and select template **No. 82 Draw R.W. Shapeless** and press the **Apply** button.

Chain	Tie/PGL	Profile	
S58	0.000000	S58FP	Typical
			Thick
			Scan

On the Define DGN Variables option, highlight the *proposed rw in dgn* line item. At the bottom, **select** the \*pp design file and press the **Modify** button to accept. Highlight the *existing rw in dgn* line item and at the bottom, **select** the \*pp design file and press the **Modify** button to accept.

to accept.

🦉 Typica	Sections		
	DRAW R/	W	LINES DO DA DE DA DE DA DE
			Real Provide American State
Cell	Description	^	Job Number: 390 Template
NO.80B	OVERLAY WIDEN CG SHAPELES		Template Designed to Work with: 1 Shape Cluster
NO.81	OVERLAY DIVIDED SHAPELESS		
NO.82 NO.83	DRAW R/W LINES SHAPELESS DRAW EX.SUBBASE SHAPELES	c .	Apply to Left Roadway 💌 Description
NO.83	DRAW EX.SUBBASE SHAPELES DRAW WETLAND SHAPELESS	3	Rance
NO.85	DRAW WETLAND SHAFELESS DRAW ROUNDABOUT SHAPELE	ss	
NO.86	DRAW LM SHAPELESS	-	Apply to Whole Chain 💌
NO.87	TRACE TOP SURFACE SHAPELE	ss 🗐	Begin Sta.: 1750 DP End Sta.: 2300 DI
•	III	Ψ 	On Chain: US25R Select
			Apply

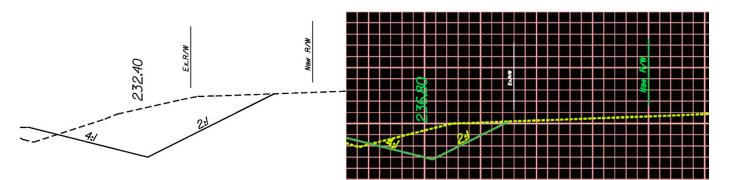
On the Plot Parameters option, turn off all of the checks. Select **File > Save Settings** and then select **File > Run** to process the right of way on cross sections.

🖌 Proposed Cross Sections - RW				
<u>Fi</u> le				
XS DGN File Pattern Existing Ground Shapes Shape Clusters Define DGN Variables Define Variables Plot Parameters	Variable proposed rw in dgn existing rw in dgn	DGN \r31937pp.dgn \r31937pp.dgn		
Drainage	By file: All	✓ Q		
Variable Name: existing	rw in dgn	Level Symbology 💌		
DGN File: C:\3193	7\r31937pp.dgn			
Lv Names: R	D_EX_RW			
Lv Numbers:	1			
Colors:	1			
Styles:	*			
Weights:				
Types:	1	Add		
Match Di	splay Reset	Modify		

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**Verify** the stationing and the existing/proposed right of way lines on the cross sections for distance and location versus the drafted lines in the \*pp design file. Verify the newly placed text in the \*fx design file.



Note: If the RW is referenced in the \*prop.dgn file or another dgn, be sure to select it instead of the \*pp.dgn file in the Define DGN Variables step above.

Note: If transitional RW exists and there are two lines in the \*pp at the same instance of pattern lines, the outer most RW line will be drawn.

Note: If running this process after cross section sheets have been processed, the New R/W limits may not show up on the sheets due to the original cross section clip limits. You can either reprocess the cross section layout sheets or you can re-clip the references for the cross sections (see page 17).

## **Draw Ancillary Features (with Profile Grade Report)**

The Draw Ancillary Features is a powerful tool to draw elevation text, cells, and lines for medians, NPDES, right of way, guardrail, or other ancillary data onto cross sections or profiles. It checks for features that intersect the profile or cross section and draws them at the specified elevation by intersecting the exact profile elevation or the tin elevation.

To access the Draw Ancillary Feature dialog, select **Applications > Geopak > Road > Cross Sections > Draw Ancillary Features**.

On the Draw Ancillary Features Dialog, under **Update Options**, set the Option to Query. This will prompt you to delete previously drawn elements and redraw on top of existing elements if this is the first instance the elements are drawn.

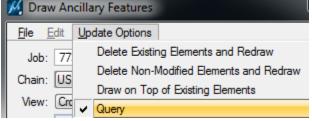
### Update Options

**Delete Existing Elements and Redraw** – deletes all previously drawn elements (modified and non-modified) and redraws the elements.

**Delete Non-modified Elements and Redraw** – deletes only the non-modified elements and redraws the elements

**Draw on Top of Existing Elements** – does not delete any existing elements and draws the elements into the file.

**Query** – pops up a dialog each time to choose the desired option each time the Draw button is processed.



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## Search Criteria for Draw Ancillary Features

#### Intersecting Elements – Horizontal Criteria

**Chain** – Uses the COGO chain in the GPK file to determine the horizontal location of the ancillary feature.

Intersecting Elements		
Chain 🔻	US25R 🗸	1.15

**Level Symbology** – scans the designated design file and locates the elements specified by the symbology if it crosses the profile or cross section cell. The location of the graphical element is used to determine the horizontal location of the ancillary feature.

Intersecting Elements			
Level Symbology 🔹	$\sim q$	Display	
DGN File: r36773pp.dgn			Q

### **Intersecting Elements – Vertical Criteria**

**COGO Profile** – determines the elevation from the intersecting horizontal location defined above with the COGO Profile

Intersecting Elements		
Chain 🔹	US25R	<b>→</b> 12
Cogo Profile:	US25RFP	<b>•</b>

**Extract Elevation Tin** – elevation is determined from the existing ground tin file at the horizontal location defined above. Browse to select the \*.tin file.

V Extract	Elevation	TIN 🔻	Vertical Offset:	0.50	
TIN File:	33905.tin				] Q

**Level Symbology** – scans the limits of the cross section cell and uses the intersecting elevation of the graphical element in the cross section file as it intersects with the horizontal location defined above.

Extract Elevation	Level Symbology	<ul> <li>Vertical Offset:</li> </ul>	0.50
Search Criteria:		Display	

**Vertical Offset** – the vertical offset draws the element at the specified height or depth from the determined elevation

Vertical Offset: 0.50

## Display Settings for Draw Ancillary Features

Cell – draws a specified cell to represent the ancillary feature Display Settings

**Symbology** – activating this and defining will overwrite the symbology of the specified cell

**Scale** – scale used for cell placement

Display Settings		
Cell 🔻	ExRWMarker	Q 🔲 🔤
Scale: 1.00	Apply Vertical Exagg	eration
Justification: Orig	jin 🔹	

Apply Vertical Exaggeration – will distort the cell scale if elements are not drawn 1:1

Justification – sets the justification of the cell placement as defined.



Symbol – Select the desired symbol from the list to draw Symbology – defines the symbology of the symbol Justification – sets the justification of the symbol

placement as defined.

Width – Defines the width of the symbol

Height – Defines the height of the symbol

**Text** – places text labels as defined; both calculated or manually specified

Symbology – defines the symbology for the text

Angle - defines the angle of the text placement

Query - Allows selection of predefined calculated variables

Label - inserts the selected Query value or allows manual entry of text to be placed.

## File Options

On the Draw Ancillary Features Dialog, there exists **File Options** for saving settings for the project and quickly creating settings files for new projects.

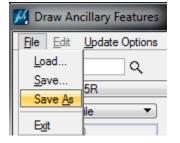
### **File Options**

Load – Loads a previously saved setting file (\*.afd)

Save – Saves the dialog settings into a settings (\*.afd) file

Save As - Saves the dialog settings into a new settings (\*.afd) file

**Exit** – Exits the dialog



In the workspace, there exists a **project.afd** file preconfigured with several options which can be quickly modified to specific projects. Select **File > Load** and navigate to the project.afd file in this folder:

\\nts\hq\CaddStandards\SCDOTBentley\Standards\SCDOT Design\Geofiles\Labelers

The dialog will look similar to the image below. Select the correct **Job #, Chain, and Station range** below. Change the View to **Cross Section** if in the \*dx.dgn file.

🌠 Draw Ancillary Fea	atures		
<u>Fi</u> le <u>E</u> dit <u>U</u> pdate O	ptions		
Job: 773 Chain: US25R View: Cross Section Offset: 0.00	Q 	Label Scale: 1.0 Station Range Begin: 413+00 End: 651+50	0.00
Element Type	Elevation	Display Settings	Drav 🔺 🥁
Lv: RD/ 3-4,16 Lv: RD_PD_RW, Lv: RD_PD_Pave Lv: RD_PD_Final	Lv: RD	Cell = New RW MARKER Symbol =	
•			•
Intersecting Elements       Level Symbology     Display       DGN File:     r26869anc.dgn			
Extract Elevation	Level Symbo	ology  Vertical Offset:	0.50
Search Criteria: Display			
	RWMarker Apply Vertica	al Exaggeration	

 Display Settings

 Symbol

 Justification:

 Width:

 Fixed

 Height:

 Fixed

 10.00



1 10 1 T 1
Insert Computed Text
station
offset
elevation
depth
skew angle
chain
region
profile
survey chain
feature
intersecting station
intersecting region
reference elevation
numeric adhoc attribute
string adhoc attribute
unit adhoc attribute
quantity adhoc attribute
remarks adhoc attribute



Line by line in the Element Type box, edit the **Level Symbology** and **Search Criteria** for the project specific settings. Select the correct **DGN File** for each item. Press the **Modify** button for each line as changes are made.

Example: The 1<sup>st</sup> line draws the Existing Right of Way onto cross sections.

For Level Symbology of Intersecting Elements, ensure your project meets the Cadd Standards for RD\_EX\_RW and line style R/W or Property – modify if necessary. For Extract Elevation – Level Symbology, ensure that it is set to RD\_XS\_ExGround or RD\_XE\_Ground.

📕 Intersecting Element Sy 🗕 🗖 🗙	📕 Extract Element Elev Sy 💻 🗖 🗶
🔽 Lv Names: RD_EX_RW 🎽	V Lv Names: RD_XE_Ground
🔲 Lv Numbers: 📉 🏷	Lv Numbers: 2
Colors: ByLevel	Colors: ByLevel 🔁
Styles: R/W OR PROPERT	V Styles: ByLevel 🔁
✓ Weights: ByLevel	✓ Weights: ByLevel *
V Types: 3-4,16	▼ Types: 3-4 *
Match Display Reset	Match Display Reset

Browse to select the correct DGN File and press the Modify button to accept changes.

Element Type	Elevation	Display Settings	Drav	*	*
Lv: RD/ 3-4,16	Lv: RD	Cell = ExRWMarker		=	
Lv: RD_PD_RW,	Lv: RD	Cell = New RW MARKER			년
Lv: RD_PD_Pave	Lv: RD	Symbol =	<b>V</b>		×
Lv: RD_PD_Final	Lv: RD	Symbol =		÷	$\cap$
•	111		*		
Intersecting Elements					
Level Symbology	) <u>~~</u>	Display			
DGN File: r36773pp.dgn Q			Q		

**Repeat for each line under Element Type**. Some Level Symbology will need to be set to the Earth Shoulder or Pavement Overlay levels in the cross section files.

Turn on the **Draw** toggle for each element to be drawn. Turn off the Draw box for those to skip at this time.



Press the **Draw** button at the top to draw the features into the Cross Section file.

After completing the dialog for the project, select **File > Save As** to save the updated settings into an \*.afd settings file in the project working directory.

File name:	r42131.afd
Save as type:	*.afd

This can be reloaded for reprocessing or use on other projects in the future by selecting **File > Load**.



#### For Ditch Labeling on Existing Cross Sections:

The User Preferences dialog will control the number of decimal places for the elevation text. Select **Applications > Geopak > Road > User Preferences** to set the Output Accuracy to **2 decimal places**.

W User Preferences	
Unit System: English 💌	Output Accuracy Distance: 99.12
Coordinates: NE 💌	Station: 9+99(9).12
Direction: Bearing	Angle Seconds: 9^9'9.12"
Station: 12+34	
Working Directory:	۹.
<u>F</u> eature Preferences	Show this dialog at startup
COGO Preferences	
<u>O</u> K	Cancel

Note: The process outlined below can be used to find the low point elevation on any criteria element in the cross section to create chains and profiles and subsequently label the elevations on the cross sections. It is not limited to only existing ditch elevations. It could also be used to label ditches in the middle of a divided highway, etc.

In the \*dx.dgn file, select **Applications > Geopak > Road > Cross Sections > Reports**.

On the Reports dialog, press the Profile Grade button, and complete the dialog as shown below. Set the Existing and Proposed Ground line to match the existing ground in the cross sections.

Press the **Apply** button to store the chains and profiles into the gpk file and output to an inp file.

[Note: this locates the lowest elevation ditch point. If more than one ditch exists left or right, this will locate the lowest ditch bottom.]

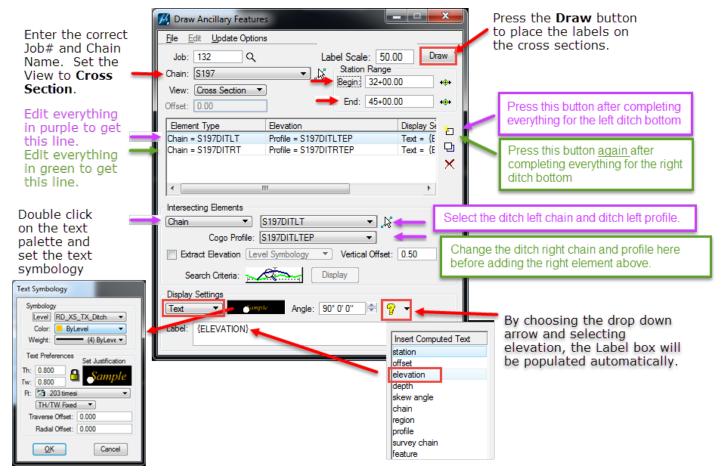
Enter the	14 Profile Grade Report	X Existing Ground Line
correct Job#		🛛 🔽 Lv Names: RD_XS_ExGround 🎽
and Chain		Lv Numbers: 1
name 🗕	Chain: S197   Profile S197EP	Colors: 1
	Begin Station: 32+00.00 R 1 32+00.00 R 1	Styles:
	End Station: 45+00.00 R 1 45+00.00 R 1	Weights:
	Search Criteria	Match Display Reset
	Existing Ground Line: Display	
Toggle Criteria	Proposed Finish Grade: Display	Proposed Finish Gr
Elements 🔿	Report Options: Criteria Elements 🔻	🛛 🛛 🕹 🕹
	Low Point	Lv Numbers:
Choose a	Store Horizontal Alignment	Colors:
begin point#	Beginning Point Number: R500	Styles:
that isn't in the gpk with	Left Chain: s197ditLT Enter the	ditab
a "R" prefix	Right Chain: s197ditRT chain nam	Iviaton Uispiav Keset I
a it promit	Store Vertical Alignment	
	Left Profile: s197ditLTep      Enter the c	litab
	Station Design Alignment	
	Right Profile: s197ditRTep - left and rig	
	Station Design Alignment	
This creates a		
text file with	Pause on Each XS	
the station	ASCII File: s197ditch_profiles.inp	<u> </u> द
and elevation info.	Apply	
	Page	



**Close** the Profile Report dialog, and verify the chains and profiles were created in the COGO > Navigator tool. Describe the chains and profiles to review.

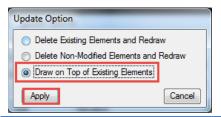
COGO Key	y-in: PR	INT PROFILE S19	7DITLTEP			
<*	3	PRINT PROFI	LE S197DITLI	TEP		Navigator(132) Select Tools
Beginn	ning pr	ofile S197DI	\			🦎 🗙 📑 id 📥 📄 Element : Profile 🔻
		STATION	ELEV	GRADE	TOTA	Name OFDEP
VPI	1	32+00.00	419.2073			S125EP S125REP
VPI	2	33+00.00	420.8890	1.6816		S125RFP S197CP
VPI	3	34+00.00	428.3140	7.4251		S197DITLTEP S197DITRTEP S197EP

Select **Applications > Geopak > Road > Cross Sections > Draw Ancillary Features** and complete the dialog as shown below:



After pressing the **Draw** button, select **Draw on Top of Existing Elements** and press the **Apply** button.

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Use COGO Cross Section Navigator to review the ditch elevation text placed on the cross sections.



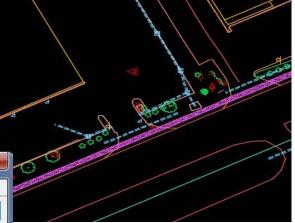
### For Ditch Elevations on Existing Cross Sections and Sidewalk Cell placement:

Note: The process outlined below was used on a sidewalk project to tie into the existing ground elevation with a sidewalk cell template to keep from manually drawing each cross section.

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The Chain depicted in the example below is a chain stored graphically from the front of sidewalk line in the \*pp.dgn file.

Select Applications > Geopak > Road > Cross Sections > Draw Ancillary Features and complete the dialog as shown.



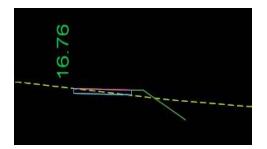
Set the toggle to Cell and browse to select the sidewalk cell.

Press the **Draw** button to draw the cell onto the cross sections.

<u>File E</u> dit <u>U</u> po	late Options				
Job: 139 Chain: ACB View: Cross S Offset: 0.00	Q ection	، پر 💌	abel Sca Station Begin: End:	ale: 50.00 Range 143+50.00 196+99.42 R 2	Draw
Element Type	Elevation	Display Settin	gs	Draw	] ,
Chain = ACB	Tin = 42139.tin	Cell = SW_P		V	Ę
					>
Intersecting Eler Chain	▼ ACB			• 1%	>
Chain	ACB     ACB     Profile: ACB     ACB     ACB     ACB		Vertica	▼ "b% ▼ I Offset: 0.00	)

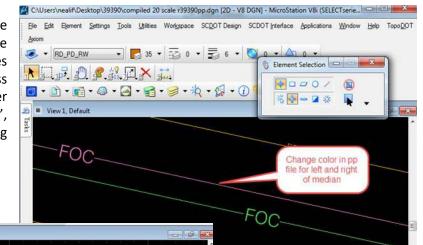


### The back slope will need to be drawn manually to tie into existing ground.



**For Medians,** run the Draw Ancillary Features **twice** to draw the elevation text on both sides of the left and right sides onto the cross sections.

Change the **color** symbology in the **\*pp.dgn** file for the left and right of the median. Set the Draw Ancillary Features as shown below and run the process twice for the left and right side. After running the text "**MEDRT**" and "**MEDLT**", extract it as a profile into the gpk using the **Profile Grade Report** tool.

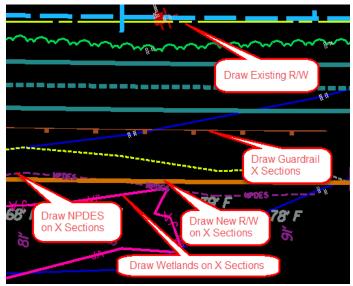


			FOC	
×	📈 Draw Ancillary Features			
学生また 🗟 🖷	Ele Edit Update Options	Use Draw Ancillary under		
S 1 2 2 2 4 1 1	Job: 390 Q Label Scale: 1.00 Draw Chain: [S33RELOC V Station Range	Cross Sections		
$\mathbf{x} = \mathbf{y} = \mathbf{x} = \mathbf{y} = \mathbf{z} + \mathbf{z}$	View: Cross Section   Begin: 250+00.00 +9+			
	Offset: 0.00 End: 257+00.00 +6+		12.6 .	Microso 8
n n a stat at n n	Bement Type Bevation Display Settings Draw	Change Attributes - Main Task		
		e 🔮 🖬 🖻 🧏 🦧 e <sup>e</sup> e <sup>o</sup>		
		1967 - 67 - 68 - 18 - 18 - 18 - 18		
a a a a a a				
	Intersecting Bements			
	DGN File: compiled 20 scale r39390pp dgn Q	Set this symbology to RD PD FOC and color		
	Extract Elevation Level Symbology     Vertical Offset: 0.00	for left - do again for right		
	Search Criteria:			
	Disolay Settinos			
	Test	Set this symbology to the median in the xsection		
7	Label: MEDRT	median in the Ascenti		
		A solution to a second to second and the		
		and color/size - press		
	the second se	for the other side		
e e fe a e a consta				

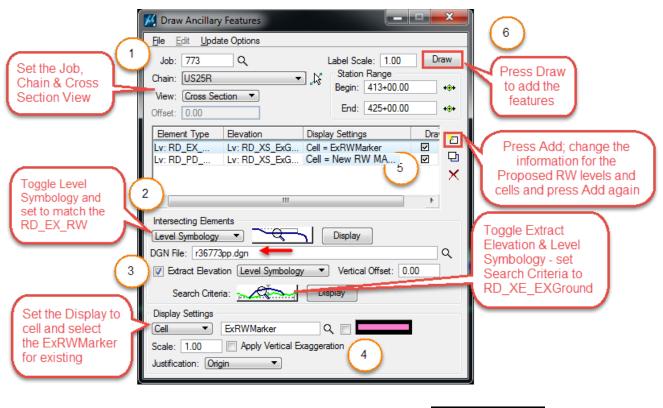
#### SCDOT ROADWAY CADD MANUAL



The **Draw Ancillary** tool can also be used to label criteria features after that fact. **Right of Way** markers and **Guardrail** on the cross sections after criteria files have already been processed. It can also mark **NPDES** lines and **Wetlands** on cross sections. (Actually, it can mark anything on the cross sections based on a graphical 2d line in the plan view intersecting with a cross section element or existing ground elevation.)



**To draw Existing and/or Proposed Right of Way**, set the Draw Ancillary Features tool as shown below: (Note, you can combine the steps for Right of Way, Guardrail, NPDES, etc. into one process and save as an \*afd file as shown in the first documentation above regarding the preconfigured project.afd.)



Be sure to use the NEW RW Marker and not the PR.RW Marker cell.



To draw Guardrail, set the Draw Ancillary Features tool in a similar fashion as above, only for the:

Level Symbology, specify Styles to distinguish between left and right guardrail.

📈 Intersecting Element Sy	🔀 Intersecting Element Sy
🔽 Lv Names: RD_PD_GR 🎽	Lv Names: RD_PD_GR
📃 Lv Numbers: 🚬 🎽	📄 Lv Numbers: 📩 🎽
🔽 Colors: ByLevel 🎽	Colors: ByLevel 🔁
Styles: NEW GR LT,ByLev 🏷	V Styles: NEW GR RT, ByLev 2
☑ Weights: ByLevel	♥ Weights: ByLevel *
V Types: 3,16	▼ Types: 3,16 *
Match Display Reset	Match Display Reset

For the Extract Elevation, Level Symbology – Search Criteria, select the RD\_XS\_EarthShd level (both sides)

📈 Exte	ract Element	Elev Sy	x
	Lv Names:	RD_XS_EarthShd	2
	Lv Numbers:		2
<b>V</b>	Colors:	15,ByLevel	2
<b>V</b>	Styles:	0,ByLevel	2
<b>V</b>	Weights:	6,ByLevel	2
	Types:	3-4	2
Match Display Reset			

For the Display Settings – Cell, select the GRAIL\_LT\_1 and GRAIL\_RT\_1 for left and right, respectively.

Cell	GRAIL_LT_1	٩
Display Settings	GRAIL_RT_1	٩

**To draw NPDES lines on cross sections**, set the Draw Ancillary Features tool in a similar fashion as above, only for the:

Level Symbology, specify the RD\_PD\_DR\_ErosCtrl level to locate the NPDES line in the \*pp.dgn file.

Lv Names:	RD_PD_DR_ErosCl 🔁
Lv Numbers:	2
Colors:	ByLevel 🔁
Styles:	ByLevel 🎽
Weights:	ByLevel 🔁
Types:	3-4 🞽
Match	Display Reset

For the Extract Elevation, Level Symbology – Search Criteria, select the RD\_XS\_ExGround level (both sides)

📕 Extract Element Elev Sy 💶 💷 💻 🎫				
	Lv Names:	RD_XS_ExGround	*	
	Lv Numbers:		2	
<b>V</b>	Colors:	ByLevel	2	
<b>V</b>	Styles:	ByLevel	2	
<b>V</b>	Weights:	ByLevel	2	
<b>V</b>	Types:	3-4	2	
Match Display Reset				

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For the Display Settings – Cell, select the NPDES cell.

Display Settings		
	NPDES	٩,

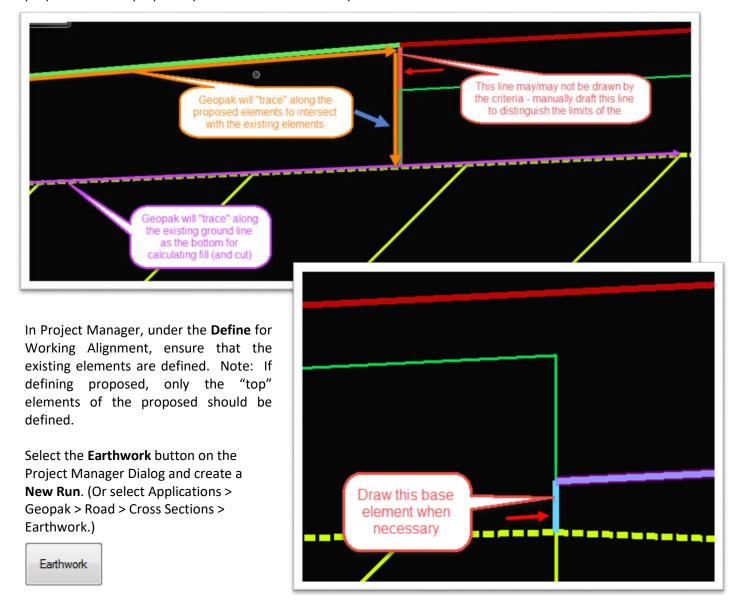


## **Earthwork**

Geopak calculates earthwork using the Average End Area Method by comparing the proposed and existing graphical elements in the cross section file. Cut and Fill quantities are determined based on defined symbology search criteria.

This tool can also be utilized to calculate subgrade, buildup, undercut, unsuitable materials and other types of volumes based on defined symbology. Shrinkage and expansion can be applied, skip areas for bridges, and ignore areas can be used to control the calculation of earthwork in certain areas of the project.

The elements in the cross sections will need to be **"traceable"** by Geopak. To calculate cut and fill between existing and proposed elements, there must exist a clear path along the bottom elements and the top elements. At times, manual drafting of a "line" must be drawn to complete the shapes on the proposed base or proposed pavement near the buildup line.



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**XS DGN File**: Select the \*dx.dgn file and appropriate station range.

Gearthwork - US25r	
<u>Fi</u> le	
XS DGN File	XS DGN File: lift\Desktop\36773\us25rdx.dgn Q
Soil Types	Tolerance: 0.010000
Earthwork Shapes Output Format	Vertical Search Distance: 500.00
Add/Subtract Volume	Baseline: US25R
Centroid Adjustment Skip Areas	Begin Station: 413+00.00 R 1
Ignore Areas	End Station: 42500
Sheet Quantity	

The tolerance checks that intersecting graphical elements are closed within the tolerance 0.01 in this case.

**Soil Types**: Add the appropriate symbology for the existing and proposed ground elements and press the Add button.

Toggle **Existing Ground** and enter a Soil Type – "A2-4". [Do not enter any spaces or special characters in the Soil Type name or Geopak will crash.] Toggle "Use Working Alignment Definition" if defined, if not defined, set the Lv Names to **RD\_XS\_ExGround** by Matching the elements in the \*dx.dgn file. Press the Add button to add the Existing Ground to the list.

🥂 Earthwork - US25r	
<u>Fi</u> le	
XS DGN File Soil Types Earthwork Shapes Output Format Add/Subtract Volume Centroid Adjustment Skip Areas	Soil Type Items Existing Ground
Ignore Areas Sheet Quantity	Search Criteria
Class Existing Ground   Soil Type: A2-4	] 🕢 Lv Names: RD_XS_ExGround 🏾 🗂
Multiplication Factors	Lv Numbers:
Roadway Excavation: 1.000	Colors:
Subsoil Excavation: 1.000 Fill: 1.000	Styles:
	✓ Types: 3-4 👋
	Match Display Reset
Add	Delete Modify

Note: If a closure report was run to tie existing ground, these levels will also need to be selected.



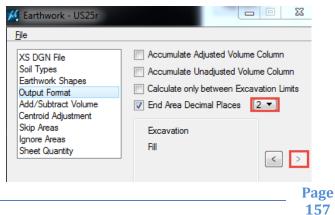
Toggle **Proposed Grade** and enter a Soil Type – "A2-4". Toggle "**Use Working Alignment Definition**" if defined, if not defined, set the Lv Names to **RD\_XS\_ExGround** by Matching the elements in the \*dx.dgn file. Press the **Add** button to add the Existing Ground to the list.

🥖 Earthwork - US25r		x
<u>Fi</u> le		
XS DGN File Soil Types Earthwork Shapes Output Format Add/Subtract Volume Centroid Adjustment	Soil Type Items Existing Ground Proposed Finish Grade	
Skip Areas Ignore Areas Sheet Quantity Class Proposed Finish Grad ▼	Search Criteria	
Soil Type: A2-4	✓ Lv Names: RD_XS_TieSlope,RD_X	<b>浩</b>
Multiplication Factors Roadway Excavation: 1.000 Subsoil Excavation: 1.000 Fill: 1.000	Lv Numbers: Colors: 12,14-16 Styles: Weights:	11 12 13 13 13 13 13 13 13 13 13 13
1 m. [1.000	Types: 3       Match       Display       Reset	
Add	Delete Modify	

Earthwork Shapes: Toggle on Draw Earthwork Shapes and double click to set the symbology.

📈 Earthwork - US25r 📃 🗖 🗙	Set Feature
File         XS DGN File         Soil Types         Earthwork Shapes         Output Format         Add/Subtract Volume         Centroid Adjustment         Skip Areas         Ignore Areas         Sheet Quantity	Symbology Level: RD_XS_EwShp ▼ Color: ByLevel ▼ Style: (0) ByLeve ▼ Weight: (0) ByLeve ▼ OK Cancel

**Output Format**: Set **End Area Decimal Place** to 2 and press the Next button until only **Excavation and Fill** are displayed.



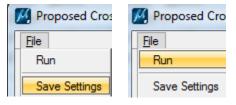


Skip the next 4 steps unless you need to enter the station ranges for a bridge for Add/Subtract Volume, Centroid Adjustment, Skip Areas, and Ignore Areas.

**Sheet Quantity**: Toggle on Write Sheet Quantities File and enter a file name \*ew.txt file. Change Decimal Places to 2 and Total Quantity Length to 10. Toggle the bottom area to complete the box as shown below. [Note: Use the outputted \*EW.txt file to process in the EWBS program documented in a subsequent chapter. This file should not be used on the cross sections. The EWBS VXT output should be used instead.]

Earthwork - US25r			-			<b>Column 1</b> – set to Excavation End Areas
XS DGN File Soil Types Earthwork Shapes Output Format	ASCII	irite Sheet Quan File: US25R_ al Places 2	EW.txt	Total Quantity Length	Q 10 ▼	(cut) <b>Column 2</b> – set to Excavation Adjusted
Add/Subtract Volume Centroid Adjustment Skip Areas Ignore Areas Sheet Quantity	1 2 3 4	mn Soil Type A2-4 A2-4 A2-4 A2-4 A2-4 A2-4	Common Exc Common Exc Fill Fill	Quantity Type End Area Adjusted Volumes End Area Unadjusted Volume Unadjusted Volumes te Modify	+/- + + + + + + *	Volumes <b>Column 3</b> – set to Fill End Areas (embankment) <b>Column 4</b> – set to Fill Unadjusted Volumes

Select File > Save Settings and select File > Run to process the Earthwork.



Toggle **Output** To Log File and enter a file name. Press the **Apply** button.

K Earthwork	×
Output	
To Log File ▼ us25r_ew.log	
Pause On Each Section	
Interactive Error Checking	Apply
Disable View Update	

Use the Cross Section Navigator to review the earthwork calculations provided. Be sure to check the areas around the buildup and base.



Turn OFF the RD\_XS\_EwShp level and select File > Save Settings (or Ctrl + F). This keeps the shapes from plotting on the cross section sheets.



## **Limits of Construction**

The Limits of Construction tool draws graphical linear elements into the \*pp file for plan production by determined the tie point of the proposed roadway and existing ground in the cross section. They are used to depict the project limits. The cut and fill offset values are also labeled from the cross section to the plan view.

Select the Limits of Construction button on the Project Manager dialog and create a New Run. (Or select Applications > Geopak > Road > Cross Sections > Limits of Construction)

Select the Job #, Chain, and appropriate Station range. Browse to select the \*pp.dgn design file.

Click on the **Existing Ground Line** and set to the RD\_XS\_ExGround symbology. (This will be preset if Use Working Alignment is checked on.)

Click on the **Proposed Finish Grade** and match the "top" elements of the proposed finish grade. [Include the RD\_XS\_TieSlope level as this is the primary level it will be looking to intersect with the existing ground. Also, add the symbology for the top and front of the curb and top of pavement if not already included.]

Select Outer Tie Downs.

📈 Limits of Construction - us25r 🛛 🗖 🔼 🗶	📈 Existing Ground Li 💶 💷 💻 🎫	
Job: 773 Q Tolerance: 0.01000( Chain: US25R	Lv Names: RD_XS_ExGround *	Change the Tolerance to a lower setting
Current Station: 413+00.00 R 1	Colors:	like 0.01 if
Begin Station: 413+00.00 R 1 413+00.00 R 1	📄 Styles: 🎽	elements are
End Station: 651+50.00 R 2 651+50.00 B 2	Weights:	having problems
Plan DGN File: s\nealif\Desktop\36773\r36773p.dgn Q	Match Display Reset	connecting.
Existing Ground Line: Display		
Proposed Finish Grade: Display	👫 Proposed Finish Gr 💻 💻 🗙	
Plot Parameters Radius of Display: 5.000000	✓ Lv Names: D_XS_TieSlope,RD ★	
Tie Down Option: Outer Tie Downs	📄 Lv Numbers: 🚬 🎽	
Apply	V Colors: 12,14-16	
Арріу	🔲 Styles: 🎽	
	🔲 Weights: 🌅 🎽	
	Match Display Reset	

Press the Plot Parameters button. Double click to set the Cut symbology.

🕺 Plot Parameters for Limi 🗖 🔲 🔀	Set Feature
Cut     Fill     Transition       Image: Construction Limit     Offset from CL        Label Plot Parameters       OK     Cancel	Symbology Level: RD_PD_CstnLmt Color: ByLevel Style: (2) ByLeve Weight: (2) ByLeve OK Cancel
	159



Right click on the Cut symbology and select **Copy**. Right click on both the **Fill and Transition** symbology and select **Paste**.

Cut	Fill Dialog By Current By Element	Fill	Dialog By Current By Element	Transition	Dialog By Current By Element
ок	Copy Paste		Copy Paste	lot Parameters Cancel	Copy Paste

Toggle on Place Construction Limit and Offset from CL. Press the Label Plot Parameters button.

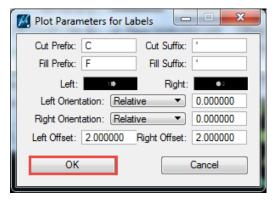
Place Construction	Limit	Offset from CL 🔻
	Lab	el Plot Parameters

Enter a C and F for the Cut and Fill Prefix respectively and a ' (foot) symbol for the Suffix.

Place Construction I	Limit	Offset from CL 🔻
	Labe	I Plot Parameters

Double click on the **Left** symbology to set as shown below with center bottom justification. Use the **Copy/paste** to copy the symbology to the **Right** Symbology. Double click and change the Set Justification to center top for the Right offset.

Set Feature Left	Set Feature Right
Symbology Level: RD_PD_TX_CstnLmt ▼ Color: ByLevel ▼ Weight: (2) ByLeve ▼ Text Preferences Th: 5.000 Tw: 5.000 R: 151 arial ▼ Decimal: 0	Symbology Level: RD_PD_TX_CstnLmt Color: ByLevel Weight: (2) ByLeve Text Preferences Text Preferences Set Justification Th: 5.000 Ft: 5.000 Ft: 151 arial Decimal: 0
<u>O</u> K Cancel	OK Cancel



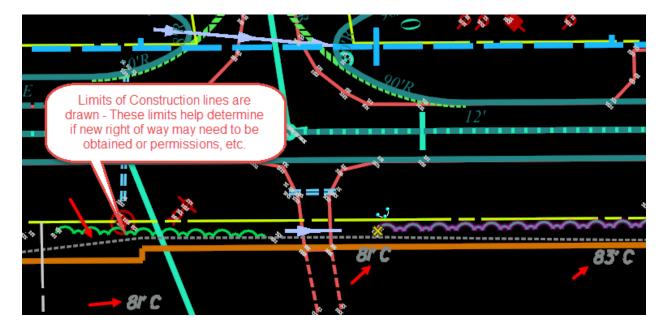
Enter the **Left and Right Offset** set to 2.000 and press **OK** to accept. Press **OK** to return to the Limits of Construction dialog. Press the **Apply** button.

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Review the Limits of Construction lines in the \*pp.dgn file. These lines will help determine the areas that exceed the existing right of way where new right of way or permissions/easements may need to be obtained.

Manually draft the tie downs for the radii and the beginning and end of the project.



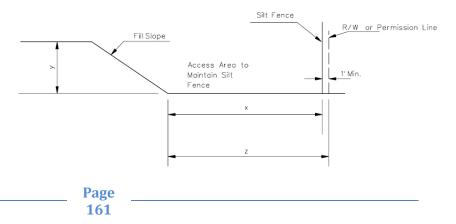
### **NPDES Lines**

NPDES lines are to be placed on plans in areas where only fills exist. They are to be placed using the following parameters:

Level: RD\_PD\_DR\_ErosCtrl Color: ByLevel (55) Style: ByLevel (NPDES) Weight: ByLevel (1)

The location of the NPDES lines is based on the chart in the Highway Design Manual (Chapter 30) and IB 2002-7.

Height of Fill (y) (feet)	Fill Slope	Minimum Silt Fence Offset from Toe of Slope (x) (feet)	Minimum Right of Way Offset from Toe of Slope (z) (feet)
<6	2H:1V 4H:1V 6H:1V	2	3
6-10	2H:1V	12	13
	4H:1V	3	4
	6H:1V	3	4
>10	2H:1V	12	13
	4H:1V	4	5
	6H:1V	4	5



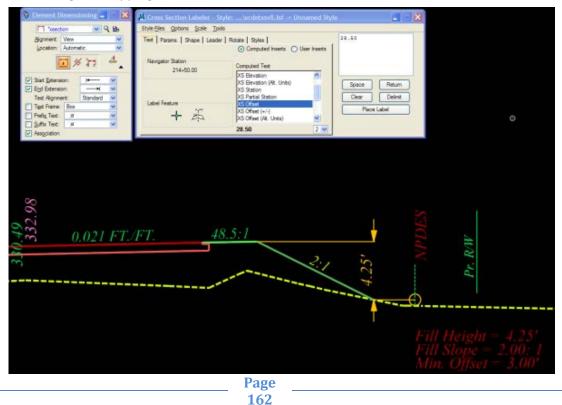


During the proposed cross section process, the options for Geopak Criteria to draw the NPDES lines exist for both the plan view and cross section view. Change the NPDES to "1" to draw the elements.

M Proposed Cross Sections - s197					
<u>Fi</u> le					
XS DGN File Pattem Existing Ground Shapes Shape Clusters Define DGN Variables Define Variables Plot Parameters Drainage	Variable ditch bottom width ditch profile It ditch profile rt median curb type draw npdes lines on xs draw npdes lines on plan view By file: All	Value 0 ditchit ditchit 1 0 1 v			
Variable Name: draw npdes lines on plan view       Value:     1       Add     Modify					

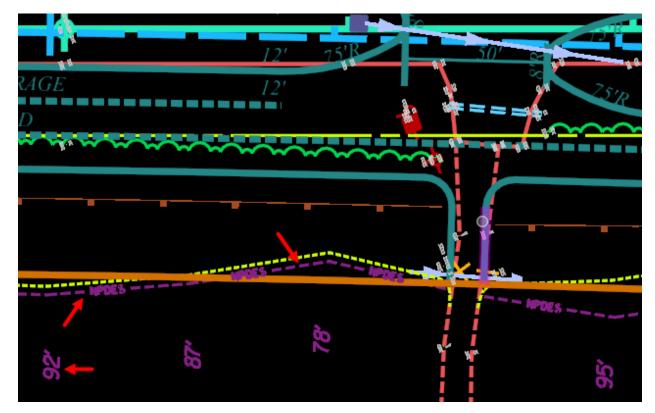
To manually draft the NPDES lines (because you have manipulated the cross sections after criteria for drainage changes), draw the NPDES lines based on height and offset from the chart onto the cross sections.

- a) Cross Section Labeler
  - Use the Cross Section Labeler in the \*dx.dgn file to calculate the offset of the NPDES line
  - Select the end of the sketch line drawn for the NPDES cell
  - On the labeler, click on the data symbol and select the XS Offset from the "Computed Text" box and double click. This will place the information into the text box.
  - Write down the Offset information. This will be used to draw the NPDES lines into the design file (\*pp.dgn)





- b) Dimension Tools
  - Select the Element Dimension from the tools.
  - Set the Dimension Style to "xsection".
  - Select the fill slope and drag cursor to sow the dimension from top of shoulder break to bottom of slope where it ties to the existing ground line.
- c) This information will be used to modify the NPDES cell.
- d) This needs to be reviewed when the designer makes changes to the cross section by adjusting slopes.
- e) Draw the information on the plans using the DP Station Offset tool and Place Line tool. Draw a line string on the correct level (RD\_PD\_DR\_ErosCtrl) by entering the station/offset and pressing the DP button with the Place Line command active. A place holder can be used for the two end points to snap the line between if easier.
- f) Label the offset using the plan view labeler. Select the NPDES label. This will place it on the proper level of RD\_TX\_Drainage. The label should be rotated 90 degrees perpendicular to the centerline.



# **Profile Grade Report - Curb Profiles**

Earlier in the documentation, the critical points and ditch profile elevations were extracted using the Profile Grade Report tool. This tool is also used to extract the Top of Curb elevations to create the CGLT and CGRT profiles.

To access, select **Applications > Geopak > Road > Cross Sections > Reports** (or press the Reports & XS Quantities button on the Project Manager dialog).



Select the **Profile Grade** button. Select the **Job #, Chain, and Station** Range. Set the Report Options to **Search Text**.

Enter **TOCLT** in the Text field and set the toggle to **Station Design Alignment**. Toggle on the **Store Profile** and enter the **\*CGLT** for the profile name. Enter an **ASCII file name** and press the **Add** button. Press the **Apply** button to generate the curb grade profile.

**Repeat** this procedure for the \*CGRT profile.

0	🧖 Profile Grade Report
	File
	Job: 779 Q Current Station: 10+50.00 R 1
	Chain: S1030 🔹
	Begin Station: 10+50.00 R 1 10+50.00 R 1
	End Station: 12+50.00 R 1 12+50.00 R 1
	Search Criteria
	Existing Ground Line: Display
TOCLT	Proposed Finish Grade: Display
1 CALI	Report Options: Search Text
	Search Text
	Text Chain Profile Preference
	TOCLT S1030CGLT DesignAlig
	×
	Text: TOCLT Station Design Alignment V
	Store Profile: 30CGLT Station Chain: S1030
	Beginning Point Number:
 	Pause on Each XS
	ASCII File: S1030CGLT_profile.inp Q
	Apply

Review the stored profiles using the **COGO Navigator**.

Next, load these profiles into the **Vertical Alignment Generator** to smooth the curb grades by adding vertical curves. (More documentation on curb grades to be provided soon.)

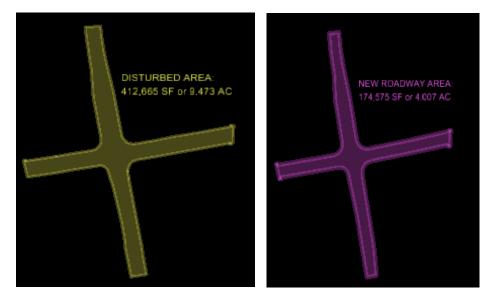


## **Reports – Seeding**

The Reports & XS Quantities provides access to 16 different reporting capabilities in the Geopak cross section files. Seeding can be calculated by including the slope symbology or eligible elements in the cross section file and running the report to produce an output file for use in the plan quantities.

There are two methods to calculate seeding and users may elect to use one process over the other or a combination of the two methods to best represent the project seeding quantities.

**By Area:** To calculate seeding by area, the user will create shapes and flood to calculate. Isolate or create the disturbed area and the new roadway area. Once these areas have been measured, subtract the disturbed area from the new roadway area and the result will be the seeding area. See the example below.



Note: Area calculations in plan view may or may not accurately calculate the best quantity for "steep slopes" that the Geopak seeding tool report may perform more accurately. Alternatively, the Geopak seeding report may not best represent the seeding quantities in intersections or tie roads due to cross sections not existing in these areas. This is why a combined method may be best for your project.

Take the disturbed area of 9.473 AC and subtract the new roadway area of 4.07 AC to get the total seeding area of 5.466 AC. To create the shapes, use the Create Complex Shape tool. Use this tool to create the boundary for the disturbed area and the new roadway area. After the shapes are created, you can measure the areas with the Measure Area tool. This tool can be set to Flood or element. These are the tool palettes to be used.

😵 Create Complex Shape 💶 🗷	J
<u>M</u> ethod: <u>Automatic</u> ▼ Max <u>G</u> ap: 0.001 ∭ Simplify geometry	
Area: Solid ▼ <u>F</u> ill Type: None ▼ Fill Color: ■ 152 ▼	

**Create Complex Shape** 

8	Measure Area
	Method: Rood
1	Tolerance (%): 1.000000 Mass Properties Display Centroid
	About: Global Z  Area Unit: Square ft
E	Area: Perimeter Unit: Feet  Perimeter:
	Locate Interior Shapes     Dynamic Area     Max <u>G</u> ap: 0.001
	ood Area method

<u>M</u> ethod:	Element
Tolerance (%):	1.000000
	Mass Properties
	Display Centroid
<u>A</u> bout:	Global Z 🔹
Area <u>U</u> nit:	Square ft 🔹
Area:	
Perimeter Unit:	Feet 💌
Perimeter:	





### **Geopak Seeding Report**



In the **\*dx.dgn file**, click on the Reports & XS Quantities button in Project Manager (or select Applications > Geopak > Road > Cross Sections > Reports). Create a new run for the alignment.

Select **User > Preferences** from the XS Reports dialog and set the Tolerance to 0.001. Close the Report Header dialog.

🔏 Report Header	Press the Seeding button.
File	Seeding
Date: Mo/Day/Year	Slope Stake
Master Header1:	
Master Header2:	Staking Detail
Master Header3:	
Number Page	
Tolerance: 0.001000	
Radius of Display Circle: 4.000000	
Adjust Output File Extension According to Report	

Enter the Chain and Station range.

📈 Seeding R	eport	
Job:	773 Q Current Station:	413+00.00 R 1
Chain:	US25R	-
Begin Station:	413+00.00 R 1	413+00.00 R 1
End Station:	651+50.00 R 2	651+50.00 R 2

Press the symbology button to identify the Candidate Seeding Elements (slopes in the \*dx.dgn) file.

Search Criteria				
Existing Ground Line:	Display			1
Proposed Finish Grade:	Display	Candidate Elements	ihd.F 🐮	
Candidate Seeding Elements:	lisplay	Lv Numbers:	10,7 日	
		Colors:		
		Styles:	<u> </u>	
		Weights:	1	
For the Existing Ground – select the existing ground levels – RD_XS_EXGround		Match Display	Reset	ļ.
	0.050 FT./FT.	_		¢ι
For the Proposed Finish Grade – select the top elements of the cross section – slopes and pavement only (no subgrade)		<b>A</b> .J		605.11 Pr.R.M

For the Candidate Seeding Elements - I

select the earth shoulder and tie slope elements where seeding will be place.



Enter a file name for the ASCII File name **\*seeding.txt** and press the **Apply** button.

ASCII File:	US25R_seeding.txt	+	۹
	Apply		

In the project working directory, open the **\*seeding.txt** file in Notepad to review the quantities.

	SEEDING REPORT			
TOTAL	LEFT	RIGHT	BOTH	
SF=	110745.0000	128194.0000	238089.0000	
ACRES=	2.5424	2.9429	5.4658	

Quantities calculated by either of the two above methods can then be inputted into the **Seeding Excel** file to total the quantities for all alignments totaled on the project.

		Items input by	
	DATA	operator	
	Section 810 - Seeding Quantites		
Item No.	Pay Item	Quantity	Unit
8100100	PERMANENT COVER	5.466	Acre
	TEMPORARY COVER 50%	50	%
8100200	TEMPORARY COVER	2.733	Acre

### **Reports - Multiline (Gen) files**

The Multiline (Gen) files are the electronic Geopak cross section report files used by the construction personnel to load the cross sections into their survey data collector. These electronic files increase the efficiency for the surveyor in the field saving time and reducing costs. It is important to recognize the downstream benefits of maintaining accurate electronic files for the surveyors, construction personnel, and contractors.

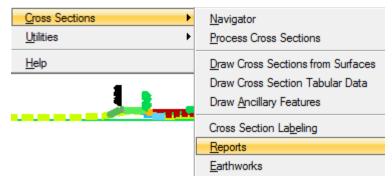
Exporting these files and reviewing also provides the designer an extra quality assurance check for their plans by allowing them to verify what the construction person is building via electronic files matches the paper plan sheets.

In a push to get the paper plan out, designers tend to edit the text of ditch elevations or curb grades and not modify the linear graphics of the cross sections. *This causes discrepancies in the electronic files for the construction personnel.* Manually editing survey text files is difficult and omissions or errors can compound.

It is recommended to always modify both the linear graphics and the text elevations in the cross section files to ensure better data integrity. {Should only the text be modified and not the linear graphics, please denote the stations in the EED\_index.xlsx file where this has happened.}



Select the Reports & XS Quantities button on the Project Manager and create a new run. (Or select Applications > Geopak > Road > Cross Sections > Reports)



#### Select the Multi-Line button

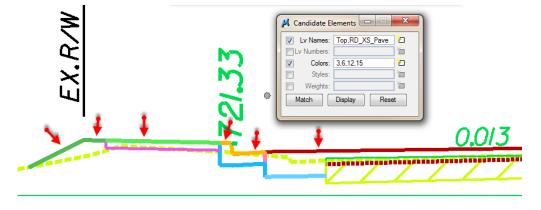
User	Refresh the <b>Job #</b> by browsir and End Station refresh on th	-		Notice the	e Begin
Blue & Red Top		0			
Clearing	📕 Multi-Line Report				
Closure	File				
DTM Input	Job: 232 Q		127+50.00 R 1		127+50.00 R 1
	Chain: BYPASS	End Station:	185+50.00 R 2		185+50.00 R 2
DTM Proposed 3D					
HEC-2					
HEC RAS					
Multi-Line					
Profile Grade					

Perform the following steps to complete the dialog as shown below:

📕 Multi-Lir	ne Report											X
File												
Job:	232 Q		Begin Station:	127+50.0	DR1		1	27+50.00	R 1			
Chain:	BYPASS	▼]	End Station:	185+50.0	D R 2		1	85+50.00	R 2			
XS Element	s											_
Lv Numb	ers Lv Name	Color	Weight		Style	Lb	T/B L	v Co	Wt	LC	P/S	
	RD_XS_TieSlop	3,6,12,15,Byl	Level			•	Т	0	0	0	Р	2
												D
												$\times$
	XS Elements:		Display			Label	: •	Тор	•	Prima	ny 🔻	
Output For	mat: GEOPAK	•		5-Point	Pause	on Eacł	n XS	Disp	olay Only	1	•	
ASCII	File: bypass.gen			٩	Create	• Cu	irrent Sta	tion: 162	+00.00 F	R 1		
					Apply							



- Set the Output Format to GEOPAK
- Enter an ASCII File name bypass.gen (extension should be gen)
- Set the toggle to **Create**
- Press the Symbology box next to XS Elements in the center of the dialog
  - Press the Reset button to clear previously set values
  - o Check on Lv Names and Colors
  - o Press the Match button
  - Zoom into the Cross Section and select the top elements of the proposed cross section like shoulders, ditches, roadway, etc.
  - Press the Display button to make sure you selected everything
  - Use the Cross Section Navigator to scroll thru the cross sections to check for any typical changes where other elements may need to be selected
  - o Close the X button to save the settings selection when done



- Press the Add icon (upper right white icon next to the white box)
- Ensure that the toggle is set to Top
- Press the **Apply** button

The text can be reviewed in the **\*.gen** file in Notepad (or in the Carlson SurvCE emulator program – see the Carlson Data Verification Instruction on the Construction Support site).

## **Scaling Cross Sections**

Original cross sections may have been drawn at a 5x5 (1:1 scale) and need to be scaled to 10x5 (2:1) to fit a wider corridor project on the cross section sheets or to double stack cross sections to reduce the number of sheets required.

In the **\*dx.dgn** file, select the Cross Section Navigator tool to verify that the original cross sections were drawn at 5H:5V.

Page 169

Cross Section Navigator - US25R	Scale 5	5H:5V		<b>E</b>
413+00.00	4 4	<b>•</b>	✐	🛃 🖷



ð

×



Select the **Cross Section Sheets** button on the Project Manager dialog (or select Applications > Geopak > Road > Cross Sections > Cross Section Sheet Composition). Create a new run.

Cross Section
Sheets

### Select File > Scale Cross Sections

M Cross Section Sheet Co	mposition
<u>Fi</u> le	
Sheet Library	n Sheet: [
Sheet •	
Load V7 Input File	
Save Settings	
Scale Cross Sections	=
Layout Sheets	
<u>E</u> xit	

Edit the file name at the end of the Output DGN File name box to **Scaled\_\*dx.dgn**. Edit the **Horizontal scale to 10.00** and the **Vertical Scale to 5.00**. Toggle **ON** the Scale Graphic Cells box and press the **Scale Cross Sections** button.

🥖 GEOPAK - Scale Cro	ss Sections (Default)
Output DGN File Name:	:\Users\nealif\Desktop\36773\Scaled_us25rdx.dgn $\ Q$
Horizontal Scale:	10.00
Vertical Scale:	5.00
	Scale Graphic Cells
	Scale Cross Sections

Review the newly scaled cross sections with the Cross Section Navigator tool.

Cross Section Navigator - US25R - Sc	ale 10 H : 5 V		<b>E</b>
413+00.00 - 44	4 🖬 🕨	✐ネᡵᠷ	🚰 🖷

Layout sheets using the 10x5 sheet instead of the 5x5 sheet.

📕 Cross Section Sheet Composition: xslayout_LN.xssl					
<u>Fi</u> le					
Active Cross Section	n Sheet: 10x5 XS SHT PE	J			
XS DGN File Sheet DGN File Sheet Dimensions / Cell XS Search Criteria Sheet Stack Orientation Sheet Stack Columns					



## **Cross Section Sheet Composition**

The Cross Section Sheet Composition tool automates the process of creating cross section plan sheets. Each cross section is displayed as a reference file and labeling for chain, station, offsets, and elevation are added. Title block information is also automated. There are settings to control the spacing between sections, number of sections per sheet, labeling, and number of stacks.

### Create a new \*fx.dgn design file for the cross section sheets.

Select the **Cross Section Sheets** button on the Project Manager dialog (or select Applications > Geopak > Road > Cross Sections > Cross Section Sheet Composition). Create a new run.



Select File > Sheet Library > Attach to attach the \*.xssl file. [Workspace: SCDOT-Bentley\Standards\SCDOT\_Design\Geofiles\Sheets\Xsection]

K Cross Section Sheet Composition: xs				
<u>Fi</u> le				
Sheet Library	<u>N</u> ew			
Sheet +	Attach			
Load V7 Input File	<u>S</u> ave			
Save Settings	Save <u>A</u> s			

The xslayout\_In.xssl file has already been set with preconfigured settings to assist getting started with the sheet layout.

After the \*.xssl is edited to meet project specific settings, this file can be saved and re-loaded for future runs into the project working directory by selecting **File > Sheet Library > Save As**. It is recommended to create a \*.xssl for each alignment on the project that requires cross section sheets.

📕 Cross Section Sheet Composition: xsl				
<u>Fi</u> le				
Sheet Library	<u>N</u> ew			
Sheet +	Attach			
Load V7 Input File	<u>S</u> ave			
Save Settings	Save <u>A</u> s			

To re-load a previously saved library, select **File > Sheet Library > Attach** and navigate to the project working directory to select the project.xssl.

For the Active Cross Section Sheet, select the sheet type from the drop down box.

📕 Cross Section Sheet Composition: xslayout_In_1box.xssl					
<u>Fi</u> le					
Active Cross Sectio	n Sheet:	5x5 XS SHT PE 1BOX 🔹	Layout Sheets		
		Sheet Name	Sheet Description		
XS DGN File		5x5 XS SHT PE 1BOX	5x5 XS Layout Sheet With PE Block		
Sheet DGN File		5x5 XS SHT PE 1BOX Double Stacked	5x5 XS Layout Sheet With PE Block Doubled Stacked		
Sheet Dimensions / Cell	-	5x5 XS SHT	5x5 XS Layout Sheet		
XS Search Criteria	=	10x5 XS SHT PE 1BOX	10x5 XS Layout Sheet With PE Block		
Sheet Stack Orientation	10x5	10x5 XS SHT PE 1BOX Double Stacked	10x5 XS Layout Sheet With PE Block Doubled Stacked		
Sheet Stack Columns Margine and Spacing		10x5 XS SHT	10x5 XS Layout Sheet		



**XS DGN File:** Select the current **\*dx.dgn** file, the chain and the station range to layout on the cross section sheets.

🔏 Cross Section Sheet Composition: xslayout_In_1box.xssl				
File Active Cross Section	Sheet: 5x5 XS SHT PE 1BOX    Lavout Sheets			
XS DGN File Sheet DGN File Sheet Dimensions / Cell XS Search Criteria Sheet Stack Orientation Sheet Stack Columns Margins and Spacing Station Labels Offset Labels	XS DGN File: nealif\Desktop\36773 us25rdx.dgn Q     XS Baseline: US25R     ■ Begin Station: 413+00.00 R 1     ■ End Station: 475+00.00			

**SHEET DGN File:** Select the newly created **\*fx.dgn** file, the chain and ensure All Sheets in Active Model is selected under Attachment.

📕 Cross Section Sheet Compo	sition: xslayout_In_1box.xssl
<u>F</u> ile	
Active Cross Section She	eet: 5x5 XS SHT PE 1BOX ▼ Layout Sheets
XS DGN File Sheet DGN File Sheet Dimensions / Cell XS Search Criteria Sheet Stack Orientation Sheet Stack Columns Margins and Spacing Station Labels Offset Labels	Sheet DGN File: nealif\Desktop\3677;\us25fx.dgn Q Horizontal Scale: 5.00 Vertical Scale: 5.00 Sheet Placement Point Lower Left X (mu): 1000.000000 DP Lower Left Y (mu): 1000.000000
	Detach Existing Sheets before Processing     Attachment: (All Sheets In Active Model

**Sheet Dimensions/Cell:** Check the Name of the cell set by the Active Cross Section Sheet. Toggle Place Sheet Cell Once in a Reference File. Accept the default name (rename if you have a mixture of types of sheets – single scale, double scale, double stacked, etc. so that you have use only one reference file per type of plan sheet.)

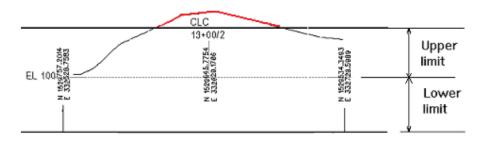
📕 Cross Section Sheet Composition	on: xslayout_in_1box.xssl
<u>F</u> ile	
Active Cross Section Sheet:	E 5x5 XS SHT PE 1BOX ▼ Layout Sheets
XS DGN File	Sheet Dimensions
Sheet DGN File Sheet Dimensions / Cell	Width: 32.00 Height: 20.00
XS Search Criteria	Place Sheet Cell         Library:       geopaksheets_In.cel       Q         Name:       xs_sheet5x5_pe_1box
	Sheet Offset from Cell Origin X Offset: 0.00 Y Offset: 0.00 +++ Sheet Cell Placement Place Sheet Cell Once in a Reference File Sheet Cell Reference File: xssheetpe.dgn



**XS Search Criteria:** The Search Criteria looks at the elements above and below the Geopak cross section cell. It will search for the highest and lowest graphical element on the levels specified. If cross sections are drawn on any other level than RD\_XS\* levels, add the additional levels to the Search Criteria.

🔏 Cross Section Sheet Composition: xslayout_In_1box.xssl					
<u>Fi</u> le					
Active Cross Section Sheet:	5x5 XS SHT PE 1BOX   Layout Sheets				
XS DGN File	XS Element Search Criteria				
Sheet DGN File	🔽 Lv Names: RD_XS* 🔪 🎦				
Sheet Dimensions / Cell XS Search Criteria	🔲 Lv Numbers: 🛛 👘				
Sheet Stack Orientation	Colors:				
Sheet Stack Columns	Styles:				
Margins and Spacing Station Labels	Weights:				
Offset Labels					
	V Types: 2-4,6,11,15-17				
A	Match Display Reset				
	Vertical Range 📃 Horizontal Search				
the second s	Lower Limit: 75.00 Left Offset: 0.00				
	Upper Limit: 75.00 Right Offset: 0.00				

The Vertical Range is a "range" for searching, not a clip limit. It will look 75' above and below the cross section cells to locate the highest and lowest graphical element. If the cross sections exceed those limits, then elements will be cut off in the sheet file. You will need to expand the range to greater values when this happens. (More likely in hilly terrain areas or large areas of fill.)



When ditches are modified after sheets have been produced, or right of way limits are extended horizontally, the "clip limits" may not allow all these elements to be shown on the sheet files. If possible, re-layout the cross section sheets again. If too many modifications have been made where it is not feasible to layout sheets again, use the process on page 17 to re-clip the cross sections to show all elements.

**Sheet Stack Orientation:** Accept the defaults for the sheet layout unless you have a particular need to change the number or spacing arrangements.

Active Cross Section Sheet:	5x5 XS SHT PE 1BOX	Layout Sheets
XS DGN File Sheet DGN File Sheet Dimensions / Cell XS Search Criteria Sheet Stack Orientation Sheet Stack Columns Margins and Spacing Station Labels Offset Labels	_ Sheet Stack Orientation: _ Horizontal Spacing: _ Vertical Spacing: Number of Sheets per Column:	Vertical         ▼           500.00         3.00           25         25



**Sheet Stack Columns:** Accept the defaults. (If running double stacked sheets, see settings in the next section of instructions.)

n Shee	et: 5x5 XS SHT PE 1B0	▼ XC	Layout Sheets
	Single Stack	Baseline X Offset:	16.00
	Double Stack	Col 2 Left Edge Offset:	0.00
Ξ	Triple Stack	Col 3 Left Edge Offset:	0.00
	Quadruple Stack	Col 4 Left Edge Offset:	0.00
-			
		Single Stack     Ouble Stack     Triple Stack     Quadruple Stack	Single Stack Baseline X Offset:     Double Stack Col 2 Left Edge Offset:     O Triple Stack Col 3 Left Edge Offset:     Quadruple Stack Col 4 Left Edge Offset:

Margins and Spacing: Accept the defaults for the initial run.

Active Cross Section Sheet:	5x5 XS SHT PE 1BOX	<ul> <li>Layout Sheets</li> </ul>
XS DGN File	Cross Section Clip Limits	
Sheet DGN File Sheet Dimensions / Cell	Minimum Spacing From Top:	1.00 🔶
XS Search Criteria	_ Minimum Spacing From Bottom:	2.00 🔶
Sheet Stack Orientation Sheet Stack Columns	_ Left Clip X Offset:	0.00
Margins and Spacing	Right Clip X Offset:	32.00
Station Labels		
	Minimum Spacing Between Sections:	1.00 🔶
Minimum Tep Specifiz Minimum XS Spectra Minimum XS Spectra Minimum Battern Spacing	Maximum Vertical Size:	25.00

If the cross sections are relatively flat, you can use a tighter spacing between sections. If the cross sections are more hilly/greater fill, you may need to increase the spacing to 2.00 or 3.00 to ensure the sections do not overlap each other.

If less room is needed for labeling, the minimum spacing from top and bottom can be set to 1.00.

**Station Labels:** Double click to set the Station text as shown below. The Y Offset can be modified to place the text closer or further from the cross section itself.



See the Clean up FX File instruction below for ensuring the labeling is legible on the plan sheets.

Station Label						
Symbology Level: RD_XS_TX_Station  Color: ByLevel						
Weight:     (5) ByLeve ▼       Text Preferences     Set Justification       Th:     1.000						
Tw:         1.000         Image: School of the school of th						
Angle: 0.000°						
Prefix Suffix						
<u>O</u> K Cancel						



Offset Labels: Accept the defaults for offset labels to be turned off.

Elevation Labels: Set the Plot Parameter symbology for the Elevation Text as shown below.

Active Cross Section Sheet:	5x5 XS SHT PE 1BOX   Layout Sheets
Sheet Stack Orientation	☑ Label Elevations
Margins and Spacing Station Labels	Plot Parameters:
Offset Labels	Elevation Label X Offset 1: 0.40
Earthwork Quantity Labels	Elevation Label X Offset 2: 31.50
Digital InterPlot	Elevation Increment (mu): 5.00
	Add Top Elevation Label
	☑ Add Bottom Elevation Label

**Earthwork Quantity Labels:** Toggle ON to plot the Earthwork Quantities onto the plan sheets. Browse to select the \*EW.txt file. Set the symbology for each of the offsets as shown below.

Sheet Dimensions / Cell XS Search Criteria	. •	🔽 Lab	el Earthwo	rk Quantitie	s	
Sheet Stack Orientation		ID ^	X Offset	Y Offset	Display	Plot
Sheet Stack Columns		1	14	-0.5	Sample	
Margins and Spacing	=	2	13	-1.0	Sample	
Station Labels		3	18	-0.5	Sample	
Offset Labels		4	19	-1.0	Sample	
Elevation Labels Earthwork Quantity Labels	-					
			rk Quantity rs\nealif\D		773\US25R_EW:	bat Q
24375 CM.	$\geq$					

Elevation Label					
Symbology Level: RD_XS_TX_Elev_EX ▼ Color: 3 ▼ Weight: 5 ▼					
Text Preferences Set Justification Th: 1.200 Tw: 1.200 R: 203 timesi TL/TW Ford					
TH/TW Fixed  Angle: 0.000°					
Format Prefix Suffix					
<u>O</u> K Cancel					

Use the Adjusted Earthwork numbers from the EWBS program output VXT, not the EW.txt from Geopak for plan sheets to accurately represent the Average End Method volumes accurately.

EW Quantity Label	EW Quantity Label	EW Quantity Label	EW Quantity Label
Symbology Level: RD_TX_EndArea  Color: 121 Weight: 5	Symbology Level: RD_TX_Volume  Color: 152 Weight: 5	Symbology Level: RD_TX_EndArea Color: 232 Weight: 5	Symbology Level: RD_TX_Volume Color: 147 Weight: 5
Text Preferences Th: 0.800 Tw: 0.800 Ft: 203 timesi TH/TW Fixed Angle: 0.000*	Text Preferences Th: 0.800 Tw: 0.800 Pt: 203 timesi TH/TW Fixed Angle: 0.000°	Text Preferences Th: 0.800 Tw: 0.800 Ft: 203 timesi TH/TW Fixed Angle: 0.000°	Text Preferences Th: 0.800 Tw: 0.800 Ft: 203 timesi TH/TW Fixed Apple: 0.000°



**Sheet Labels:** Click in each box to enter the **Project** information to be shown in the Title block. (In the Display section, edit the colors for each if desired. It is helpful when colors are assigned to use the Select by Attributes later to move the items around individually.)

Active Cross Section	h Sheet:	5x5 XS	SHT PE			✓ Layo	ut She	ets
Sheet Stack Orientation	-	Name	Label	X Offset	Y Offset	Display	Plot	
Sheet Stack Columns		Pin	37271	29.67	20.59	Sample		*
Margins and Spacing		Cou	FL	29.68	20.13	Sample		_
Station Labels		File	21	30.67	20.13	Sample		$  \times$
Offset Labels Elevation Labels	=	/	R	31.44	20.42	Sample		
Earthwork Quantity Labels	=	Roa	US	31.45	20.13	Sample		
Sheet Labels		She	1	32.02	20.13	Sample		
Digital InterPlot	-	Loca	U.S	29.01	19.77	Sample		

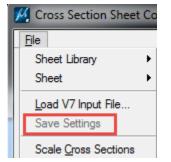
Select File > Sheet Library > Save As and save the \*.xssl for the alignment.

1	K Cross Section Sheet Composition: xsl						
	<u>Fi</u> le						
	Sheet Library	•	<u>N</u> ew				
	Sheet	►	Attach				
	Load V7 Input File		<u>S</u> ave				
	Save Settings		Save <u>A</u> s				

Make sure the **Fill** is turned off. Make sure the RD\_GPK\_XS\_Cell & RD\_XS\_EwShp\* levels are turned off. Select **File > Save Settings** from the top MicroStation tool bar (or press Ctrl + F)

🗊 Presentatio	n	#≡ ^	RD_PD_RW
Display Style:	(Wireframe Display)	• 9	RD_GPK_XS_Cell     RD_EX_RW
1 ACC Triad			<ul> <li>RD_XS_EwShp</li> </ul>
😭 ACS Triad	🖄 Fast Cells	-	RD_XS_EwShp1
Background	😑 Fill		RD_XS_EwShp2
		-	RD_XS_EwShp3
			BD XS ExGround

Select **File > Save Settings** to save the settings for the cross section run.



Press the **Layout Sheets** button to process the sheets.

Active Cross Section	on Shee	et: 5x5 XS SHT PE 1BOX   Layout Sheet
XS DGN File Sheet DGN File Sheet Dimensions / Cell XS Search Criteria Sheet Stack Orientation Sheet Stack Columns Margins and Spacing Station Labels Offset Labels		XS DGN File: C:\Users\nealif\Desktop\36773\us2 Q XS Baseline: US25R ▼ Begin Station: 413+00.00 R 1 End Station: 475+00.00



**To re-run cross sections** into the same \*fx.dgn file, select the References dialog and **detach** all of the references. Select **Ctrl + A** to select all elements inside of the fx file and press the **Delete X** to delete. Select **File > Compress > Design** to compress the file before re-running.

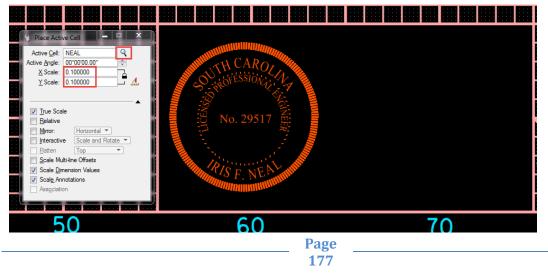
**	References (324 of 324)	unique, 324 displayed)	Main - Main Task		
32	Tools Settings				
	<u>A</u> ttach	🖉 🔿 🌾 🛃 🚰	i 😭 🖪		Delete Element
4       1	<u>D</u> etach				<b>;</b>
	Detach All	Model	Descript		
<u> 11 11 1</u>	R <u>el</u> oad	n Default	US25R	5 6° °C	•
	Reload All	h Default	US25R		8
	-	h Default	US25R	5	
	Exchange	h Default	US25R	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	

Each time the cross sections are run and the Sheet Cell Reference File name is the same, the cell is placed a 2<sup>nd</sup> time in the xssheetpe.dgn file. Open this file and **delete** one of the cells.

	M Cross Section Sheet Composition: xslayout_In_1box.xssl
	Ele
Ver Martin	Active Cross Section Sheet: 5x5 XS SHT PE 1BOX   Layout Sheets
	XS DGN File       Sheet Dimensions         Sheet Dimensions / Cell       Width:         XS Search Criteria       Width:         Sheet Stack Orientation       Place Sheet Cell         Width:       upper state         Width:       32.00         Height:       20.00         Vidth:       32.00         Width:       32.00         Width:       32.00         Width:       32.00         Vidth:       32.00         Vidth:       32.00         Width:       32.00         Name:       xs_sheet5x5_pe_1box         Scale:       5.00
	Sheet Offset from Cell Origin X Offset: 0.00 Y Offset: 0.00 +++ Sheet Cell Placement Place Sheet Cell Once in a Reference File Sheet Cell Reference File Sheet Cell Reference File

**To place the Engineer of Record PE seal** as a reference to each of the cross section sheets, open the xssheetpe.dgn file.

Select the **Place Cell** tool, browse to select a cell. Select **File > Attach File**. Select the SCDOT\_PE.cel library. Enter a scale of 0.1 X/Y to place the cell in the center of the box in the lower right corner of the sheet.





# Clean Up Text in FX File:

For better legibility on the plan sheets, in the \*fx.dgn file, select **Edit > Select by Attributes** after processing.

Select the **RD\_XS\_TX\_Station** level. Press the **Execute** button to select all of the stationing text.

🥂 Select By Attributes				×
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Select the Change Text Attributes tool and select the **STA NAME** text style to background out the grid lines behind the text.

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Repeat the Select by Attributes command to select the Earthwork text by both the Level & Color for each of the 4 texts. Use the Change Text Attributes to assign the appropriate Text Style to each.

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Select By Attributes          Tools       Settings         Levels       Name         Default       RD_SHT_TX         RD_TX_EndArea       Name	C       20         EW_END AREA         EW_END AREA1         EW_VOLUME         EW_VOLUME1         There is also a text style Offset Elev Txt for the side elevations of each cross section.	ch
RD_TX_Volume RD_XS_TX_Ditch RD_XS_TX_ShdSlope	✓ Offset Elev Txt	
Symbology           ✓ Color:           121 ▼           Style:           Weight:           (0) B ▼	<u>605</u>	

# **Double Stacked Cross Section Sheets**

In order to conserve resources and reduce the number of sheets per plan set, designers may choose to use double stack cross section layout on applicable projects.



Open the \*dx.dgn file and start the Cross Section Composition tool.

On the **XS DGN File** tab choose the 5x5 or the 10x5 XS SHT for the type of cross sections you need to layout. Choose the \*dx file and set the baseline and begin/end station range.

名 Cross Section Sheet C	omposition: xslayout_LN.xssl	
Eile		
Active Cross Section	Sheet: 5x5XS SHT	Layout Sheets
XS DGN File Sheet DGN File Sheet Dimensions / Cell XS search Criteria Sheet Stack Orientation Sheet Stack Columns Margins and Spacing Station Labels Offset Labels		XR.dgn Q



On the Sheet DGN File dialog, choose the \*fx file. Accept the default settings on the Sheet Dimensions / Cell, XS Search Criteria, and Sheet Stack Orientation dialogs.

On the **Sheet Stack Columns** dialog, set the toggle to **Double Stack** and adjust the Baseline X Offset to 8.00 and the Col 2 left Edge Offset to 16.00.

XS DGN File	<u> </u>	🗇 Single Stack	Baseline X Offset: 8.00
Sheet DGN File		Double Stack	Col 2 Left Edge Offset 16.00
Sheet Dimensions / Cell			
XS Search Criteria		Triple Stack	Col 3 Left Edge Offset: 0.00
Sheet Stack Orientation		Dupdruple Stock	Col 4 Left Edge Offset: 0.00
Sheet Stack Columns	`	or iquadrupie stack	Cor 4 Len Euge onset. 10.00
Margins and Spacing			
Station Labels			
Offset Labels	-		

On the **Margins and Spacing** dialog, set the Min. Spacing Form Top to 0.00. Min Spacing From Bottom to 1.00, and the Right Clip X Offset to 16.00.

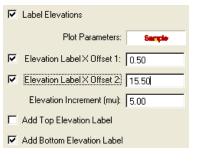


On the **Station Labels** dialog, set the Station Label X Offset 1 to 8.00 and the Station Label Y Offset to - 5.00.



Accept the defaults on the Offset Labels dialog.

On the Elevation Labels dialog, set the Elevation Label X Offset 2 to 15.50.



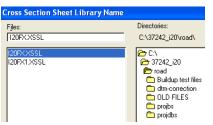
On the Earthwork Quantity Labels dialog, set the X Offsets as follows: 6, 5, 10, 11 for IDs 1-4.

Label Earthwork Quantities				
ID 🛆	X Offset	Y Offset		
1	6	-0.5		
2	5	-1.0		
3	10	-0.5		
4	11	-1.0		



Enter your project information on the Sheet Labels dialog as you normally would.

Select **File > Sheet Library > Save As** from the top menu bar to save the customized \*xssl file to your working directory.



Press the **Layout Sheets** button on the top right to generate your cross section sheets.

Layout Sheets
---------------

Open the **\*fx** design file and review the cross section sheets.

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## **Cross Section Labeling**

The majority of the cross section labeling will take place in the \*fx.dgn design file to ensure legibility on the cross section sheets. There are a few items that can be labeled directly in the \*dx.dgn file.

In the **\*dx.dgn** file, select the Cross Section Labeler tool from **Applications > Geopak > Road > Cross** Sections > Cross Section Labeling.

Select the **Styles** tab and then select **File** > **Attach** and select the **scdotxsv8.lsf** for cross section labeling. In the XS Labels folder, use the styles defined to label the Begin/End Max and SE (superelevation). Add the ditch notes. Use the styles for centerline elevation, slope, etc. if manually adjusting cross sections.

Cross Section Labeler - Style:\scdotxsv8.lsf -> Beg/End SE - A	Active
Style <u>Fi</u> les <u>Options</u> <u>S</u> cale <u>T</u> ools	
Text       Params.       Shape       Leader       Rotate       Styles         Item Selector       Style Preview         Image: Style Preview       Image: Style Preview         Image: Styl	Clear Delimit Place Label



In the **\*fx.dgn** file, select the Plan Labeler tool **Application > Geopak > Road > Plans Preparation > Plan View Labeling**.

Select the **Styles** tab and then select **File > Attach** and select the **scdotsheetv8.lsf** for sheet labeling. In the XSect Sheets folder, use the styles defined to label the Begin/End stationing labeling, begin/end superelevation, end area labels, ditches, exceptions, toe of fill, and volume labels.

📕 Plan View Labeler - Style:\scdotshee	tV8.I	sf -> Beg/End Label - Active	
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New Category Scale : 1.00	A	Node and Shape Only 💌	

If the Title block information has not previously been filled out, use the Sheet Labels folder to label the Title block information in the **xssheetpe.dgn** file to reference to each of the sheets.

Contract ID 1981260						
FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	<i>ROUTE</i> NO.	SHEET NO.	
3	S.C.	EDGEFIELD	0036773	US 25	Xl	
	- U.,	S. ROL	<i>TE 25</i>	REL		

Page 182

If the Project information changes during the course of the plan production, use the **Edit > Find/Replace** MicroStation tool to replace the text.

🥂 Find/Replace text	
Find: 0036773	
Replace: P036773	
<ul> <li>Find Options</li> </ul>	
Match Case	Mhole Words
Use Regular Expressions	🔽 In Cells
Use Fence	Inside -
- View Options	
Animate	Rotate
Zoom	
Find Replace	Replace All Pick



# **Draw Patterns from Cross Sections**

At times you may receive a \*dx.dgn file that was drawn by stationing or in another software program without the use of pattern lines. To create pattern lines for redrawing the cross sections, **open the file where the pattern lines will be drawn** (\*sh.dgn or \*pat.dgn).

#### Select Applications > Geopak > Road > Cross Sections > Draw Patterns from Cross Sections.

Select the **\*dx.dgn** file to locate the Geopak cross section cells to draw the pattern lines. Select the **XS Baseline (chain)** and set the **Symbology** for the pattern lines. Press the **Draw Pattern Lines** button.

M Draw Pattern Lines from XS 💷 🗵 🕺	Set Feature
XS DGN File: esktop\36773\Scaled_us25rdx.dgn Q XS Baseline: US25R Symbology:	Symbology Level: RD_PD_PatLn1 ▼ Color: ByLevel ▼ Style: (0) ByLeve ▼ Weight: (3) ByLeve ▼
Draw Pattern Lines	OK Cancel
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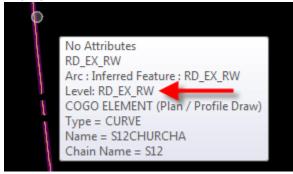


# **Bentley Map**

The Bentley Map feature in MicroStation is utilized to import and export GIS data in the form of shapefiles (\*.shp) of graphical elements from the design file.

## Export DGN Level to Shape File

Identify the level(s) the desired graphical objects are on. Hovering the mouse cursor over an object will display information about it.

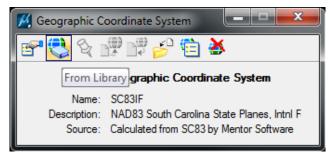


Only one level can be exported in a given shape file. If objects to be exported are scattered across several levels, they will need to be exported individually by repeating this process.

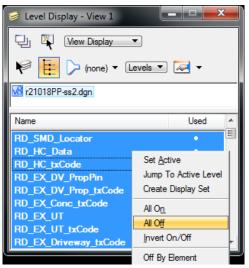
Isolate the level to confirm that only objects to be exported are on it. Select Settings > Levels > Display from the top menu bar.



In the menu bar, choose **Applications > Map > Activate Map** to activate the Bentley Map software. Then choose **Tools > Geographic > Geographic Coordinate System**. Verify it is set to the SC83IF.

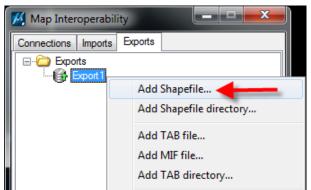


Right click the list of levels and choose **All Off**, then scroll through the list to the desired level and double click to turn it back on and activate it (highlighted).



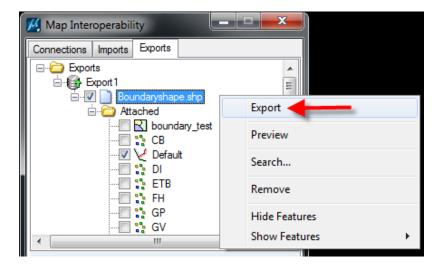


Select **File > Export > GIS Data Types** to begin the export process. In the Map Interoperability window, right click on the **Exports** folder and choose New Export. Then, right click on the Export1 icon that appears and choose **Add Shapefile**.



Navigate to the working directory the new shapefile will be stored in and type in a name for it. Then press **Save.** 

Press the plus sign beside the **Attached** folder in your new shapefile to reveal a list of all levels used in the current file. Click the checkbox next to the level to be exported. Then right click on the new shapefile and choose **Export**.



#### **Import Shape File**

In the menu bar, choose **Applications > Map > Activate Map** to activate the Bentley Map software. Then choose **Tools > Geographic > Geographic Coordinate System**. Verify it is set to the SC83IF.

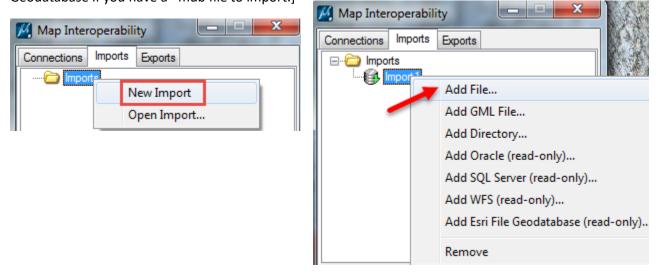
🥂 Geographic C	oordinate System
🚰 😍 ६ 🛛	# 🛱 😓 🤠 🛠
From Lik	orary graphic Coordinate System
Description:	SC83IF NAD83 South Carolina State Planes, Intnl F Calculated from SC83 by Mentor Software



Select File > Import > GIS Data Types to begin the import process.

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	InterPlot Organizer IPLOT		<u>A</u> CIS SAT <u>C</u> GM
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\$	Print Organizer		FME
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	Properties	Alt+Enter	I <u>m</u> age
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2	Sen <u>d</u>		<u>G</u> IS Data Types

In the Map Interoperability window, right click on the **Imports** folder and choose New Import. Then, right click on the Import1 icon that appears and choose **Add File**. [Note: Select Add Esri File Geodatabase if you have a \*mdb file to import.]



Browse to select the **\*shp** file and press **Done** to open the file in MicroStation.

File name:	s58prop.shp 🔻	Done
Files of type:	Shapefiles (*.shp)	Cancel

Right click on the Shape file name and select **Import**. Press the **Fit View** command to review the imported shape file. Repeat for additional shape files to import.

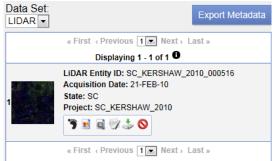
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Connections	Imports	Exports	
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			Preview



# **Data Acquisition Lidar Processing**

In a partnership with several agencies including the SC Department of Natural Resources, SCDOT has acquired lidar data for the majority of the counties in South Carolina. This data is utilized to extend the existing ground survey data for hydraulic design.

This data is available to consultants on these websites: NOAA website: <u>http://coast.noaa.gov/digitalcoast/data/coastallidar</u> USGS website: http://earthexplorer.usgs.gov/



#### Lidar Usage Recommendations

- Map the Lidar Network Drive to your computer to eliminate the need to copy the large LAS data files to the network server. You can process them directly from here.
- Reduce the Lidar Tiles in MicroStation using Data Acquisition to a minimum of 50% and a recommended reduction of 60-65% to reduce the size of the Geopak tin file that will be created and to prevent the Data Acquisition tool from crashing.
- Create the Contours dgn file and remove the Geopak tin file from the server when finished processing.

#### How to Map the Lidar Network Drive:

Select Start > Computer

- a. Press the Map network drive button
- b. Select the letter L: and copy/paste or type <u>\\nts\hq\scdot-apps\scdot-lidar</u>
- c. Press the Finish button

<ul> <li>Favorites</li> <li>Isktop</li> <li>Connoids</li> <li>Recent Places</li> <li>Documents</li> <li>Documents</li> <li>Dictures</li> <li>Dictures</li> <li>Videos</li> <li>Computer</li> <li>Connect to a Web site that you can use to store your documents and picts</li> <li>Connect to a Web site that you can use to store your documents and picts</li> <li>Connect (IntShq) (Pc)</li> <li>Computer</li> <li>Computer</li> <li>Connect (IntShq) (Pc)</li> <li< th=""><th></th></li<></ul>	



## Available Lidar Data:

County	Year	Tiled	County	Year	Tiled		County	Year	Tiled
Abbeville	2012	County	Darlington	2008	RPG		Lee	2010	County
Aiken	2012	County	Dillon	2008	RPG		Lexington	2010	County
Allendale	2010	County	Dorchester	2009	County		Marion	2008	RPG
Anderson	2011	County	Edgefield	2012	County		Marlboro	2008	RPG
Bamberg	2010	County	Fairfield	2008	RPG		McCormick	2012	County
Barnwell	2012	County	Florence	2009	County		Newberry	2008	RPG
Beaufort	2013	RPG	Georgetown				Oconee	2011	County
Berkeley	2014	RPG	Greenville	2014	RPG		Orangeburg	2008	RPG
Calhoun	2012	County	Greenwood	2008	RPG		Pickens	2011	County
Charleston	2007	RPG	Hampton	2010	County		Richland	2010	RPG
Cherokee	2008	RPG	Horry				Saluda	2010	County
Chester	2008	RPG	Jasper				Spartanburg	2014	RPG
Chesterfield	2008	RPG	Kershaw	2010	County		Sumter	2010	County
Clarendon	2008	RPG	Lancaster	2008	RPG		Union	2008	RPG
Colleton	2007	RPG	Laurens	2008	RPG	1	Williamsburg	2008	RPG
							York	2011	County



## Using the Referenced Tile Index Labeled MicroStation file:

Open your pp design file

- a. Select File > References
- b. Select Tools > Attach
- Navigate to the mapped Lidar drive and the appropriate County folder for your project (Ex., L:\Lexington\)
- d. Highlight the **County\_Tile\_Index\_Labeled.dgn** design file, where "County" is replaced with the name of the county you're working in, and press Open
- e. On the Reference Attachment dialog, select the County\_Annotation under Model and press OK to attach
- f. Fit View/Zoom in to review which tiles you need for your project



Ele Name:       Lexington_Tile_Index_Labeled.dgn         Full Path:      \nealif\Desktop\test\\Lexington_Tile_Index_Labeled.dgn         Model:       Lexington_Tile_IndexAnnotation         Logical Name:
Logical Name:
Description:         Annotation Model           Orientation:
Description:         Annotation Model           Orientation:
Orientation:           View         Description           Coincident         Aligned with Master File
View         Description           Coincident         Aligned with Master File
Coincident Aligned with Master File
-
Coincident - World Global Origin aligned with Master File
Geographic - AEC Transform Calculated Transform, max error 8.135e-0
Geographic - Reprojected Reproject reference data to Master GCS    Standard Views
Saved Views (none)
Named Fences (none)
( III )
Detail Scale: Full Size 1=1 ▼
Scale (Master:Ref): 1.000000 : 1.000000
Named Group:
Revision:
Le <u>v</u> el:
Nesting Depth: 2
Display Ovenides: Allow
Ne <u>w</u> Level Display: Always
Global LineStyle Scale: Master
Synchronize View: Volume Only
Toggles
Drawing Title
Create
Name: Drawing
<u>O</u> K Cancel

Using a Tile Index Labeled Google Earth KMZ file:

Navigate to the mapped Lidar drive and the appropriate County folder for your project

- a. Double click on the County\_Tile\_Index\_Labeled.kmz file to open Google Earth
- b. Type in the location and press Search or Zoom in to your project Location
- c. Review which tiles you need for your project



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Trick: Turn off the Tile labels while it is zooming. It will zoom a lot faster! Turn them back on to see the tile numbers.

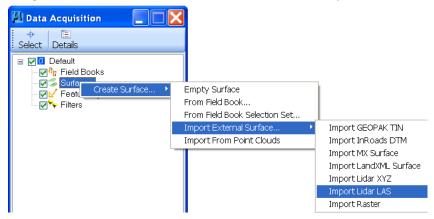


#### Managing Lidar Data with Data Acquisition in Geopak

- Determine which Lidar \*.las files correspond with the project corridor (Ex. Lexington 978702 & 978704). The Data Acquisition tool can handle processing approximately 12 Lidar tiles per project.
- 2. Create a new 3D MicroStation file.
- 3. Expand the tool palette on the Task pane on the left to select Data Acquisition (Or select Tools > Data Acquisition from the top menu bar).

Tasks	<b>ч X</b>
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🗲 Tasks	-
▖▖▖▖ ▖ ▖	•
Roundabouts	~
Civil Geometry	~
🕅 Data Acqui 🖽 🚍	
*	
😭 Data Acquisition Iana	- 💒

4. Right click on Surfaces and select Create Surface > Import External Surface > Import Lidar LAS.

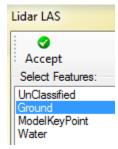




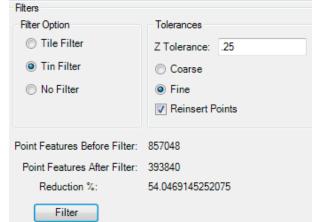
5. Navigate to the folder location of the stored Lidar files and highlight the first Lidar .las tile (Ex.\\nts\hq\scdot-apps\scdot-lidar\lidar\Lexington\_2010\LiDAR\LAS\978702.las).

ganize 🔻 🛛 New fo	lder				= -	(
Favorites	Name	Date modified	Туре	Size		
Desktop	978701.las	12/21/2011 6:22 PM	LAS File	151,157 KB		
Downloads	978702.las	12/21/2011 6:23 PM	LAS File	138,104 KB		
Recent Places	978703.las	12/21/2011 6:08 PM	LAS File	129,237 KB		
	978704.las	12/21/2011 6:08 PM	LAS File	141,193 KB		
Libraries	978801.las	12/21/2011 6:51 PM	LAS File	120,824 KB		
Documents	978802.las	12/21/2011 6:52 PM	LAS File	23,377 KB		
J Music	978803.las	2/2/2012 3:21 PM	LAS File	151,240 KB		
Pictures	978804.las	12/21/2011 6:37 PM	LAS File	133,022 KB		
📕 Videos	978903.las	12/21/2011 7:06 PM	LAS File	133,585 KB		
	979001.las	12/21/2011 1:46 PM	LAS File	150,333 KB		
Computer	979002.las	12/21/2011 1:48 PM	LAS File	200,009 KB		
	979003.las	12/21/2011 1:47 PM	LAS File	190,858 KB		
Network	979004.las	12/21/2011 1:48 PM	LAS File	185,849 KB		
<u>.</u>	979401.las	12/21/2011 4:49 PM	LAS File	216,368 KB		
	979402.las	12/21/2011 4:49 PM	LAS File	42,804 KB		
	979403.las	12/21/2011 4:34 PM	LAS File	158,044 KB		

6. Select the Ground option if presented with more than one type of data.



7. Set the Filter Option to the following settings and press the Filter button to process. The Z tolerance will keep regenerating over and over until all points are within the range set. Midland and upstate areas will typically work well with Z tolerances of around 0.25 feet. Flatter areas, such as the Lowcountry and coastal regions, may require Z tolerances around 0.05 feet for accurate modeling. Higher filter rates may be acceptable for larger projects containing many lidar tiles, where precision modeling is less important than reducing file sizes to something Geopak can handle.

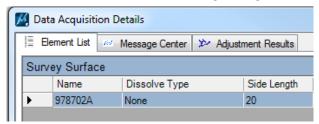




8. Press the Accept button once an acceptable amount of filtering has taken place. Reductions of up to 65% will preserve most ground features with a minimum of distortion. Reductions between 65% and 80% may distort or eliminate terrain features and will increase the error in ground surface elevations, but are acceptable for larger projects.



9. To check for errors introduced during filtering, you can import the unfiltered surface and compare the two. If you don't need to check for errors, skip to step 25. Otherwise, select the new surface in Data Acquisition, then click the surface name in the Details panel to highlight it. Add the letter 'B' or another distinguishing character to the end of the name.



- 10. Repeat Steps 4 to 9 for the same .las tile, choosing the "No Filter" option in step 7 instead of "Tin Filter", and adding a 'A' or similar character to the name of the new unfiltered surface. Remove the extra letter from the name of the filtered surface.
- 11. Right click on the unfiltered surface and select Export to > Geopak Tin.

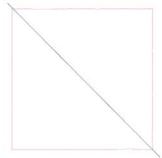
ider - I and a second	Create Graphics Vertical Exaggeration Clip by Polygon Append External Surface Merge External Surface	*	
	Export to	×	GEOPAK TIN
	Delete		InRoads DTM

12. Enter a file name and press Save.

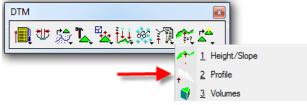
File name:	978702-unfiltered.tin		
Save as type:	GEOPAK TIN file (*.tin)		•
Alide Folders		Save	Cancel
L3. Repeat steps	11 and 12 for the filtered surfa	ce.	
•	data tree for the unfiltere		
	panded. Click to turn on the B our toolbar to see the entire b		Composing Surfaces
			Spots Breaklines
			🔀 Triangles 🖿 🕒 Holes
			Major Contours
	Page	9	Minor Contours
	192		🔲 🔕 Island



15. Draw a line across the area of the tiles.



- 16. Select Applications > Geopak > Road > DTM Tools.
- 17. Click and hold the mouse button on "Analysis:Height/Slope", the second icon from the right, to bring up the Analysis menu. Choose option 2, "Profile", to bring up the Profile panel.



18. Choose a color and line type for the filtered surface, then click the magnifying glass icon and open the filtered .tin file.

M Profile	x
Type Feature Level Color Weight Style Extract	
Select color and linetype here	⊼⊡× ≶.ª.≌ Ø
TIN File	

19. Click the Add List Item button to add the filtered surface to the profiles.



- 20. Repeat steps 18 & 19 for the unfiltered profile.
- 21. Click the Create Profile icon on the Profile panel.

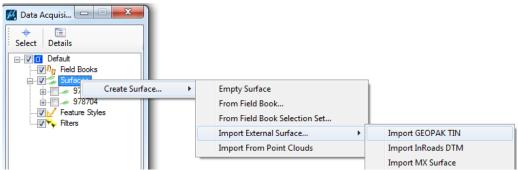
	🧳 Profi	le						23
	<u>Fi</u> le	1						
Ш	Туре	Feature	Level	Color	Weight	Style	Extract	
Ш	TIN	978702-filtered.tin	RD_SMD_Locator	3	0	2	On	*
Ш	TIN	978702-unfiltered	RD_SMD_Locator	1	0	2	On	2
						Pa	ge _	



22. Activate Select Profile Element and select the line drawn across the tile boundaries. Activate Place Profile and place the profile on the plan sheet.

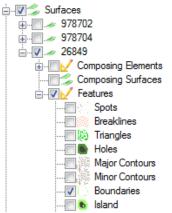


- 23. Compare the filtered and unfiltered profiles. If there are sufficient differences to make the filtered surface unsuitable for use, delete and reinsert it with a lower Z tolerance in the filter settings, then repeat steps 13 through 23 to re-evaluate it.
- 24. Delete the profile, the line from step 15, and the unfiltered surface in Data Acquisition.
- 25. Repeat Steps 4 to 8 for any additional Lidar .las tiles. Repeat steps 9 to 25 as needed to evaluate filtering.
- 26. Locate and copy the project survey .tin file to the project directory (Ex. <u>\\nts\hq\precon\Lexington\26849 s1431\survey\26849.tin</u>).
- 27. Right click on Surfaces and select Create Surface > Import External Surface > Import GEOPAK TIN. Open the project survey .tin file.

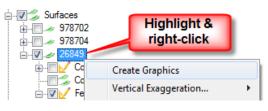


28. Expand the data tree for the project .tin until Features is expanded. Click to turn on the Boundaries.

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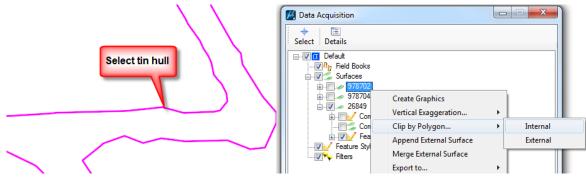


29. Highlight the surface for the project. Right click and select Create Graphics. (This draws the tin hull into the design file.)





30. Use the MicroStation selection tool to select the tin hull. Right click on the first Lidar .las tile and select Clip Polygon > Internal.



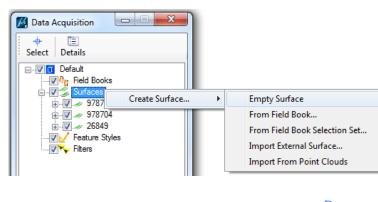
31. Repeat right clicking on the remaining Lidar .las tiles and select Clip Polygon > Internal for each one.

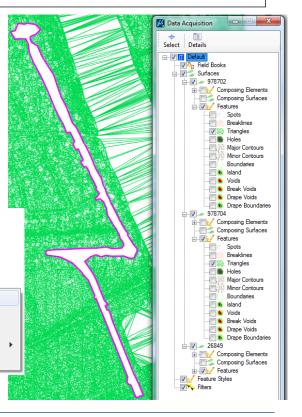
Special Note: If your project extends past the shape of the lidar file, you will need to do one of two things:

- 1. Use additional lidar tiles to cover the entire project and apply step 31 to each one
- Close the shape of the tin hull within the boundaries of the lidar tile break the line segments to complete the shape. You will also need to Clip by Polygon > External on the project tin to get rid of the project tin that extends past the lidar tile. This is in addition to Clipping the Lidar tile Internally.

Failure to do so will make Geopak crash when you get ready to export the TIN file and you will have to start ALL OVER.

- 32. Expand the data trees for each of the LAS Surfaces and turn on Features -- Triangles to verify that the tin hull has been clipped from each of the tiles. (You can turn the display back off).
- 33. Right click on Surfaces and select Create Surface > Empty Surface.

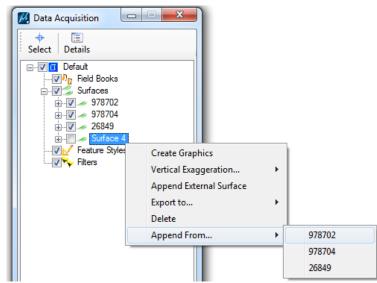




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34. On the newly created Surface, right click and select Append From > ###### (select your first .las surface in the list). Repeat until all of the las surfaces in the list have been added. (Do not add the project surface in this step).



35. Pay attention to the # of Triangles in the Details panel. Occasionally it will bomb out and reset to 0 and you will have to delete the surface and start over again.

🗾 Da	ata Acquisition	Details			
E	Element List	Message Center	≯ Adjustment Results		
List	t				
	Name	Dissolve Type	Side Length	Triangles	Breaklines
•	978702	None	20	783462	0
	978704	None	20	798644	0
	26849	None	20	3325	156
	Surface 4	None	20	> 1585257	0

36. Right click on the new project surface, select Merge From, and select the project surface.

Surfaces     Surfaces     978702     978704     978704     9784			
Surface 4     Surface 4     Compo      Compo      Feature Styles      Filters	Create Graphics Vertical Exaggeration Export to Delete	*	
	Merge From	•	26849
	Append From	•	

37. Right click on the project surface and select Export to > Geopak Tin. Enter a file name and press Save.

File name:	Lidar_TinMerged.tin		-
Save as type:	GEOPAK TIN file (*.tin)		-
lide Folders		Save	Cancel



- 38. Create a new MicroStation 2d file.
- 39. Select Applications > Geopak > Road > DTM Tools.
- 40. Press the DTM menu icon.



- 41. Select the Load > DTM Feature button.
- 42. On the Load DTM Features dialog, set the Load File to Tin and browse to select the Lidar\_TinMerged.tin create above. Select File > Open and select the P:\Hydraulics\Geopak\lidar\_contours.lpf file to set the symbology for the contours. (\\nts\hg\precon-general\Hydraulics\Geopak\lidar contours.lpf)

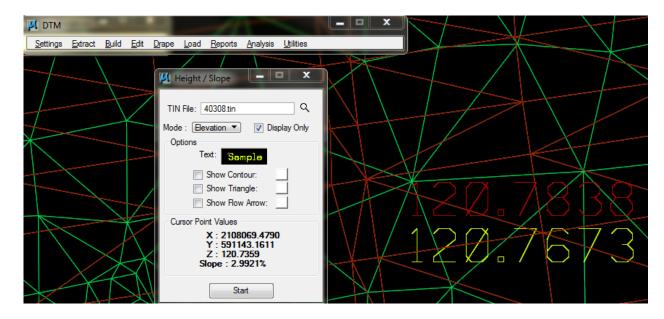
Display Preferences	Lidar_TinMe s     Display (	-		aphic G	Q	Loa	d
Load: Extent		Only	🔽 Gr	aphic G	roup		
	Display (	Only	📝 Gr	aphic G	roup		
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Feature Le						_	
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Triangles R	D_DTM_Fina	6	0	0	OFF	=	<u>କ</u> ‡
TIN Hull R	D_DTM_Fina	6	0	0	OFF	-	<b>e</b> t
Contours -		-	-	-	ON		
Major Lines R	D_DTM_Major1	By Lv	By Lv	By Lv	ON		9
Major Label R	D_DTM_Majo	By Lv	By Lv	0	ON		<b>. ?</b>
Minor Lines R	D_DTM_Minor1	5	By Lv	By Lv	ON	Ŧ	

Comparing the Lidar Tin to Existing Field Tin

- 1. Create a new 3d MicroStation file.
- 2. Activate the Data Acquisition tool.
- Add the lidar tiles that directly correspond to the existing tin file. If only one tile encompasses the entire field survey, only add that one. If it overlaps add the number of tiles that overlap. If more than one lidar tile was added, create a new surface and select Append from and add all the tiles that correspond to the existing file to create one lidar surface. (See steps 4-9, and 17, 18)
- 4. Import the Geopak project tin file and turn on the boundaries. Draw it to graphics and select the tin hull. (See steps 10-14 above.)
- 5. Highlight the LAS file or the newly created surface and right click to select Clip by Polygon > External. This will give you a lidar version of the existing field survey extents.
- 6. Right click on this file and select Export To > Geopak Tin. Name the file Lidar\_ClippedExisting.tin.



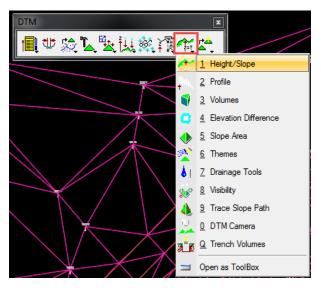
- 7. Turn on the display for the triangles. You can change one of the colors to a different color in the Data Acquisition Details panel.
- 8. Select the DTM Tools button and select Analysis > Height/Slope. Compare the elevations of data points along the two tin files.



## **DTM Tools**

There are several DTMS tools that can be used for performing quality assurance of the location survey data and also for hydraulic design. Reviewing the Survey data is outlined below. For hydraulic design, please review the Geopak Drainage Manual.

In the \*dtm.dgn design file, attach the Statewide.xwms aerial as a raster attachment and the \*pp.dgn file as a reference attachment. Turn the view on/off as needed to help review the dtm.



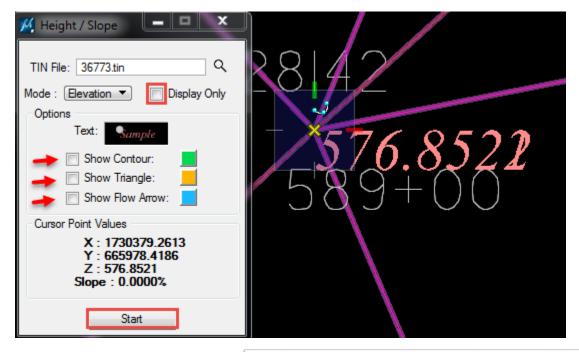
Select **Applications > Geopak > Road > DTM Tools**. Create a new run for the mainline. On the DTM toolbar, select the **Height/Slope** tool from the next to last icon.



Browse to select the existing project **\*.tin** file. Set the mode to **Elevation** and press the **Start** button. Pan through the dtm triangles to look for any irregularities in the triangles.

(Examples: jumps in elevations in short distances, missing point codes/shots in intersections, clusters of triangle legs intersecting, etc.)

Set the **Symbology** for the Text and turn ON the Contour, Triangle, or Arrow to review these options in the design file. Turn off the **Display Only** to place the Elevation text into the MicroStation file.



The following example shows an issue where **too many triangles** intersect in the curb radii in the dtm file. The curb shots, edge of pavement shots, and other shots in the vicinity are causing a "bad interpolation" on the centerline profile.

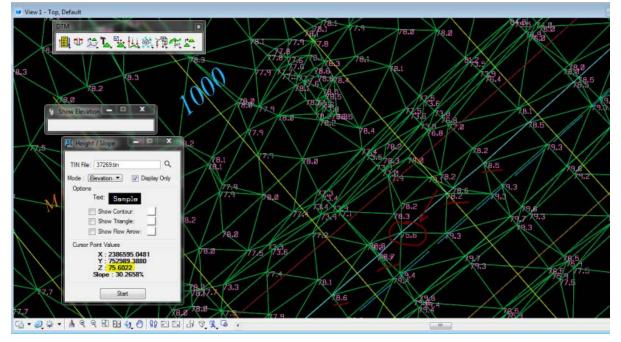


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The following example shows a dip in the elevation along the left edge of pavement of the travel lane.

Elevation at 1000+25 w/ 13' left offset (Ex. EOP-L) = 75.6'Elevation at 1000+00 w/ 13' left offset (Ex. EOP-L) = 78.7'Elevation at 1000+50 w/ 13' left offset (Ex. EOP-L) = 78.2'

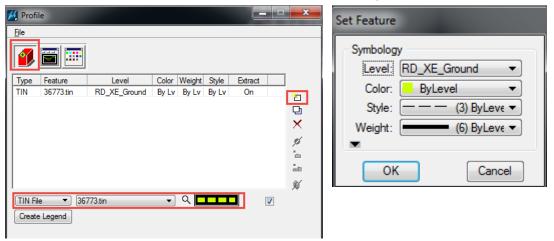


On the DTM toolbar, select the **Profile** tool from the next to last icon.



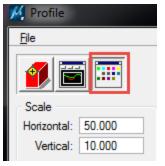
On the **Object Selection** tab of the **Profile** dialog, browse to select the Tin file and set the symbology as shown. Press the **Add** button to add the TIN to the list. (Multiple surfaces can be added and compared.)

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On the **Profile Preferences** tab of the Profile dialog, set the **Horizontal and Vertical to 50 and 10** or a more exaggerated scale for reviewing the profile. [If you plan to place the profile into the drawing, set the Horizontal and Vertical Grid symbology as desired.]



On the **Create Profile** tab of the Profile dialog, select the **Place Profile Element** button. Draw a line directly down the centerline of the roadway to review the centerline profile in the dtm file. Draw a line perpendicular to the centerline to review a cross section of the dtm file. Repeat this process to review areas of interest in the dtm file.

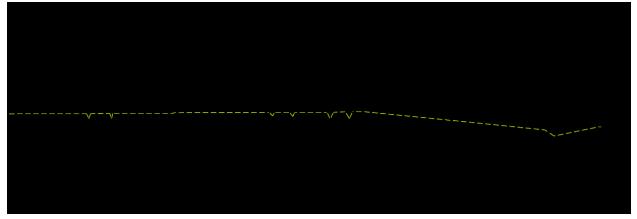
Profile      File	To place the profile into the design file,
Curve Stroking: 0.000	press the Place Profile button.
Place Profile Element	

In addition to the quick profile method outlined above, **each of the existing profiles** should be checked for spikes and dips along the centerline. [Note: Relocated centerlines that cut across "unsmooth" terrain will have spikes/dips. However, an existing pavement should not have such extreme elevation changes unless there is severe rutting or another determined issue.]

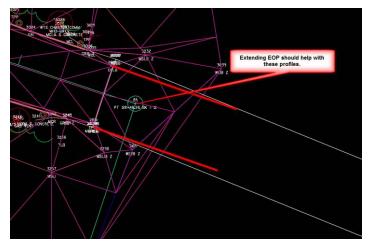
Use the **Draw Profile** tool as demonstrated on page 98 to cut the existing profiles for each alignment of the project.

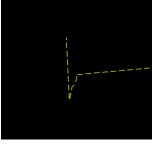


This example shows where the centerline of the roadway crosses over 3 railroad tracks. The top of rail should have been maintained in the dtm file and not included the shots in between the tracks.

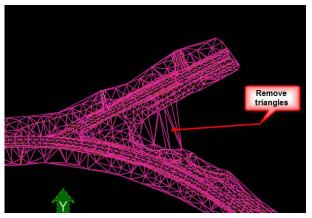


This example shows where the EOP lines do not extend past the centerline alignment, thus the TIN file interpolates with the ditch shots and produces incorrect centerline elevation numbers. If this happens, do not include the stationing in the profile. If this station must be included in the plans, ask Surveys to extend the EOP lines past the centerline to have a more accurate interpolation.



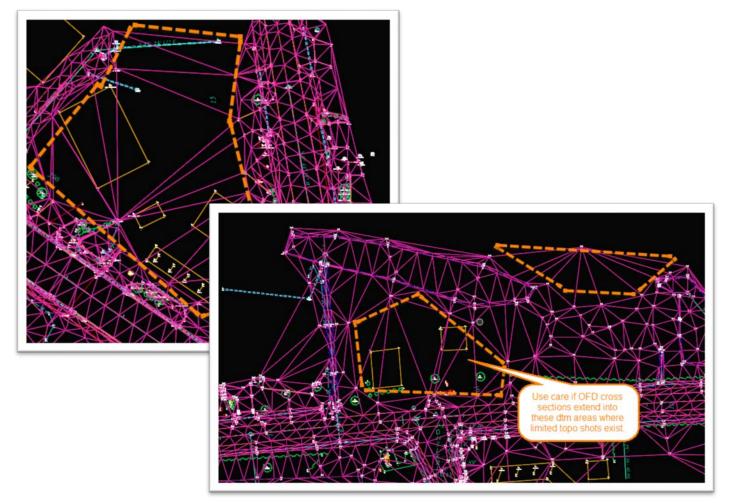


The designer should also note that if a relocated centerline profile or existing cross sections extend out into areas between intersections where there are limited topo survey shots, inaccurate interpolation may occur. These areas should be used with caution in the plans. If necessary, place a gap in the profile so as not to misrepresent the data. Surveys can also assist by removing unnecessary triangles in these areas.

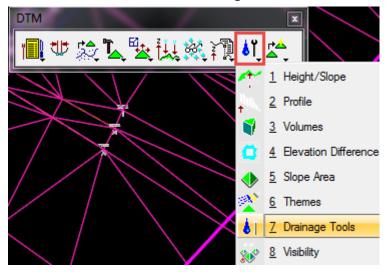




More examples where the designer should use caution with cross sections or relocated centerlines, etc.



On the DTM toolbar, select the **Drainage Tools** tool from the next to last icon.





Flow Arrows can be drawn to review the flow of the water for existing ground conditions. Survey shot elevations in the Survey.xls can also be used in conjunction to locate any issues determined. Browse to select the **\*.tin** file and press the **Flow Arrow** button. Toggle on **Display Only** and set symbology to a desired **color**. Enter an Arrow Size of 5.00. Press the **Apply** button. (To permanently draw the flow arrows, turn off Display Only and be sure to turn on Set Graphic Group before pressing the Apply button.)



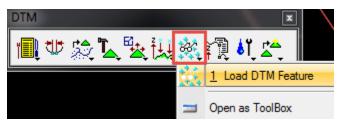
Select the **Ponds** Option and set the symbology as desired. Ensure **Fill** is turned on in the View Attributes. Turn on the Set Graphic Group and press the Apply button. Pan through the dtm file and review any ponding areas to look for during the design process, especially in intersections.



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Select the Load DTM Feature option under the eyeglass icon.



Browse to select the **TIN** file. Turn **ON Display Only** and **Graphic Group**. Use the **lightbulbs** on the right to turn **off** the Triangles and Tin Hull and to turn **ON** the **Contours** and Major Lines/Labels and Minor Lines/Labels.

🌿 Load DTM Fe	atures						
<u>F</u> ile							
Load File: TIN	▼ 36773.tin				9	Load	٦
Display Preferen	ces				,		5
Load: Extent	💌 🔽 Display	Only	🔽 G	iraphic G	roup		
Frature	Level	Calas	W-:-bt	Chile	Disala		
Feature	Level	LOIOT	Weight 0		Displa	v ^ v	
TIN Hull Contours	Default	1	U	0	OFF		
	-	-	-	-	ON	+ +	
Major Lines	RD_DTM_Major1	-	By Lv	By Lv	ON	🔸 🔽	1
Major Label	RD_DTM_Majo				ON		-
Minor Lines	RD_DTM_Minor1			By Lv	ON	v	
Minor Label	RD_DTM_Mino	5	By Lv	0	ON	<b>T</b>	
	Minor Inter	val: 1.(	000	Major Int	terval:	2.000	]
Smooth: B Splin	ne 🔻 Registrati	on: 0.(	000	Minimum	Area:	0.000	
Range 🔻 Mir	nimum Z: 486.442	Max	kimum Z	630.6	51	Read	

On the **Contours** option, set the **Minor and Major Interval**. For flat areas of the state use 1' & 2' for Minor and Major. For hilly areas, edit as necessary for 1' & 5' or 2' & 10', etc.

Minor Interval: 1.	000	Major Interval:	2.000
--------------------	-----	-----------------	-------

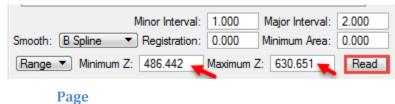
(Optional) Set the Symbology for the Major and Minor Lines/Labels as shown below.

Set Feature	Set Feature	Set Feature	Set Feature
Symbology Level RD_DTM_Major1  Color: ByLevel  Style: (0) ByLeve  Weight: (4) ByLeve  OK Cancel	Symbology Level RD_DTM_Major1_Lbi Color: ByLevel Weight: (2) ByLeve Text Preferences Th: 4.000 Tw: 4.000 Ft: 203 timesi Decimal: 0 QK Cancel	Symbology Level: RD_DTM_Minor1 ▼ Color: 5 ▼ Style: (0) ByLeve ▼ Weight: (1) ByLeve ▼ ▼ OK Cancel	Symbology Level: RD_DTM_Minor1_Lb Color: 5 Weight: (1) ByLeve Text Preferences Th: 4.000 Ft: 203 timesi Decimal: 0 QK Cancel

Press the **Read** button and review the elevation ranges for the project and verify that they make sense for the project location in the state. Any zeros, too high or too low elevations will be "red flags" that

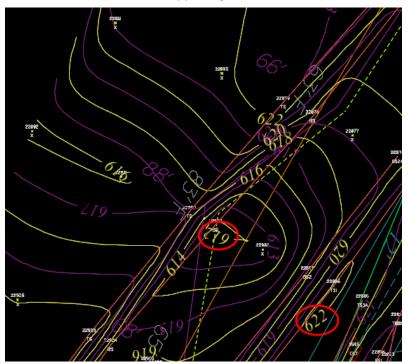
205

there are points in the dtm file that need further analysis.





Press the **Load** button. Review the contours in the file. Look for areas where there are too many contours together – this signifies a large change in elevation. Investigate further to ensure there are no "zero" elevations or "issues" with this area found. The aerial, pp.dgn, or the Survey.xls may help determine further what is happening in this area.



Select **File > Save As** to save the DTM Load Feature preferences as a \*lpf file. This can be reloaded by selecting **File > Open**.

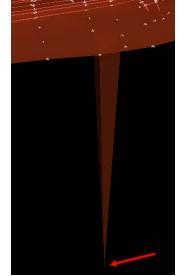
K Load DTM Features -	File name:	36773.lpf	•	Save
<u></u> Open	Save as type:	*.lpf	•	Cancel
<u>S</u> ave				
S <u>a</u> ve As				

Change the View Attributes to Smooth (can also try Monochrome).

🔀 View Attribut	es - View 1	
View Number:	1 - 🔁 💐	
🕜 Presentat	ion	#≡^
Display Style:	🔊 Smooth	<b>-</b> ९

**Use the 3d Rotation** MicroStation tool to rotate the view of the dtm triangles to look for spikes in the dtm file. If any are found, investigate further to determine what is causing the elevation change.

📦 View 1, Default	
🖫 र 🔊 🔆 र 🛃 🍳	🍳 🕄 🖽 🔙 🕐



Page 206

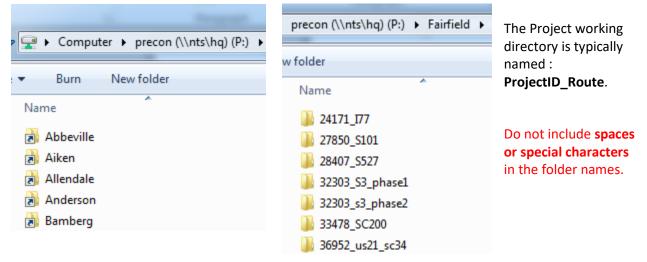


# File & Plan Management

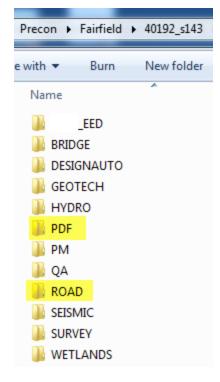
## **Folder Naming Conventions**

An organized and well maintained project working directory is critical to plan production. Designers should take care to follow the folder and file naming conventions outlined below to keep their project organized, to maintain the integrity of the electronic data, and to assist others who receive the data downstream to easily follow the folder and file naming structure to locate the information they need to bid, survey, construct, and as-built the project.

SCDOT utilizes the P:\ drive to store project design files. The P:\ drive is defined as <u>\\nts\hq\precon</u>. Inside the Precon directory, the 46 County folders plus a Statewide folder subdivide the projects.



Each **discipline** has a subfolder in the Project Working directory.



Roadway Design utilizes the **PDF and Road** folders and references information in the other disciplines by viewing or by copying into the road folder.

Original and additional surveys are copied from the **Surveys** folder to the road folder for manipulation and review.

Station offset and gpk merge information is referenced from the **DesignAuto** folder.

**Wetlands** files are referenced to the \*pp.dgn file for inclusion in the plan set.

Other discipline folders are referenced as detailed in correspondence during the project life cycle.



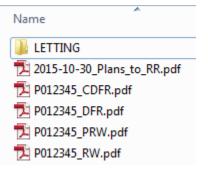
Inside the road folder, the following list depicts *some* of the most commonly named subfolders that are utilized. All folders may not be applicable to all projects. A logical, organized folder structure is ideal for maintaining the project files.

~
퉬 Quantities
퉬 rddbs
퉬 Right_of_Way
퉬 TE_pavement_markings
🛯 🐌 TE_road_lighting
퉬 TE_signal_plans
ın 🌗 TE_signing_plans
퉬 TE_workzone
: 🥼 Utilities
XSections

Inside the **PDF** folder, the following naming conventions are utilized for preliminary plans. All other intermediate plan sets will use the ProjectID\_Description. Dates in the file name are acceptable in the **YYYY-MM-DD** format so the files will sort properly.

P012345_PRW.PDF	Preliminary Right of Way Plans
P012345_DFR.PDF	Design Field Review Plans (use _Before & _After)
P012345_RW.PDF	Right of Way Plans
P012345_CDFR.PDF	Construction Field Review Plans
2015-10-30_P012345_Plans_to_RR.pdf	Plan deliverables to other departments
2015-10-30_P012345_Plans_to_Hydro.pdf	Plan deliverables to other departments

A subfolder named **LETTING** will be used to contain the single page pdfs of the construction plans for the letting. These will be single page pdfs in order to comply with the **digital signature policy** for signing and sealing plans electronically.



File names should contain *no spaces, using underscores* in their places. All files should include a prefix consisting of a three-digit sheet number, an underscore, and the project ID number (ex., **001\_P012345\_Title\_Sheet.pdf**). Once this prefix is included, sheets can be named as desired to correspond with the plan set's index of sheet descriptions.



In order to separate cross section sheets from other plan sheets, they will be given a special prefix. Follow the same rules as above, but begin the name of cross section sheets with an "X" and number them separately from the rest of the plan set. Thus, if a plan set began with sheets **001\_P012345\_Title\_Sheet.pdf** and **002\_P012345\_Summary\_Qty.pdf**, the first cross section sheet in the set would be **X001\_P012345\_Cross Sections.pdf**.

Name

- 001\_P012345\_Title\_Sheet.pdf
   002\_P012345\_Summary\_Quantities.pdf
   003\_P012345\_Typical\_Section.pdf
   004\_P012345\_RW\_Data.pdf
   X001\_P012345\_Cross\_Sections.pdf
   X002\_P012345\_Cross\_Sections.pdf
- X003\_P012345\_Cross\_Sections.pdf

In order to insert an additional sheet into an existing plan set, add a letter designator to the sheet number of the previous sheet. For example, if a Moving Item sheet needs to be added following the second sheet of the set, **002\_P012345\_Summary Quantities.pdf**, the Moving Items sheet would be named **002A\_P012345\_Moving\_Items.pdf**.

Name

001\_P012345\_Title\_Sheet.pdf
 002\_P012345\_Summary\_Quantities
 002A\_P012345\_Moving\_Items.pdf
 003\_P012345\_Typical\_Section.pdf

The Prefix/Suffix can be added in the IPS file to make renaming of the pdf files more efficient. (More instructions will be contained in the SCDOT Roadway Plotting Manual – to be written next.) Select Edit > Rename in Iplot Organizer to apply the Project information.

Untitled - ProjectWise InterPlot Org	Rename Plots
File       Edit       View       Tools       Help         Image: Section Section       Image: Section Section Section       Image: Section Sect	✓       Number Plots         Start At:       1         Field Width:       3         ✓       Add Prefix         X       X         ✓       Add Suffix         _P012345_Cross_Sections         Apply to         ○       All plots          Selected plots         OK       Cancel



The Project\_EED folder is primarily populated by the Design Automation Office by coordinating with the roadway designers for project specific information to be included in the bid package for the SCDOT construction office and the contractors. The electronic files are for **selected** projects or for **requested** construction survey stakeout. This is not available or applicable on every project. Please contact Design Automation to inquire further.

The contents of the Project\_EED folder are as described:

40192_s143 >EED >	CADD	Contains cadd files to provide for bidding to construction and contractor; dgn, gpk, gdf, tin
New folder	CARLSON	Contains the converted xml & gen files to Carlson formats; cl, pro, sct (for SCDOT Construction offices)
Name	DATA	Contains horizontal & vertical alignments and cross sections files for contractors; xml, gen, rpt
LADD CARLSON	PDF_PLANS	Contains the pdf construction plans at time of letting
DATA PDF_PLANS	PROPOSED_3D_MODELS	Contains proposed 3d models created for construction; dgn, dxf, xml
PROPOSED_3D_MODELS	SURVEY_CONTROLS	Contains original location survey control, control plan sheet; csv or ascii, pdf
SURVEY_CONTROLS	*_EED_INDEX.XLSX	Excel Index file of the contents of the Project_EED directories

## **File Naming Conventions**

Equally as important as maintaining an organized project working directory is to properly follow file naming conventions. Designers should take care to follow file naming conventions outlined below to keep their project organized, to maintain the integrity of the electronic data, and to assist others who receive the data downstream to easily follow the folder and file naming structure to locate the information they need to bid, survey, construct, and as-built the project.

When possible, Roadway Designers should follow the standard file naming conventions and avoid creating design files that do not follow this method. Any deviations from the typical file names should be **logical** in name so the recipient can understand what the **file contents** are. (Ex. R12345\_Alt4\_US378.dgn is used for "alternative design #4 for US378".)

All road design files will begin with the letter **"r"** for roadway. After the letter, add the 5 digits of the Project ID number, followed by a two or three letter file description. (Ex., **r12345ts.dgn**)

When a major revision is made, an unrevised copy of the file should be retained under the same name followed by the date of the revision. The new file will keep the name of the replaced file to keep the references intact.

#### Example for a revised PP file:

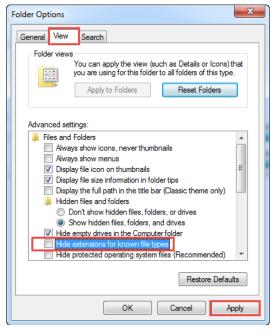
r12345pp_2014-08-25.dgn	The unmodified copy of pp file.	
r12345pp.dgn	The revised copy of the file keeps the same name to maintain any	
	references that it is attached to.	



# Do not include **spaces or special characters** in the folder names. Do not name files excessively long or bury files into subfolders greater than 7 levels deep.

Ensure that file extensions are turned on in Windows Explorer to avoid naming design files \*dgn.dgn with double extensions:

- In Windows Explorer, select Organize > Folder and Search Options
- Select the View tab and "uncheck" Hide extensions for known file types. Press the Apply button.



The following list depicts SCDOT Roadway File Naming Conventions:

Design File	Description
r12345ts.dgn	Title Sheet
r12345il.dgn	Index/Layout Sheet
r12345eq.xlsx	Summary of Estimated Quantities
r12345mi.xlsx	Moving Items/Disposal/Fence Sheets
r12345typ.dgn	Typical Sections and Miscellaneous Details
r12345rw.xlsx	Right of Way Data Sheets
r12345pc.dgn	Property Closure & Layout
r12345gcn.dgn	General Construction Note
r12345ref.dgn	Reference Data Sheets
r12345so.dgn	Station Offset Text file
r12345pf*.dgn	Plan and Profile Plotting File
r12345dr.dgn	Drainage Plan and Profile Sheets
r12345cg.dgn	Curb Grade Sheets
r12345ecds.xlsx	Erosion Control Data Sheets
r12345dx.dgn	Mainline Cross Section Design File
r12345fx.dgn	Mainline Cross Section Layout File
s123dx.dgn	Side road cross section file
s123fx.dgn	Side road cross section sheet file
us12xp_dx.dgn	Crossing pipe design cross sections
us12xp_fx.dgn	Crossing pipe final cross section layout
ofd1dx.dgn	Outfall ditch cross section file
ofd1fx.dgn	Outfall ditch cross section sheet file



r12345cp.dgn	Critical Points file
12345dtm.dgn	Digital Terrain Models
r12345pp.dgn	Plan and Property Design File
r12345sh.dgn	Shape File (may contain pattern lines)
r12345pat.dgn	Pattern line file
r12345eop.dgn	Proposed Edge of Pavement file
r12345prof.dgn	Profile Design file
planref.dgn	Created during plan sheet layout
r12345cogo.dgn	Created during plan sheet layout
xssheetpe.dgn	Created during cross section layout
prop345.dgn	Property file from Surveys
r12345pp_aerial.dgn	Aerial or Remote Sensing acquired survey Plan and Property Design File
12345dtm_aerial.dgn	Aerial or Remote Sensing acquired survey Digital Terrain Model
12345_aerial.tin	Aerial or Remote Sensing acquired survey tin file

# **Electronic Engineering Data Index File (EED\_index.xlsx)**

The Electronic Engineering Data Index file (EED\_index.xlsx) should be completed for every project and updated as frequently as possible to maintain a table of contents of the electronic files found in the project working directory. By maintaining this file, you are helping other departments quickly and easily identify the pertinent files that are required for their job. By maintaining this file, you are helping yourself when you have not worked on the project for some time to be able to quickly locate the files you need to update. **THIS FILE** (or a file in similar format and content) **IS REQUIRED** for all in-house and consultant projects.

The first section of the Excel file will include the Project information, primary design files, plan and profile files, and the border sheet names.

ELECTRONIC ENGINEERING	DATA INDEX				
COUNTY ROAD/ROUTE NO.		PCN NO.	DESIGN GROUP		
Florence	US 378 Part 5	37272	RPG 2		
File Description	File Name	File Description	File Name		
Geopak GPK COGO FILE	job272.gpk	DTM File -Existing	r37272dtm.dgn		
Geopak TIN FILE - Existing	37272.tin	Exported TIN File - Existing	37272_ExistingGroundDTM.xml		
Geopak GDF Drainage File	h378.gdf	Survey Excel File	37272_Survey.xlsx		
Design File	r37272pp.dgn	Survey Control Points	37272_SurveyControl.csv		
Property File	prop272.dgn	Survey Control Sheet	005A_0037272_ControlSheet.pdf		
Typical Sections	r37272typ.dgn	Datum Description	37272_Datum_Description.pdf		
		SCDOT Survey Control Plan Form	SCDOT_SurveyControlPlanForm.docx		
	PLAN A	ND PROFILE SHEETS			
Sheet Range	File Name	Sheet Range	File Name		
Plan & Profile Sheets 6-24	r37272pf.dgn	Curb Grades Sheets 37-40	r37272cg.dgn		
Side Road Profile Sheets 25-36	r37272pf1.dgn				
	B	DRDER SHEETS			
File Name	File Name	File Name	File Name		
border1.dgn	planref.dgn	xssheetpe.dgn	us378prof.dgn		
borderref.dgn	planref6.dgn	sctyp1.dgn	r37272ofdprof.dgn		



The second section will be indexed to include all of the GPK information. It is very important that the naming conventions are followed and the GPK is kept up to date so the electronic information "matches" the paper plans. Insert additional rows for additional alignments as needed. Leave blank the fields that are not applicable to each alignment. The Design Automation Office will fill in the Exported \* information.

GPK Description	GPK Name	GPK Description	GPK Name	
Existing Mainline Chain	US378	Cross Sections	us378rdx.dgn	
Relocated Mainline Chain	US378R	Cross Sections (Scale 10H:5V)	scaled_us378rdx.dgn	
Existing Mainline Profile	US378EP	Cross Sections Sheets	scaled_us378rfx.dgn	
Existing Relocated Mainline Profile	US378REP	Shape File	r37272sh.dgn	
Proposed Relocated Mainline Profile	US378RFP	Criteria File Used	Typical 5	
Curb Grade Left Profile	US378RCGLT	Critical Points Profile	US378RCP	
Curb Grade Right Profile	US378RCGRT	Pattern Line File	r37272pat.dgn	
Exported EED File	us378r.xml	Exported Carlson File	us378r.cl	
Exported EED File	us378r_top.gen	Exported Carlson File	us378r.pro	
Geopak COGO Report	Geopak COGO Report us378r_cogo.rpt		us378r.sct	

GPK Description	GPK Name	GPK Description	GPK Name	
Existing Chain	s121	Cross Sections	s121dx.dgn	
Relocated Chain		Cross Sections (Scale 10H:5V)		
Existing Profile	S121ep	Cross Sections Sheets	s121fx.dgn	
Existing Relocated Profile		Shape File	s121sh.dgn	
Proposed Profile	s121fp	Criteria File Used	Typical 3	
Curb Grade Left Profile		Critical Points Profile	s121cp.dgn	
Curb Grade Right Profile		Pattern Line File	r37272pat.dgn	
Exported EED File	sideroads.xml	Exported Carlson File	s121.cl	
Exported EED File	s121_top.gen	Exported Carlson File	s121.pro	
Geopak COGO Report	sideroads_cogo.rpt	Exported Carlson File	s121.sct	

The third section will be indexed to include all of the Proposed 3D Model information.

PROPOSED 3D MODELS FOR CONSTRUCTION				
Description	File Name			
Proposed 3D finish grade surface (1/5)	US378_FG_DTM_PD_1735_to_1780.xml			
Proposed 3D finish grade surface (2/5)	US378_FG_DTM_PD_1780_to_1815.xml			
Proposed 3D finish grade surface (3/5)	US378_FG_DTM_PD_1815_to_1845.xml			
Proposed 3D finish grade surface (4/5)	US378_FG_DTM_PD_1845_to_1895.xml			
Proposed 3D finish grade surface (5/5)	US378_FG_DTM_PD_1895_to_eop.xml			
Proposed 3D finish grade surface - Bridge End (1/2)	US378_FG_DTM_PD_BRIDGE-East.xml			
Proposed 3D finish grade surface - Bridge End (2/2)	US378_FG_DTM_PD_BRIDGE-West.xml			
Proposed 3D Break Lines in DGN format	US378_BreakLine_PD.dgn			
Proposed 3D Break Lines in DXF format	US378_BreakLine_PD.dxf			



# **Additional Surveys & Relocations**

The original plan and property design file (pp.dgn) will follow the file naming convention described above. Additional surveys and relocations for a project will be coordinated through the Surveys Office and will be named according to the following guidelines:

P012345a.xlsx	Additional Survey "A" Excel File			
prop345a.dgn	Additional Survey "A" Property File			
12345.tin	The additional survey "A" tin file will be merged with the original tin file. This			
	file should be copied to the Road folder.			
r12345app.dgn	Additional Survey "A" Plan and Property File. This file should be referenced and merged to master into the original r12345pp.dgn file in the Road folder.			
job45a.gpk	Additional Survey "A" gpk file. This file should be merged using the D&C Manager VBA "GPK Merge" into the job345.gpk in the Road folder. Ask the			
	Design Automation Group for assistance if needed.			
r12345soa.dgn	Additional Survey "A" station offset file. The station offsets in this file will nee			
	to be copied/pasted onto the r12345ref.dgn files.			

The letter "A" signifies the first additional survey for the project, and b, c, d, etc. would be used, if needed for further additional surveys. Once an additional survey is received, the roadway design group should verify that it is correct and not a duplication of previous information. The new survey should then be merged into the original pp file by attachment as a reference file with the merge command.

The Surveys or Design Automation Office will also coordinate the new Geopak points and chains for the new surveys. They will verify previously stored Geopak points and chains and ensure that the Roadway Group has not used points reserved for the Surveys Office. (Remember: Roadway Points should be stored with the "R" prefix.)

## **Property/Utility/Sue/Wetland Files**

There will always be additional design files that are provided to the Roadway Design Group for inclusion in the plan set. If the files are from an outside source such as a consultant, utility, or environmental group, these files should be referenced to the roadway design files.

It is highly recommended that these files **ARE NOT MERGED** into the main design file. As these files are updated, it become more difficult to distinguish what has been modified. The use of reference files makes this determination and update process easier.

- prop345.dgn This is the property file from the Surveys office. This file can be modified as right of way is researched and additional information is provided to the Surveys office. Attach this file as a reference to the r12345pp.dgn file for inclusion in the plan set.
- u345pp.dgn Utility and SUE Planimetry files. Turn on/off the appropriate levels and Save Settings in the design file. If the roadway pp.dgn file is attached as a reference, detach so not to confuse MicroStation. Attach the u345pp.dgn file as a reference to the r12345pp.dgn file for inclusion in the plan set.



e12345jw.dgn Jurisdictional Wetland Files. Turn off the location survey wetlands lines (light purple) in the r12345pp.dgn file and Save Settings. Attach the wetlands file as a reference to the r12345pp.dgn file for inclusion in the plan set. (Insert the date in the YYYY-MM-DD format for revised or updated wetland files.)

Additional file naming for Utility and SUE Files are as follows: (See the SCDOT SUE Manual for additional information.)

Design File	Description
u345ts.dgn	SUE Title & Reference
u345ul.dgn	SUE Legend
u345ud.dgn	Utility & Pole Data
u345th.dgn	Test Hole Data
u345pp.dgn	SUE Planimetry
u345thpp.dgn	SUE Test Hole Planimetry
u345md.dgn	Miscellaneous Detail
u345tbls.xlsx	SUE Table spreadsheet
u345pp.pdf	SUE Planimetry Plan Set
u345thrp.pdf	SUE Test Hole Reports

## **Environmental Standards**

The following CADD elements have been developed with the SCDOT Design workspace to accurately depict Environmentally Jurisdictional areas for jurisdictional wetland mapping, environmental permit exhibits, and other environment submittals.

Additional file naming for Environmental Files are as follows:

Design File	Description
e12345jw.dgn	Jurisdictional Wetlands File
e12345evs.pdf	Sketch file
e12345evp.txt	Surveyed Environmental Point File in ASCII format
e12345evr.pdf	Surveyor Report
e12345em.dgn	Environmental Management CADD file

There are several Environmental levels utilized for incorporating environmental information into the roadway plans. These levels can also be used to complete Environmental Permits.

Δ	Name ^	Number	1		12	Used	Description
	RD_EV_Ditch	1312	36	3	3		Environmental Non-Regulated Ditch
	RD_EV_ESA	1302	24	EVS_ESA	<u> </u>		Environmental Environmental Sensitive Area
	RD_EV_Hatch	1303	32	0	2		Environmental Hatch patterns
	RD_EV_JDitch	1301	251	EVS_JD	<u> </u>		Environmental Jurisdictional Ditch
	RD_EV_JFlag	1306	251	0	0		Environmental Located Flag Numbers
	RD_EV_JTrib	1305	231	EVS_EJT	<u> </u>		Environmental Jurisdictional Tributary
	RD_EV_JW	1304	79	EVS_EJW	<u> </u>		Environmental Jurisdictional Wetlands
	RD_EV_OWater	1308	250	EVS_OW	<u> </u>		Environmental Open Water Within Jurisdictional Area
	RD_EV_Shades	1309	24	0	0		Environmental Color fills
	RD_EV_TNW	1307	141	EVS_TNW	<u> </u>		Environmental Traditionally Navigable Water/OCRM Critical Area
	RD_EV_TX	1300	250	0			Environmental Text for Plan Sheets
	RD_EV_TxCode	1310	0	0	0		Environmental Survey Code Data & Text
	RD_EV_Working	1311	175	0	0		Environmental Non-Plotting Working Level



Of these levels, specific combinations are used in coordination with the various functions they will provide. The following chart details the visibility of the levels and graphics in accordance with general project functions with construction plan sets.

Level Name	Survey CADD Deliverable	Construction Plans		
		Property Strip Map	Plan & Profile	Drainage Sheet
RD_EV_Tx	ON	OFF	OFF	OFF
RD_EV_JDitch	ON	ON	ON	ON
RD_EV_Ditch	ON	OFF	OFF	OFF
RD_EV_ESA	ON	OFF*	OFF*	OFF*
RD_EV_Hatch	ON	OFF	OFF	OFF
RD_EV_JW	ON	ON	ON	ON
RD_EV_JTrib	ON	ON	ON	ON
RD_EV_JFlag	ON	ON	ON	ON
RD_EV_TNW	ON	ON	ON	ON
RD_EV_OWater	ON	ON	ON	ON
RD_EV_Shades	ON	OFF	OFF	OFF
RD_EV_TxCode	ON	OFF	OFF	OFF
RD_EV_Working	ON	OFF	OFF	OFF

For Army Corp Drawings and Permit Exhibits, all levels will be turned on in the list above with the exception of the RD\_EV\_TxCode and RD\_EV\_Working levels.

The Environmental information will be drafted using the following line-styles.

		Environmental - Traditionally	TNW
EVS_TNW	RD_EV_TNW	Navigable Water/OCRM Critical Area	
		Environmental - Environmentally	—— ESA ——
EVS_ESA	RD_EV_ESA	Sensitive Area	ESA
			JD
EVS_JD	RD_EV_JDitch	Environmental - Jurisditional Ditch	
		Environmental - Jurisdictional	I T
EVS_EJT	RD_EV_JTrib	Tributary	51
		Environmental - Jurisdictional	
EVS_EJW	RD_EV_JW	Wetlands	
		Environmental - Open Water Within	0.11
EVS_OW	RD_EV_OWater	Jurisdictional	OW



These line styles may have additional labeling shown on the same level and the line style and should use the provided Environmental abbreviations as provided in these instructions. These additional labels will use the SCDOT Text-style **Environmental – Line Labels**. The following is an example of additional line labeling for the Environmental Office.

$\overline{\mathbf{v}}$	¥	<u>`</u>	JW vr	$\overline{}$	—E ↓	₩	¥	JW	$\checkmark$	~	$\checkmark$	$\checkmark$	JW Ƴ	/	¥		$\checkmark$	- 1/	v - √	$\overline{\mathbf{v}}$	—E	₩ <sub>↓</sub>	 ∨	JW	¥	~	$\checkmark$	7
$\checkmark$	$\checkmark$	$\overline{}$	$\checkmark$	$\checkmark$	¥	$\downarrow$	¥	$\checkmark$	V	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	¥	$\checkmark$	$\checkmark$	$\overline{}$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	¥	$\checkmark$	$\checkmark$	4
<u>.</u> (.		.l.		<i></i>		_1.		- L.		<u>_</u> [.		. I .		_1.		- ( .		_L.		<u>_</u> L.		. ( .		- L.				_1.

Approved abbreviations are shown in the following charts:

Salt Water Habitats	Common Description	Abbreviation
Marine Subtidal*	Open Ocean	MS
Marine Intertidal	Near shore	MI
Estuarine Subtidal*	Open-water/bay bottoms	ES
Estuarine Intertidal Vegetated		EIV
Estuarine Wetland		EW
Estuarine Intertidal Emergent	Salt marsh	EIE
Estuarine Intertidal Forested/Shrub	Mangroves / other estuarine shrubs	EIF
Estuarine Intertidal Non-Vegetated		EINV
Estuarine Intertidal Unconsolidated Shore	Beaches/bars/shoals	EIU
Riverine* (may be tidal or non-tidal)	River systems/channels	RS



Freshwater Habitats	Common Description	<u>Abbreviation</u>
Freshwater Vegetated		FW
Palustrine Wetland		PW
Palustrine Forested	Forested Wetlands	PF
Palustrine Shrub	Shrub wetlands	PS
Palustrine Emergent	Inland marshes/emergent wetlands	PE
Freshwater Non-Vegetated		FWNV
Palustrine Unconsolidated Shore	Shorelines/beaches/bars	PUS
Palustrine Unconsolidated Bottom	Open-water ponds	PUB
Palustrine farmed	Farmed wetland	PA
Lacustrine*	Deepwater lakes and reservoirs	LS

<u>Uplands</u>	Common Description	Abbreviation
Agriculture	Cropland, pasture, managed rangeland	AA
Urban	Cities and incorporated developments	UA
Forested Plantations	Planted or intensively managed forests; silviculture	FP
Rural Development	Non-urban developed areas and Infrastructure	RD
Other Uplands	Rural uplands not in any other category; barren lands	OU

In many cases, ESAs are bounded by an established Environmental Project Boundary (EPB), which is usually a consistent distance offset from the centerline of the project roadway. This project boundary line-work will be placed on the **RD\_EV\_Working** level and will be a solid, thin line.

All surveyed ESA data will be submitted using South Carolina State Plane Coordinates, referenced horizontally to NAD83 datum and vertically to NAVD88 datum. Elevations for the surveyed ESA boundaries and areas are not required and may be replaced by zero values. The Survey Deliverables for ESA projects must include the following files and information:

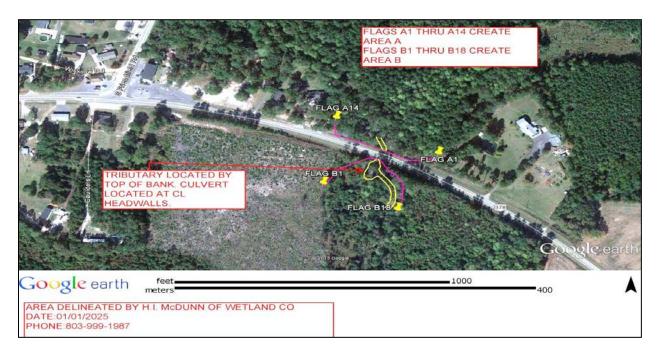
- A pdf of an ESA Sketch showing site location, ESAs, flag numbers, etc. (e12345evs.pdf)
- A comma delineated ASCII file containing the Survey Point data (e12345evp.txt)
- A Survey Statement describing the survey datum and location methodology. (e12345evr.txt)
- A MicroStation CADD file containing all applicable data (e12345jw.dgn)



**<u>ESA Sketch (e12345evs.pdf)</u>** - This sketch can be a scanned hand drawn, or digitally produced, drawing in an Adobe PDF format. At a minimum, this sketch must show the following information:

- Name and contact information of persons responsible for the delineation
- General area of site road along with road names, showing at least one intersection
- North Arrow
- General area and shape of delineated areas.
- Identifying numbers from flagging along with connectivity sequencing

The following is an example of an ESA sketch:



<u>Survey Point Data (e12345evp.txt)</u> - Surveyed ESA will be submitted in a comma delineated ASCII format that contains the following information:

- Survey Point Number (Point#)
- North Coordinate (Northing)
- East Coordinate (Easting)
- Elevation (these can be set to zero if elevations were not recorded)
- Feature Code & Description (separated by a "--")

Below is an example of the required information and format of the ASCII file.

Point#,	Northing,	Easting,	Elevation,	Feature Code-Description
1,	1234567.89,	12345678.90,	0.00,	EJAA1
2,	1234567.89,	12345678.90,	0.00,	EJAA2
3,	1234567.89,	12345678.90,	0.00,	EJAA3



<u>Surveyor Report (e12345evr.pdf)</u> - A short description of the equipment, methodology, and expected accuracies associated with the location of the ESA will be submitted in either as a document file (.docx) of an Adobe pdf.

The following chart shows the Environmental colors to be used when shading Jurisdictional Areas:

TRUE	SCDOT	Jurisdictional
COLOR	COLOR	Туре
	99	Freshwater Forested & Shrub Wetland
	93	Freshwater Emergent Wetland
	108	Freshwater Pond
	68	Estuarine & Marine Wetland
	191	Riverine
	190	Lakes
	253	Estuarine & Marine Deep-Water
	85	Other Freshwater Wetlands

The following chart shows the hatch patterns used with the different Jurisdictional Areas:





## **Electronic File Policy**

#### **Providing Electronic Files to Non-Department Entities**

It is the intent of the SCDOT to cooperate fully with all those with whom we do business. There are recognized shortcomings when the Department tries to provide electronic files to others in a format that is not native to the Department's operation. In light of the possible incomplete or errant electronic information that may be shared with other business affiliates, the Department will provide electronic information to non-Department entities only in the format the Department used to create the requested data. In the fullest degree of cooperation with the engineering community and the public, electronic vector files of plans, standards, specifications, or any other available electronic information may be provided through shared file sites, Internet and disks. Electronic files should only be provided with hard copies of the same information, unless the recipient has already obtained a hard copy of the information or the recipient obtains electronic raster images through shared files and/or the Internet. It is the responsibility of the recipient of the electronic files to verify the electronic files with the paper or raster copy of all information provided shall be the governing document. The disclaimer shown below should be placed in every electronic document file prior to distribution.

#### Disclaimer

These electronic files were created by the South Carolina Department of Transportation (SCDOT) for the sole purpose of creating a set of plans for project development at the site shown. SCDOT believes that the information contained herein is reliable and generally accurate for the purpose intended. However, since physical conditions may vary and can change over time, SCDOT makes no performance guarantees, expressed or implied warranties and assumes no obligation or liability for the reliability or accuracy of the information contained herein; or for the accuracy of the information translated by the Department's software for use with end users' software. The paper copy of the electronic information, if available, shall govern over the electronic stored copy. Only the paper copy of the information may be used to determine errors and omissions in the documents. SCDOT assumes no liability for hardware or software damage that may result from the use of the electronic files provided on disk, tape or by electronic transfer due to unknown viruses that may reside on the electronic media when transferred to the end user.

Requesting copies of electronic files may incur costs if research, file manipulation and/or storage media is required. There is a cost for copies of paper documents. Delivery of electronic and hard copy files and plans to other government entities and public utilities is at no cost to those groups as long as sharing these files are deemed in the best interest of the Department. Files to be used to generate profit or to complete work for private interests will be charged the established rate. If the shared files are given to a Consultant in order to perform work at the request of the Department, there is no cost for the electronic or hard copy files and plans.

Electronic information is provided as employee time and availability permits. When large amounts of time are needed to gather data, a deposit from the requestor may be required.



#### Summary of Details

- 1) CADD drawing files are only provided in MicroStation Format.
- 2) Files are provided to Consultants working on projects in conjunction with SCDOT projects.
- 3) Files are provided to Cities, Counties, other government entities and utility companies at no charge when deemed in the best interest of the Department.
- 4) Files are provided to the Prime Contractor, if requested, only after they are awarded a project at no charge.
- 5) Files are provided to Property Owners, before letting, if the project impacts their property and authorized by the project manager at no charge.
- 6) Files are available to anyone after the project is let and awarded. (Fee Based)
- 7) Files are noted and labeled "Preliminary" if the project hasn't been let to contract.
- 8) Disclaimer is placed in electronic files directory or placed in the correspondence delivered to requestor except when provided to Consultants for a Department project.
- 9) Requestor should have a paper copy or raster image of the plan sheets being requested. (Fee Based on number of sheets)
- 10) Requestor can subscribe to SCDOT Plans Online system to access plans. (Fee Based)

#### Hard Copy Plan Prices

No Research -- \$1.00 per full size (22"x36") and \$0.50 per half size (12"x18") black and white Research Required -- \$1.75 per full size (22"x36") and \$1.25 per half size (12"x18") black and white

#### Contact for Hard Copy Plan Sheets and/or access to SCDOT Plans Online System:

Attention: Mark Lorick, Room G-21 South Carolina Department of Transportation Plans Storage Office Post Office Box 191 Columbia, South Carolina 29202-0191 Email: <u>planstorage@scdot.org</u> Telephone: (803) 737-7236

#### **Electronic File Transfer Prices**

Research and Transfer Fee -- \$30.00 per hour -- \$15.00 Minimum SCDOT Plans Online System -- \$60.00 yearly

#### **Contact for Electronic Cadd Files:**

Scott Shaffer	shafferss@scdot.org	803-737-1090
Iris Neal	nealif@scdot.org	803-737-9964
Brett Calcutt	calcuttbm@scdot.org	803-737-6873
Peter Yeh	yehnp@scdot.org	803-737-1904

South Carolina Department of Transportation Design Automation Office, Room G-19 Post Office Box 191 Columbia, South Carolina 29202-0191



## **Digital Imagery Non-Disclosure Agreement**

Digital orthophoto imagery is provided to the South Carolina Department of Transportation (SCDOT) from the South Carolina Geodetic Survey (SCGS) for Department use only. In the event that any digital orthophoto imagery is used as a base map for projects conducted by non-Department entities working with the SCDOT, all SCDOT employees will require an electronically signed agreement form of non-disclosure from said non-Department entities.

By electronically signing and submitting this agreement form to SCDOT, you personally, and/or as a representative of the above entity, agree that any imagery used for a project in South Carolina will be used only for the project with which it is intended and will be destroyed once the project is completed. You agree not to resell or redistribute this imagery provided or derived in digital form to third parties.

The electronic form is to be submitted to the Program Manager for approval. The form is available on the Cadd Design website at: <u>https://www.scdot.org/business/CADD-Design.aspx</u>



#### SCDOT Digital Imagery Non-Disclosure Agreement

Digital orthophoto imagery is provided to the South Carolina Department of Transportation (SCDOT) from the South Carolina Geodetic Survey (SCGS) for Department use only. In the event that any digital orthophoto imagery is used as a base map for projects conducted by non-Department entities working with the SCDOT, all SCDOT employees will require an electronically signed agreement form of non-disclosure from said non-Department entities.

Project Information:					
County Rou	te Project ID				
Program Manager					
Company Information:					
Name of Company	City				
Address 1	State				
Address 2	Zip				
Company Information:					
Name of Contact	Phone				
Title	Email Address				
Company Owner or Principal					

#### Non-Department Entities:

By electronically signing and submitting this agreement form to SCDOT, I personally, and/or as a representative of the above entity, agree that any imagery used for a project in South Carolina will be used only for the project with which it is intended and will be destroyed once the project is completed. I agree not to resell or redistribute this imagery provided or derived in digital form to third parties.

Signature:	
Date:	



## **Plan Covers**

The Engineering Documents Office prepares the manila folders for the plan sets. The covers are available for pick up in room G-23 to SCDOT employees only.

Consultants are responsible for providing the covers for their plans. The labels are 8.5" x 5.5" (Half Sheet) Shipping Labels for Laser/InkJet printers – Avery 5126.



To create the **label** to stick onto the cover, complete the <u>word document template</u> with the correct project information. (You can change the Route/Road as appropriate and the To/From vs. Bridge Replacement description as necessary.) If needed, reduce the font size to ensure the text fits properly on ½ of the template file.

The information can be modified to fit as necessary, with the key objective being to create a legible and informative label for the plan set.

## FLORENCE COUNTY PROJECT ID. 0037272 ROUTE: US 378 (MYRTLE BEACH HWY) FROM: WEST OF RD S-225 (SANDPIT RD) TO: SC RTE 41 (KINGSBURG HWY)

**Email** the label to <u>PlanStorage@scdot.org</u> to be printed onto the label paper. Wait for notification from Plans Storage that the cover is ready for **pick up** on the counter in Room G-23.

If you have any issues completing the template, please feel free to contact:

Mark Lorick, Travis Huckabee, or Calvin Johnson Plans Storage – Room G21 Phone: 803-737-1743 and 803-737-9981 Email: <u>PlanStorage@scdot.org</u>

Note: If you have a large set of plans that needs to be drilled, please feel free to stop by the Plans Storage office in person and they will accommodate you with a specialized plan cover.





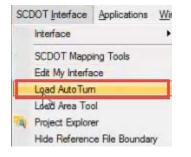
## **Application Programs**

## AutoTurn

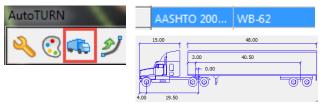
AutoTurn software is utilized to analyze truck turning movements using Truck Turning Radius templates and cells. AutoTurn is a vehicle swept path analysis software. This software can analyze almost all vehicles in road and site design projects including intersections, roundabouts, bus terminals, loading bays and parking lots. It can provide detailed reports and visual analysis clearances, swept path maneuvers, clear sight triangles, and much more. For additional help using this software, see the tutorials located in the AutoTurn icon selection.

AutoTURN	×
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🗊 Tutorials	
Select a tutorial then dick Play: Example 1 - Place Adaptive Simulation Example 2 - Continue in Reverse Example 3 - Generate Corner Simulation Example 4 - Generate Arc Simulation Example 5 - Place Adaptive Simulation - Offset	
Example 7 - Radius Type Example 8 - Conflict Analysis	
Drawing: _sample Play Close Help	

To load, select **SCDOT Interface > Load AutoTurn** from the top MicroStation menu.

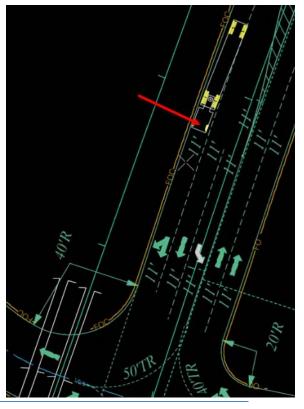


Press the **Vehicle** button to select the appropriate vehicle for the project. Press **OK**.



To create a turning path using **Path tools**, select the 4<sup>th</sup> icon, **Generate Arc Path**. **Data click** the vehicle into the lane approaching the intersection. Rotate the vehicle and data click again to place the vehicle in the correct direction.

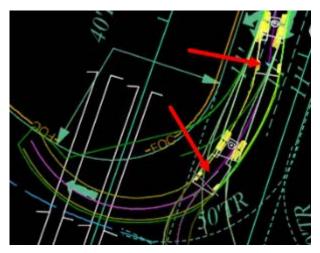


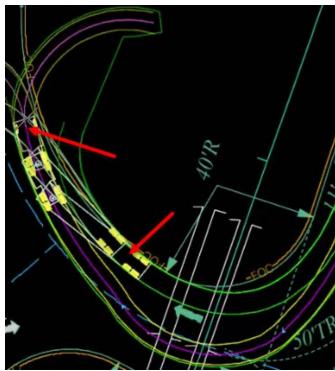


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**Drag** the cursor and **data click** to define the truck path movement. Continue through the curve of the intersection. (Note: it does not have to be perfect the first time through, the curve path can be adjusted after drawn.)





After completing the path, press the **Path Control** icon. This will highlight the path with Nodes that can be moved (right image below). Use the mouse to drag/drop and fine tune the vehicle path to fit onto the road and turn radius of the intersection (bottom image).

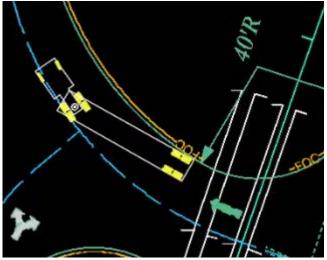




Press the **Run Animation** icon and select the path. The **Hide Simulation** can be checked on or off for viewing the vehicle movements. The **Loop Animation** button can be turned on to repeat the simulation again. Set the timing to 5 seconds and press the **Play** button to review the movements.

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Loop Animation	Hide Simulation	
	Close	Help

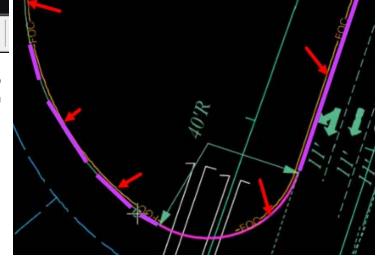
**Modify** the intersection design radius if necessary. **Modify** the truck turning path if necessary to ensure good movement.



To create a turning path using the **Place Adaptive tool**, select the 8<sup>th</sup> icon, **Place Adaptive Simulation**. **Data click** to select the proposed edge of travel way from the tangent approach path through the radius of the intersection to the tangent of the intersection path.

Toggle the **Offset Left button** and enter **5.00** to offset the path elements. Toggle on **Use Smooth Transitions**. Press **OK**.

Place Adaptive Simulation
Simulation Type Offset Left  Centered  Offset Right
Offset
5.00 ft
Use Smooth Transitions
Simulation Envelope: Front and Rear Tires 🔻
Maximum Deviation: 0.00 ft
Minimum Radius: 41.00 ft
Oversteer Applied At:
Entry Exit
Link turn simulation to path geometry
OK Cancel Help



From the AutoTurn help: *This tool generates turn simulations* based on following selected path elements with the center of the steering axle group (traditional centerline path follow) or by offsetting the turn simulation a specified distance relative to the selected turn simulation envelopes (offset simulation).

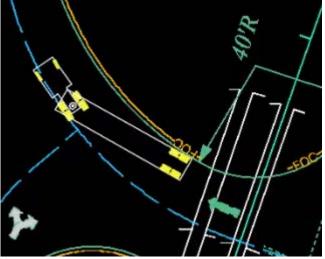
Offset turn simulations are measured from the selected path elements to the specified simulation envelopes: front and rear tires; vehicle body; or body clearance.



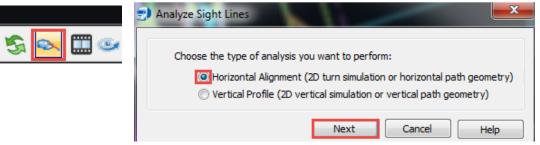
Press the **Run Animation** icon and select the path. The **Hide Simulation** can be checked on or off for viewing the vehicle movements. The **Loop Animation** button can be turned on to repeat the simulation again. Set the timing to 5 seconds and press the **Play** button to review the movements.

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🛃 Run Animation	
<b>5</b>	
Loop Animation	✓ Hide Simulation
	Close Help

**Modify** the intersection design radius if necessary. **Modify** the truck turning path if necessary to ensure good movement.



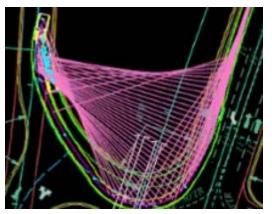
Press the Analyze Sight Line tool icon. Select the Horizontal Alignment option, and press the Next button.



Data click to select the turn path. Set the Driver's Eye Location to **Center**. Set the Stopping Sight Distance and Sight Line Options. **Review** the line of sight for the intersection of the project. **Adjust** the design as necessary to meet design standards.

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🛃 Analyze Sight Lin	es - Horizontal A	lignment	×
Driver's Eye Setting	IS		Units: ft
	•	🔘 Left 💿 Center	🔘 Right
Distance fi	rom Driver's Side:	N/A	
Distance fr	om Vehicle Front:	4.00	
Sight Line Settings			
Stoppin	ig Sight Distance:	150.00	
I	interval Distance:	5.00	
Sight Line Draw Op	tions		
Element	Color	Line Style	
Sight Lines	Color 7	✓ Solid	•
Summary	Color 0	•	
	ОК	Cancel	Help





Select the **Place Vertical Simulation** icon to create a vertical path. **Data click** to select the profile. (Note: The following example depicts the centerline profile. This tool can be used anywhere an existing or proposed profile has been drawn – centerlines, edge of pavements, driveways, etc.)



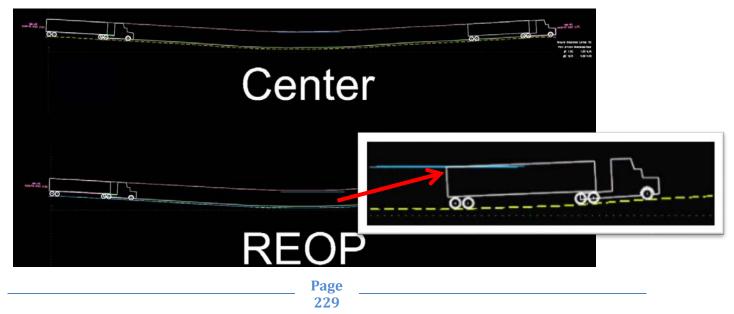


Press the **Run Animation** icon and select the vertical path. The **Hide Simulation** can be checked on or off for viewing the vehicle movements. The **Loop Animation** button can be turned on to repeat the simulation again. Set the timing to 5 seconds and press the **Play** button to review the movements. {The video can be paused to zoom in closer to review. Press the **Move Slider Right** button to slowly maneuver thru obstacles for review.}

000	Run Animation	
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**Modify** the proposed profile as necessary to ensure the vehicles have enough clearance height and also do not bottom out in dips or over railroad crossings.

This tool can also be used to check **bridge clearances**. On the profile have both the existing and/or proposed centerline elevation drawn with the bottom of the bridge deck profile. It can be checked for centerline and left and right edges of pavement profiles.





## **Alternatives to Axiom Software**

Axiom software was phased out of roadway design plan production in April 2016. Alternative processes have been developed to accomplish all of the items previously completed with the Axiom software.

Axiom was primarily used to copy and paste formatted Excel data into MicroStation for plan production. Excel sheets for the Quantity Sheets, Moving Items/Removal Disposal, Erosion Control, General Construction Note, and Right of Way Data have been developed to create the plan sheets by printing Excel to pdfs.

Excel Sheets	See page 242 for instructions.
Index of Sheets	See page 286 for instructions.
Utility Owners	See page 289 for instructions.

The additional tools utilized in Axiom are to be replaced with the following alternatives in MicroStation:

#### **File Fixer**

To recover or compress a potentially corrupted dgn file:

File Compress and Repair See page 13 for instructions.

#### File Backup

Files on the network server are backed up to tape on a nightly basis for modified files and a weekly basis for unchanged files. To recover a previous version of the file, submit a request using the SCDOT Help Desk ticket system at <a href="http://apps.sharepoint.dot.state.sc.us/HelpDeskApp/default.aspx">http://apps.sharepoint.dot.state.sc.us/HelpDeskApp/default.aspx</a>.

Select **Create a Ticket** on the left. Enter your **nts user name** and the Short Description **File Restore**. Select the Category **Data Management** and specify the file name to be backed up (or files/folders), the date to be backed up from, and the location on the network. Include the <u>full path to the file</u>. Do not list a mapped drive such as P:\ drive. Specify if the file is to be overwritten or specify to name the file or folder \* backup.dgn for comparison to the existing file.

View All Site Content			
Lists	🔋 Attach File   🍄 Spellin	g	
Libraries	Customer *	nealif 🖛 😵	
Site Pages		Enter all or part of Username or NTS Account and then click the "Check Name" icon.	
Tickets	Category *	Data Management	
<ul> <li>HomePage</li> </ul>	Short Description	File Restore	1
<ul> <li>Create a Ticket</li> </ul>	Details	A A1 B Z U   ■ ■ ■   扫 扫 建 律   A 例 M 14	
All My Customer Tickets		Please restore the following file:	
<ul> <li>Technician Tickets</li> </ul>		-	
<ul> <li>IT Infrastructure Upgrades</li> </ul>		r37272pp.dgn \\nts\hq\Precon\Florence\37272_us378_part5\road	
<ul> <li>Support FAQs</li> </ul>	-	From 11/15/15 backup	
Knowledge Base		Please rename the file r37272pp_backup.dgn so I can	
<ul> <li>Teams and Experts</li> </ul>		compare the two files.	
<ul> <li>Search Tickets</li> </ul>		Thanks!	
			ľ

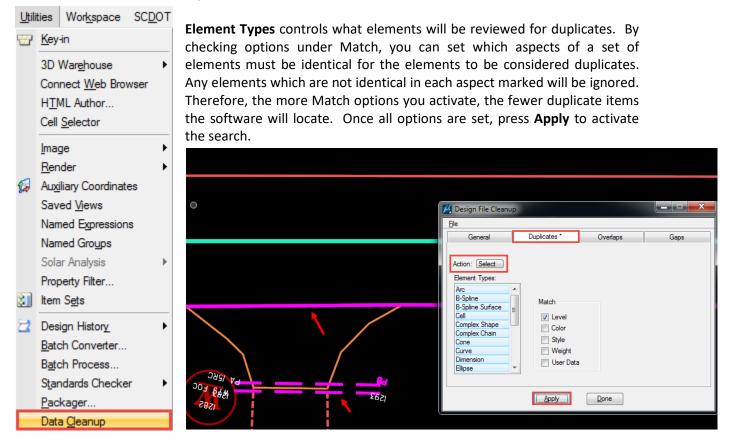
#### Service Requests : New Item



## **Duplicate Element Remover**

When copying and pasting, moving, or applying elements, it can be easy to accidently duplicate a single element. MicroStation has the ability to locate and select or delete duplicate elements. In the **Utilities** menu, select **Data Cleanup**.

In the **Design File Cleanup** dialog, select the **Duplicates** tab. In the Action pull down menu, choose whether to **select or delete** duplicate items.



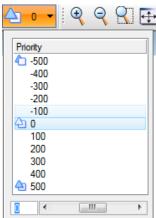
## **Element Priorities**

When elements in a MicroStation file are overlaid or when a second file is referenced into a DGN, MicroStation can determine which element has "priority" – which one is "in front" of the other – for selection and printing.

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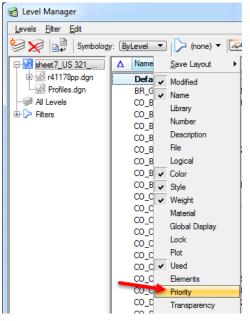
For elements in a single file, priority can be set individually or by the Level the element is placed on. To set priorities for individual elements, simply select the element and click the **Active Element Priority** tool in the Attributes toolbox, typically docked at the top of the window. Levels with higher values will be 'in front' of those with lower values, making it easier to select and edit elements set to those priorities.







To set priorities by Level, open the **Level Manager** and review the factors listed at the top of the Levels list. If Priority is not shown, right-click on the bar and select "Priority".



Once the level priorities are shown, you can simply click on the values and choose a new one.

Similarly, to set priorities for referenced files, open the **References** menu and activate the **Priority** option by right-clicking on the qualities bar and selecting 'Priority'. Once the Priority of each reference is shown, the priorities can be set by clicking on them and choosing a priority level.

References (3 of 3 unique, 3 displayed)	Presentation 👍 💽 🤳 🦎 🏠
Tools Settings	Wireframe 0 🗸 🗸 🗸
Tools       Settings         Image: Slot       Image: Slot         1       r41178pr         2       Profiles.d         Image: Slot       Image: Slot         2       Profiles.d         Image: Slot       Image: Slot         Image: Slot <td>Wireframe       0       √       √         Wireframe       Priority (x1000000)       1         -5       -4       -3         -3       -2       -1         -1       0       1         2       -1       2         3       4       5         5       •       •</td>	Wireframe       0       √       √         Wireframe       Priority (x1000000)       1         -5       -4       -3         -3       -2       -1         -1       0       1         2       -1       2         3       4       5         5       •       •
Revision GeoCS	<u>O</u> K Cancel
Transparency Priority	
Scale 1.000000	



## **Spell Checker**

To spell check text in MicroStation, Fit View for the design file. Draw a fence around all of the elements. On the Text toolbar, select the **Spell Checker** tool, the fourth tool in the list. Check on **Use** Fence.

٨	$\mathbf{A} \checkmark^{\mathbf{A}} \overset{\mathbf{B}}{\checkmark} \overset{\mathbf{ABC}}{\checkmark} \mathbf{C}^{\mathbf{C}} \overset{?}{\overset{?}{}} \overset{\mathbf{ABC}}{\overset{\mathbf{ABC}}{}} \overset{\mathbf{A}}{\overset{\mathbf{ABC}}{}}$	Spell Checker 💷 🖾
A	$A^{4} \xrightarrow{1} A_{A2A} \xrightarrow{A1} A_{A2} \xrightarrow{A1} A_{A2} \xrightarrow{A1BC} \cdots$	Use <u>F</u> ence: Inside

Data click in the design file to activate the spell checker. Review each word found and select the appropriate response to either Ignore, Change, etc.

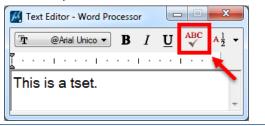
ĺ	K Spell Checker	
decsription	Error Word: decsription Change <u>T</u> o: description	10 Zoom Factor: ◀ Ⅲ ► Ignore Ignore All
	Suggestions  description description description prescription	onungo o <u>n</u> ungo / u

\*Tip: Turn off all of the Text Code – Location Survey Levels to avoid the spell checker stopping on each of these codes.

🥩 Lev	vel Display - View 1			
말	View Display			
P	🔎 🔃 🏳 Text Co 🕶 Levels 💌 🛹			
Use the filter to quickly turn off the Survey txCode levels				
Used	ed Name Number Description			
	RD_EX_Bridge_txCode	124	Survey Code for RD EX Bridge	
•	RD_EX_Conc_txCode	126	Survey Code for RD_EX_Conc	
•	RD_EX_DR_Inlet_txCode	134	Survey Code for RD_EX_DR_Inlet	
•	RD_EX_DR_Pipe_txCode	136	Survey Code for RD_EX_DR_Pipe	
•	RD_EX_Driveway_txCode	130	Survey Code for RD_EX_Driveway	

You can also spellcheck a line or paragraph of text prior to placing it. After typing or pasting the text, click the Spell Checker icon in the Text Editor window.

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## **Pipe Spreadsheets (SCDOT only)**

The Pipe Spreadsheet is used to organize drainage network data for inclusion in plan sets. The spreadsheet itself can be located on the Preconstruction intranet page under **Resources > Design Tools** listed as **Pipe Editor**. (This sheet is available internally to SCDOT only.)

The information for generating the necessary reports is located in the DrainReport4AltPipe2010.drf file found (internally only) here:

\\nts\hq\Precon-General\Hydraulics\Standard Files GEOPAK 2009\GEOPAK Output\Output drf files

To export the drainage system data from Geopak, select **Drainage > Reports > Generate.** Make sure you have an active network selected. By **Drainage Report Format File**, choose the preset **DrainReport4AltPipe2010.drf**.

By **Output File Name** choose your working directory and name the file as desired. Change the extension to csv. Select **Generate** to produce the file. A message will appear stating the file has been generated.

🥂 Generate Report	
Drainage Report Format File: DrainReport4A	tPipe2010.drf Q
Output File Name: Smooth.csv	۹ م
Generate Vie	w

**Copy** the Pipe Editor spreadsheet from the intranet page to your working directory and open the file. Select Enable Editing to authorize Macros and to confirm that files from the internet are allowed (if prompted).

1 Protected View	Protected View This file originated from an Internet location and might be unsafe.		Enable Editing
Security Warning	g Some active content has been disabled. Click for more details.	Enable Content	

Fill in the File Number (Contract ID) on the Input tab of the spreadsheet. The Joint Pressure cell should be 13 psi for coastal regions and 10 psi for all others unless otherwise indicated for the specified project. Set Smooth Data to Yes and Corrugated Data to No. If Driveway Pipes are to be included in the final report, set that field to Yes. Then enter the name of the .drf file created in the previous section next to the Smooth Data field under File Names.

File Number:	21.038191B	
Date:	Apr-01-15	
Current User:	Holtzclaw, Bobby	
		-
Joint Pressure:	10	psi

Type of Data Files To Import A	File Names	?	
Smooth Data:	Yes	Smooth	
Corrugated Data:	No		
Will Project Include Driveway Pipe:	Yes	· · · ·	

Press the "Import Geopak Data" button to fill in the network data from the .csv file. The left most column of data, System ID, must be filled in manually. For each Link, enter the point number of the outlet of its system. The SPT "N" values must be entered manually by the geotech. Once both columns



have been filled out, press the "Generate Road Output Results" button and enter a file name to create the final reports. This Excel file will be sent to the Roadway Design Group for inclusion in the plans.

In MicroStation, select the most appropriate border sheet applicable for your project. Alternatively to displaying the information on the Drainage Plan, Plan & Profile, Dual Plan, or Profile sheets, you can elect to use a standard border sheet and copy and paste the entire chart at once instead of separating it per road or 1500 station range.

\mu reference 👻
Name
Drainage_profilepipe.dgn Drainage_planprofilepipe.dgn Drainage_planpipe.dgn Drainage_planpipe.dgn Drainage_dualplanpipe.dgn

In the Excel file, highlight the headers and pipe data columns and rows. Right click to select **Copy**.

				V .	n.a.					Smooth												
т. т.				r •	LUL	Upstream				Downstream			Fill Height Min Field		Joint	oint Smooth Wall Options						
System ID	Link ID	Diameter	No.c	Da i	Copy	Node	Node	Link Invert	Node	Node	Node	Link Invert	Min	Max	SPT "N"	Pressure	HDPE	Built	RCP	Buik	SRAP	Buik
π	E.	(in)	Barre		20py	Description	Station	(R)		Description	Station	(ft)	(R)	(代)	below invert	(psi)	Type	1	Highest Class	1	Thickest Gage	1
Clebourne	EP-110	18	1	<b>B</b> 1		NG CATCH BASIN	30+90.10	636.51	DN-111	DUMMY JOINT	31+67.40	634.61	EP	EP		10	EP		EP		EP	
Clebourne	EP-111	18	1	_	22	UMMY JOINT	31+67.40	624.30	OP-2	OP	31+67.40	621.23	EP	EP		10	EP		EP		EP	
Clebourne		18	1		= <u></u>	C.B. TYPE 16	26+36.84	637.50	CB-101	C.B. TYPE 16	26+37.78	637.40	3.15	3.25		10	s				16ga	
Clebourne		18	1			MH.	28+34.69	637.10	CB-109	C.B. TYPE 16	29+15.00	636.90	5.33	5.62		10	s				16ga	
Clebourne		18	1		Paste Special	D.B. TYPE 16	29+15.00	636.90		EXISTING CATCH BASIN	30+90.10	636.51	4.20	5.33		10	S				16ga	
Clebourne		18	1		-	NG CATCH BASIN	30+90.00	637.20	EX-110	EXISTING CATCH BASIN	30+90.10	636.69	EP	EP		10	EP		EP		EP	
Clebourne	NP-101a	18	1	1	insert	C.B. TYPE 16	26+37.78	637.40	J-108	M.H.	28+34.69	637.10	3.25	5.62		10	s				<u>16qa</u>	

In MicroStation, select **Edit > Paste Special**, select **Embedded Microsoft Excel Worksheet**, and ensure *Transparent Background* is not selected.

	<u>E</u> dit	Element <u>S</u> ettings <u>1</u>	<u>F</u> ools <u>Ut</u> ili	Paste Special 👘 Paste OLE Object 👘 💻 💌	
	n	Undo Attach Reference	Ctrl+Z	Data Type Object: Microsoft Excel Worksheet	
		Undo Ot <u>h</u> er	•	Picture of Microsoft Excel Worksheet	
	24	<u>R</u> edo	Ctrl+R	Embedded Microsoft Excel Worksheet	
		Set <u>M</u> ark		Linked Microsoft Excel Worksheet	
-	X	Cu <u>t</u>	Ctrl+X	Rich Text to Design File  Unked Text To Design File	
	2	Copy	Ctrl+C	Transparent Background	
	Ĉ	<u>P</u> aste	Ctrl+V	Paste Cancel Rotate With View	
		Paste Special	-		

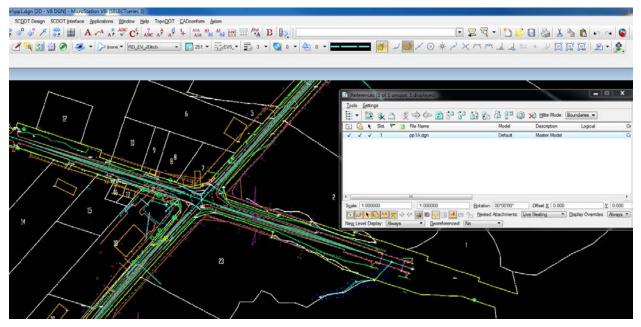
Left click in the upper left corner and then in the upper right corner to draw the extents of the chart.

amooth																							
Geometry Upstream				Dowinstream			FillHohn		MinField	Joint		Smooth Wall Options											
System D	Link D	Dameter	No. of	Pipe Length	Sope	Node	Node	Node	Link Invert	Node	Node	Node	Unk Invert	Min	Max		Pressure	HOPE	Buit	ROP	Bult	SRAP	6
		(11)	Berreis	(#)	(%)		Description	Station	(75		Description	Station	(ft)	(70	(#)	below Invert	(ps)	Type	1	HighestClass		Thickest Gage	-
ebour ne	EP-110	18	1	93.27 EP	203	E€110	EXISTING CATCH BASIN	30-90.10	636.51	DN-111	DUMMY JOINT	31+67.40	634.61	BP	B		10	B		P		P	
ebourne	P 111	18	1	30.64 BP	10.00	DN-111	DUMITY JOINT	31+67.40	624.30	OP2	OP	31+67.40	61.23	8P	<b>P</b>		10	P		P			
ebourne	NP-100	18	1	37.94	0.26	CB-100	C.B. TYPE 16	26-36.84	637.50	08-101	C.B. TYPE16	26+37.78	637.40	3.15	3.25		10	5				1605	
lebourne	NP-108	18	1	51.62	0.39	J-108	MH	28-34.69	637.10	OS-109	C.B. TYPE16	29+15.00	636.90	533	5.62		10	8				1698	
lebourne	NP-109	18	1	173.16	0.22	CB-109	C.B. TYPE 16	29-15.00	636.90	B(-110	EXISTING CATCH BASIN	30+90.10	636.51	420	5.33		10	8				1698	
Sebour ne	EP 110a	18	1	27.91 EP	183	EX-110a	EXISTING CATCH BASIN	30+90.00	637.20	BK-110	EXISTING CATCH BASIN	30+90.10	636.69	BP	B		10	8		8		8	
Sebour ne	NP 101a	18	1	177.61	0:17	CB-101	C.B. TYPE 16	26-37.78	637.40	3-108	MR	22+34.69	637.10	325	5.62		10	8				1608	
												,											

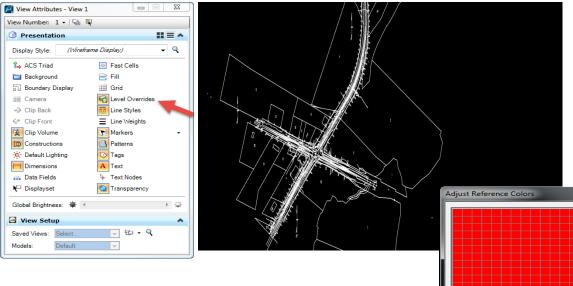


## **Compare DGNs**

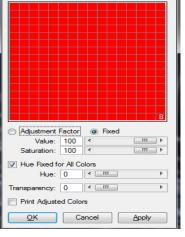
To compare two design files to one another to verify the modified content, **attach** the older file as a **reference** to the newer file. (The following example demonstrates referencing \*pp1A.dgn to \*pp1.dgn.)



The two design files should be on top of each other. At this point, it is very difficult to notice the differences. To simplify the on screen colors, turn on **Level Overrides** in the **View Attributes** dialog box. All levels will now look the same.

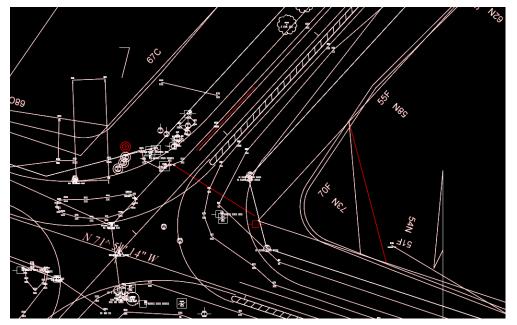


In the reference dialog box, select **Settings > Adjust Colors**. You can adjust the Values, Saturation, and Hue slide bars to make any color you would like for the reference file. The example depicts the color modified to **red**.





Once you do this, you can easily see the graphical difference in the design files.



If all of the colors turn red, you will need to change the sequence of how the elements are displayed. To do this, open the Reference dialog box and go to **Settings > Update Sequence** and move the referenced file to the top.

Updat	te Sequence		
~	<b>^ ∨ ⊻</b>		
Slot	File Name	Model	Logical Name
1	pp1A.dgn	Default	
	pp1.dgn	Default	Active Design File
	Default	<u>о</u> к	Cancel



## **EWBS - Earthwork Balancing System (SCDOT only)**

The Earthwork Balancing System Program (EWBS) processes exported Geopak earthwork data from cross sections to determine how much total fill to bring to a project site, or how much total waste to truck from the project site.

EWBS imports the Geopak earthwork text file and allows the user to edit and save it into a **\*.cnr** file. The program uses either he original **\*ew.txt** file or the edited **\*.cnr** file to run and balance the earthwork for each alignment.

### Geopak Setup for Earthwork

Run Earthwork in Geopak using the Project Manager.

Ensure that the **column length is 10** for each column. [The program is set up to read the columns using this length. It will not work if a different value is used.]

KS DGN File Soil Types			neet Quantities File	Select	1
EW Shapes Dutput Format Add/Sub Vol	Colu	imn 1	Decimal Places	Total Quantity Lengt	u h <u>10</u>
Centroid Adi	Col.	Soil Type	EW Operation	Quantity Type	+/-
Skip Areas	1	A2-4	Common Exc	End Area	+
Sheet Quant.	2	A2-4	Common Exc	Adjusted Volumes	+
	3	A2-4	Fill	End Area	+
	4	A2-4	Fill	Unadjusted Volumes	+
	, A2-4	1	Common Exc	End Area	+

Column 1 – set to Excavation End Areas (cut) Column 2 – set to Excavation Adjusted Volumes Column 3 – set to Fill End Areas (embankment) Column 4 – set to Fill Unadjusted Volumes

Open the **\*ew.txt** from the Geopak file created by the Project Manager Earthwork run.

- Enter a **zero "0"** where there is no cut or fill.
- Add any beginning and ending stations with the excavation and/or embankment in the correct columns. (Careful not to add/reduce the number of spaces.)
- If working on a bridge project, add the Bridge stations and volumes or toe of fills and volumes.
- Select File > Save to save the text file.

e Edit View Insert	Format Help				
	M X 🖻 🛍	r 💀			
000000000000 11	11111111 222	2222222 333	3333333 444	444444	
10+00.00	O	0	8	O	
10+50.00	9	9	27	33	
11+00.00	10	17	23	47	
11+50.00	6	14	45	63	
12+00.00	7	11	99	133	
12+50.00	17	22	139	220	
13+00.00	10	25	181	296	
13+50.00	4	13	234	385	
14+00.00	5	9	201	403	
14+45.00	32	31	151	293	
14+47.43	0	0	0	0	
15+43.28	0	0	0	0	
15+45.00	0	60	99	463	
15+50.00	0	0	93	18	
16+00.00	0	0	130	206	
16+50.00	0	0	112	224	
17+00.00	0	0	97	193	
17+50.00	0	0	66	151	Ι
18+00.00	6	6	49	106	1
18+50.00	16	21	32	75	
19+00.00	11	26	21	49	
19+50.00	3	13	24	41	
20+00.00	5	7	22	42	
20+50.00	5	9	15	35	
21+00.00	0	4	3	17	
Help, press F1					NUM



Double click on the **EWBS** icon on the desktop to start the program.



[If no icon, right click on EWBS.exe located in <u>C:\Program Files (x86)\SCDOT\EWBS</u> and select Sent to > Desktop (create shortcut).]

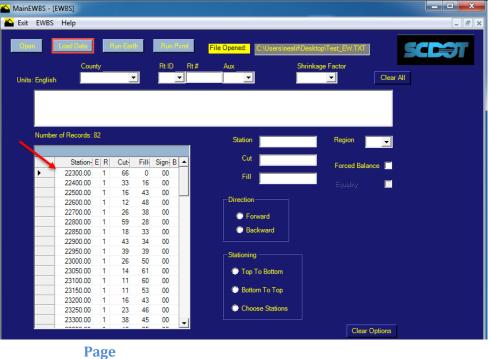
In EWBS, press the **OPEN** button at the top of the screen.



To import the \*ew.txt file, press the **TXT** button. Navigate to locate the \*ew.txt file in the project working directory. **Highlight** the file and press **Open**.

🖳 OpenFile	File name: S197 EW.TXT	▼ TXT files (*.bd) ▼
		Open 🔽 Cancel
Choose file type to open		
Imported file TXT		
EBS file CNF		
EBS file CNF Contains Regions CNR		
Exit		

Press the **Load Data** button. The data will populate in the program below.



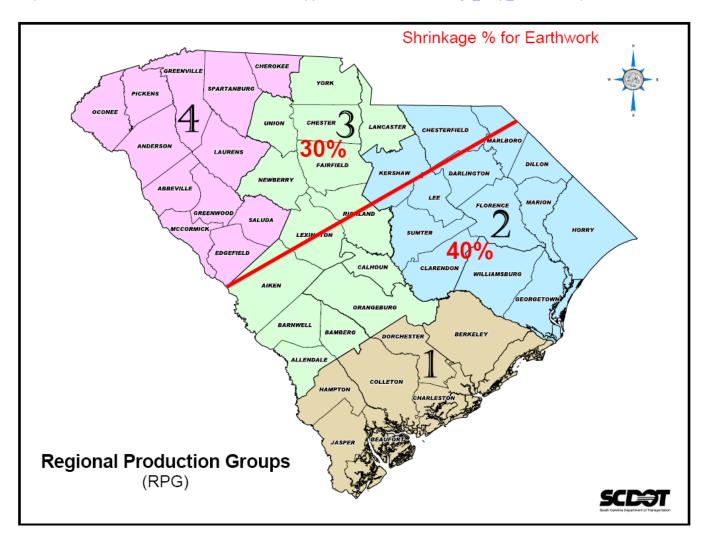


Enter the **County, Route ID, Route #**, and **Shrinkage Factor** to the headers at the top.



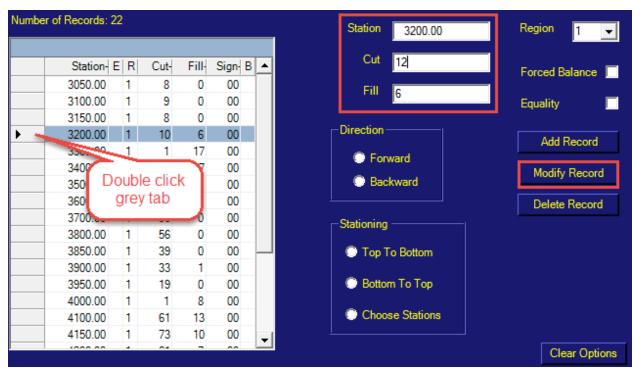
For the **Shrinkage Factor**, refer to the map area for the County to determine whether to use 30% or 40% unless otherwise directed by the Engineer of Record.

http://iwww.dot.state.sc.us/PreConstruction/Support/documents/shrinkage\_map\_earthwork.pdf



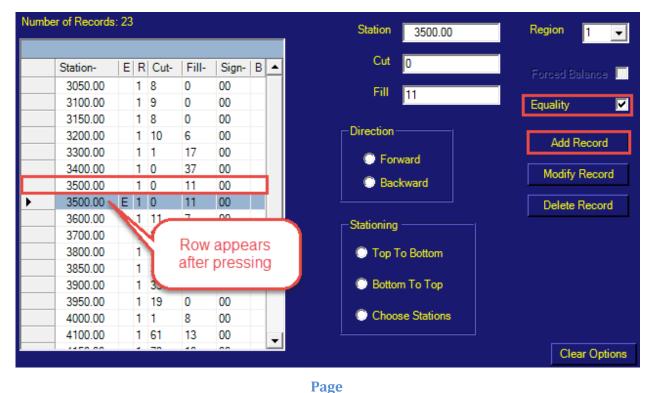


To edit data, **double click** on the grey tab next to the line of text which needs editing. In the **Station**, **Cut**, **and Fill** boxes, edit as necessary. Press the **Modify Record** button to update the data.



To add Equalities in Stationing, start by selecting the Back Station. **Double click** on the grey box to the left of the **Back Station**. This will load that station in the field to the right. Once loaded, check the **Equality** box and select **Add Record**.

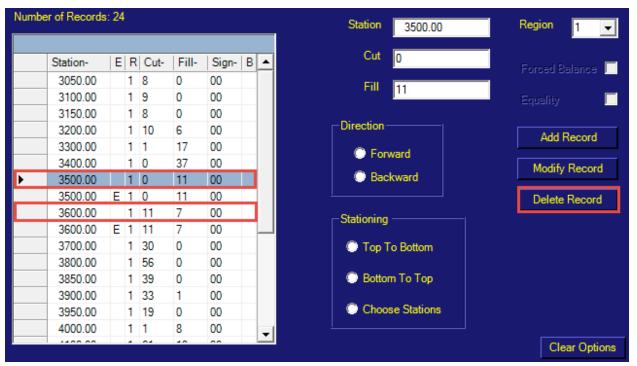
Repeat the same process for the Ahead Station.



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Once both equalities have been added to EWBS, delete the original Back and Ahead Stations. Double click to activate the original Back Station and press the **Delete Record** button. Double click to activate the original Ahead Station and press the **Delete Record** button.



This is how it should look after the Equality is inserted.

	Station-	E	R	Cut-	Fill-	Sign-	B	-
•	3050.00		1	8	0	00		
	3100.00		1	9	0	00		
	3150.00		1	Af	ter Fo	quality		L
	3200.00		1		sinse	-	, 	L
	3300.00		1	'.	5 11150	nicu		
	3400.00		1	0	37	00		
	3500.00	Е	1	0	11	00		
	3600.00	Е	1	11	7	00		
	3700.00		1	30	0	00		
	3800.00		1	56	0	00		
	3850.00		1	39	0	00		
	3900.00		1	33	1	00		
	3950.00		1	19	0	00		
	4000.00		1	1	8	00		
	4100.00		1	61	13	00		
	4150.00		1	73	10	00		-
	1000.00				-	~~		_

The above steps can be used for a **Forced Balance** as well. Instead of Equality, check Forced Balance and Add Record for the station. Remove the original station.

The distance between the balance stations cannot be greater than 3000 feet (or it is considered a pay item for overhaul). There will be occasions when you are required to force the balance. You will also need to include the **TOE OF FILL** on bridge projects and potentially force balances at either side to avoid transporting dirt from one side to the other.



To continue processing Earthwork, select the options based on the following:

#### Forward

**Top to Bottom** – runs the txt file from top to bottom **Choose Stations**– allows the user to choose the desired station range to balance

#### Backward

Directio

Stationi

O Cł

**Bottom to Top** – runs the txt file from bottom to top **Choose Stations** – allows the user to choose the desired station range to balance

#### Forward/Top to Bottom

#### **Forward/Choose Stations**

n		Direction			
orward		Forward			
ackward		Backward			
	L				
ng		Stationing			
o To Bottom		Top To Bottom			
			Begin Station	0000.00	
				3200.00	
pose Stations		Choose Stations	End Station	4500.00	-

#### Press the Run Earth button.

MainEWBS - [EWBS]									
📤 Exit EWBS	Help								
Open	oad Data	Run Earth	Run Pvmt						

The **Earthwork report** will open and will also be saved to the project working directory.

# The Earthwork will also be saved in a \*.vxt file. This file should be used on the cross section sheets.

SCDOT EARTHWORK BALANCING SYSTEM

Date: 9/16/2015 12:22:37 PM Report for: 42132earth.cnr Units: English County: Aiken Route: S-197

ish Calculation For: Earth

Station	Cut	Double Area	Distc	Volume	Balance Cut	Fill	Double Area	Distc	Volume	Balance Fill	Fill+ 40.0
3050.00	8					0					
3100.00	9	17	50	16	16	0	0	50	0	0	0
3150.00	8	17	50	16	32	0	0	50	0	0	0
3200.00	10	18	50	17	49	6	6	50	6	6	8
3300.00	1	11	100	20	69	17	23	100	43	49	69
				(0)					(1)		
* 3301.26					69					49	69
				(2)					(99)		
3400.00	0	1	100	2	2	37	54	100	100	99	139
3500.00	0	0	100	0	2	11	48	100	89	188	263
3600.00	11	11	100	20	22	7	18	100	33	221	309
3700.00	30	41	100	76	98	0	7	100	13	234	328
3800.00	56	86	100	159	257	0	0	100	0	234	328
				(71)					(0)		
* 3840.26					328					234	328
				(17)					(0)		
3850.00	39	95	50	88	17	0	0	50	Ó	0	0
3900.00	33	72	50	67	84	1	1	50	1	1	1
3950.00	19	52	50	48	132	0	1	50	1	2	3
4000.00	1	20	50	19	151	8	8	50	7	9	13
4100.00	61	62	100	115	266	13	21	100	39	48	67
4150.00	73	134	50	124	390	10	23	50	21	69	97
4200.00	61	134	50	124	514	7	17	50	16	85	119
4300.00	0	61	100	113	627	12	19	100	35	120	168
4400.00	1	1	100	2	629	10	22	100	41	161	225
4500.00	3	4	100	7	636	5	15	100	28	189	265
4600.00	20	23	100	43	679	0	5	100	9	198	277
4650.00	12	32	50	30	709	0	0	50	0	198	277
** Finished	Balance	** Waste:	432	с.ч.							
age Total					1106					482	

Use the information in the EWBS report to add cut/fill volumes on the **plan and profile sheets**.

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		· · · · · · · · · · · · · · · · · · ·
EXC = 69 C Y	EMP = 40 C V	
	EMB = 49 C.Y.	
TOT = 69 C.Y.	40% = 20 C.Y.	······ <del>····</del>
+00000	TOT. = 69 C.Y.	+ 0/ 26
+00:00		+01.20



## **Balance Points**

Open the Yardage.xlsx spreadsheet and enter the County, Project ID, and Route or Road information.

Complete the **"yellow" highlighted areas** using the data from the EWBS report. Add the Station, Volume, Roadway Borrow, Borrow for the Excavation columns. Add the Volume, Shrinkage value and Waste in the Embankment columns. [Station numbers should be typed without the plus (+) sign.]

		SUA	MARY C	OF YARD	AGE SH	EET			
COUNTY:	AIKEN								
PCN NO:	42132								
RTE. OR RD.									
		CAVATION						т	
STATION	VOLUME	RDWY BOR	BORROW	TOTAL	VOLUME	40%	SUBTOTAL	WASTE	TOTAL
30+50.00									
33+01.26	69			69	49	20	69		69
38+40.26	328			328	234	94	328		328
46+50.00	709			709	198	79	277	432	709
5-125									
10+79.91									
17+50.00	1775			1775	61	24	85	1690	1775
17-50.00	1775			1775	01		00	1000	1775
TOTALS	2881			2881	542	217	759	2122	2881
TOTALS	2001			2001	542	21/	133	2122	2001
			EXC.=	2881					
			WY BOR.=						
			OR. EXC. =						
			B. TOTAL	2881					
		D	ITCHES =						
			DRIVES =						
			TOTAL =	2881					
					Bor. Ex.		Enter	Total Borr	ow
					Drive Bor.		Enter Dri	ve Borrow	Quant.
					Total Bor.				

The designer is responsible for adding the volumes for new drives/entrances and outfall ditches supplied by Hydrology. These quantities are calculated based on the length and width of the ditch and/or size of drive.

**Notes** should be placed on the plans to cover these items. The notes are available in the Profile Labeler. The values should be added to place the labels.

#### **Ditch Note**

CONSTRUCT SPECIAL DITCH RT. STA. 30+30.00 TO STA. 32+00.00 SEE CROSS SECTIONS SHEET(S) X1

#### **Entrance Note**

CONSTR. ENTRANCE APPROX. AS SHOWN (EST. EXC. = 20 C. Y.)**OBTAIN PERMISSION** 



Use the information and place the balance points and volumes on the profile sheets.

M Profile Labeler - Style:Scdotprofv8.lsf ->         Style Eles       Options         Scale       Tools         Text       Params.         Shape       Leader.         Rotate       Stem Selector         Image: State       State         Image: State       State	Bytes Style Preview EMB = C.Y. XX% = C.Y.	EMB = 49 C.Y. 406 = 20 C.Y. TOT.= 69 C.Y. Space Return Clear Delmit Place Label	× )0 ); S-197	(OLD	EDGE	FIELD	RD.)
<b>i</b> i i						-	-
	EXC. = 69 (	( <b>)</b>	EMB. = 4	9CY			
	(TT) (D) (D)	······································		A	. 2 2.	· · · · · · · · · · · · · · · · · · ·	
·····	$IOI_{.} = 690$		40% = 2	$0 \in I$	ee		
·····			TOT = 6	$0 \cap V$			··· <b>* + ``</b> ·····
+00.00			101 0	$\mathcal{F} \cup \mathcal{I}$			01.26
		3					· · · · · · · · · · · · · · · · · · ·

Use the cells from the cell library where needed:

- **BALPT1** Beginning Station
- BALPT2 Use between begin and end stations
- BALPT3 Ending Stations



Continue labeling the plan/profile sheets for all of the earthwork information.



## **Excel Sheets for Plan Production**

New data sheets have been developed using Microsoft Excel for plan production to make tabular format plan data easier. The Excel-based data sheets are intended to speed up data entry, calculations, and plan drafting. It is also intended to eliminate the need to retype or re-enter data sent in by consultants or other departmental offices.

The sheets can be printed directly to an Adobe PDF and included in the final plan set without the need to transfer the sheets into MicroStation via Axiom. The sheets reduce the manual calculations and repetitive data entry through Excel's tabular references and automatically calculated formulas.

Minor revisions and updates, centralization of data that was previously spread across many files and the ability to apply digital seals to the final plans are additional benefits to utilizing these Excel sheets.

There also exists the ability to import the data directly from the Excel sheet into the P2S and RWDMS systems.

Excel Templates and instructions can be located on the SCDOT Cadd Design internet page: <a href="https://www.scdot.org/business/CADD-Design.aspx">https://www.scdot.org/business/CADD-Design.aspx</a>

The following sheets can be prepared using the Excel templates:

- Summary of Estimated Quantities
- Construction Plans Review Quantity Sheet
- Moving Items, Removal & Disposal, and New Fence Sheets
- Right of Way Data Sheet
- Erosion Control Data Sheet
- Survey Control Data Sheet
- General Construction Note Sheet

To begin each sheet for a new project, download the Excel file and add the 5-digit project number into its name.

Unless otherwise noted all text is to be entered on these sheets in ALL-CAPS to improve readability.

#### **Converting Excel Sheets to Adobe PDF**

#### Select File > Print in Excel

Select the <u>\\smpltservc-08-1\d8plc-tds700\_505\_wpd</u> plotter queue (or another Windows driver large format plotter.)

Printer	0
d8plc-tds700_505_wpd on Smpltservc-08-1 Ready	•

Printer Properties





The first time this process is followed, a custom **22" x 36" paper size** must be created. After this has been done once, the local settings will be saved for future prints.

#### Click on the Page Size listing to expand. Choose More Paper Sizes.

New	Oce D+ 24x36 in 24" x 36"	
Print	Oce E+ 36x48 in 36" x 48"	
Save & Send	Oce 30" 30x42 in 30" x 42"	
Help	<b>SCDOT 22x36</b> 22" x 36"	
Dptions	More Paper Sizes	
Exit	Oce D+ 24x36 in 24" x 36"	More Page Sizes
	Custom Margins	-

#### Select the **Options** button.

Page Setup	8	23
Page Margins Header/Footer Sheet		
Orientation		
A © Portrait A © Landscape		
Scaling		
Adjust to: 100 🚔 % normal size		
○ Fit to: 1 → page(s) wide by 1 → tall		
Paper size:		-
Print guality:		-
First page number: Auto		
	ptions	
ОК	Can	cel

#### Press the **Custom Size** button.

User Preferences Support		
Page size (as in application) —	 	
SCDOT 22x36	•	Custom size
<ul> <li>Portrait</li> <li>Landscape</li> </ul>		Print area



Set the **Width to 22**" and the **Length to 36**", enter the name SCDOT22x36 and press the **Save as Local** button.

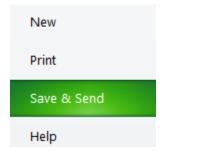
☐ Custom size	? ×
Create a size from Custom size	
Width 22.00 • [8.26 - 36] inch	
Length 36.00 • [11.69 - roll length]	inch
Name SCDOT 22x36	
Save to Share	
Save as Local	

Under File > Print, change the settings as follows: (it should remember these the next time you print)

- Landscape Orientation
- Set paper size to SCDOT 22x36
- Custom Margins Set Left to 2", Top/Bottom/Right to 0.5"
- No Scaling

	Page Setup	? <mark>x</mark>
Landscape Orientation 🔹	Page Margins Header/Footer Sheet	
SCDOT 22x36	<u>T</u> op: Header: 0.5 ♀ 0.5 ♀	
22" x 36"	0.5 💌 0.5 💌	
👷 Custom Margins 👻		
No Scaling	Left: Right: 0.5	
100 Print sheets at their actual size		
Page Setup		
	Bottom: Eooter:	
	0.5	

#### Select File > Save & Send (on the left)





#### Select Create Adobe PDF (in center)

File Typ	)es	
R	Change File Type	
5	Create Adobe PDF	
	Create PDF/XPS Doo	ument

#### Select Create Adobe PDF (on top right)

Create Adob	PDF
Create Adobe PDF	Convert to PDF using Adobe Acrobat <ul> <li>Viewable and printable on most platforms</li> <li>Reliable and secure way of exchanging and archiving documents</li> <li>Preserves original document look and feel</li> </ul>

On the Acrobat PDFMaker dialog, press the **Convert to PDF** button. Select **Yes** to save the file. [Repeat these steps for each individual ECDS Sheet # to create individual PDF files for each sheet.]

🔁 Acrobat PDFMaker		×	Acrobat PDFMaker
Conversion Range © Entire Workbook			Acrobat PDFMaker needs to save the file before continuing. Do you want PDFMaker to save the file and continue?
Selection			
Sheet(s)			Yes No
Sheets in Excel	Sheet Selection Sheets in P	DF	
ECDS SHEET 1 ECDS SHEET 2	Add > ECDS SH	IEET 1	
ECDS SHEET 3 ECDS SHEET 4 ECDS SHEET 5	< Remove		
FAQ			
	Arrange		
	Move Up		
	Move Down		
	Convert to PDF	Cancel	

Enter a filename and press **Save**. [Note: For digital signatures and IPS files, extract each page of the pdf to single sheets and name them appropriately.]

File name:	EC1_ECDS_P027169.pdf	Save
Save as type:	PDF files 🔹	Cancel
	View result	Options



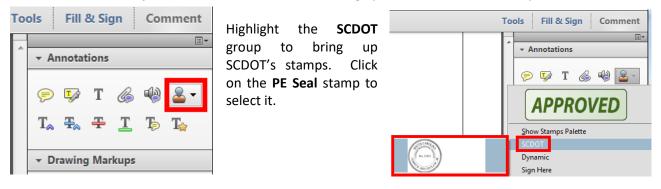
## **Apply PE Seal to Adobe PDF**

Each plan sheet should be an individual single page pdf and named according to the File Naming Conventions for Roadway Plans.

Open the pdf plan sheet in Adobe Acrobat. (Reader will work as well.) Expand the **Comment** tools in the upper right corner.

🔁 digital signature test.pdf - Adobe Acrobat Pro		- 🗆 🗙
File Edit View Window Help		×
📄 Open 🛛 🔁 Create 🔻 🛛 🤷 📄 🔯	🗿 🖂 │ 🏟 ₹ Custo	mize 🔻 📔
	Tools Fill & Sign	Comment
		^

Click on the Add Stamp tool in the Annotations list to bring up the list of available stamps.



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Click on the PDF document in the proper location to **place the seal**.



The sheet can now be added to the Iplot file for plotting in order to be manually signed and scanned back in as a PDF (and/or ready for digitally signing).

Note: Because the stamp is a "Comment", this option must be turned on when plotting. In Adobe is shown below and in Iplot is shown on the right.

Comments & Forms							
Document and Markups 🔷							
Document							
Document and Markups							
Document and Stamps							
Form fields only							

Browse



## Adding PDF to Iplot IPS File

PDFs can be added to the Iplot IPS files in the same manner as DGN files. Open the IPS file and drag the PDF from the folder into the plotting list. Use the arrow keys to move the file to the correct location in the plan set for plotting.

Untitled - ProjectWise InterPlot Organizer V8i (SELECTseries 4)									
File Edit View Tools Help									
D 🚅 🖬 🚭	10 L 🕅	😭 春 🛧 🗣	₽ <u></u> <u></u> <u></u>						
Plot Name	File	Model	View Group	Plot Area					
🔏 r39111ts	r39111ts.dgn	Default	Default	Fence					
📕 r39111ts1	r39111ts.dgn	Default	Default	Fence					
📕 📶 r39111ts2	r39111ts.dgn	Default	Default	Fence					
QuantitySheet	QuantitySheet								
🔏 r39111typ	r39111typ.dgn	Default	Default	Fence					
🔏 r39111typ1	r39111typ.dgn	Default	Default	Fence					

Before plotting, check the plotter driver to ensure the correct driver is being used. In the File menu, select Print Setup. Check that either the Halfsize Iplot or the regular Iplot drivers are being used, NOT the WPD Windows driver.

ن 🏈	Intitled - ProjectWise InterPlot O	rganizer V8i (Sl	Print Setup		? ×
		rganizer V8i (SI Ctrl+ N Ctrl+ O Ctrl+ S	Print Setup Printer Name: Status: Type: Where: Comment:	\smpltservc-08-1\D8PLC-CW600_505_lplc \smpltservc-08-1\D8PLC-CW600_505_lplc \smpltservc-08-1\D8PLC-TD5700_505_Hz \smpltservc-08-1\D8PLC-TD5700_505_Hz \smpltservc-08-1\D8PLC-TD5700_505_Plz \smpltservc-08-1\D8PLC-TD5700_505_Plz \smpltservc-08-1\D8PLC-TD5700_505_W \smpltservc-08-1D8PLC-TD5700_505_W \smpltservc-08-1D8PLC-TD5700_505_W	Rendering Attributes
	Print Setup Print	Ctrl+P			
	FILLE	Cuitr			

## **Construction Changes after Letting**

If changes are made after letting, the appropriate Excel files must be revised and re-exported as fresh Adobe PDF files. Before making changes, **create a copy** of the current excel file and rename the PDF file to include the **date it was printed** (e.g. "r37212\_RWDS\_2015-07-12.xlsm") so that an archive copy is kept. The printing date can be found in the bottom left corner of the sheet.

Make the necessary revisions to the Excel file. On the Images tab, locate the **Construction Change image**. Select **Copy** and activate the Excel plan sheet to **Paste** the image. Resize and move the image to the upper right corner.



Follow the Export to Adobe PDF instructions above to recreate a new plan sheet and re-apply the PE Seal. Remove the outdated plan sheet from the IPS file and add the revised sheet.

- CONSTRUCTION CHANGE -							
SHEET PROVIDED AFTER LETTING							

## **P2S Input Quantities Individually**

Launch P2S and select **Project > Program** in the menu at the top of the screen.



Enter the Project ID and press **Search. Highlight** the project in the box below and press "Program Selected Project".

Project ID	(	1			Funding Type		
Project ID	41380	<u> </u>					
Project Name		FMIS Project Number			Obligation Date Betwe	ten (	and
Description					Cost Estimate Less Tha	an 🤇	Dollars 💌
Project Phase	All	Project Status	Active		Cost Estimate Greater	Than (	Dollars 💌
Work By		Consultant or LPA			Location		
Project Type		Approval Statu	s		District	•	
Program Manager		Approver			County		
					Route Type	•	
				Search	Reset		
ID 🔻	Name			-	Description		
0041380	US 78/SC 781 Intesection Improvement	INT	ERSECTION AT US	5 78 WITH SC 781 IN	WILLISTON (US 78/SC 781)		

Select the appropriate **County** (If multiple counties exist on the project, repeat these steps for each project's quantities.) Click the box under Pay Item Categories to create a new Category. Enter **Roadway Items**. Enter the Category Length and Federal Construction Class #. Press the **Save Changes** button.

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Locations	Horry		Percent of Project Ler	ngth 100%	Spec Book Year	2007					
Pay Item	Categories										
	Category Number		Category Des	cription			Bridge ID	Category Ler	gth	Federal Construction Class	
	-	ROADWAY ITEMS						-	0.68	2	~
Sa	ve Char	nges									

Category 001 Pay Items



Category 001 Pay Items

 Item #

 107

 1071100

 1071512

 1075001

 1071510

 1075004

 1075002

 1071001

Click the **1**<sup>st</sup> **row** under the Category Pay Items to activate the row. **Begin typing** the Pay Item #. After 3 or more characters, the **drop down** of pay item numbers will appear. Keep typing the full pay item number or **select the pay item** # from the drop down.

The Item Description and Units will auto-populate. **Enter** the Estimated Quantity. Tabs and arrow keys can be used to navigate between the pay items.

Item #	Item Description	Units	*Estimated Qty.
1071100	TRAFFIC CONTROL	EA	1
2012001	CLEARING & GRUBBING WITHIN ROADWAY	ACRE	1

Pressing the **magnifying glass** will allow you to search for a pay item and also select multiple pay items at once. Enter the first three numbers of the pay item and press the **Search** button. Scroll through the list and **check** the items required for the project in this pay item series. After selecting the desired pay items from the search screen, press the **Use Selected Items** button. **Enter** the Quantities for each pay item.

Filter Items				
Item Number 203	Item Description	Units	Spec Year 2007 💌	Search

Item Number	Item Description	Units	Spec Year
2030010	FURNISH AND INSTALL MAILBOX	EA	2007
2030011	RELOCATE MAILBOX	EA	2007
2031000	UNCLASSIFIED EXCAVATION	СҮ	2007
2031100	ORGANIC TOPSOIL	СҮ	2007
2031200	SITE EXCAVATION	LS	2007
2032000	ROCK EXCAVATION	СҮ	2007
2033000	BORROW EXCAVATION	СҮ	2007
2033010	BORROW EXCAVATION - SPECIAL (FA-10)	СҮ	2007
2033011	BORROW EXCAVATION - SPECIAL (FA-10)	TON	2007
2033015	BORROW EXCAVATION - SPECIAL (FA-13)	СҮ	2007
2033020	BORROW EXCAVATION - LIGHTWEIGHT BORROW EXCAVATION	СҮ	2007
2033025	BORROW EXCAVATION - (AASHTO TYPE A-1 SAND)	TON	2007
2033030	BORROW MATERIAL - CONTROLLED FILL	CY	2007
			4

#### Use Selected Items

Save Changes

After inputting all of the pay items, press the **Save Changes** button to save the pay items into the system.

Continue with the **P2S Export Quantities to Excel** instructions for completing the Quantity Sheet for plan production.



## **P2S Import Quantities from Excel**

Review the data on the Quantity Sheet 1 and Quantity Sheet 2 tabs to ensure accuracy.

Open the tab labeled **MySheet** and confirm that all item numbers and quantities are shown accurately.

If any pay items have multiple entries with the same Item Number (such as items listed on the Moving Items, Removal & Disposal sheet), label them appropriately in the SA Desc column.

If any pay items are part of alternative options in the bid (such as if a contractor has included several possible base courses in the bid), number them appropriately in the Altitem column.

Save the document and **close Excel** entirely.

Launch P2S and open Project > Program in the menu at the top of the screen.

	Home	Search	Projects	Reports	Funds
DS		State and and a	Program		

Enter the Project ID and press **Search. Highlight** the project in the box below and press the **Program Selected Project** button.

Project Identity			Funding	
Project ID	(41380		Funding Type	
Project Name		FMIS Project	Obligation Date Between	and
Description		)	Cost Estimate Less Than	Dollars
Project Phase	All	Project Status Active	Cost Estimate Greater Than	Dollars
Work By		Consultant	Location	
Project Type		Approval Status	District	•
Program Manager		Approver 💽	County	•
wanager			Route Type	•
ID 🔻	Name	Search	Reset	
0041380	US 78/SC 781 Intesection Improvement	INTERSECTION AT US 78 WITH SC 781 IN W		

	А	В	С	D
1	Item#	Qty	SA Desc	AltItem
2	1071000	1		
3	2012000	1		
4	2023000	3332		
5	2027801	495		
6	2028605	10		
7	2031000	17581		
8	2033000	116828		
9	2033100	1		
10				



Select the appropriate County and Category, and then press the Import from Excel link.

ations Barnwell	Percent of Project Length 3%	Spec Book Ye	ear 2007			
Item Categories Category Number 001 RDADWAY ITEMS	Category Description		No. 1	iridge ID	Category Length	Federal Construction Class
					C.000 miles	*
ete Selected egory 001 Pay Items						Import from Exc
Item #	Item Description	Units	*Estimated Qty.	SA	SA Description	Altitem

Click the **Browse** button that appears, then locate and open the Quantities Sheet **Excel** file in the project directory.

Select an Excel File:	
	Browse
a worksheet labeled "M and "Altitem" as column about each pay item (su	t correctly, the selected file must include lySheet" with "Item#", "Cty", "SA Desc" n headers. The rest of the information ich as the item description and unit) will tem based on the Item#.

**Review** the Pay Items imported into the list.

Click twice on the checkbox labeled **"Pay Items Ready for Transmittal**" to first check, then un-check it. The program has a tendency to consider it checked otherwise.

#### Click Save Changes.

	8100100	PERMANENT COVER		ACRE	0.403	False		
otal Pay Item	is: 0 id		Pay Items Ready for Transmitte	1	Save Chan	ges )	Discard Changes	Print   View in Excel
			43				Request App	roval   Cancel Approval   No

### **P2S Export Quantities to Excel**

Launch P2S and select **Projects > Program** 



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Enter the **Project ID** and press the **Search** button. **Highlight** the correct project and press the **Program Selected Project**.

(	-		-	C. M.	Home	Search	Projects	Reports	Funds			-		
		KA CO				- CANANA	Halley.			Marine 1	2000	200	-	the second
	P													
	SP - SP	and I	•	Search	General	Location	Roads	Bridge/RR	Phases	Schedule	Pay Items	Remarks	Approval	PPMS
Search Pr	-			_										
	Project Identity			1				Funding						
	Project ID	39389		$\neg$				Funding Typ	be .			-		
	Project Name			FMIS Project Number				Obligation [	Date Between		an	d		
	Description							Cost Estima	te Less Than			ollars 💌	]	
	Project Phase	All	▼ F	Project Status	Active	•		Cost Estima	te Greater Th	an		ollars 💌	)	
	Work By		•	Consultant or LPA		•		Location						
	Project Type		•	Approval Status	[	•		District			•			
	Program Manager		•	Approver		•		County			•			
	Wallager				_			Route Type	e (		•			
					2									
						Searc	h	Reset						
3	ID 🔻	Na	ime					Descr	iption					
	0039389	HENRY BROWN E	SLVD (PHA	SE I) WID	ENING OF S-136	FROM LIBERTY	HALL ROAD (S-	529) TO RED BA	NK ROAD (S-2	!9)				
	1 of 1 Projects					<b>~</b>								
Project Sumr	mary Report   M	ap Projects				Progr	am Selected P	roject						

Highlight the appropriate **Category** field if more than one quantity type exists. Determine the **Total Pay Items #** in the bottom left of the screen. Press the **View in Excel** button.

[Note: If the quantities are not currently sorted in order in P2S, press the Item # column heading to sort. Press the Save Changes button to save.]

· y ·	tems - Project 00	39389 Berkeley County, S- 136					
atior	Berkeley	Percent of Project Length 100	0% Spec Book Ye	2007			
r Iten	m Categories Category Number	Category Description		E	Bridge ID	Category Length	Federal Construction Class
]	001 ROADWAY					3.177 miles	2
1							
	Selected						Import from Ex
gor	ry 001 Pay Items	Item Description	Units	*Estimated Qty.	SA	SA Description	Altitem
		TRAFFIC CONTROL	LS	1.000	False		
	2012000	CLEARING & GRUBBING WITHIN ROADWAY	LS	1.000	False		
	2023000	REMOVAL & DISPOSAL OF EXISTING PAVEMENT	SY	3332.000	False		
	2027801	REMOVAL OF EXIST. GUARDRAIL	LF	495.000	False		
	2028605						
		CULVERT EXTENSION PREPARATION	EA	10.000	False		
	2031000	CULVERT EXTENSION PREPARATION UNCLASSIFIED EXCAVATION	EA	10.000 17581.000	False False		
]	2033000	UNCLASSIFIED EXCAVATION	СҮ	17581.000	False		
	2033000 2033100	UNCLASSIFIED EXCAVATION BORROW EXCAVATION	СҮ	17581.000 116828.000	False False		
]	2033000 2033100 2034000	UNCLASSIFIED EXCAVATION BORROW EXCAVATION BORROW PIT SET-UP	CY CY LS	17581.000 116828.000 1.000	False False False		
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2033000 2033100 2034000 2034515	UNCLASSIFIED EXCAVATION BORROW EXCAVATION BORROW PIT SET-UP MUCK EXCAVATION	Сү Сү ЦS Сү	17581.000 116828.000 1.000 55971.000	False False False False		
] ] ] ]	2033000 2033100 2034000 2034515	UNCLASSIFIED EXCAVATION BORROW EXCAVATION BORROW PIT SET-UP MUCK EXCAVATION 15" DIAMETER PIPE ADDITIONAL FOUNDATION WORK	CY CY LS CY LF	17581.000 116828.000 1.000 55971.000 10.000	False False False False False		3
] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ]	2033000 2033100 2034000 2034515 2034518 2034518 2034518	UNCLASSIFIED EXCAVATION BORROW EXCAVATION BORROW PIT SET-UP MUCK EXCAVATION 15° DIAMETER PIPE ADDITIONAL FOUNDATION WORK 18° DIAMETER PIPE ADDITIONAL FOUNDATION WORK	CY CY LS CY LF LF	17581.000 116828.000 1.000 55971.000 10.000 10.000	False False False False False False		3



Press the Save as button to save the Excel file to your project directory.

Windows Internet Explorer
What do you want to do with Project0039389BerkeleyCategory001PayItems63537559 Size: 9.61 KB Type: Microsoft Excel 12 From: smpvend1
<ul> <li>Open The file won't be saved automatically.</li> </ul>
→ Save
Save as
Cancel

**Navigate** to your project directory and enter a file name. Press the **Save** button. Open the newly saved Excel file.

File name:	Exported_P2S_Quantities xlsx
Save as type:	Microsoft Excel Worksheet (*.xlsx)
Hide Folders	Save Cancel

Paste the data into the tab named "**Paste Data Here**" beginning with cell A1 in the Cadd Standard "**Quantity.xlsx**" Excel file located on the Cadd Support webpage.

[Note: Do not delete rows, move rows, sort, etc. in the Quantity Excel sheet because the formulas will not perform correctly. Any and all edits need to take place in the P2S Excel Export prior to copying and pasting.]

	A	В	С	D	E	F	1	А	В	С	D	E	
1	Item#	Descriptio	Unit	Qty	SA	SA Desc	1	1071000	TRAFFIC C	LS	1		STEP 1:
2	1071000	TRAFFIC C			False		2	2012000	CLEARIN	Dooto in	1		DO NOT DELET
-							3	2023000	REMOV	Paste in	3332		FORMULAS WIL
3	2012000	CLEARING	LS	1	False		4	2027801	REMOVA	Cell A1	495		
4	2023000	REMOVAL	SY	3332	False		5	2028605	CULVERT	EA	10		IF THE DATA
5	2027801	REMOVAL	LF	495	False		6	2031000	UNCLASS	СҮ	17581		EXCEL FILE,
6	2028605	CULVERT E	EA	10	False		7	2033000	BORROW	СҮ	116828		FILE PRIOR T
7	2031000	UNCLASSI	СҮ	17581	False		8	2033100	BORROW	LS	1		
8	2033000	BORROW	СҮ	116828	False		9	2034000	MUCK EXC	СҮ	55971		STEP 2A:
9	2033100	BORROW	15	1	False		10	2034515	15" DIAMI	LF	10		IF GREATER T
9	2033100	BONNOW	13	1	raise	I	11	2034518	18" DIAMI	LF	10		CELL A1 FOR

Review the results on the Excel tabs – Quantity Sheet 1 and Quantity Sheet 2.

# P	C D	E	1 1	H I	1	к	L.	н	н	0	PQR	5	T	U
			SOUTH CARD	LINA DEPAI	RTMENT	OF TRA	NSPORTATION		,	Ύs.c.	PERKELEY	33383	5-196	2.6
		STINIA	LADV OF	TOT	тъл л	A TT	D OUANTITIES							
		SUMIN	IAKY OF	F21		<b>A I E</b>	ED QUANTITIES							
	ITEM NO.	PATITEM	QUANTITY	PAT UNIT	ľ	TEM NO.	PATITEM		QUANTI	T	PAT UNIT	1		
	1071000	TRAFFIC CONTROL	1.000	LS		6865781	FRI-2-WAY-1SECT.HAND/MAN EMBLEM PEDESTRIAN SIGNAL HEAD			3.000	EA			
	2012000	CLEARING & GRUBBING WITHIN ROADWAY	1.000	LS		6865784	F&I 1WAY-1SECT H/M C/D PED SIG W/MNT-LT			2.000				
	2023000	REMOVAL & DISPOSAL OF EXISTING PAVEMENT	3332.000	SY		6865785	F&I 1WAY-1SECT H/M C/D PED SIG W/MNT-RT			3.000	EA			
	2027801	REMOVAL OF EXIST. GUARDRAIL	495.000	LF		6865797	FRIPUSHBUT.SOLID STATE9"X15"			10.000	EA			
	2028605	CULVERT EXTENSION PREPARATION	10.000	EA		6865834	BACKPLATE W/ RETROBEFL BORDERS FOR TRAFF. SIG.			26.000	EA			
	2031000	UNCLASSIFIED EXCAVATION	17581.000	CY		6865840	F&I-PEDESTRIAN TRAF. SIGNAL HEAD MOUNTING ASSEM FOR POST TOP			1.000	EA			
	2033000	BORROWEXCAVATION	116828.000	07		6865842	F&I-PED. TRAF. SIGNAL HEAD MOUNT. ASSY FOR DUAL POST TOP			1.000	EA			
	2033100	BORROW PIT SET-UP	1.000	LS		6335990	REMOVAL, SALVAGE, & DISP. OF EXISTING TRAF. SIGNAL EQUIPMENT			1.000	LS			
	2034000	MUCKERCAVATION	55971.000	07		6885992	TEMPORARY ADJUSTMENT OF TRAFFIC SIGNAL EQUIPMENT			1.000	LS			
	2034515	15" DIAMETER PIPE ADDITIONAL FOUNDATION WORK	10.000	LF		6885996	TEMPORARY TIMING ADJUSTMENTS PER SITE VISIT			4.000	EA			
	2034518	18* DIAMETER PIPE ADDITIONAL FOUNDATION WORK	10.000	LF		6887941	REMOVE FOUNDATION FOR STEEL STRAIN POLE - 18" BELOW GRADE			4.000	EA			
	2034524	24" DIAMETER PIPE ADDITIONAL FOUNDATION WORK	10.000	LF		6888225	INST.CONTROLLER-BASEMNTD.CAB.W/FOUND.			2.000	EA			
	2034530	30" DIAMETER PIPE ADDITIONAL FOUNDATION WORK	10.000	LF		7011402	CONC.FOR STRUCTURES - CLASS 4000(CULVERT)			485,600	CY			
	2034548	48" DIAMETER PIPE ADDITIONAL FOUNDATION WORK	10,000	LF		7031100	REINF, STEEL FOR STRUCTURES (ROADWAY)		10	0727.000	LB			



## **Quantity Sheet Finalization**

Enter the **County, Project ID, and Route/Road No.** onto the Quantity Sheet 1. It will be copied to the Quantity Sheet 2. Edit the **Sheet No.** as necessary for your plan set.

FED. RD. DIT. HO. STATE COUNTY PROJECT ID HO.	SHEET	ROUTE/ROAD			1			
	NO.	NO.	PROJECTID	COUNTT		STATE		
3 S.C. BERKELEY 39389 S-136	2A		39389	BERKELEY	E	S.C.	3	

**Save** the Excel file to your project directory.

File name: 39389_QuantityS	heet.xlsx		•
Save as type: Excel Workbook	(*.xlsx)		•
Authors: Neal, Iris F.	Tags: Add a tag	Title: Add a title	
Save Thur	nbnail		
ide Folders		Tools 🔻 Save Cancel	

Continue the **Export Excel Sheets to Adobe PDF** to create a pdf and add the pdf to the lplot file for plotting and/or digital signatures.

## **Quantity Sheet Preparation Using Manual Input**

If the Quantity data has not been inputted into P2S or if P2S is not accessible to the user, the quantities can be entered manually into the Excel sheet and sent to the appropriate party for import into P2S.

In the Quantities Sheet, open the **Paste Data Here** tab. Enter the quantity data into the four columns on the left.

- 1. Column A: Item Number
- 2. Column B: Pay Item
- 3. Column C: Pay Unit
- 4. Column D: Unit Quantity

	Α	В	С	D	E	F	G
1	1071000	TRAFFIC C	LS	1		STEP 1:	
2	2012000	CLEARING	LS	1		DO NOT DELETE ROWS, MOVE ROWS, ETC. IN THIS FILE OR	THE
3	2023000	REMOVAL	SY	3332		FORMULAS WILL NOT PERFORM CORRECTLY.	
4	2027801	REMOVAL	LF	495			
5	2028605	CULVERT E	EA	10		IF THE DATA IS NOT SORTED PROPERLY COMING FROM THE H	P2S
6	2031000	UNCLASSI	СҮ	17581		EXCEL FILE, ALL EDITS MUST BE DONE IN THE EXPORTED H	EXCEL
7	2033000	BORROW	СҮ	116828		FILE PRIOR TO COPYING AND PASTING TO THIS FILE.	
8	2033100	BORROW	LS	1			
9						STEP 2:	

#### Review the results on the Excel tabs – Quantity Sheet 1 and Quantity Sheet 2.

A P C	Ð	E	r (	G M I	. J К	L. L		H <	P 0	1	5	т	
								- II.					
			SOUTH CARC	LINA DEPA	RTMENT OF TRA	ANSPORTATION		1 1	C. DERKEI	54	,,,,,	5-196	
							_						-
		SUM	MARV OF	FST	тат	ED QUANTITIES							
		SUM	MAKI OF	LOI.	INTHI	LD QUANTILS							
	ITEM NO.		QUANTITY	PAT UNIT	ITEM NO.	PATITEM	QUAL		PAT	MIT			
	1071000	TRAFFIC CONTROL	1.000	LS	6865781	Fill - 2-WAY-1SECT.HAND/MANEMBLEM PEDESTRIAN SIGNAL HEAD		3.0	100 EA				
	2012000	CLEARING & GRUBBING WITHIN ROADWAY	1,000	LS	6265784	Fill IWAY-1SECT H/M C/D PED SIG W/MNT-LT		2/	100 EA				
	2023000	REMOVAL & DISPOSAL OF EXISTING PAVEMENT	3332.000	ST	6365785	Fill IWAY-ISECT H/M C/D PED SIG W/MNT-RT		3.0	100 EA				
	2027801	REMOVAL OF EXIST. GUARDRAIL	495.000	LF	6265797	FNIPUSHBUT.SOLID STATE9"215"		10.	100 EA				
	2028605	CULVERTEXTENSION PREPARATION	10.000	EA	6865834	BACKPLATE W/ RETROREFL BORDERS FOR TRAFF. SIG.		26.7	100 EA				
	2031000	UNCLASSIFIEDEXCAVATION	17581.000	C7	6165240	FRI-PEDESTRIAN TRAF, SIGNAL HEAD MOUNTING ASSEM FOR POST TOP		1) 1)	100 EA				
	2033000	BORROWEXCAVATION	116828.000	07	6165042	FRI-PED. TRAF. SIGNAL HEAD MOUNT. ASSY FOR DUAL POST TOP		10	100 EA				
	2033100	BORROW PIT SET-UP	1.000	LS	6135999	REMOVAL SALVAGE & DISP. OF EXISTING TRAF, SIGNAL EQUIPMENT		1/	100 LS				
	2034000	MUCKERCAVATION	55971.000	07	6885992	TEMPORARY ADJUSTMENT OF TRAFFIC SIGNAL EQUIPMENT		10	100 LS				
	2034515	15" DIAMETER PIPE ADDITIONAL FOUNDATION WORK	10.000	LF	6435996	TEMPORARY TIMING ADJUSTMENTS PER SITE VISIT		40	100 EA				
	2024510	18* DIAMETER PIPE ADDITIONAL FOUNDATION WORK	10.000	LF	6407941	REMOVE FOUNDATION FOR STEEL STRAIN POLE - 11" BELOW GRADE		4)	100 EA				
	2034524	24" DIAMETER PIPE ADDITIONAL FOUNDATION WORK	10.000	LF	6100225	INST.CONTROLLER-BASEMNTD.CAB.WFOUND.		2.)	100 EA				
	2024530	30* DIAMETER PIPE ADDITIONAL FOUNDATION WORK	10.000	LF	7011402	CONC.FOR STRUCTURES - CLASS 4000(CULVERT)		485.	600 CY				
	2034548	48* DIAMETER PIPE ADDITIONAL FOUNDATION WORK	10.000	1.5	7031100	BEINE STEELEOB STRUCTURES (ROADWAY)		100727	100 LB				





Enter the **County, Project ID, and Route/Road No.** onto the Quantity Sheet 1. It will be copied to the Quantity Sheet 2. Edit the **Sheet No.** as necessary for your plan set.

M	N	0	PQ R	S	Т	U	
	FED. RD.	STATE	COUNT	PROJECT ID	ROUTE/ROAD	SHEET	
	DIT. NO.	SINIE	COONTI	PROJECTIO	NO.	NO.	
	3	S.C.	BERKELEY	39389	S-136	2A	

Save the Excel file to your project directory.

File name:	39389_QuantitySheet.xlsx			•
Save as type:	Excel Workbook (*.xlsx)			•
Authors:	Neal, Iris F.	Tags: Add a tag	Title: Add a title	
	Save Thumbnail			
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Continue the **Convert Excel Sheets to Adobe PDF** and **Applying the PE Seal** to create a pdf and add the pdf to the Iplot file for plotting and/or digital signatures.

**Electronically submit the Excel file and the pdf file** to the SCDOT personnel responsible for inputting the data into P2S and also for inclusion in the plan set.

### **Construction Quantity Sheet Preparation**

The Construction Plans Review Excel sheet is to be utilized for field reviews and correspondence with the District Construction offices to obtain the "inclusion" quantities for the project. Quantities have most likely not been entered into P2S at this time.

To complete this sheet, manually enter the pay items on the QUANTITY SHEET tab. (If you can locate an older project to copy and paste from, this will save you time.)

ITEM NO.	PAY ITEM	COMPUTED QUANTITY	INCIDENTAL QUANTITY	PAY UNIT

Save and send the Excel spreadsheet to your District contact to receive the Incidental Quantity column numbers. You will use these items to include on the General Construction Note page.

This spreadsheet will also create a MY SHEET tab. This can be imported into P2S as outlined in previous sections.

### **Dual Quantity Sheet Preparation**

The Quantities will be inputted into P2S as two separate Category items under their respective County header. Export each excel sheet from P2S.



Open the **first** County Excel file that was exported and **highlight** the appropriate columns by data clicking in the upper left corner and dragging to the end of the data in column D. Right click to select **Copy**.

	А	В	С	D
1	Item#	Description	Unit	Qty
2	1031000	MOBILIZATION	LS	1
3	1032010	BONDS AND INSURANCE	LS	1
4	1050800	CON: Calibri v 11 v A A V v v v v	EA	1
5	1071000	TRAF B $I \equiv \sqrt[3]{4} \cdot \underline{A} \cdot \underline{H} \cdot \frac{1}{50} \downarrow 0 \checkmark$	LS	1
6		CPM PROGRESS SCHEDULE	LS	1
7	2011000		LS	1
8	2025000	REM( Copy SPHALT PAVEMENT	SY	3505
9	2031000	UNCI Paste Options:	СҮ	7320
10	2033000	BORF	CY	6410

Open the QuantitySheet\_DualCounty.xlsx Excel spreadsheet. [Tip: Open a blank workbook and then drag this sheet into it to open. This will allow you to have 2 instances of Excel open at the same time.]

Click on the **PASTE DATA HERE** tab. Right click in **Cell A3** and select **Paste** to paste the data. Enter the **County** in **Cell C1**.

	Α		В	С	D	
1			COUNTY:	All	(EN	
2	Item#		Descriptio	Unit	Qty	
3	1031	000	MOBILIZA	LS		1
4	1032	010	BONDS AN	LS		1
5	1050	800	Paste Opti			1
6	1071	000	ren en			1
7	1080	300	9			1

Open the **second** County Excel file that was exported and **highlight** the appropriate columns by data clicking in the upper left corner and dragging to the end of the data in column D. Right click to select **Copy**.

	А	В	С	D
1	Item#	Description	Unit	Qty
2	031000	MOBILIZATION	LS	1
3	1032010	BONDS AND INSURANCE	LS	1
4	1050800	CONSTR Calibri - 11 - A A S - % , 🔤	EA	1
5	1071000	TRAFFIC <b>B</b> $I \equiv 4$ · $A = 10 + 500 + 000$	LS	1
6	1080300	CPM PROGRESS SCHEDULE	LS	1
7	2011000	CLEARIN 🐰 Cut	LS	1
8	2031000		СҮ	124
9	2033000	BORROV Paste Options:	СҮ	10
10	2081001	FINE GR.	SY	3.5

In the QuantitySheet\_DualCounty.xlsx Excel spreadsheet, click on the **PASTE DATA HERE** tab. Right click in **Cell F3** and select **Paste** to paste the data. Enter the **County** in **Cell H1**.

	F		G	н		
1			COUNTY:	BARN	WELL	
2	Item#		Descriptio	Unit	Qty	
3	1031	000	MOBILIZA	LS		1
4	1032	010	BONDS AN	LS		1
5	1050	800	CONSTRU	EA		1
6	1071	000	Paste Opti	ons:		1
7	1080	300	8			1

Page



The spreadsheet has comparison formulas to compare the Pay Item numbers and match them to one another and paste them to the Quantity sheet in the appropriate columns. The spreadsheet will put a value of 0.000 in the columns where a pay item exists in one county but not the other.

ITEM NO.	PAY ITEM	AIKEN	BARNWELL	PAY UNIT
1031000	MOBILIZATION	1.000	1.000	LS
1032010	BONDS AND INSURANCE	1.000	1.000	LS
1050800	CONSTRUCTION STAKES, LINES & GRADES	1.000	1.000	EA
1071000	TRAFFIC CONTROL	1.000	1.000	LS
1080300	CPM PROGRESS SCHEDULE	1.000	1.000	LS
2011000	CLEARING & GRUBBING WITHIN RIGHT OF WAY	1.000	1.000	LS
2025000	REMOVAL & DISPOSAL OF EXISTING ASPHALT PAVEMENT	3505.000	0.000	SY
2031000	UNCLASSIFIED EXCAVATION	7320.000	124.000	CY
2033000	BORROW EXCAVATION	6410.000	10.000	CY

Review the results on the Excel tabs – Quantity Sheet 1 and Quantity Sheet 2.

- A 1 2	SCDOT	•							PER. 8		0 (k) (***			-
3	32231	SUMMAR	Y OF	ESTIN	IAT.	СD	QU.	ANITHES	2	\$.0.	AKDVEA	AMVELL 41946	1-29	24
5	ITEM NO.	PAYITEM	AIKEN	BARNVELL	PAY UNIT		ITEM NO.	PAY ITEM		AIK	EN	BARNVELL	PAY UNIT	a –
6					1		1031000	MODUZATION			1000	1.000	LS	1
7								BONDS AND INSURANCE			1,000	1,000	LS	1
							1050800	CONSTRUCTION STAKES, LINES & GRADES			1000	1000	EA	1
							1071000	TRAFFIC CONTROL			1.000	1.000	US	1
10							1080300	CPM PROGRESS SCHEDULE			1000	1,000	LS	1
71							2019000	CLEARING & GRUBBING VITHIN RIGHT OF VAY			1000	1000	LS	1
42							2025000	REMOVAL & DISPOSAL OF EXISTING ASPHALT PAVEMENT			3505.000	0.000	SY	1
0							2031000	UNCLASSIFIED EXCAVATION			7320.000	124.000	CY	1

Enter the **County, Project ID, and Route/Road No.** onto the Quantity Sheet 1. It will be copied to the Quantity Sheet 2. Edit the **Sheet No.** as necessary for your plan set.

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	ed. IV. I		STATE		COUNTY	<i>(</i>	PROJ	ECTI	כ	Route/Road No.	Sheet No.
	3		S.C.	AIKE	N/BARN	WELL	411	46		S-19	2A

**Save** the Excel file to your project directory.

File name:	39389_QuantitySheet.xlsx				-
Save as type:	Excel Workbook (*.xlsx)				•
Authors:	Neal, Iris F.	Tags: Add a tag		Title: Add a title	
	Save Thumbnail				
ide Folders			Tools	▼ Save	Cancel

Continue the **Convert Excel Sheets to Adobe PDF** and **Applying the PE Seal** to create a pdf and add the pdf to the Iplot file for plotting and/or digital signatures.

**Electronically submit the Excel file and the pdf file** to the SCDOT personnel responsible for inputting the data into P2S and also for inclusion in the plan set.

### Moving Items, Removal & Disposal, New or Reset Fence Sheet

The Moving Items Excel file includes several customizable data sheets for recording items that must be moved on-site or removed and disposed of, as well as fences that must be constructed. Each numbered item has two rows for data entry. The first row is for the initial input by the Right of Way field agent. The second is provided for corrections or comments to be added by the District Construction personnel during the construction process.

ITEM	LOCATION		DESCRIPTION						
NO.	OFFSET LT/RT	STATION	DESCRIPTION						
			Right of Way Agent completes this line						
			Construction completes this line						



To customize a sheet for a particular project, determine which of the following lists will be required: **Moving Items, Removal & Disposal Items, and New Fences**.

Based on that determination, choose an existing sheet in the file to start with. Several examples and layout exist to select from.

<u>Moving Items</u> - (Note, this sheet can be made into a complete Removal & Disposal Items sheet simply by typing over the Moving Items header.)

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#### Moving Items and Removal & Disposal Items

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### Moving Items and New Fences

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## Moving Items, Removal & Disposal, and New Fences

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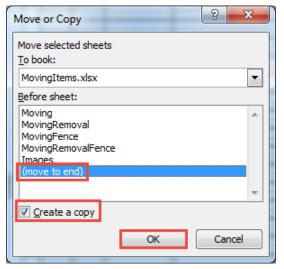


#### To create a Removal & Disposal Only Sheet:

Right click on the **Moving** tab and select **Move or Copy**.

	_		
		Insert	
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Toggle on **Create a copy**. Click (move to end) and press **OK** to create a new worksheet.



Double click the newly created tab and rename it to **Removal**.



Change the header from Moving Items to **Removal & Disposal Items**.

<b>REMOVAL &amp; DISPOSAL, NEW</b>	R R	Enter the data for the sheet						
MOVING ITEMS	MOVING ITEMS							
WORK TO BE DOME	UNIT							
		-	Continue creating additional sheets as					
<b>REMOVAL &amp; DISPOSAL, NEW</b>	Ο (	R R	necessary for the project.					
REMOVAL & DISPOSAL ITEMS								
WORK TO BE DONE	UNIT							

Next, follow the **Convert Excel to Adobe PDF** instructions to complete the plan sheets.



#### To add additional rows to a sheet:

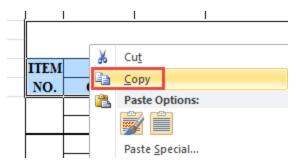
The following can be used to modify any of the headers and rows on any of the plan sheet layouts to make more room for projects that have more Removal & Disposal Items and few Moving Items, and vice versa.

Example: Six (6) additional Removal & Disposal Item rows are needed to avoid created a new plan sheet.

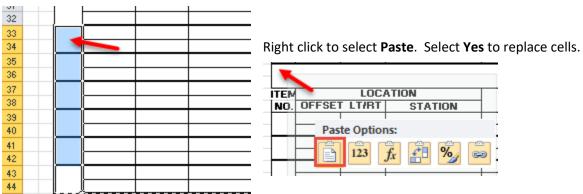
**Left click** to highlight the 2 header rows for Removal & Disposal Items. With the mouse continuously pressed, drag the cursor down until the 2 headers rows are selected.



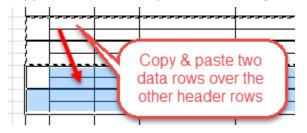
Right click to select **Copy** 



Click in the cell where the new header is to go to provide a sufficient number of rows above, starting at the bottom – up. (This example will be 6 rows – 2 header rows plus 4 data rows) Left click in the upper left cell.



Copy two data rows and paste over the original header rows for Removal & Disposal (or other).





## **Moving Item Sheet Finalization**

Enter the **County, Project ID, and Route/Road No.** onto the appropriate Moving Item Sheets. Edit the **Sheet No.** as necessary for your plan set. Repeat for all combination of sheets used in the Excel file.

M	N	0	PQ	B	S	Т	U
	FED. RD.	STATE		OUNTT	PROJECT ID	ROUTE/ROAD	SHEET
	DIT. NO.	31412	, v	oonn	PROVECTIO	NO.	HO.
	3	S.C.	BERKELEY		39389	S-136	2A

**Save** the Excel file to your project directory. Send the file **electronically** to the Roadway Design group for inclusion in the plan set.

File name:	r39389_MovingItems.xlsx	<b>~</b>
Save as type:	Excel Workbook (*.xlsx)	▼
Authors:	Neal, Iris F.	Tags: Add a tag
	🗐 Save Thumbnail	
Hide Folders		Tools 🔻 Save Cancel

Continue the **Export Excel Sheets to Adobe PDF** to create a pdf and add the pdf to the Iplot file for plotting and/or digital signatures.

### **Right of Way Data Sheets**

#### Summary Sheet – Road Group

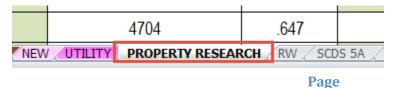
In the Right of Way Data Sheet, click on the SUMMARY worksheet tab. Enter the County, Road, and Project Id. This will be copied to the plan sheet Title blocks.

PROJECT PROPERTY DATABASE									
COUNTY:	LANCASTER								
ROAD - ROUTE:	S-51								
PROJECT ID:	P028383								
CHARGE CODE:									

PSG Sheet – Road Group

Locate the project's **Preconstruction Survey Report Excel** file in the working directory or in the Surveys folder on the network. Open the file and go to the **PROPERTY RESEARCH** worksheet tab.

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**Select all** completed cells on the worksheet beginning with the row of **Tract 1** (cell A12) to the end of the data in column DB/PB or TM. Right click to select **Copy.** 

10	TRK	OWNERS' NAME			TAX-MAP	D.B. &	D.B.	P.B. &	P.B.	TRACT	DB,PB
11	No.	(LAST, FIRST)		RI	EFERENCE	PAGE	AREA	PAGE	AREA	AREA	or TM
12	×	STOGNER, MARY ELLEN SCOTT	N I	00	068-00-043.01	C 6 / 2635		2697	1.0		
13	2	RELOT, SYBIL B. ETAL	K Cu <u>t</u>		68-00-043.00	874 / 83	30				
14	3	PELOT, SYBIL B. ETAL	Paste Options:		69-00-001.00	874 / 83					
15	4	BLACKMON, JESSICA D.			69-00-001.03	874 / 97		9774	1.05		
16	5	EVANS, LONNIE EARL	Paste Special		69-00-002.01	A 6 / 4994		437	2.25		
17	6	EVANS, LONNIE EARL	Insert Delete		69-00-002.04	78 / 328		5414	14.64		
18	7	LANE, GRACE C. % LANE, JOHN E. JF	Clear Co <u>n</u> tents		69-00-002.00	771 / 201		5414	11.1		
19	8	LANE, GRACE C.	Format Cells		69-00-002.02	749 / 119		5414	1.292		
20	9	KNIGHT, SARAH J.	Insert Page <u>B</u> rea Reset All Page B		69-00-005.01	877 / 66		13250	11.59		
21	10	SMITH, WAYNE WILSON	Set Print Area	i caks	69-00-006.00	L 9 / 203					
22	11	REDFEARD, JOE R. JR. ETAL	Reset Print Area		69-00-019.00	815 / 197	109				
23	12	PELOT, SYBIL B. ETAL	Page Set <u>u</u> p	0.0	69-00-007.00	874 / 83	22.76				

Click in the **Tract 1 cell (A10)** in the RWDS.xlsm – **PSG** tab. Right click and select the command **Paste Special**. When the additional menu pops up beside it, choose **Paste Values**. This will insert the data from the survey sheet without affecting the formatting or function of the rest of this sheet.

8	TRACT	OI	OWNER			DEED BOOK	DEED BOOK	PLAT BOOK	PLAT BOOK
9	No.	NAMES			REFERENCE	& PAGE	AREA	& PAGE	AREA
10	1	STOGNER, MARY ELLEN SCOTT			0068-00-043.01	C 6 / 2635		2697	1.0
11	2	🔏 Cu <u>t</u>	1		0068-00-043.00	874 / 83	30		
12	3	🗈 <u>с</u> ору			0069-00-001.00	874 / 83			
13	4	Paste Options:			0069-00-001.03	874 / 97		9774	1.05
14	5	123 fx 🛃 %			0069-00-002.01	A 6 / 4994		437	2.25
15	6	Paste <u>S</u> pecial →	Paste		0069-00-002.04	78 / 328		5414	14.64
16	7	Insert Delete	📑 fx %j.		0069-00-002.00	771 / 201		5414	11.1
17	8	Clear Contents	Ê 🔒 🗿		0069-00-002.02	749 / 119		5414	1.292
18	9	Filt <u>e</u> r →	Paste Values		0069-00-005.01	877 / 66		13250	11.59
19	10	S <u>o</u> rt ≻	123 123 123		0069-00-006.00	L 9 / 203			
20	11	Format Cells	Other Paste Options		0069-00-019.00	815 / 197	109		
21	12	Pick From Drop-down List			0069-00-007.00	874 / 83	22.76		
22	13	Define N <u>a</u> me , Hyperlink			0069H-0C-008.00	Q 10 / 226		9660	.732
23	14	WIAII, WALIEK E. & PA	Paste <u>S</u> pecial		0069H-0C-007.00	Q 8 / 329		4704	.661

These tracts and their details can be revised by hand if necessary. If a tract needs to be removed from the document, rather than deleting its data, simply place an X in the right-most cell on that line, in the column titled "RW SHEET TRACT No." Placing an X in that cell will remove the tract from the rest of the document.

26	17	HALL, JAMES		525-00-00-005	11281/318	1	29799	1.89		×
27	18	PALMETTO FAMILY HOMES, LLC 5		525-00-00-002	4746/151		29799	LOT	-	
28	19	GARRISON, AMANDA & MoCURRY, RICHARD 5		525-00-00-006	5428794		29799	LOT		
29	20	LEWIS, BERTHAE.		525-00-00-007	967/260		29799	LOT	_	-
30	21	MCGUIRE, SCOTT		525-00-00-005	11281/318		29799	1.89		17
16		ITON, SHIRLEY F. RE, SCOTT		0-00-004						
18	PALME	ITO FAMILY HOMES, LLC	525-0	0-00-002						

To split a tract, enter an "A" for the tract to be split in the appropriate column. Then scroll down to the bottom of the list and enter the Tract No., Owner Names, Tax-Map Reference, etc. Use the format A, B,



C in sequential order to split a tract. Example (Tract No. 4A, 4B, 4C, etc.) [Note: If additional tracts are added, restart the numbering back at the last available number – example below, restart at 118.]

8	TRACT	OWNER	TAX-MAP
9	No.	NAMES	REFERENCE
10	1	R&B Partners	024-07-17-001
11	2	Unable to verify ownership	024-07-13-001
12	3	Clear B.L. Inc.	024-07-11-009
13	<b>4</b> A	Palmetto Federal Savings	024-07-11-008
14	5	Paul B. Blackburn & Lori B. Baxley	024-07-11-007
15	6	Clear B.L. Inc.	024-07-11-006
123	114	R.C. Robison	023-09-02-001
124	115	Katherine L. Downs	023-18-09-001
125	116	R&B Partners	024-07-17-002
126	117	Ogles Allen Life Estate Add split tract at bottom of list	024-07-12-002
127	4B	Investments LLC	024-07-11-008
128	119 🔺	<ul> <li>Renumber here if necessary</li> </ul>	

#### <u>Areas Sheet – Road Group</u>

In the AREAS sheet, enter the areas of the outfall ditch, right, and/or left obtains required from each tract in **square feet** in the white cells. The outfall ditch area should also be included in the right or left obtain as appropriate. The tan-colored cells are filled in and calculated automatically. The cells beneath each obtain area convert that area to acres.

TAX-MAP	TOTAL	OUTFALL	LEFT	RIGHT	TOTAL	REMAINDER	REMAINDER
REFERENCE	TRACT AREA	DITCH (sf)	(sf)	(sf)	(sf)	LEFT (sf)	RIGHT (sf)
121-26-01-005-000	8.28	2000.00	100000.00		102000.000	260676.800 ┥	
		0.046	2.296	0.000	2.342	5.984	
121-26-01-011-000	0.88			9000.00	9000.000		29332.800
		0.000	0.000	0.207	0.207		0.673

In most cases, only a right OR a left obtain will be relevant and the remainder will be calculated automatically. In situations such as a new road passing through a tract, however, obtains and remainders may exist on BOTH sides of the road. In this case, the remainders must be entered manually in the white cells of the "REMAINDER LEFT (manual)" and "REMAINDER RIGHT (manual)" columns. The "VERIFY" column to the right will then show the total acreage of the obtains plus the remainders – this should equal the Total Tract Area in column D. If not, the remainders may have been entered incorrectly.

TOTAL	OUTFALL	LEFT	RIGHT	TOTAL	REMAINDER	REMAINDER	REMAINDER	REMAINDER	TOTAL TRACT
TRACT AREA	DITCH (sf)	(sf)	(sf)	(sf)	LEFT (sf)	RIGHT (sf)	LEFT (manual)	RIGHT (manual)	AREA (VERIFY)
8.28	2000.00	100000.00		102000.000	260676.800				2.30
	0.046	2.296	0.000	2.342	5.984		0.000	0.000	
0.88			9000.00	9000.000		29332.800			0.21
	0.000	0.000	0.207	0.207		0.673	0.000	0.000	1. A.
0.74		7500.00	1000.00	8500.000	15000.000	8700.000	15000.000	8700.000	0.74
	0.000	0.172	0.023	0.195	0.344	0.200	0.344	0.200	

#### PMNS – Road Group

In the Permissions sheet, click on the white cells in each Permission column to produce a little white arrow to the right of the cell.



Click that arrow to bring up the options **Yes** or **No** – click the one that is appropriate for each Tract. (Yes or No can also be typed directly into the cells in all caps if preferred.)

OWNER	TAX-MAP	TOTAL	OUTFALL	LEFT	RIGHT	TOTAL	REMAINDER	REMAINDER
NAMES	REFERENCE	TRACT AREA	DITCH (sf)	(sf)	(sf)	(sf)	LEFT (sf)	RIGHT (sf)
NORA LEE R. HANNA, ETAL	00418-02-005	38.254		4665.00		4665.000	1661679.240	1666344.240
			0.000	0.107	0.000	0.107	38.147	38.254
ERNEST D. HANNA, ETAL	00418-02-097	9.554		5332.00		5332.000	410840.240	416172.240
			0.000	0.122	0.000	0.122	9.432	9.554
ROGER HOWARD HENRY, III, ETAL	00418-02-006	46.862			77170.00	77170.000	2041308.720	1964138.720
			0.000	0.000	1.772	1.772	46.862	45.090
SALEM INDEPENDENT METHODIST CHURCH	00418-02-036	1.584		3786.00		3786.000	65213.040	68999.040

#### **INRMT Sheet – ROW Group**

In the Instrument sheet, enter the dates of acquisition and instruments used for each tract in the white cells. If multiple dates and instruments need to be entered, two dates or instruments can be listed in the same cell, or white cells in the second row under each tract number can be used as well to provide more space.

1	WALLACE, SAM W. JR	526-00-00-058	05/15/07, 12/6/07	PERMISSION, FEE DEED
			9/21/09	CONDEM.
	· · · · · · · · · · · · · · · · · · ·		•	

#### RWDS Sheet – ROW Group & Road Group

Enter the details of the right-of-ways involved in the project in the spaces provided in the bottom right of the sheet.

Road / Route #	File#	R/W Width	Year Aco'd.
	1 110 11		
Road S-62	8.338	66'	1956
US Route 17A	8.72	Variable	1999
Road S-61	8.382	66'	1962

Review the RWDS sheet(s) to confirm all data has been entered correctly. Each sheet can display data from up to 45 tracts, so projects involving more than that will use multiple sheets. Some cells may need to have their font size reduced to display correctly.

The white space on the right side of the sheet, under the revisions listings, can be used for any additional notes required. Type comments in all caps to ensure readability.

If revisions are made, the date of revision, tract(s) involved, and the nature of the revisions must be noted in the cells provided on the right side of the sheet. If necessary, the font size in the Remarks cells can be reduced to allow longer comments to be made, or multiple lines can be used for a single revision.

DATE	TRACT NO.	REMARKS

Continue the plan production process by following the **Export Excel to Adobe PDF** instructions.



## **Erosion Control Data Sheets**

#### **General Instructions**

- 1. The input cells are highlighted in orange. The uncolored cells will automatically populate with the appropriate quantities as we input our data.
- 2. The file should be opened in the 100% zoom. When saving, ensure that the file is saved at the 100% zoom.
- 3. For all "SIDE" columns enter LT for left or RT for right. Do no input LT/RT. Each side must have its own row.
- 4. For all "STATION TO STATION" columns, do not enter the + sign. The + sign appears automatically.
  - a. Example: Station 1100+00 will be entered as 110000. It will appear as 1100+00 in the spreadsheet.
- 5. For all "SLOPES X:1" columns, enter the number for the X (ex. 2, 4, 6, ....). "FRONT" is the front of the ditch coming off the roadway and "BACK" is the back slope of the ditch typing back into the natural ground.
- 6. Many of the input areas are designed to be compatible in case additional lines are needed for one type of erosion control measure. Experienced Excel users can unlock the sheet and copy lines form one section to the other to avoid using additional plan sheets for a few additional rows. Less experienced Excel users can simply use the additional sheets as necessary or contact the Design Automation Office for assistance.
  - a. To unlock the sheet for editing, click the Review tab at the top of Excel. Click the button labeled "Unprotect Sheet". When all revisions are complete, click the same button, which should now be labeled "Protect Sheet", and press "OK" in the menu.
  - b. Receiving Waters and Soil Types, Temporary Erosion Control Blankets and Sediment Tubes in Ditches, and Turf Reinforcement Matting and Sediment Dam are each interchangeable pairs that can be easily replaced with one another.
  - c. To convert part of one section into the other, copy the entire header area from the section that needs more lines, along with the necessary number of those lines and paste it over the bottom lines of the other section, then fill it out normally.
  - d. Sections that have "Total" lines at the bottom will need to have that line copied and pasted to remain at the bottom of the new section. Be sure not to overwrite the Total line with another section without moving it up above the pasted line first. The formulas in those lines must be adjusted to sum up only the appropriate cells. Please contact the Design Automation Office for assistance with these changes as required.
  - e. Do not add any additional rows to the sheet or expand the heights and widths of the columns. The Excel sheet is preconfigured to plot with the proper margins to an Adobe pdf plan sheet.

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	т	EMD		DVED	OFION	CON	TDO	L BLANKET
	1	EMPU	JKA					L BLANKE I
ROAD / ROUTE		ON TO TION	SIDE		DITCH BOTTOM	н	PES	MSY
				(FT)	WIDTH(FT)	FRONT	BACK	

	Т	EMP	ORA	RY ER	OSION	CON	TRO	L BLANKET
ROAD / ROUTE STATION TO STATION		SIDE	DEPTH OF BLANKET (FT)	DITCH BOTTOM WIDTH (FT)	SLC x FRONT		MSY	
			-					
							OTAL	
			SEI	DIMEN	T TUBE			CHES
ROAD/ROUTE		ON TO TION	SIDE	AVERAGE LENGTH	SPACING (FT)	то	TAL	COMMENTS
		-	-					
					TOTAL			



#### Sediment Dam

- 1. The silt basin, dam, spillway, and outfall dimensions are in feet. The storage is measured in cubic yards.
- 2. For the "SIDE SLOPE OF SILT BASIN" column put a 2 or the word VERTICAL
- 3. For the last three columns dealing with the outfall channel, leave blank if no ditch is present to tie into. Do not put or 0.

#### Soil Types

 For the "ZONE" column, input the appropriate zone: Piedmont, Blue Ridge, Upper Coastal Plain, or Lower Coastal Plain. If the text does not fit in the cell, abbreviate as necessary and enter the full text on the last line.

SOIL TYPES							
ROAD / ROUTE	STATION TO STATION		SOIL PARTICLE SIZE (COARSE / FINE)	ZONE			
				*UCP			
*UPPER	COASTAL	PLAIN					

#### Turf Reinforced Matting (TRM)

- 1. For the "DEPTH OF MAT" column, measure a vertical <u>"UPPER COASTAL PLAIN</u> distance from the bottom of the channel to the top of the water surface elevation and then add your freeboard height. This will ensure the quantities are calculated correctly.
- 2. For the "DITCH BOTTOM WIDTH" column, put a 0 for the "V" ditch.
- 3. For the "TYPE" column, type a 1, 2, or 3 depending on what type of mat your situation requires. This column ensures the proper column for quantities is populated.

#### Temporary Erosion Control Blanket

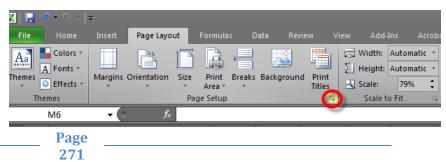
- 1. For the "DEPTH OF BLANKET" column, measure a vertical distance from the bottom of the channel to the top of the water surface elevation and then add your freeboard height. This will ensure the quantities are calculated correctly.
- 2. For the "DITCH BOTTOM WIDTH" column, put a 0 for a "V" ditch.

#### Sediment Tubes in Ditches

- 1. For the "AVERAGE LENGTH" column refer to the specs for the tubes to determine the proper length of tube in feet. If it is required to overlap the tubes for the installation, ensure the extra length for the tubes is included in the total length.
- 2. For the "SPACING" column refer to the specs for the spacing of the tubes. If they are to be 100 feet apart, then enter 100.
- 3. For the "COMMENTS" column add notes where you have overlapping tubes, for the benefit of the field personnel, otherwise leave it blank.

#### Turning Off Orange Fill for Printing

- 1. Select the Page layout Tab
- 2. Click the bottom right corner of the **Page Setup** section





3. On the Sheet tab, check on Black and White and press OK

F	age Setup	þ				? 🔀
	Page	Margins	Heade	r/Footer Sheet		
	Print <u>a</u> rea Print titles					<b>E</b>
	<u>R</u> ows to <u>C</u> olumn					
	Print —					
	Blac	lines k and white ft <u>q</u> uality		Co <u>m</u> ments: Cell <u>e</u> rrors as:	(None) displayed	▼ ▼

After completing the data entry for the Erosion Control Data Sheet, continue the process by **Converting the Excel Sheet to Adobe PDF** and **Applying the PE Seal** instructions.

### **General Construction Notes Sheet**

To prepare the General Construction Notes sheet for printing directly to PDF, open the Quantity Sheet for the project and copy the pay items out of the tab named **"Paste Data Here"**. Only the *first three columns are needed* - Item#, Description, and Unit – not the actual Quantities. Paste the data into the tab named **"Paste Data Here"** beginning with cell A2 in the Cadd Standard **"General Construction Notes.xlsx"** Excel file located on the Cadd Support webpage.

[Note: Do not delete rows, move rows, sort, etc. because the formulas will not perform correctly. The spreadsheet will automatically sort the quantities in order by Item Number.]

	А	В	С
1	ITEM NO.	PAY ITEM	UNIT
2	1031000	MOBILIZATION	LS
3	1031000	MOBILIZATION	LS
4	1031000	MOBILIZATION	LS
5	1031000	MOBILIZATION	LS
6	1031010	MOBILIZATION	EA
7	1032010	BONDS AND INSURANCE	LS
8	1050800	CONSTRUCTION STAKES, LINES & GRADES	EA
9	1071000	TRAFFIC CONTROL	LS

Enter the Quantities and Use Descriptions for the Inclusion Items by hand into the Quantity column. You can prevent items from appearing on the General Construction Notes sheet by leaving their quantity blank. Items with any information filled in for quantity, including the number "0", will appear; items with a blank Quantity cell will be filtered out. Only fill in quantities for items you wish to display.

Addition items may need to be added to the quantities list, particularly if more than one inclusion item with the same Item Number must be included. Additional items can be added to the bottom of the list and will be automatically sorted into the correct position by their Item Number. Information can be copied and pasted from existing items if desired; do not cut and paste or insert/delete rows, however.

Review the results on the Excel tab - **GCN**. Fill out the Project Contacts information and add any additional notes required for the project.



SCDƏT	6			ERAL CONSTRUCTI			PER. 88.	0 0 T	PRIVACE IN 10	
322371			GEI	EKAL CONSTRUCT		ILS.	3	S.O. LEXIMITON	4171	AS
ITEM NO.	PAYITEN	QUANTITY	PAY UNIT	USE DESCRIPTION		PROJECT CONTACTS		have	TELEPHONE	
						PROGRAM/PROJECT MANAGE DESIGN GROUP COOPDINATO		ULIE BARKERUP.E. BERT L. WALSH, P.E.	803-737-1365 803-327-7121	
							-			
						CONSTRUCTION NOTES:				
					COST OF THE PR	OJECT OR CHANGES IN ALIGNMENT CTION OF THE DEPUTY SECRETARY	THE DISTR FOR ENGINE	ICT ENGINEERING AOMIN LERING TO AUTHORIZE N	ISTRATOR IS PERMITTED INOR ALTERATIONS NOT	
						H THE STANDARD PRACTICES OF TH NGES IN ALIGAMENT TO THE COLUM			ATION ON ANY	
					SEE INDIVIDUAL O APPLICABLE	CURVES ON REFERENCE DATA SHEE	TFOR SUPE	RELEVATION RATE AND	DESIGN SPEED, AS	
						QUANTITIES ARE NOT SHOWN IN DE				
						ALL STREET ALL SERVICES REPORT		NOUTING DECISION	in the chord of	

The **GCN** tab includes a copy of the Riprap/Geotextiles table for pipe outlets. If this table is not needed, it can be deleted to provide additional space for notes.

If the GCN sheet must be created in MicroStation (for example, in order to include Standard Drawings or similar details on it), the Inclusion Items list can simply be copied and pasted directly to MicroStation and placed properly within the GCN sheet there. Copy the list of items from the **GCN** tab and press **CTRL+V** in MicroStation to paste it. On the resulting menu, choose "Paste as Link", then delineate the upper-left and lower-right corners of the intended image.

💡 Paste OLE Object 📃 💻 💻
Object: Microsoft Excel Worksheet Paste as: Link Method: By Comers

The resulting image is linked to the spreadsheet. By double-clicking on the image, you can open Excel and review or edit the data. Closing Excel again will update the image to match the spreadsheet. However, if the spreadsheet is ever moved, the image will be unable to locate it and no longer be edited.



## **Google Earth Pro**

Google Earth is used frequently in design for reviewing the existing topography of the project, for planning, for preliminary design, for land use identification and drainage patterns in hydrology, for public hearing displays, and many other purposes to provide the project scope in context to existing conditions.

Open the \*pp.dgn file and select **Tools > Geographic > Select Geographic Coordinate System**.

Geographic	٠	1 Select Geographic Coordinate System
Groups	► 🖧	2 Global Positioning System (GPS)
Levels	۶ 🐊	3 Export Google Earth (KML) File
Manipulate	۲ 🥪	4 Capture Google Earth Image
Measure	۲ 😫	5 Define Placemark Monument
Mesh	۲	6 Synchronize Google Earth View
Multi-lines	₽ 😤	7 Follow Google Earth View
Parametrics	۱ 💼	8 Google Earth Settings
Patterning	۱ 📦	9 Play Camera Animation in Google Earth
Point Cloud	•	0 Open Location in Google Maps
Project Navigation	٠ 🔜	Open as ToolBox

Verify it is set to the SC83IF - South Carolina State Planes Coordinates - International Feet. (See page 6)

Geographic Coordinate System             Geographic Coordinate System             Geographic Coordinate System	Select <b>Tools &gt; Geographic &gt; Export Google Earth</b> KML File
Current Geographic Coordinate System Name: SC83IF Description: NAD83 South Carolina State Planes, Interna Source: Calculated from SC83 by Mentor Software	Geographic       I       Select Geographic Coordinate System         Groups       Image: Coordinate System       Image: Coordinate System         Levels       Image: Coordinate System       Image: Coordinate System         Image: Coordinate System       Image: Coordinate System       Image: Coordinate System         Image: Coordinate System       Image: Coordinate System       Image: Coordinate System         Image: Coordinate System       Image: Coordinate System       Image: Coordinate System         Image: Coordinate System       Image: Coordinate System       Image: Coordinate System         Image: Coordinate System       Image: Coordinate System       Image: Coordinate System         Image: Coordinate System       Image: Coordinate System       Image: Coordinate System         Image: Coordinate System       Image: Coordinate System       Image: Coordinate System         Image: Coordinate System       Image: Coordinate System       Image: Coordinate System         Image: Coordinate System       Image: Coordinate System       Image: Coordinate System         Image: Coordinate System       Image: Coordinate System       Image: Coordinate System         Image: Coordinate System       Image: Coordinate System       Image: Coordinate System         Image: Coordinate System       Image: Coordinate System       Image: Coordinate System

Select the working directory and assign a file name. Press the Save button.

File name:	r36773pp.kmz	-	Save
Save as type:	Google Earth Files (*.kml;*.kmz)	-	Cancel

**Review** the kmz file in Google Earth.





There still exist older projects that were not surveyed in State Plane Coordinates. In order to export these files to Google Earth, thumbtacks will need to be placed in Google Earth and MicroStation to match elements to images in the Google Earth.

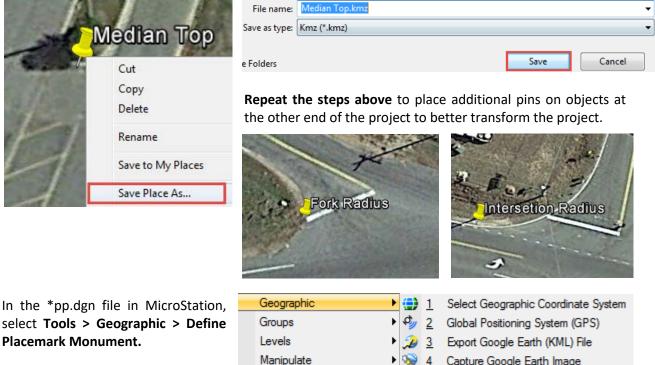
Thumbtacks should be placed on ground objects as opposed to building or other objects with height as shadows in the image could alter the transformation of the graphics to the image.

Open Google Earth and zoom into the project area. Locate a known feature such as a curb return, parking lot corner, etc. to add a placemark/monument.

Select the yellow pushpin icon at the top menu bar to Add Placemark. Enter a Name and move the push pin to a **recognizable** corner. Press the **OK** button.

🔲 🛠 🖉 🌫 🥸	Google I	Earth - New	Placemark	Contraction of the	<b>×</b>
Thedian Top			33°42'17.41"N 81°51'39.93"W		
				ОК	Cancel

Right click on the pushpin to select Save Place As, enter a name and save the pushpin to the working directory.



4 Capture Google Earth Image

Define Placemark Monument

Synchronize Google Earth View 6

Page 275

Measure

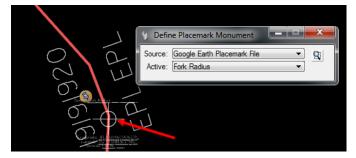
Mesh



Zoom into the same location in the design file that was located in the Google Earth location. **Browse** to select the Placemark.kmz file and **data click** as close as possible to transform the file correctly.



#### Repeat to add additional Placemark pushins.



#### Select Tools > Geographic > Export Google Earth KML File

Geographic	•	1	Select Geographic Coordinate System
Groups	• 💞	<u>2</u>	Global Positioning System (GPS)
Levels	🔹 🕨 🎾	3	Export Google Earth (KML) File

Select the working directory and assign a file name. Press the **Save** button.

File name:	r36773pp.kmz	•	Save
Save as type:	Google Earth Files (*.kml;*.kmz)	•	Cancel

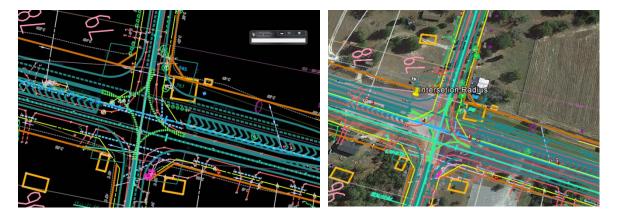
### **Review** the kmz file in Google Earth.





To **Synchronize Google Earth View**, select **Tools > Geographic > Synchronize Google Earth View**. This will zoom into the same area of the Google Earth image as is zoomed into the MicroStation drawing.

Geographic	•	۲	<u>1</u>	Select Geographic Coordinate System
Groups	۲	ф,	<u>2</u>	Global Positioning System (GPS)
Levels	۲	2	<u>3</u>	Export Google Earth (KML) File
Manipulate	۲	N	<u>4</u>	Capture Google Earth Image
Measure	۲	3	<u>5</u>	Define Placemark Monument
Mesh	Þ	7	<u>6</u>	Synchronize Google Earth View



To **Capture Google Earth Image**, you must have a 3D model. To create a 3D DGN Model in the existing drawing, select **Model** on the Primary Tool bar. [Note: this procedure is used when aerial images are not available through WMS or ECW files or the imagery is more outdated than the Google Earth images.]

Page 277



#### Select the Create a new model icon.

Models	-	1.2
Active File	• 🛅 🔓 🛩 🗙	🤌 🗆 ≽
Type 2D/3D	Name	Description
	Default	Master Model
Create Model		
Line Style Scale Cell Properties	(Not using seed> Google Earth Image          Full Size 1=1         ♥ Propagate Annotation Scale         Global Line Style Scale ▼         □         Update Fields Automatically         ad as a cell       Cell Type:         id as an annotation cell         v Group	00000(

Create a **3D Model** as shown below by selecting **Design and 3D**. Press **OK** to create the model.



Select the **Reference** File button to attach the **\*pp.dgn** file as a reference to the model.



Verify the **SC83IF** coordinate system is attached to the new model. Attach if necessary.

🥂 Geographic C	🥂 Geographic Coordinate System							
er 😍 & 🕂 🛱 🤌 🔁 🎽								
Current Geographic Coordinate System								
Name:	SC83IF							
Description:	NAD83 South Carolina State Planes, Interna							
Source:	Calculated from SC83 by Mentor Software							

Adjust the view so that it contains the desired area to be captured. [Note: if the area is too large, the image will have a lower resolution due to Google's compression techniques. For a large project, complete the image capture in a series of steps for multiple images.]



#### Select Synchronize Google Earth View.

Geographic	•	<u>1</u>	Select Geographic Coordinate System
Groups	ه الج	<u>2</u>	Global Positioning System (GPS)
Levels	+ 🐊	<u>3</u>	Export Google Earth (KML) File
Manipulate	۱ 🥪	<u>4</u>	Capture Google Earth Image
Measure	۱ 😫	<u>5</u>	Define Placemark Monument
Mesh	• 💣	<u>6</u>	Synchronize Google Earth View

In Google Earth, check and confirm the view. Do not alter the view in any way.



#### In MicroStation, select the Capture Google Earth Image.

Geographic 🔸	۲	<u>1</u>	Select Geographic Coordinate System
Groups 🕨	ø	<u>2</u>	Global Positioning System (GPS)
Levels •	2	<u>3</u>	Export Google Earth (KML) File
Manipulate 🕨 🕨	2	<u>4</u>	Capture Google Earth Image

Data click in the center of the MicroStation view. A 3D wireframe mesh will appear in the drawing covering the view area.





Change the View Attributes to display style Smooth to view the Google Image.



The Google image appears **black and white** and at a lower resolution.



The higher resolution image file is located in the working directory and can be attached as a raster image to the 2D \*pp.dgn file if needed. Tip: Draw a box along the edges of the view to attach the image by "Place Interactively" to snap to the corners for better alignment of the image.

Name	Date modified	Туре
💯 r36773pp.dgn	9/24/2015 12:15 PM	Bentley MicroStati
🔄 r36773ppTerrainCapture1.jpg	9/24/2015 12:14 PM	JPEG image

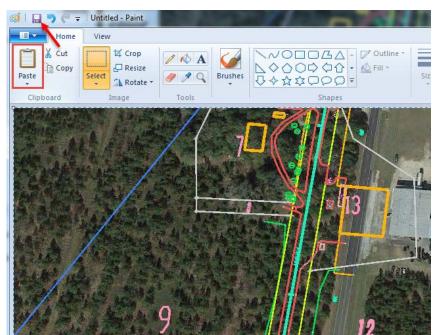
To save the image in color, in Google Earth with the same view, select Edit > Copy Image.

🕒 Go	😂 Google Earth Pro								
File	Edit	) View To	ols	Add	Help				
▼ Se		Cut			Ctrl+X				
Sear		Сору			Ctrl+C				
		Copy As Tra	acks						
011 27		Copy Imag	e		Ctrl+Alt+C				

Select **Start > All Programs > Accessories > Paint** to open Microsoft Paint. Press the Paste button.

Select the **Save** icon and overwrite the black and white image from the previous step.

Close and restart MicroStation to view the image in color.





## **Zip Files**

To bundle groups of files together into a compressed folder for electronic transfer, **highlight** the files in the folder and right click to select **Send To > Compressed Zip Folder**. The \*.zip file will be located in the folder. Rename the file as necessary and then use this file when uploading to a file transfer site or attaching to an email.

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ß r006ref.dgn		Open with MicroStation V8i (SELECTseries 3)	Stati	i 45 KB
₿ r006rfx.dgn		Print with MicroStation V8i (SELECTseries 3)	Stati	i 422 KB
⊯ r006rfxa1.dgn	12	Convert to Adobe PDF	Stati	i 726 KB
💯 r006rrwd.dgn	U	Scan for threats	Stati	i 34 KB
🞉 r006sh.dgn	×	Scarror threats	Stati	i 144 KB
🎉 r006ts.dgn		Always available offline	Stati	i 39 KB
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Name				
🔒 2015-10-30_r310	06_F	iles_to_Consultant.zip		

To unzip files, double click on the \*.zip file. Highlight the files and **drag/drop** the files out of the \*.zip to the network server location.

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/ℬ r006rfx.dgn	Bentley MicroStation Desi	
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/₿ r006typ.dgn	Bentley MicroStation Desi	
// r31006pp.dgn	Bentley MicroStation Desi	
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## **FTP Options**

#### SCDOT File Transfer (FTP) Interface

IT Services maintains the SCDOT File Transfer (FTP) solution which allows SCDOT employees or customers to upload/download data using either desktop installed software or a web browser interface.

https://www.scdot.org/business/file-transfer.aspx

Please contact the Design Automation Office to have the desktop client (for SCDOT employees) installed on your workstation or laptop. The Preconstruction Office shares a user account for internal SCDOT employees. This username and password cannot be shared with anyone outside of Preconstruction.

External customers should contact the SCDOT Program Manager they are currently working with to request a user account. The internal SCDOT employee will submit the Help Desk ticket on your behalf after your access has been approved.

The SCDOT File Transfer (FTP) User Guide is located here: <u>https://www.scdot.org/business/pdf/consultants/fileTransfer\_UserGuide.pdf</u>

The SCDOT File Transfer (FTP) web version can be accessed here: <a href="https://file.scdot.org/thinclient/">https://file.scdot.org/thinclient/</a>

#### ProjectWise

ProjectWise is the **preferred file sharing solution** of the Preconstruction Office for all project related files. ProjectWise provides several key benefits to both SCDOT employees and external customers:

- Centralized location for all engineering project files
- Securely connect SCDOT offices and engineering firms
- Multiple levels of security using access lists to determine proper user permission to folders and files
- Environments with custom sets of project and document attributes
- Powerful search engine
- Complete audit trail of user actions performed on folders and files
- Delta File Transfer (Only transfers file changes to and from the server)
- Improved interoffice communication by ensuring access to the most current version of a file
- Saves time locating files and reduces paper

The IT Services Office maintains the following website for updated documentation and the ProjectWise Account Form which is required to request access to projects through your SCDOT Program Manager. https://www.scdot.org/business/design-build-projectwise.aspx

The Design Automation Office will assist internal Preconstruction employees by coordinating the creation of new projects and assigning the appropriate permissions to the projects.



#### SharePoint

The Preconstruction Office maintains a SCDOT Preconstruction SharePoint site which allows SCDOT employees to upload and send files via an email link to external customers. This site is for *outgoing files only* and does not require the external customer to have an account. (If the external customer needs to deliver files to you, then either the SCDOT FTP Site or ProjectWise will need to be utilized.)

#### http://files.sharepoint.dot.state.sc.us/Preconstruction/SitePages/Home.aspx

**Create** a Zip/Compressed folder prior to uploading of the files to be sent. (Instructions in previous section.)

To upload the files to be sent, click on **the Shared Documents** on the left. In the center of the page, **click** on the designated group folder that you have access to. You may only see one or two folders from the list below.

On the Documents tab at the top, press the **Upload Document** button. (Alternatively, press the +Add Document button.)

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SharePoint Basics		Project C	3/16/2015 1:06 PM
(Help!)		Project D	3/16/2015 1:06 PM
Environmental		Project E	3/16/2015 1:06 PM
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		RPG2-Pee Dee	3/20/2015 10:46 AN
🗟 Recycle Bin		RPG3-Midlands	3/20/2015 10:46 AM
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		Sharepoint Instructions	3/20/2015 3:51 PM
	-	Support	3/25/2015 11:41 AM

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		8139-04	4/1/2015 8:37 AM
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Browse to locate the Zip/Compressed folder and select **Open**. Click **OK**. **Enter** a title for the file being uploaded and press **Save**.

load Document		<b>□</b> ×	Desktop 🔹		• 44 Sec
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To send an external link via email, on the Documents tab, select the **Workflows** button.

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#### Press the **Share This Document** link to start the workflow.

SCENT		Shared Documents: Wo new workflow on the current ite		e running or completed workflow.	
Preconstruction					
	Start a New Workflow				
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	Workflows				
	Select a workflow for more deta	ils on the current status or history.	Show my workflows only.		
	Name		Started		Ended
	Running Workflows				
	There are no currently runr	ing workflows on this item.			

It is recommended to enter your email address in the **Email Recipients(s)** box. This will send an invitation to your email address. Next, you can forward the invitation to external recipients.

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Preconstruction • Start "Share This Documer To start the workflow, use the submit button in the form be					
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					Select an expiration date
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		Enter email addresses for the intended viewers of th invitation number required for viewing the file.	is file. They will receive	10	invitation will be active).
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		1	29 30 1 2 3 4	5	
		*	Index is finder. Putches 10.	2015	

Note: This is a temporary location. Please clean and remove older files once the recipient has obtained the necessary files.

Once you receive the invitation, **forward the email** to the recipients. If you do not receive the invitation file in your email within approximately 10 minutes, retry the workflow again or contact the Design Automation Office for assistance.

In the email, there will be an **invitation number**. The entire number plus the { brackets should be selected and **copied/pasted**.

From: To: Cc: Subject:	Preconstruction <smpshpt1001@dot.state.sc.us> SCDOT Preconstruction Files: You have been invited to review a file.</smpshpt1001@dot.state.sc.us>
sci	http://files.sharepoint.dot.state.sc.us/ preconstructionpublicfiles/shared documents/forms/allitems.aspx Click to follow link Direct consultant to click on SCDOT Preconstruction site link or SCDOT Icon above They must copy and paste the invitation number including the { curly bracket
This is a	an automated alert from the SCDOT Preconstruction Public Files System, Please do not reply directly to this email.
You hav	ve been invited by Macedo, Delvin to review a file on the SCDOT Preconstruction site. You will need to enter your invitiation number to view t
Your In	vitation Number is: <mark>{F0AACE8C-9B4B-4A69-8CD6-88A13A52B710}</mark>
Thank y	you for your assistance!
8	
	Page

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Once the Invitation number is pasted and the **Search** button is pressed, the shared file will appear. The user can click on the file name to download the file. Select **Save As** to select the directory to save the Zip/Compressed files to.

construction Public Fi	iles				
ared Documents	Enter your Invitation N				
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# **Plan Sheets**

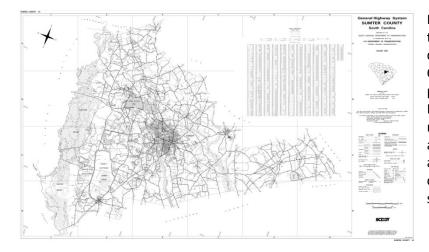
### **Title Sheet**

The Title Sheet is to be completed in accordance with the Roadway Design Manual Chapter 22.

Create a new MicroStation design file "r12345ts.dgn" to contain the title sheet.

Navigate to the GIS Mapping internet site: <u>http://info.scdot.org/sites/GIS/SitePages/default.aspx</u>

Select **Maps** > **City** or **Maps** > **County** to locate the appropriate map for your project. Download the map and save it to your project working directory. In Adobe, select Tools > Pages > Rotate and rotate the pdf as necessary. Press the Save button.



Note: If the city map crosses more than one pdf page or County line, contact the Design Automation Office to coordinate a "special" project map. (Alternatively, Google Maps can be used if both the street numbers and street names are available by clipping a jpeg image and attaching as a raster as outlined in the following steps shown for the pdf maps.)

In the MicroStation Title Sheet file, select **File > Raster Manager**. Select **File > Attach > Raster**. Select the County or City pdf file to attach and press that **Open** button.

**286** 

🛃 Raster Manager : 1 of 1 listed					
<u>File E</u> dit <u>Vi</u> ew	<u>D</u> isplay <u>S</u> ettings <u>Ut</u> ilities				
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On the Attachment Option button, select the GN\_TitleSheetMap level and press the **Attach** button.

ton.	Attachment Options           Attachments           C:\Users\nealif\Deskt	top\S-131\Sumter_County.pdf
	Action	* *
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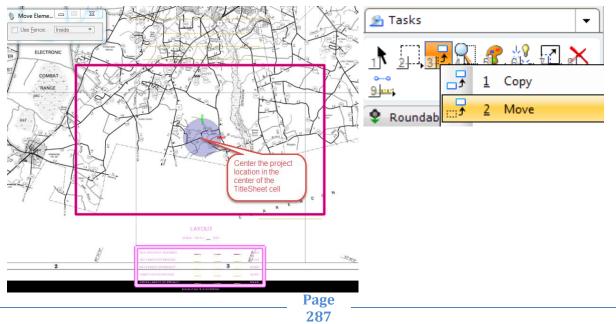
With the raster highlighted, select the **Scale** button on the Raster dialog and enter a Scale value of 600. Data point to scale the raster up 600. (This will make the 1'' = 5280' when submitted as a 50:1 plot).

B F	laster Manager : 1 of 1 liste	ed		💡 Scale Raster 💶 💻 💌
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Select the **Place Cell** command. Attach the Title.cel library to locate the sheet cells required. (Consultants will attach the eclts13.dgn file as a reference border sheet instead.)

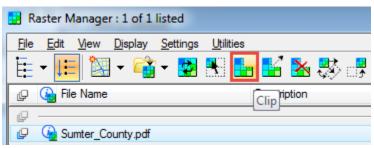
*** ۲ <sup>*</sup> * ** ** ** ≣			-	d press the <b>Placement</b> the TitleSheet cell.
😗 Place Active Cell 📃 💻 🗶	🗮 Cell Library: [\S	CDOT_Design\MSfiles\ce	ll\Title.cel]	
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Use the MicroStation **Move** command to center the project location to the center of the map clip box in the center of the Title Sheet cell.

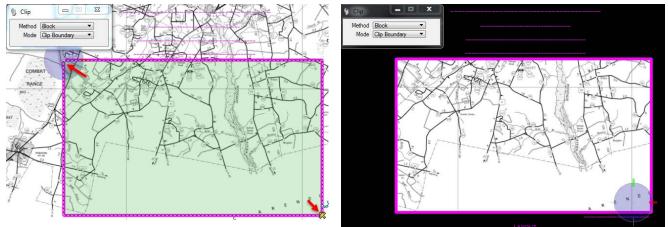




On the Raster Manager dialog, select the Clip button.

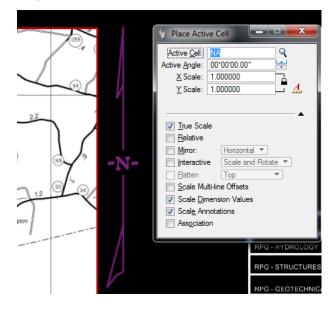


Data click the upper left and lower right corners of the Title Sheet Map block to create the fence clip boundary. Data click in the design file to accept the clip.



To modify the clipped map, see the Raster Manager section of this manual on page 22.

Attach the RoadV8.cel cell library and select the NA cell to place the **North Arrow** to the right of the Title Map block.



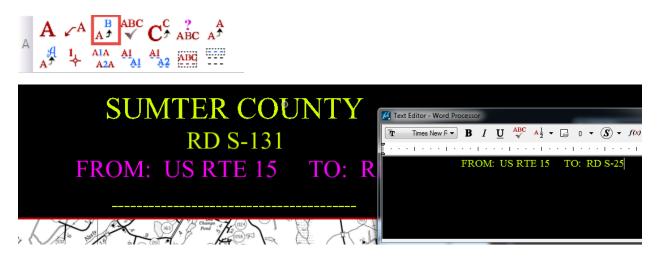
Note: If you are having issues with the map, please see raster settings on page 24.



Select the **Drop Element** command and check on the following options. Select the Title Sheet cell once to drop the status of the cell. This will allow you to utilize the text nodes to quickly place the Title Sheet fields without having to select the font sizes.

😤 Tasks 🗸 🗸	💡 Drop Element
	✓ Complex         □ Dimensions       To Geometry         ✓ Line Strings/Shapes         Multi-lines         ✓ Shared Cells       To Geometry         ▼ Ext         ▲pplication Elements

Use the **Edit Text** command to click on each of the text nodes to enter the Title Sheet data. (If text nodes do not exist for a field, copy a similar text to that area and use the Edit Text to modify as necessary – there are a few new fields that were not set up this way.) Use **%%d** for the degree symbol in the Lat/Long boxes.



Special Note about plotting: Because the map is attached as a pdf, when converting back to pdf, Iplot strips down the pdf and then recreates it. This may cause Iplot to take 2-3 minutes to convert the title sheet. To speed up this process, you can save the original County or City map as a Jpeg or Tif in Adobe and attach it in the same manner in raster manager.

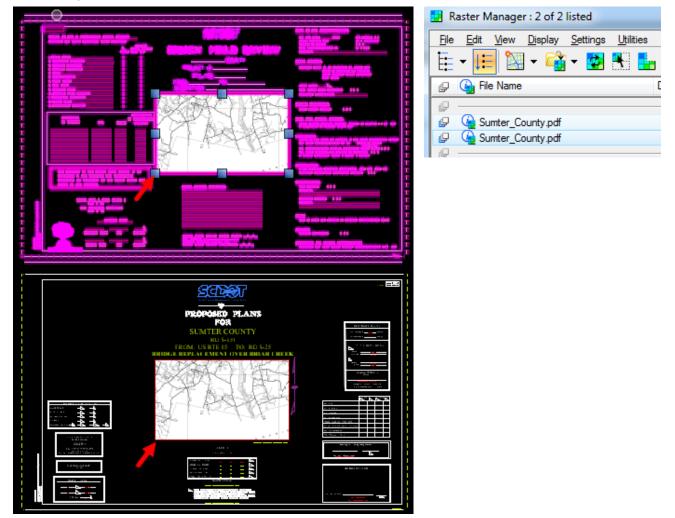
### Copy the Raster Image to Multiple Title Sheet Cells

If multiple title sheets were attached as cells in this MicroStation file, in Raster Manager, highlight the raster file to select. Select the MicroStation command **Copy**.

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	Page
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Data click the **bottom left corner** of the image and then **click the bottom left corner** of the next title sheet to copy the image to. This will create another raster attachment to the file and can be repeated for as many title sheets that exist in the file.

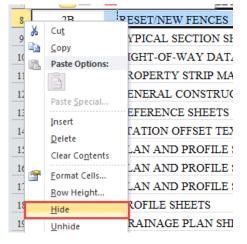


# Index of Sheets (on the Title Sheet)

The Index of Sheets may be included in the upper left corner of the Title Sheet or in the upper right corner of the Index Layout Sheet (IL1) directly following the Title Sheet in the plans.

Open the Index of Sheets **Excel** file and update the Sheet No., Description, and Sheet Subtotals information to match the plans for your project.

Right click on the rows that do not apply to your project and select **Hide** to hide these rows, to keep them in case these sheets are added at a later date.





On the View tab, uncheck the **Gridlines** button. This will allow the pasted results in MicroStation to be more aesthetically pleasing.



Highlight the rows and columns of the Index of Sheets and right click to select **Copy**. (Press Ctrl + C on the keyboard)

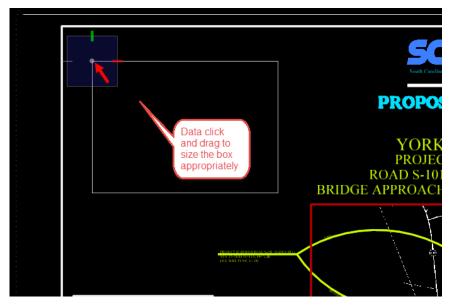
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2	<u>SHEET NO.</u> 1		DESCRIPTION TITLE SHEET	¥	Cu <u>t</u>		SHEET SUBTOTALS	
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12 13	5 5A		GENERAL CONSTRUCTION SHEET REFERENCE SHEETS		Filt <u>e</u> r ► Sort ►		1 1	
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In MicroStation, select Edit > Paste. On the dialog, select Embedded and check on Transparent Background.

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G - C - Ta	e) C	Cu <u>t</u> Copy Paste	Ctrl+X Ctrl+C Ctrl+V	Transparent Background
		Paste <u>S</u> pecial		Page 291



In the upper left corner of the Title Sheet (or in the upper right corner of the Index Layout sheet), **data click** to define the upper left corner of the box and drag to size the Index of Sheets box. (If updates are required, make modifications in the Excel file and repeat this process. The Excel data is embedded rather than linked. Linking causes the text to have a "grey" background when plotted.)



Once the box is pasted, you can use the **Element Selection** tool to select and manipulate the size by dragging and dropping the handles on the corners.

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### Index/Plan Layout Sheets

Create a new \*il.dgn design file. Add the Index of Sheets as **outlined in the above steps** if you are including on the IL1 Sheet (preferred) instead of the Title Sheet. Most users paste this in the **upper right corner**, so thumbing thru the plans; it is more easily accessible on the page.



Determine the scale for the Index Layout sheets by length of alignment to show the layout of the plan sheets for the project.

Scale	Border Cell X & Y	Alignment Length	Minimum Font Size
50:1	1.00	1500 ft stationing	5
100:1	2.00	3000 ft stationing	10
150:1	3.00	4500 ft stationing	15
200:1	4.00	6000 ft stationing	20
400:1	8.00	12000 ft stationing	40

A 150:1 will fit approximately 3 plan sheets or 4500 lf of the alignment. The following example will demonstrate a 150:1 Index/Plan Layout Sheet.

Open the geopaksheets\_In.cel cell library and select the  $01_Index_Layout_Sheet$  cell. Adjust the cell scale to 3.00 for both the height and width (3 x 50 = 150). Place the cell additional times for the number of plan sheets you are including in the layout.

💡 Place Active Cell	👯 Cell Library: [\MSfiles\Cell\geopaksheets_	_In.cel]	<b>– – X</b>
Active Cell: dex_Layout_Sheet Q Active Angle: 00°00'00.00"	<u>File</u> <u>Use Shared Cells</u> Display All Cells	i In Path	<u>D</u> isplay: <u>Wireframe</u> ▼
X Scale: 3.000000 Y Scale: 3.000000 ✓ Irue Scale Relative Mirror: Horizontal ▼ Interactive Scale and Rotate ▼	01_Index_Layout_Sheet         01_Int           03_Typical_Section         03_T           04_Property_Strip_Map         04_P           05_Drainage_Data_Sheet         05_D           05_General_Construction_Note         05_R           05_Reference_Data_Sheet         05_R           05_Reference_Data_StationOffset         05_R	cription Type ndex_Layout_Sheet Grph roperty_Strip_Map Grph Drainage_Data_Sheet Grph General_Construction Grph Reference_Data_Stati	
☐ Hatten     Top       ▼     Scale Multi-line Offsets       ♥ Scale Dimension Values       ♥ Scale Annotations       ■ Association	Active Cells	Point Bement NONE	Edit     Delete       Create     Share

If plan sheet clipper was used to layout the plan sheets, attach the \*cogo.dgn design file as a reference to the \*il.dgn. (If plan sheets were manually assembled, attach the \*pp.dgn design file as a reference.)

**Move, rotate and clip** the alignment where approximately 3 of the clipped border sheets fit on the one 01\_Index\_Layout\_Sheet cell. Repeat attaching the \*cogo.dgn for subsequent layout sheets as necessary to fit the entire length of the project onto sheets at 150:1 scale.

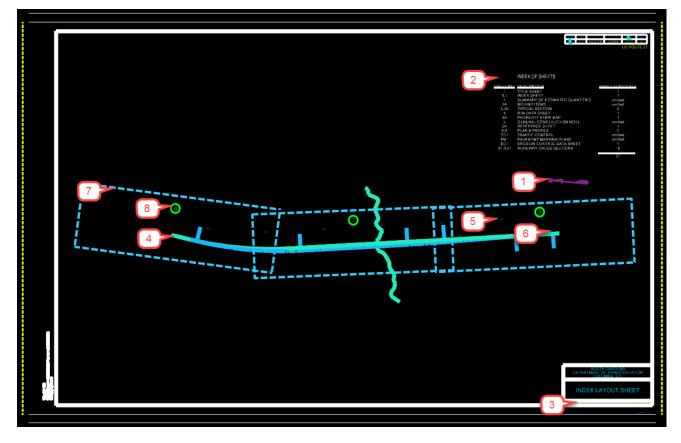
**Turn on/off** levels in the referenced \*cogo.dgn to properly show the following items on the Index Layout sheets:

- 1. North Arrow in upper right corner
- 2. Index of Sheets in upper right corner



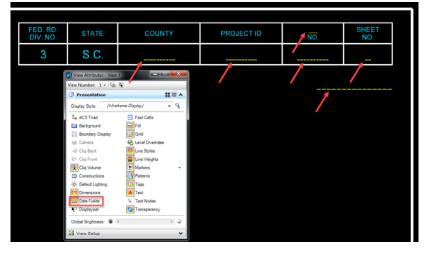
- 3. Scale in lower right corner
- 4. Existing and Proposed Alignments for both mainline and side roads including stationing
- 5. 500' Stationing
- 6. Road Names, Creeks and Outfall Ditches labeled
- 7. Border Sheet Outlines
- 8. Plan Sheet Numbers

Note: If the \*pp.dgn file was attached, you will need to manually draw the clipped border sheet shapes for the layout file.



Data Fields have been setup in the cell to ensure fonts choice, font sizes, levels, and justification are predefined for each Index Layout sheet.

To utilize, zoom into the upper right corner to complete the title block information. If you do not see the "Data Fields", select Settings > View Attributes and turn on "Data Fields".





If you are utilizing the reference border sheet, you will need to set the following attributes:

Level: RD\_SHT\_TX Weight: By Level (3) Font: Arial

- County, Project ID, Road No., Sheet No. use font size: 5 x Scale Multiple (5 x 3 for 150' scale = 15), Justification: Center Center
- Road/Route No. use font size: 3 x Scale Multiple, Center Center Justification
- Road Name use font size:: 8 x Scale Multiple, Right Top Justification

Press the "Edit Text" button to edit each of the data fields with the appropriate title block information.



Repeat for additional sheets or pipe the title block information by selecting the text, selecting the copy command, then enter dx=0,x|y where x is the distance you want to move it and y is how many times to copy it.



Enter the Scale and RPG/Initials in the lower right Sheet Block information. Repeat as necessary for additional sheets.

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION COLUMBIA, S.C.
INDEX LAYOUT SHEET
SCALE 1" = 150' RPG 1 - SSS

To **scale the text** to a legible size when plotted, use the same multiple as used for the 01\_Index\_Layout\_Sheet cell. In this example, you will need a minimum font size of 15. Larger fonts can be utilized to distinguish notes and labels.

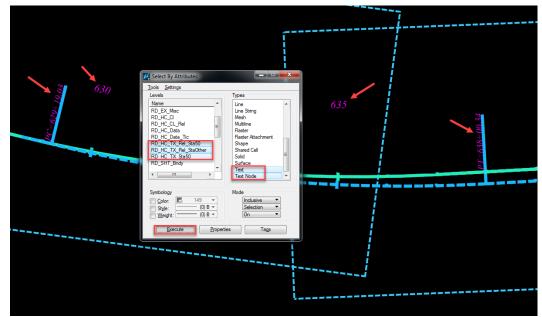
Text Height = 15 (normally sized 5 x 3 to scale) Text Width = 15 (normally sized 5 x 3 to scale)

### SCDOT ROADWAY CADD MANUAL

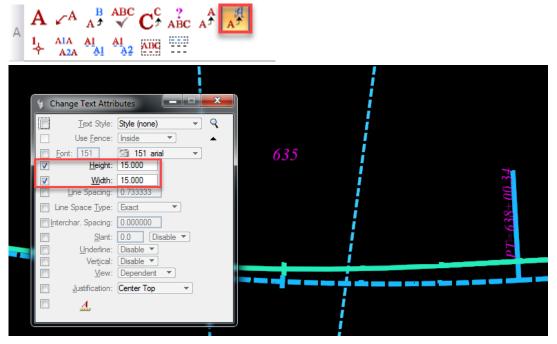


Scale	Border Cell X & Y	Alignment Length	<b>Minimum Font Size</b>
50:1	1.00	1500 ft stationing	5
100:1	2.00	3000 ft stationing	10
150:1	3.00	4500 ft stationing	15
200:1	4.00	6000 ft stationing	20
400:1	8.00	12000 ft stationing	40

Use the Edit > Select By Attributes tool to select text on each of the levels.

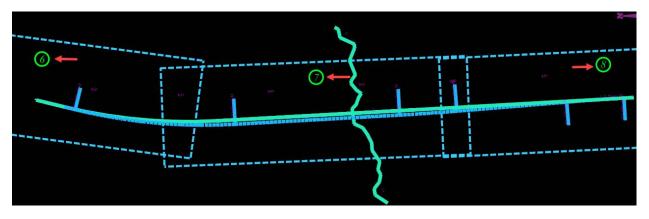


Select the **Change Text Attributes** tool and check on Height and Width. Enter the Font Size and data click to accept the changes to the fonts. Realign and shift text as necessary to "clean up" and make the plan sheet as legible as possible. Repeat these steps for the other text levels and font sizes.





Label each clipped border sheet with the appropriate plan sheet number.



Select **File > Save Settings** to ensure all of the levels which are turned on/off are properly saved to the view for plotting.











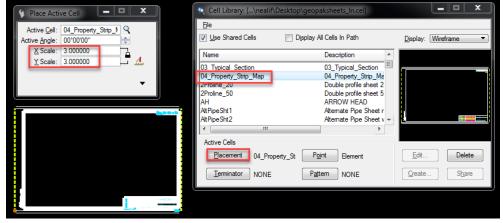
# Property Strip Map/Property Closure Sheets

Create a new design file using the **\*pc.dgn** naming convention. Determine the scale for the Property Strip Map sheets by length of alignment to depict and also the corridor width for the properties.

Scale	Border Cell X & Y	Alignment Length	<b>Minimum Font Size</b>
50:1	1.00	1500 ft stationing	5
100:1	2.00	3000 ft stationing	10
150:1	3.00	4500 ft stationing	15
200:1	4.00	6000 ft stationing	20
400:1	8.00	12000 ft stationing	40

A 150:1 will fit approximately 4500 lf of the alignment. The following example will demonstrate a 150:1 Property Strip Map Sheet.

Open the geopaksheets\_In.cel cell library and select the 04\_Property\_Strip\_Map cell. Adjust the cell scale to 3.00 for both the height and width (3 x 50 = 150). Place the cell additional times for the number of plan sheets you are including in the layout.



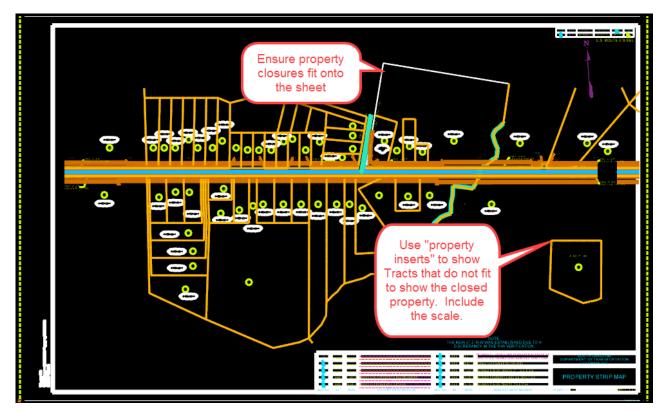
Attach the \*pp.dgn design file as a reference. Ensure Live Nesting is turned on and set to a depth of 2 to include the \*prop.dgn file attached.

🗈 Refe	erences (10 of 10 unique, 5 displayed)								
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8	r37272pp.dgn	Default	Global Origin aligne Ref-5	Coincident - World	Wireframe	$\checkmark$	√ 、	1	
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**Move, rotate and clip** the reference file to fit as much of the alignment as possible onto the border sheet. Ensure that the **"closed" shapes** of the property are included. Any properties that are "cut off" and do not fit may require the sheet to be created at a different scale, example 400:1. The use of "property inserts", with included scale, is also recommended to accomplish showing all of the property closures.



**Repeat** attaching the \*pp.dgn for subsequent layout sheets as necessary to fit the entire length of the project onto sheets at 150:1 scale.



**Turn on/off** levels in the referenced \*pp file to properly show the following items on the Property Strip Map sheets:

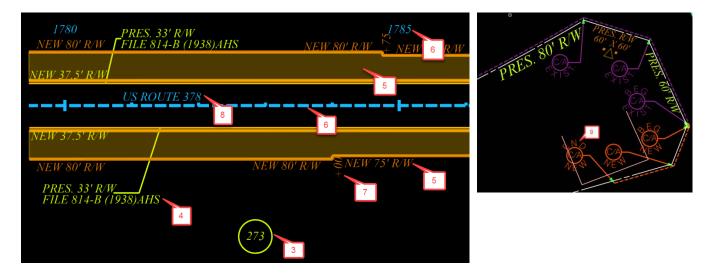
- 1. North Arrow in upper right corner
- 2. Scale in lower right corner
- 3. Tract Numbers
- 4. All Present Right of Way information and lines labeled
- 5. All New Right of Way information and lines labeled (including shading of areas)
- 6. Existing and proposed horizontal alignments for mainline and side roads including stationing

- 7. Stations and offsets where the Right of Way breaks
- 8. Road Names, Creeks and Outfall Ditches labeled
- 9. Any breaks in the Control Access or Limited Access Line



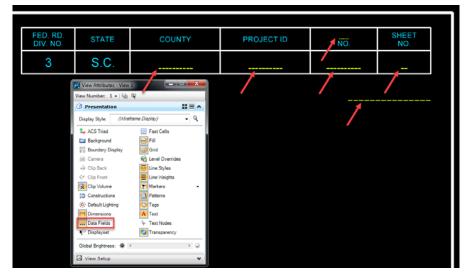






Data Fields have been setup in the cell to ensure fonts choice, font sizes, levels, and justification are predefined for each Property Strip Map sheet.

To utilize, zoom into the upper right corner to complete the title block information. If you do not see the "Data Fields", select Settings > View Attributes and turn on "Data Fields".



If you are utilizing the reference border sheet, you will need to set the following attributes:

Level: RD\_SHT\_TX Weight: By Level (3) Font: Arial

- County, Project ID, Road No., Sheet No. use font size: 5 x Scale Multiple (5 x 3 for 150' scale = 15), Justification: Center Center
- Road/Route No. use font size: 3 x Scale Multiple, Center Center Justification
- Road Name use font size:: 8 x Scale Multiple, Right Top Justification



Press the "Edit Text" button to edit each of the data fields with the appropriate title block information.



FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.	
3	S.C.	FLORENCE	P037272	US 378	4D	
			U.S. RO	UTE 378	8 REL	

Repeat for additional sheets or pipe the title block information by selecting the text, selecting the copy command, then enter dx=0,x|y where x is the distance you want to move it and y is how many times to copy it.

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.	🚟 Key-in
3	S.C.	FLORENCE	P037272	US 378	4D	dx=0,1150 6
			U.S. RO	UTE 37	8 REL	

Enter the Scale and RPG/Initials in the lower right Sheet Block information. Repeat as necessary for additional sheets.



For revisions, utlize the data fields to input the Designer's initials, date of revision, and a brief description of the revision. Press Enter to wrap the text for two lines of revision notes.

5	AHS	08-21-14	REVISED PL, OBTAIN AND REMAINDER ACREAGE ON TRACTS 334, 336 AND 336A. REMOVED TRACT 334A.
4	AHS	04-07-14	ADDED SUPPLEMENTAL OBTAINS
3	AHS	01-23-14	REVISED R/W ON TRACTS 311, 333, & 336
2	AHS	02-28-13	REVISED PROPERTY LINES ON TRACT 352
1	AHS	03-15-12	REVISED R/W ON TRACTS 374 & 374A
REV. NO.	BY	DATE	DESCRIPTION OF REVISION

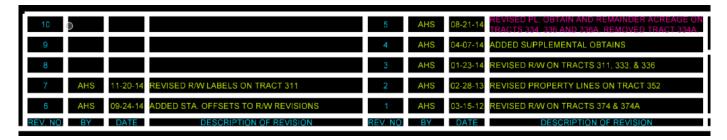
If you are utilizing the reference border sheet, you will need to set the following attributes:

Level: RD\_SHT\_TX Weight: By Level (3) Font: Arial Font size: 9 x Scale Multiple (9 x 3 for 150' scale = 18)



For additional revision blocks, utilize the "Revision\_Box\_6-10 or 11-15" cells from the RoadV8.cel library. Snap in the lower right corner to align with the current revision block. Continue along the bottom of the Property Strip Map Sheet as necessary.

🎄 Cell Library: [\SCDOT_Design\MSfile	es\Cell\RoadV8.cel]				_ 🗆 🗙
<u>F</u> ile					
Use Shared Cells Display A	ll Cells In Path				Display: Wireframe
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RARRW	RIGHT TURN ARROW	Grph			
RARRW2	RIGHT TURN ARROW	Grph			
RelCLMarker	Proposed Relocation CL	Grph			
Revision_Box_1-5	Revision_Box_1-5	Grph			
Revision Box 11-15	Revision_Box_11-15	Grph		_	
Revision_Box_6-10	Revision_Box_6-10	Grph			
RRB	RR SIGNAL BOX	Grph		-	
·			F.		
Active Cells					
Placement Revision_Box_6-10	Point Element				Edit Delete
Terminator NONE	Pattem NONE				Create Share



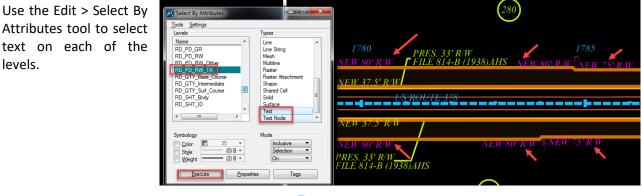
To scale the text to a legible size when plotted, use the same multiple as used for the Property\_Strip\_Map cell. In this example, you will need a minimum font size of 15. Larger fonts can be utilized to distinguish notes and labels.

Text Height = 15 (normally sized 5 x 3 to scale)

Text Width = 15 (normally sized 5 x 3 to scale)

levels.

Scale	Border Cell X & Y	Alignment Length	Minimum Font Size
50:1	1.00	1500 ft stationing	5
100:1	2.00	3000 ft stationing	10
150:1	3.00	4500 ft stationing	15
200:1	4.00	6000 ft stationing	20
400:1	8.00	12000 ft stationing	40





Select the **Change Text Attributes** tool and check on Height and Width. Enter the Font Size and data click to accept the changes to the fonts. Realign and shift text as necessary to "clean up" and make the plan sheet as legible as possible. Repeat these steps for the other text levels and font sizes.

$A \xrightarrow{A} A \xrightarrow{A} A^{A} \xrightarrow{B} A^{A} \xrightarrow{A} A^{A} A^{A} \xrightarrow{A} A^{A} A^{A} \xrightarrow{A} A^{A} A^{A} \xrightarrow{A} A^{A} \xrightarrow{A} A^{A} \xrightarrow{A} A^{A} \xrightarrow{A} A^{A} A^{A} \xrightarrow{A} A^{A$	$\stackrel{ABC}{\checkmark} C^{C}_{?} \stackrel{?}{_{ABC}} ABC A$			
V       Use Fence:         Font:       151         V       Height:         V       Width:         Line Space:       Interchar. Spacing:         Interchar. Spacing:       Slant:         Underline:       Vertical:         Vertical:       Vertical:	Style (none)         •         •           Inside         •         •           151 anal         •           15.00         •	1780 NEW 80' R/W NEW 37.5' R/W NEW 37.5' R/W NEW 37.5' R/W PRES. 33' R/W FILE 814-B (193	Shift text as needed to make the plans "legible" S ROUTE 378 NEW 8)AHS	1785 NEW 80' R/W +NEW 75' V 80' R/W \$NEW 75' R/W +

Set the Symbology at the top of MicroStation to the following level "RD\_PD\_RW\_Dither".



Select the Place Shape tool and trace the New R/W areas to be shaded on the Property Strip Maps. Repeat for each New R/W area.

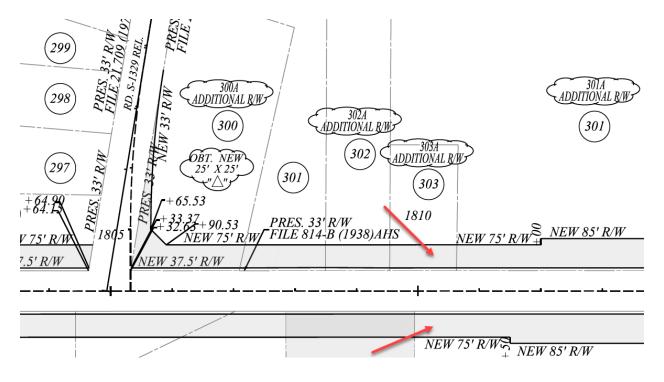


In Iplot, attach the "Property\_Strip\_Map.pen" pen table to dither the areas drawn in the above image.

🥖 IPLOT - Select Plo	otting Files	MIPLOT - Select	Design Script - \\nts\hq\CaddStandards\SCDOT-B	entley\Site\Iplot\Pen_Ta	ables
Color Table:	Program Files\Common Files\InterPlot\IPLOT\misc\bw.ctb	Look in:	Pen_Tables -	G 🤌 📂 🛄 -	
	dot-bentley\site\iplot\pen_tables\property_strip_maps.pen	( Ho	Name	Date modified	Туре
MS Pen Table:	NONE	3	Property_Strip_Maps.pen	4/4/2017 10:47 AM	PEN File
Rendering Attributes:	NONE	Recent Places	id_TDS700_XS_FG2.pen	2/24/2017 4:43 PM	PEN File
Property Filter (PDF o	only)		id_TDS700_XS_FG2s.pen	2/24/2017 12:09 PM	PEN File
None			id_TDS700 with existing in gray.pen	1/6/2017 2:02 PM	PEN File
Publish all propert	ties	Desktop	id_TDS700 existing.pen	1/4/2017 3:59 PM	PEN File
File name			id_TDS700_xs_sheet.pen	11/17/2016 3:11 PM	PEN File
			id_PW500.pen	9/26/2016 1:27 PM	PEN File

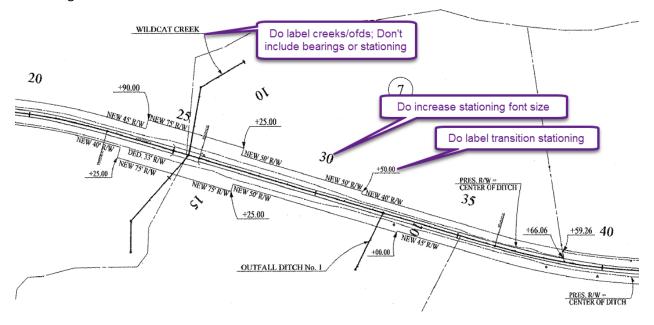


The New R/W Areas will be "dithered" or transparent as shown below in the pdf or plotted plan sheet.



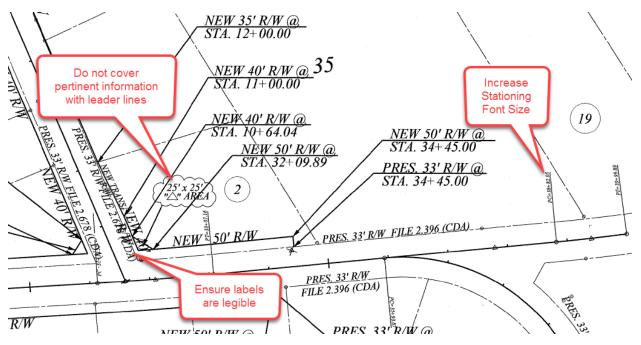
# Do's and Don'ts for Property Strip Maps

Example 1: Do label creeks and outfall ditches with the proper names. Do not include bearings or stationing on creeks or outfall ditches. Do increase stationing font size and do label transition stationing.

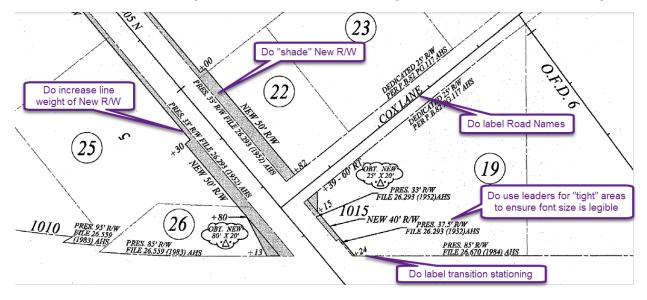




Example 2: Do not cover pertinent information with leader lines. Ensure all present and new right of way levels are legible. Do increase stationing font text size.

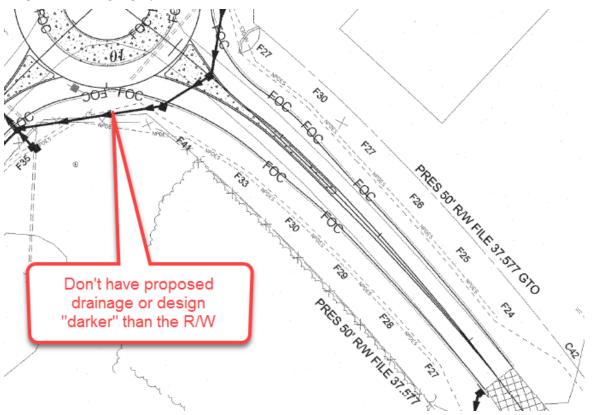


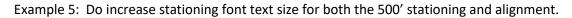
Example 3: Do increase the line weight of the New R/W. Do "shade" the New R/W areas. Do label Road Names. Do use leaders for "tight" areas to ensure font size is legible. Do label transition stationing.



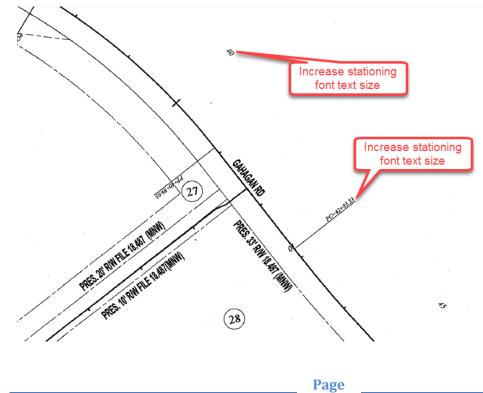


Example 4: Contrary to what the HDM specifies, most groups do not to include existing or proposed design or drainage on Property Strip Map sheets. If it is requested to be shown, do not have proposed or design information "darker" than the R/W information, use pen tables to ensure it is "dithered" to a weight of 1 and light grey in color.



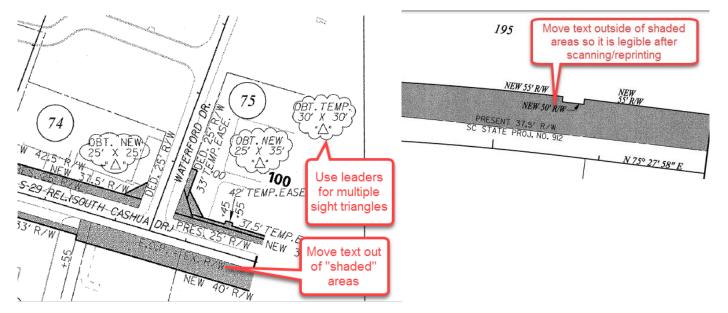


**310** 

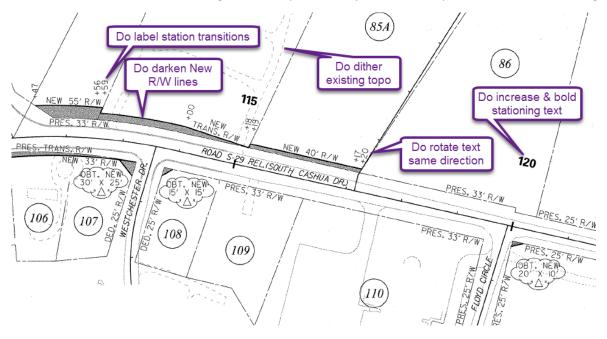




Example 6: Do use leaders for multiple sight triangles notes or to provide clarity for what the note is for. Do use True Type fonts or move text out of shaded areas for increased legibility.

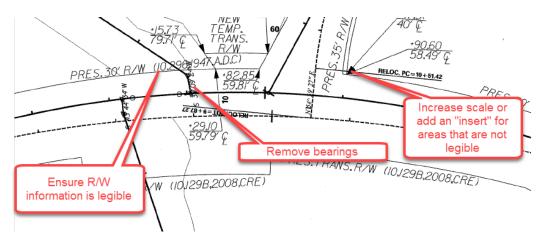


Example 7: Do label station transitions. Do darken New R/W lines. Do rotate text the same direction and do increase and bold stationing text. If required (see previous example), do dither the existing topo.

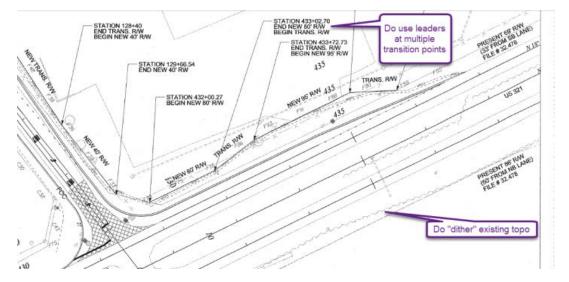




Example 8: Do relocate right of way text to split text with lines thru in the spaces. Do not show bearings on creeks or outfall ditches. Do increase the scale or add an insert for areas that are not legible.



Example 9: Do use leaders at multiple transistion points. Do "dither" existing topo if required to include on Property Strip Map sheets by your supervisor.

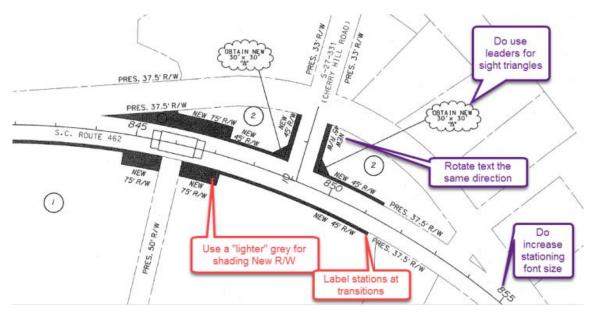


Example 10: Do add revision blocks to the left. (Use the new cells in the RoadV8.cel library). Do remember to renumber the additional revisions where needed.

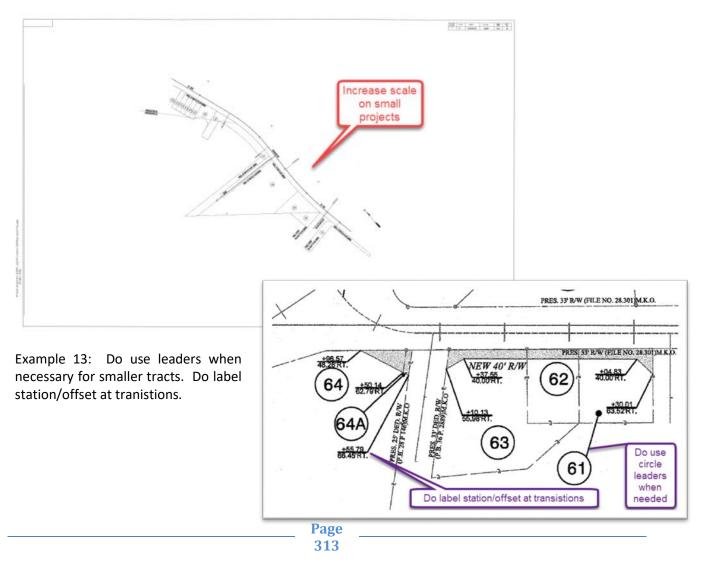
						1 1		
	4	BDH	9/4/15	Revised OFD R/W Tract74 Left Sta. 373+75	4			
	3	BDH	9/4/15	Revised R/W Labels Deanna & Jessen Lns. Right Sta. 352+66 & Sta. 355+77	3			
	2	4		vised New R/W Tract 76	2	MFS	2/9/16	
		1	numbei ion No.	moved New R/W Tract 67	1	BDH	1/11/16	Added IL left Sta. 378+50 Revised New R/W - Tracts 80 & 83
RE	V. NO.	Itevis	ion no.	Description of Revision	REV. NO.	BY	DATE	DESCRIPTION OF REVISION
	4	BDH	4/3/15	Revised Tract 54 Boundary Removed Tract 58	4	BDr	UDI /IE	Added SCE&G Easement on left
	3	BDH	4/3/15	Removed Tract 56 Revised Tracts 55 & 57 Boundary	3	BDł	Do add re	evision blocks to the left
	2	BDH	4/3/15	Revised New 55.5' R/W Tract 68	2	BDI		
	ł	BDH	4/3/15	Removed New 55.5' R/W Tract 59 Revised Triangle Area Tract 59	I	BDH	11/19/14	Revised New R/W Tract 74 Left Sta. 374.00
RE	V. NO.	BY	DATE	DESCRIPTION OF REVISION	REV. NO.	BY	DATE	DESCRIPTION OF REVISION



Example 11: Do user leaders for sight triangles. Do rotate text the same direction. Do increase stationing font size. Do label stations at transitions. Do use a "lighter" grey for shading New R/W areas.

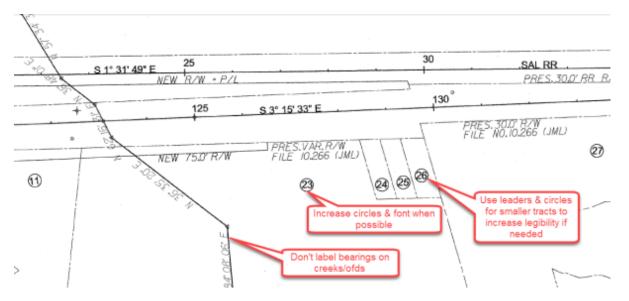


Example 12: Do increase the scale on small projects so the property strip map is legible.

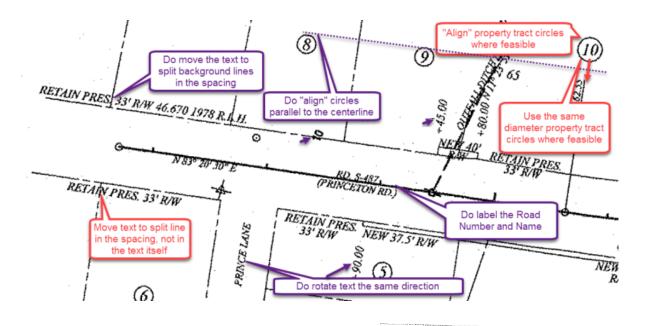




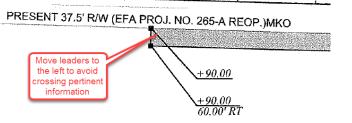
Example 14: Do increase the circles and fonts on property tracts when possible. Do use leaders and circles for smaller tracts to increase legibility if needed. Do not label bearings on creeks and outfall ditches.



Example 15: Do move the text to splic background lines in the spacing of the text. Do align the circles parallel to the centerline. Do use the same diameter property tract circles where feasible. Do label the Road Number and Name. Do rotate the text the same direction.

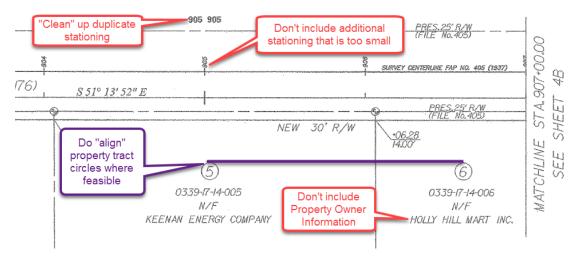


Example 16: Do move leaders to the left to avoid crossing pertinent information.





Example 17: Do clean up duplicate stationing. Do not include additional stationing that is too small. Do align property tract circles where feasible. Do not include the property owner information.



Example 18: Do not stack revision boxes, but run them along the bottom of the sheet. This will keep the boxes from conflicting with the strip map details.

1	/				1	
	/	10	J.D.B.	1/19/16	ADDED TEMPORARY EASEMENT TR. 75	
	Stack revision	9	K.E.M.	11/04/15	TEMPORARY EASEMENT TR. 75 REMOVED TRACT 165 CHANGED TO DED. R/W CHANGED EXIST. R/W	
		8	J.D.B.	11/12/14	CHANGED EXIST. R/W ADDED TR. 165, 61A & 62A	
	boxes to the left, /	7	J.D.B.	10/08/14	CHG. EX. R/W TR. 58,94,99,100	
	along the bottom	6	J.D.B.	10/01/14	ADDED NEW R/W TR, 96	
1		5	J.D.B.	7/19/14	CHG. NEW R/W AND TRACT TR. 56,57	
. [		4	J.D.B.	7/17/14	REVISED TRACT / CHANGED NEW RW TR. 97, 98, 99, 100 SUBDVD. TR. 73, ADD TR. 73A&73B	SOUTH CAROLINA
		3	J.D.B.	//01/14	CHANGED NEW R/W TR. 73,73A,73B	DEPARTMENT OF TRANSPORTATION
. 1		2	J.D.B.	7/01/14	CHANGED NEW R/W TR. 57,58,59,74 97, 94,99,100 SUBDIVIDED TR. 42, ADDED TR. 42A	COLUMBIA, S.C.
		Ì	J.D.B.	7/01/14	SUBDIVIDED TR. 42, ADDED TR. 42A CHANGED NEW R/W TR. 41, 42 & 42A	
	· · · · · · · · · · · · · · · · · · ·	REV. NO.	BY	DATE	DESCRIPTION OF REVISION	PROPERTY STRIP MAP
		TOPO.	DATE			FROFER IT STRIF WAF
		DGN.	DATE		RPG 2 - GSR	
		R/W	DATE			SCALE I'=100' RTE. S-29

### **Right of Way Obtains**

Open the \*pp.dgn file and turn off all levels but the following:

- a) RD\_EX\_DV\_Prop
- b) RD\_EX\_RW
- c) RD\_PD\_RW

Select the Measure Area tool and set the following options:

- a) Method Flood
- b) About Global Z
- c) Area Unit Square ft
- d) Perimeter Unit (Feet)
- e) Dynamic Area check on
- f) Max Gap 0.001

For each tract, data point to flood the closed shape of the tract.

📎 Measure A	rea 🗖 🗖 🗙
<u>M</u> ethod:	Flood
Tolerance (%):	1.000000 Mass Properties Display Centroid
<u>A</u> bout:	Global Z 🔹
Area <u>U</u> nit:	Square ft 🔹
Area:	55600.3158 Sq. ft
Perimeter Unit:	Feet 💌
Perimeter:	1037.582ft
	Locate Interior Shapes
Max <u>G</u> ap:	☑ Dynamic Area 0.001



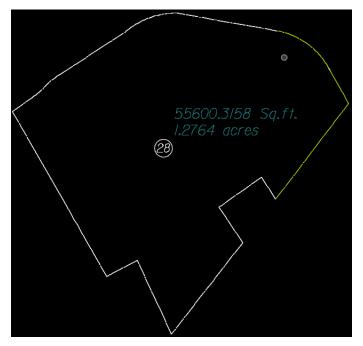
5

Measure Area



Make a note of the areas in both Square Feet and Acres. You can place text in the design file for future reference.

For obtain and remainder calculations, **ensure that the polygons are closed shapes** by checking every connection point. The slightest gap can cause differences in the calculations. A misrepresented value on a Right of Way obtain may cause several unintended consequences downstream. Please be very **conscientious** to your calculations and have a second person check these numbers behind you.



These numbers will be entered into the RWDS.xlsx Excel file to create the Right of Way Data Sheet.

### **Reference Data Sheet**

The Reference Data Sheet is a blank border sheet that allows the designer to paste the existing and relocated alignment information from Coordinate Geometry (COGO) and the curve data.

On older projects that have not received the new "Survey Control Data Sheet – 5A" in accordance with PCDM-08, the designer will also need to include this information in the reference data sheets. This would include the control points, bench marks, survey datum, combined scale factor, and property monuments (IP, PLC, RWM, etc.).

Place the 05\_Reference\_Data\_Sheet cell into the \*ref.dgn (Reference Data Sheet series).

🔆 Cell Library: [\MSfiles\Cell\geopak	(sheets_In.cel]			
<u>F</u> ile				
Use Shared Cells Display	All Cells In Path			Display: Wireframe
Name ^	Description	Туре		
01_Index_Layout_Sheet 03_Typical_Section 04_Property_Strip_Map 05_Drainage_Data_Sheet 05_General_Construction_Note 05_Reference_Data_Sheet 05_Staking_Plan_Sheet	01_Index_Layout_Sheet 03_Typical_Section 04_Property_Strip_Map 05_Drainage_Data_Sheet 05_General_Construction 05_Reference_Data_Sheet 05_Reference_Data_Stati 05_Staking_Plan_Sheet	Grph		
Active Cells     Placement     05_Reference_Data_S     Ierminator     NONE	her Point Element		•	Edt     Delete       Create     Share



Set the Level to "RD\_SHT\_TX" with a weight of 3. Select the "Place Text" and select the "Reference Points Style TT Font" Text Style.



Place Text		
	By Origin	
<u>H</u> eight:	<ul> <li>♀ Quitclaims Text</li> <li>♀ RD NAME</li> </ul>	*
	<ul> <li>Reference Points Style</li> <li>Reference Points Style TT Font</li> </ul>	
	☞ RW Data Style ☞ RW Data Style TT Font	

Open COGO and select Tools > Navigator. Highlight the **mainline** chain and press the "Print/Describe" icon to describe the alignment information into the COGO Window. If possible, go in order of the most important route/road (mainline) and then from left to right with the side roads.

🗸 Navigator(333)			x
Select Tools			
📉 🗙 🖪 id 📥 🗎	<sup>3</sup> 8		
Element : Chain	-		
Name	Feature	Description	
OFD1			
RAILROAD			
RRREL			
S1179			
S245			=
S245REL			
S522			
\$710			
S710REL			
SC72			
			Ŧ
۲ III ا		- F	

(Note: Both the existing and relocated alignments should be included in their entirety for the surveyors benefit during the project and years down the road when re-establishing right of way.)

Highlight the text in the COGO Window starting with the "Beginning chain \*\*\*\* description" and ending with the "Ending chain \*\*\*\* description". Right click to select **Copy**.

Point 400		N 1,121,	771.584	450 E	1,999,601.7	4880 S	ta 10+00.00
Course from	400	to PC S7100FFRE	L-1 S S	51° 1	Select All	t 30	6.24302
			Cur	rve	Select None		
			*		Invert Selection	1	
Curve S7100					Сору		
P.I. Stati		15+46.				в	2,000,027.8542
Delta -		6° 06' 27.8		)	Print		
		1° 16' 23.6			Process		
		240.078					
Length		479.701					
Radius External		4,500.000					
		6.399					
Long Chora Mid. Ord.		479.474 6.390					
Mid. Urd. P.C. Stati		13+06.		1	101 570 0004	0 F	1,999,840.6043
P.C. Stati P.T. Stati		17+85.					2,000,230.0275
C.C.	on	1/105.	94 N N				2,000,230.0275
	- 9	51° 15' 22.99"		1	,123,085.7203	0 5	2,002,030.0007
		57° 21' 50.88"					
		54° 18' 36.94"					
Course from	PT S	7100FFREL-1 to	401 S S	57°2	1' 50.88" E D	ist 80	.62918
Point 401		N 1,121,	256.720	002 E	2,000,297.9	2661 S	ta 18+66.57





Paste this information into the "Place Text" command.

🥂 Text Editor - Word Processor	r
Tr Times New F ▼ B	$I  \underline{U}  \overset{ABC}{\checkmark}  A^{\frac{1}{2}}  \overrightarrow{u}  152  \overrightarrow{s}  \overrightarrow{f(x)}  \underline{u}^{2}  \underline{u}_{2}$
Cut_	• • • • • • • • • • • • • • • • • • • •
Beg Copy Paste	REL description
<u>D</u> elete	
Poi Select <u>Al</u> l Cl <u>e</u> ar	1,121,771.58450 E 1,999,601.74880 Sta 10+00.00
Cot Change Case ► Insert Enter Data Field Insert Field	C S710OFFREL-1 S 51° 15' 22.99" E Dist 306.24302 Curve Data **
Curve S710OFFREL	-1
	5+46.32 N 1,121,429.67681 E 2,000,027.85425 5' 27.89" (LT)
Degree = 1°1	
0	240.07806
Length = 42	79.70134
•	

Delete a few of the "=" marks until it aligns with the edges of the alignment text to clean up the text.

Beginning cha	ain S710REL description	
Point 400	N 1,121,771.58450 E 1,999,601.74880 Sta	10+00.00
Course from 4	000 to PC S710OFFREL-1 S 51° 15' 22.99" E Dist	306.24302

Place the text beginning in the upper left corner of the reference data sheet, approximately 50 units to the right and 100 units down.

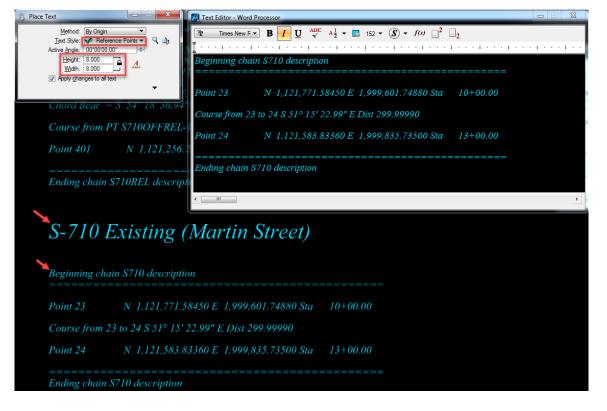
X	50.000 Y -100.000
	9
	Beginning chain S710REL description
	Point 400 N 1,121,771.58450 E 1,999,601.74880 Sta 10+00.00
	Course from 400 to PC S7100FFREL-1 S 51° 15' 22.99" E Dist 306.24302
	Curve Data



Modify the text size to 16.0 and enter the alignment name as a header. Place the text approximately 50 units above the COGO data.

Place Text		Text Editor - Word Processor
Method: By Origin Text Style: Reference Active Angle: 00°00'00.00° Height: 16.000 Width: 16.000 V Apply ghanges to all text V		$ \underline{ \text{Times New F } } \mathbf{B} \mathbf{I} \underline{ U} \overset{\text{ABC}}{\checkmark} \mathbf{A}_{2}^{1} \mathbf{V} \underline{ S} \mathbf{v} \mathbf{S} \mathbf{v} \mathbf{f} \mathbf{v} \underline{ C}^{2} \underline{ c}_{2} $
		ORelocation (Martin Street)
	====== Point 400 Course fro	N 1,121,771.58450 E 1,999,601.74880 Sta 10+00.00 m 400 to PC S7100FFREL-1 S 51° 15' 22.99" E Dist 306.24302

Repeat the process for each alignment on the project maintaining adequate spacing for legibility and ease of locating the pertinent information. Use additional reference data border sheets as necessary.

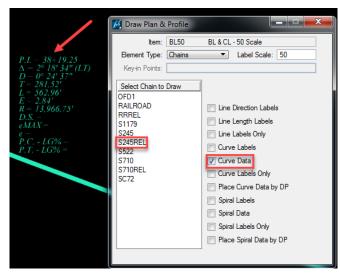


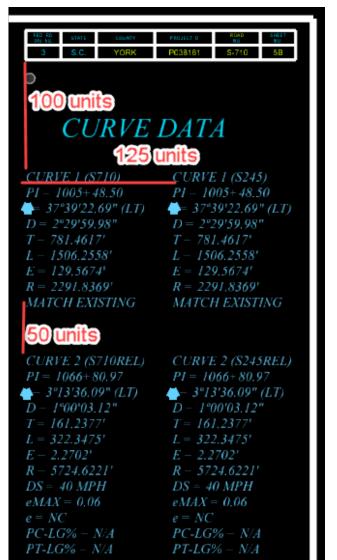


Use a recommended distance of 450 units between each column. This will leave enough room for two columns of curve tables on the far right.

S-710 Relocation (Martin Street)	Railroad Relocation	S-245 Relocation (George Street)	
$\label{eq:constraints} \begin{split} & \sum_{l=0}^{l} C_{l}r(r, b)a_{l} \\ C_{l}r(r, s) (2005) F(r, s) (2005) (200$	$\label{eq:constraint} \begin{array}{c} Constraint} Constraint} \\ Constraint} \\ Pf, London \\ Pf, London \\ Pf, Station \\ Pf, S$	Curren Maria Samana (2014) PJ Sunia (94,213, N. J.122,407,4431, E. J.908,100,77200 PJ Sunia (94,213,307,413) Party (94,213,307,413) Party (94,213,307,413) Party (94,213,307,413) Party (94,213,307,413) Party (94,213,317,413) Party (94,213,113,113,113,113,113,113,113,113,113	

For the curve data, use the D&C Manager to draw each alignment with the curve data. Copy and rotate the text as necessary. Use the space on the right of the reference alignment sheet to create two columns of curve tables, aligning the first with the title block left edge approximately 100 units down. The second column will be 125 units to the right of the first and a 50 unit spacing can be used between each curve data. If the project is large, create a new reference data sheet for the curve data tables. Edit the text to include the eMAX, e, PC-LG%, and PT-LG% as related to the project.





Criterrane



Press the "Edit Text" button to edit each of the data fields with the appropriate title block information.

$A \overset{A}{\downarrow} \overset{A}{\downarrow} \overset{A}{\downarrow} \overset{B}{\downarrow} \overset{ABC}{\downarrow} \overset{C}{\downarrow} \overset{C}{\downarrow} \overset{ABC}{ABC} \overset{A}{\downarrow} \overset{A}$	FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
★ A2A AI A2 (****)	3	S.C.	YORK	P038161	S-710	5B

Repeat for additional sheets or pipe the title block information by selecting the text, selecting the copy command, then enter dx=0,x|y where x is the distance you want to move it and y is how many times to copy it.

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.	🐨 Key-in
3	S.C.	YORK	P038161	S-710	5B	dx=0,1150 6

The final Reference Data Sheet will look similar to this. (For smaller projects, **AVOID** blowing up the text greater than a size 8.0 for text and 16.0 for headers. Align information on the right of the sheet for smaller projects and leave the left area blank.)

			RN2         AND         GALEY         PALACE         MAD         MA	
S-710 Relocation (Martin Street)	Railroad Relocation	S-245 Relocation (George Street)		
Beginning chain S710REL description	Beginning chain RRREL description	Beginning chain S245REL description	CURVE DATA	
hubu 40         N 1,121,771,54450 E 1,999,601,74840 Su         10-00.00           Currue from 400 to PC ST100FFEL21 S 11*15*22.99* E Duti 366,24802         Surve ST100FFEL1         Surve ST100FFEL1           Currue ST100FFEL1         Surve ST100FFEL1         Surve ST100FFEL1         Surve ST100FFEL1           Currue ST100FFEL1         Surve ST10FE         Surve ST100FFEL1         Surve ST100FFEL1           Currue ST100FFEL1         Surve ST10FE         Surve ST100FFEL1         Surve ST100FFEL1           Currue ST10FFEL1 <td>Protect 00 N 1.121.804-02410 E 2.000.235.75248 Sta 10+00.00 Course-from 100 to FC &amp; ROFFICEREL1 N 75° 07' 09 09' W Dut 1.507.15946 Course ROFFICEREL1 D Status 27:013 (2012) 2013 (2012) 2013 (2012) 2013 Course ROFFICEREL1 D Status 27:013 (2012) 2013 (2012) 2014 D Course ROFFICEREL1 D Status 27:013 (2012) 2013 (2012) 2014 D Course ROFFICEREL1 D Status 27:013 (2012) 2014 Robins 21:013 (2013) 2014 D Course 21:013 (2013) 2014 D Course 21:013 (2013) 2014 (2014) 2014 D Course 21:013 (2014) (2014) 2014 D Cou</td> <td>Prime 305         N 1,122,449,54610 E 1,197,955 75590 Sun 34+37.73           Course from 305 to PC 54538-15 68*00*1.14* E Dut 100.00458         Course 5438-1           Curve 5-358-1         Discourse from 305 to PC 54538-15 68*00*1.14* E Dut 100.00458           Curve 5-358-1         Discourse from 305 to PC 54538-15 68*00*1.14* E Dut 100.00458           Depres         = 0*2         S438-15           Depres         = 0*2         S438-15           Depres         = 0*2         S438-15           Mail         = 1.315300         Biology           Balling         = 2.35836         Biology         = 2.35836           Mc Cours         = 2.35836         = 2.35836         = 1.31572355 fr = 2.002.25537147           Mc Cours         = 2.35826         = 0.35825 fr = 2.002.25537147         = 1.996,646.55121           Curve for start of the form 1.2555 fr = 2.002.25537147         = 0.002.25537147         = 0.002.25537147           Balling for the form 1.2555 fr = 2.002.25537147         = 0.002.25537147         = 0.002.25537147           Balling for the form 1.2555 fr = 2.002.25537147         = 0.002.25537147         = 0.002.25537147           Balling for the form 1.2555 fr = 2.002.25537147         = 0.002.25537147         = 0.002.25537147           Balling for the form 1.2555 fr = 2.002.25537147         = 0.002.25537147         = 0.002.25537147<td><math display="block">\begin{array}{c} C(HFF1 (STR)) \\ C(HFF1 (STR)) \\ FI = 103 + 859 \\ F</math></td></td>	Protect 00 N 1.121.804-02410 E 2.000.235.75248 Sta 10+00.00 Course-from 100 to FC & ROFFICEREL1 N 75° 07' 09 09' W Dut 1.507.15946 Course ROFFICEREL1 D Status 27:013 (2012) 2013 (2012) 2013 (2012) 2013 Course ROFFICEREL1 D Status 27:013 (2012) 2013 (2012) 2014 D Course ROFFICEREL1 D Status 27:013 (2012) 2013 (2012) 2014 D Course ROFFICEREL1 D Status 27:013 (2012) 2014 Robins 21:013 (2013) 2014 D Course 21:013 (2013) 2014 D Course 21:013 (2013) 2014 (2014) 2014 D Course 21:013 (2014) (2014) 2014 D Cou	Prime 305         N 1,122,449,54610 E 1,197,955 75590 Sun 34+37.73           Course from 305 to PC 54538-15 68*00*1.14* E Dut 100.00458         Course 5438-1           Curve 5-358-1         Discourse from 305 to PC 54538-15 68*00*1.14* E Dut 100.00458           Curve 5-358-1         Discourse from 305 to PC 54538-15 68*00*1.14* E Dut 100.00458           Depres         = 0*2         S438-15           Depres         = 0*2         S438-15           Depres         = 0*2         S438-15           Mail         = 1.315300         Biology           Balling         = 2.35836         Biology         = 2.35836           Mc Cours         = 2.35836         = 2.35836         = 1.31572355 fr = 2.002.25537147           Mc Cours         = 2.35826         = 0.35825 fr = 2.002.25537147         = 1.996,646.55121           Curve for start of the form 1.2555 fr = 2.002.25537147         = 0.002.25537147         = 0.002.25537147           Balling for the form 1.2555 fr = 2.002.25537147         = 0.002.25537147         = 0.002.25537147           Balling for the form 1.2555 fr = 2.002.25537147         = 0.002.25537147         = 0.002.25537147           Balling for the form 1.2555 fr = 2.002.25537147         = 0.002.25537147         = 0.002.25537147           Balling for the form 1.2555 fr = 2.002.25537147         = 0.002.25537147         = 0.002.25537147 <td><math display="block">\begin{array}{c} C(HFF1 (STR)) \\ C(HFF1 (STR)) \\ FI = 103 + 859 \\ F</math></td>	$\begin{array}{c} C(HFF1 (STR)) \\ C(HFF1 (STR)) \\ FI = 103 + 859 \\ F$	
2000 z usia ( 5 7 × 10 × 0.07 × 10 × 0.07 × 10 × 0.07 × 0.	Contra data 2 47 17 20 2007 m Contra from PT RR OFFICERET-10 101 N 68* 66* 41.14* 97 Dist 175.70152 Public 101 N 1.12248442188 E 1.997.945 22344 Sta 3+15.53 Ending chain RRREL description	Course from PT 5-2458-1 to PC 5-2458-2 5 70° 22' 15:03° E Dist 35231462 Course 5-2458-2 Course 5-2458-2 PJ. Stadom 5470 587 N 1.122.07725560 E 1.598.596.66070 Delai 7171 1271 1476 670	$ \begin{array}{llllllllllllllllllllllllllllllllllll$	
S-710 Existing (Martin Street)	S-245 Existing (George Street) Beginning chain 5245 description	Tungent - 52,97844 Langeb - 105,93007 Radius - 1.894,23680 External - 0.74021 Mol Ord 0.74644 P.C. Station - 44+53,00 N 1,122,095,01228 E 1,598,906,95412		
Puni 23 N 1.121.771.546.0 E 1.999.601.74880 Sta 10+00.00 Controe from 23 to 24 5 51* 15* 22.99* E Dia 299.99990 Puni 24 N 1.121.583.8380 E 1.999.835.75300 Sta 13+00.00 Ending chain 3710 description Railroad Existing	Point 5 N 1.122.449.44410 E 1.997,955.75399 Sin 34+37.73 Convertions 1 or C 25424.58 6% 0% 41.4* Data 100.08458 Converting 1 or C 25424.58 6% 0% 41.4* Data 100.08458 Converting 1 or C 25424.58 6% 1.998,589,77290 Data 1 or C 25424.59 (C) 1.998,598,77290 Data 1 or C 25424.59 (C)	IF Production         413 (303)         1112 (306) (317)         1120 (306) (317)           C.C.         YM         1120 (316) (48)         1,998,727 (336)           C.C.         Set (310) (17)         1120 (317) (317)           Construct         Set (470) (17)         1120 (317) (317)           Construct         Set (470) (17) (17)         1120 (317)		
Beginning chain RAILROAD description	Long Chord = 562,91766 Md. Ord = 2.83628 P.C. Station 35-37.75 N 1,122,412.36412 E 1,998,048.55121 P.T. Station 41+00.68 N 1,122,213.07757 E 1,998,75.01148 C.C. N 1,133,272.2545 E 2.203,255.39147	P.1. Station 51-06.96 N 1,121,844.44214 E 1,999,510.94933 Delta 15 <sup>5</sup> 65 <sup>9</sup> 8.69 <sup>o</sup> (R <sup>2</sup> ) Degree = 15 <sup>5</sup> 64 <sup>o</sup> 40.21 <sup>o</sup> Tamered = 53 <sup>2</sup> 21728		
Point 25 N 1.121.804.42430 E 2.000.258.79230 Sua 10+00.00 Course from 25 to 27 N 75* 07* 09.00* W Dist 799.99997 Point 27 N 1.122.009.87190 E 1.599,455.6320 Sua 18+00.00	Back = 5 68° 00° 41.14° E Ahcad = 5 70° 25' 15.03° E Chord Bear = 5 69° 15' 58.09° E Point 15 N 1.121.790.52560 E 1.999,639.53760 Sta 52+46.40	Longth = 105.74832 Radius = 350.0000 Esterval = 3.7003 Long Charl = 105.959 P.C. Saution = 59:15.74 N . 1,12,1,845.06405 E 1,999,461.89002 P.C. Saution = 51:55.49 N . 1,12,18,11.14642 E 1,999,552,45617		
Ending chain RAILROAD description	Ending chain \$245 description	C.C	SOUTH CAROLINA DEPARTMENT OF TRANSPORTATI COLUMBIA, S.C.	
		Ending chain S245REL description	REFERENCE DATA SHE	



# **Station Offset Sheet**

The Station Offset Sheet is a blank border sheet that allows the designer to paste the station and offset information created by running the SOR VBA in the D&C Manager. (See pages 83 to 89 for instructions to run the VBA application.)

Place the 05\_Reference\_Data\_StationOffset cell into the \*ref.dgn (Reference Data Sheet series).

Cell Library: [\MSfiles\Cell\geopaksheets_In.cel]						
File						
Use Shared Cells     Display All Cells In Path       Display:     Wireframe						
Name ^	Description	Туре 🔬 🔺				
01_Index_Layout_Sheet 03_Typical_Section 04_Property_Strip_Map 05_Drainage_Data_Sheet 05_General_Construction_Note 05_Reference_Data_Sheet 05_Reference_Data_StationOffset 05_Staking_Plan_Sheet <	05_Reference_Data_Sheet 05_Reference_Data_Stati 05_Staking_Plan_Sheet	01_Index_Layout_Sheet Grph 03_Typical_Section Grph 04_Property_Strip_Map Grph 05_Drainage_Data_Sheet Grph 05_General_Construction Grph 05_Reference_Data_Sheet Grph 05_Reference_Data_Stati Grph				
Active Cells     Edit     Delete       Placement     05_Reference_Data_Stati     Point     Element     Edit     Delete       Terminator     NONE     Pattern     NONE     Share						

Set the Level to "RD\_TX\_StaOff" with a weight of 2.

RD_TX_StaOff	200 🔻	- 0	2 🔹
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In the VBA, ensure the Table Symbology is set as follows and the the Rows per Column is set to 80. Highlight the first road and select "Place Table". Snap to the upper left "construction line" in the border sheet.

Text Drawing Attributes	— Table — XML Data File:
Level: RD_TX_StaOff	test.xml Q
Color: 🛃 ByLevel (200)	Chain Data:
Weight: ByLevel (2)	S710 LT         25 Points           S710_RT         40 Points           S710_DR         8 Points           S245 LT         45 Points
Font: timesi	S245_RT 152 Points S245_DR 19 Points RAILROAD LT 29 Points
TW: 8 9 8	Table Symbology:
OK Cancel	Table Rotation: 0
	Rows per Column: 80
	Export to Excel Place Table



Use a 25 unit spacing between each set of station offset text. Add headers using a font size of 16.0.

►	-S-710	► \$245 LEFT	<i>S-245</i>	► 	– CONTINUED)
Station-Offset	Description	Station-Offset	Description	Station-Offset	Description
10+7537.9	PROPERTY CORNER FOUND P.POLE SHRUB ROW	35+4457.4	WATER VALVE	38+4718.4	WATER METER
10 + 75 - 41.3	P.POLE	35+5674.8	WATER VALVE	38+6262.5	BUILDING
10+7543.2	SHRUB ROW	35+6551.5	SEWER MH	39+05-14.7	SEWER MH
10 + 77 - 33.0	PROPERTY CORNER FOUND	35 + 76 - 629	WATER VALVE	39+1726.0	WATER VALVE
10 + 83 - 51.0	SIGN	35 + 83 - 67.9	WATER VALVE	39+1819.1	GAS VALVE
10+8557.2	SHRUB ROW	35+8456.7	LIGHT POLE	39+2833.1	SHRUB ROW
10 + 89 - 40.5	GUY WIRE	35+8567.8	FIRE HYDRANT	39+2823.8	FIRE HYDRANT
10 + 92 - 47.1	SIGN	44+1621.6	P.POLE	39+3023.2	SHRUB ROW
11+1869.8	SHRUB ROW GUY WIRE SIGN CANOPY SHRUB ROW 48 GAS PUMP ISLAND GAS PUMP ISLAND CANOPY 48 GAS PUMP ISLAND LIGHT POLE FILL CAP FOR U/G TANK WALL SHRUB GUY WIRE P.POLE WALL PROPERTY CORNER FOUND PROPERTY CORNER FOUND	45+3120.8	LIGHT POLE	39+3219.6	PROPERTY CORN
11+2832.9	SHRUB ROW	46+5823.9	FIRE HYDRANT	39+3617.5	P.POLE
11+3374.9	48 GAS PUMP ISLAND	$48 \pm 07 - 32.6$	BUILDING	39+3718.5	SHRUB ROW
11+4270.1	GAS PUMP ISLAND	48+0773.2	BUILDING	39+4270.6	14 OAK TREE
11+4854.2	CANOPY	48+9332.3	BUILDING	39 + 5460.6	BUILDING
11+5465.4	48 GAS PUMP ISLAND	48+9472.8	SHED BUILDING	40+0120.1	WATER METER
11+7731.9	LIGHT POLE	48+9472.8	BUILDING	40+2560.5	RISBR BUILDING
11+8145.0	FILL CAP FOR U/G TANK	48+9548.3	LIGHT POLE	40+2560.5	BUILDING
11+8228.4	WALL	49+4544.4	BUILDING	40+3719.9	SHRUB ROW
11+8935.7	SHRUB	49+7830.8	SHRUB ROW	40+3738.3	SHRUB ROW
11+9738.1	GUY WIRE	49+8025.2	SHRUB ROW	40+7267.5	BUILDING
11+9932.1	P.POLE	49+8032.0	SIGN	40+8820.6	P.POLE
12 + 02 - 28.5	WALL	49+8125.9	SIGN	41+0321.8	WATER METER
12 + 10 - 27.8	PROPERTY CORNER FOUND	49+8531.7	SHRUB ROW	41+3468.0	BUILDING
			SHRUB ROW	41+6020.9	SHRUB ROW
12+8529.7	PROPERTY CORNER FOUND	49+8626.7	SHRUB ROW	41+7221.4	SHRUB ROW
5 units 12+8748.1	LIGHT POLE	49+9320.5	WATER METER	41+7964.1	BUILDING
~		50+2755.8	BUISBR BUILDING	42+0464.2	RISF BUILDING
S710 RIGHT		50+2755.8	BUILDING	42+0464.2	BUILDING
Station-Offset	LIGHT POLE Description	50+3123.7	LIGHT POLE FIRE HYDRANT BUILDING BUILDING BUILDING BUILDING LIGHT POLE BUILDING SHRUB ROW SHRUB br>FILL CAP FOR U/G TANK FILL CAP FOR U/G TANK LP P.POLE	42+1121.0	WATER METER
		50+8353.4	FILL CAP FOR U/G TANK	42+1141.2	LIGHT POLE
10 + 24 - 72.0	SEWER CLEANOUT GUY WIRE	50+9659.7	FILL CAP FOR U/G TANK	42+1138.3	SHRUB
		51 + 03 - 39.5	LP P.POLE	42+1326.3	SEWER CLEANO
10+338.9	WATER VALVE	51+4352.2	WATER MONITORING WELL	42+1513.9	SEWER MH

For text that is greater than 80 columns or runs over the edge of the border sheet, select the "Edit Text" command. Scroll down to the text that crosses the border line and highlight the rows of text and select **Ctrl + X** to cut the text from the column. Data click in the design file to accept. Select the next column of text and enter down one row. Select **Ctrl + V** to paste the rows from the previous column into the new column. Repeat these steps as necessary, moving the data around to complete the Station Offset Sheet.

	M Text Editor - Word Processor			
$\mathbf{A} \checkmark^{\mathbf{A}} \mathbf{A} \overset{\mathbf{B}}{\checkmark} \mathbf{C} \overset{\mathbf{A}}{\bullet} \overset{\mathbf{C}}{\bullet} \overset{\mathbf{C}}$	$\boxed{\begin{array}{c} \hline			
A 1 AIA AI Edit Text i i				
A2A Later Carl	S245 RIGHT			
M Text Editor - Word Processor	Station-Offset Description			
<b>3</b> 203 timesi <b>• B</b> $I \stackrel{\text{U}}{\checkmark} \stackrel{\text{ABC}}{\checkmark} A_2^1 • s 200 • (S) • f(x) = {}^2 = {}_2$				
<b>1</b>	42+83			
38+3063.1 FENCE	42+9124.6 Enter down and press			
38+3025.5 36 CHAINLINK FENCE	42+9232.4 Ctrl + V to paste			
38+3118.0 P.POLE	43+1126.3 1/2PIPE PROPERTY CORNER FOUND			
38+3124.1 4RBR PROPERTY CORNER FOUND	<i>43+1324.5 P.POLE</i>			
38+3462.2 BUILDING	43+2924.9 GUY WIRE			
38+4718.4 WATER METER	43+6345.1 36 OAK TREE			
38+6262.5 BUILDING				
39+0514.7 SEWER MH				
<i>39+1726.0 WATER VALVE</i> Ctrl + X to	cut			
39+1819.1 GAS VALVE				
39+2833.1 SHRUB ROW				
<i>39+2823.8 FIRE HYDRANT</i>				



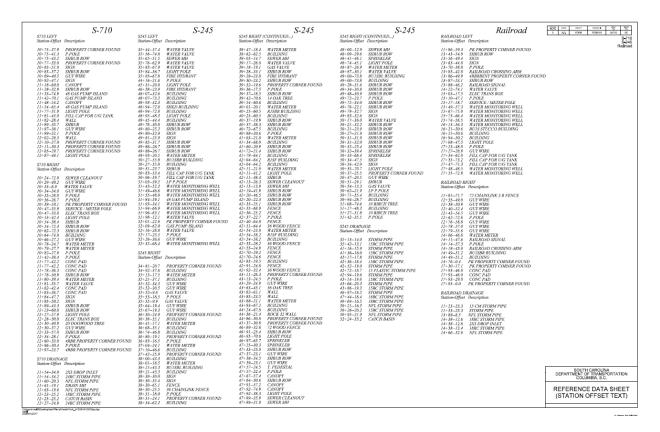
Press the "Edit Text" button to edit each of the data fields with the appropriate title block information.



Repeat for additional sheets or pipe the title block information by selecting the text, selecting the copy command, then enter dx=0,x|y where x is the distance you want to move it and y is how many times to copy it.

FED, RD, DIV, NO,	STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.	😁 Key-in
3	S.C.	YORK	P038161	S-710	5C	dx=0,1150 6
				R	S-710 S-245 ailroad	

The final Reference Data Sheet – Station Offset will look similar to this.





#### **Drainage Data Sheet**

The Drainage Data Sheet is a blank border sheet that allows the designer to paste the "spreadsheet" drainage information onto one or more reference data sheets in lieu of splitting the data based on stationing on the plan and profile sheets. This drainage summary sheet should be utilized when using "old school" pipe labels on the plan sheets. This will allow the additional information from the chart to be included in the plans for the contractor and construction, but will save the designer time from splitting the data across multiple sheets, especially if there are multiple revisions to the drainage design.

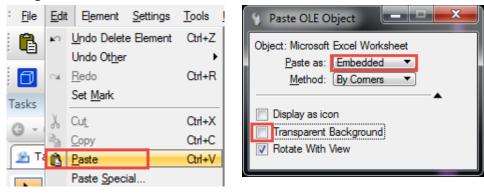
Place the 05\_Drainage\_Data\_Sheet cell into the \*ref.dgn (Reference Data Sheet series).

🔆 Cell Library: [\MSfiles\Cell\geopaks	heets_In.cel]		<b>— — X</b>	🐐 Place Active Cell 📃 💻 🗙
Eile				Active Cell: inage Data Sheet
🔲 Use Shared Cells 👘 Display A	Il Cells In Path		Display: Wireframe	Active Angle: 00°00'00.00"
Name ^	Description	Type <u>A</u> ^		X Scale: 1.000000 Y Scale: 1.000000
01_Index_Layout_Sheet 03_Typical_Section 104_Pronetry_Srin_Man 105_Deninage_Data_Sheet 105_General_Construction_Note 06_Reference_Data_Sheet 05_Reference_Data_StationOffset 05_Staking_Plan_Sheet	01_Index_Layout_Sheet 03_Typical_Section 04_Property_Strip_Map 05_Drainage_Data_Sheet 05_General_Construction 05_Reference_Data_Sheet 05_Reference_Data_Stati 05_Staking_Plan_Sheet			Jula Scale     Relative     Mirror: Horizontal ▼     Interactive Scale and Rotate ▼     Battern Top ▼     Scale Multime Offsets
Active Cells           Placement         05_Drainage_Data_Shere           Terminator         NONE	et Pgint Element		Edt     Delete       Qreate     Share	Scale Multime Crises Scale Dimension Values Scale Annotations Association

In the Excel file, copy the rows and columns of drainage data, including the header information.

	DZ	Arial	*  8 *  A <sup>-</sup> A <sup>*</sup> \$ * %	6 ·	a÷							
A	В	B	I 🔳 🕭 - A - 🖂 - 🐝	.00	G	Н		J	K	L	M	N
1	· · · · · ·	B	I 🔳 🕭 - 🗛 - 🔛 - 🐝	÷.0 🍼								
2				7							Smooth	1
2	x	8	Cut				U	pstream			Dov	vnstream
4	System ID	Ea	⊆opy	ength	Slope	Node	Node	Node	Link Invert	Node	Node	Node
5	×			;)	(%)		Description	Station	(ft)		Description	Station
6	300	1	Paste Options:	EP :	0.16	EX-300	DUMMY JOINT	1010+48.69	32.57	EX-301	D.I. TYPE 112	1010+08.00
7	300			EP .	0.19	EX-301	D.I. TYPE 112	1010+08.00	32.42	OP-302	OP	1009+61.66
8	400			EP	0.29	DN-400	DUMMY JOINT	1023+82.97	29.81	EX-400	D.I. TYPE 112	1024+07.55
9	400		Paste <u>Special</u>	EP :	0.53	EX-400	D.I. TYPE 112	1024+07.55	29.59	OP-402	OP	1024+32.03
10	100		Turnet	.12	0.17	CB-100	C.B. TYPE 1	1016+66.63	34.16	CB-101	C.B. TYPE 1	1018+16.75
11	100		Insert	.70	0.53	CB-101	C.B. TYPE 1	1018+16.75	33.92	CB-102	C.B. TYPE 1	1019+69.47
12	100		Delete	00	0.62	CB-102	C.B. TYPE 1	1019+69.47	33.13	DI-103	D.I. TYPE 112	1020+00.00
13	100		Clear Contents	.26	0.22	DI-103	D.I. TYPE 112	1020+00.00	32.85	OP-104	OP	1021+00.00
14	200		clear co <u>n</u> tents	46	0.13	DN-200	DUMMY JOINT	3+37.86	33.80	DI-201	D.I. 24"X36"	2+84.93
15	200		Filter 🕨	99	0.30	DI-201	D.I. 24"X36"	2+84.93	33.73	OP-202	OP	2+84.23
16	200		-	80	0.19	DI-210	D.I. 24"X36"	2+19.23	33.80	DI-201	D.I. 24"X36"	2+84.93
17	500		S <u>o</u> rt ►	00	DRIVE	DRIVE	DRIVE	1065+02.34	DRIVE	DRIVE	DRIVE	1064+36.34
18	500		Insert Comment	00	DRIVE	DRIVE	DRIVE	1066+61.55	DRIVE	DRIVE	DRIVE	1066+24.75
19	500		insere co <u>m</u> mente	00	DRIVE	DRIVE	DRIVE	1067+22.40	DRIVE	DRIVE	DRIVE	1066+74.67
20	500		Format Cells	00	DRIVE	DRIVE	DRIVE	1067+80.97	DRIVE	DRIVE	DRIVE	1067+54.80
21	500		- Biele Franz Danas darren Lint	00	DRIVE	DRIVE	DRIVE	1068+48.57	DRIVE	DRIVE	DRIVE	1068+24.46
22	500		Pick From Drop-down List	00	DRIVE	DRIVE	DRIVE	1069+35.12	DRIVE	DRIVE	DRIVE	1068+67.12
<mark>23</mark> 24	500		Define N <u>a</u> me	00	DRIVE	DRIVE	DRIVE	1069+97.47	DRIVE	DRIVE	DRIVE	1068+73.47
24		2	Hyperlink									
25		C C C C	Hypen <u>i</u> nk									

In MicroStation, select Edit > Paste. On the dialog, select Embedded and turn off Transparent Background.



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Snap to the upper left and upper right "construction" lines to paste the chart at the correct size into the MicroStation file. (Repeat this as necessary for data extending onto multiple border sheets.)

# 

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																				_			<u> </u>
											Smoot	h											
				ometry				patream				v natream		FEH		Min Reid	Joint			Smooth Wal			_
System D	Link D	Dismeter		Ree Length	Signe	Node	Note	Nod e	Link Invent	Nod e	Not •	Note	Link Invert	Min	Max	SPT IN	Ressure	HOPE	Buitt	RCP	Bult	SRAP	Built
		(0)	Carreix	(n)	(%)		Description	Station	0.0		Description	Station	(713)	0.0	(N)	below invert	(pai)	10.00	1	Highest Case		Thickest Gage	
3.00	BP-300	18	1	55.52 EP	0.16	EX-300 EX-301	DUMMY JONT	1010445.69	32.57	EK-301 CIP-302	DUTYPE 112	1010408.00	32.42		50		12	60 50			<u> </u>	5P	<u> </u>
300	EP-301 EP-400	18		12.55 SP	0.19	DN-400	DU TYPE 112 DUMM JOINT	1010408.00	22.42	DP-302 BX-400	0.17/65/112	1009461.66	22.24	8			12		-	-			<u> </u>
400	BP-400	18		75.35 EP	0.53	EX-400	D.L TYPE 112	1024407.55	29.59	0P-402	0.07746112	1024-07.55	28.59		50		12			-	<u>+'</u>		<u> </u>
100	NP-100	18		140.12	0.54	C2-100	C.S. TYPE1	1016466.63	24.16	C8-101	C.R. TYPE1	1018-16.75	22.92	1.82	2.00		10		-	Ň	<u>+</u>	160	
100	NP-101	15		145.70	0.53	CB-101	C.S. TYPE1	1018416.75	22.92	C8-102	C.B. TYPE1	1019469.47	32.13	1.22	2.29		12		-	IV.	<u> </u>	190	
100	NP-102	14		45.00	0.62	CE-102		1012453.47	22.12	DF 102	DUTYES 112	1020400.00	32.65	1.21	2.62		12	NA		FALSE	-	0.00	<u> </u>
100	NP-102	14		101.26	0.22	DE 103	D.L TY #5 112	1020400.00	32.85	OP-104	OP	1021400.00	12.61	0.10	1.71			NA	-	FALSE	<del>  _ '</del>	0.00	<u> </u>
200	NP-200	18	1	\$1,45	0.12	QN-200	DUMMY JONT	24.27.66	33.80	DF 201	0.1.247036	24 54, 92	22.72	0.00	1.27		12			IV.	<u> </u>	16 pa	
200	NP-201	15	1	75.99	0.20	D>201	0.124706	2454.52	22.72	OP-202	OP	2454.22	22.45	0.00	1.27		12	5		IV.		100	
200	NP-210	14	1	61.50	0.19	D-210	0.1 247036	2419.22	32.80	DF 201	0.1 24'7(36'	24 54.92	22.72	1.00	1.60		12	NA		FALSE		0.00	
500	07-500	18	1	65.00	DRME	DRIVE	DRIVE.	1065402.34	DRM E	DRME	DRVS	1054435.34		DRME	DRIVE			DRIVE( )		DRVE( )		DRIVE( )	
500	OP-501	18	1	27.00	DRMS	DRIVE.	DRIVE.	1065461.55	ORVE	DRVIE	ORVE	1056424.75		DRME	DRIVE			DRIVE( )		DRIVE( )		DRIVE( )	
5.00	OP-502	18	1	45.00	DRME	DRIVE	DRVE	1067422.40	DRV E	DRVE	DRVE	1056474.67		DRME	DRVE			DRIVE( )		DRVE( )		DRIVE( )	
500	09-505	18	1	25.00	DRMS	DRIVE	DRIVE.	1067450.97	DRIVE	DRIVE	DRVG	1087454.80		DRAS	DRIVE			DRIVE( )		DRIVE( )		DRVE( )	
5.00	09-504	18	1	24.00	DRME	DRIVE	DRVE	1065445.57	DRV E	DRVE	DRVS	1055424.45		DRME	DRVE			DRIVE( )		DRVE( )		DRIVE( )	
500	07-505	18	1	65.00	DRME	DRIVE	2 VIRG	1069435.12	DRV E	DRME	ORVE	1055467.12		ORME	ORME			DRIVE( )		DRVE( )		DRVE( )	
500	02-505	15	1	24.00	DRMS	ORIVE	DRIVE	1062497.47	DRIVE	DRVE	DRVS	1055473.47		DRMS	DRVE			DRIVE( 1		DBME( 1		DRME( 1	

Press the "Edit Text" button to edit each of the data fields with the appropriate title block information.

$A \checkmark^{A} A^{A} A^{A} \checkmark^{A} C^{C} A^{A} A^{A} A^{A}$	FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
	3	S.C.	FLORENCE	P037272	US 378	5D
				U.S. RC	OUTE 37	8 REL

The final Drainage Data Sheet will look similar to this.

											Smoot											
System D	Link D	Dameter	Ge No. of	Pipe Length	Slope	Node	Up	stream Node	Link Invert	Niode	Do	w nstream Ninde	Link Invert	Mo	Height	Min Field - SPT 'N' Pre	ture HDP		Sr Buit	incoth Well	Optons Balt St	RAP Built
		(in)	Barrels	(11)	(%)		Description	Station	(ft)		Description	Station	(ft)	(ft)	(11)	below invert (	si) Typ		V Hgt	hest Class		est Gage 🗸
300	Ebr 300	18	1	88.82 EP	0.16	EX-300	DUMMY JONT	1010+48.69	32.57	EX-301	D.I. TYPE 112	1010+08.00	32.42	EP.	Eb.		3 UP			EP EP		EP
300 400	EP-301 EP-400	18	1	93.66 EP 75.35 EP	0.19	EX-301 DN-400	D.I. TYPE 112 DUMMY JONT	1010+08.00 1023+82.97	32.42 29.81	OP-302 EX-400	OP D.L TYPE 112	1009+61.66 1024+07.55	32.24 29.59	EP EP	EP EP		3 EP 3 EP			EP EP		EP EP
400	EP-400	18	1	74.92 EP	0.53	EX-400		1024+07.55	29.50	OP-402	OP	1024+32.03	29.00	DP	UP UP		3 DP			DP		P
100	NP-100 NP-101	18	1	148.12	0.17	C8-100 (08-101	C.B. TYPE1 C.B. TYPE1	1016+66.63	34.16	C8-101 C8-102	C.B. TYPE 1	1018+16.75	33.92	1.92	2.00		3 S			N		iéga
100	NP-102	18	1	148.70	0.53	CB-101 CB-102	C.B. TYPE1 C.B. TYPE1	1018+16.75	33.92	CB-102 DF103	DI TYPE 112	1019+69.47 1020+00.00	333	1.92	2.29		3 S 3 NA	-	-	FALSE		90ja 0.00
100	NP-103	14	1	101.26	0.22	DI-103	D1 TYPE 112	1020+00.00	32.85	OF-104	OP	1021+00.00	32.63	0.10	1.21		3 NA			FALSE	0	0.00
200	NP-200	18	1	51.46	0.13	DN-200	DUMMY JONT	3+37.86	33.80	DI-201	D1 24"X36"	2+84.93	33.73	0.00	1.27		3 S			N	9	16ga
200	NP-201 NP-210	18	1	75.99 61.80	0.30	DI-201 DI-210	D.1.24"X36" D.1.24"X36"	2+84.93 2+19.23	33.73 33.80	OP-202 DF-201	OP D1 24"X36"	2+84.23 2+84.93	33.45	0.00	1.27		3 S 3 NA	-		N FALSE		16ga 0.00
500	DP-500	18	1	66.00	DRIVE	DR8/E	DRIVE	1065+02.34	DRIVE	DRI/E	DRIVE	1064+36.34		DRVE	DRIVE		DRIVE(	)	DR	RIVE()	DRN	/E( )
500	DP-501	18	1	37.00	DRIVE	DR8/E	DRIVE	1066+61.55	DRIVE	DRI/E	DRIVE	1066+24.75		DRVE	DRIVE		DRIVE	2		RV/E()		(E( )
500	DP-502 DP-503	18	1	48.00 26.00	DRIVE	DR8/E DR8/E	DRIVE	1067+22.40 1067+80.97	DRIVE DRIVE	DR8/E DR8/E	DRIVE	1066+74.67 1067+54.80		DRVE	DRIVE		DRIVE	2	09	RV/E() RV/E()	DRM	(8( )
500	DP-504	18	1	24.00	DRIVE	DR8/E	DRIVE	1068+48.57	DRIVE	DR#/E	DRIVE	1068+24.46		DRVE	DRIVE		DRIVE	5	DR	RIVE()	DRM	(6)
500 500	DP-505 DP-506	18 18	1	68.00	DRIVE	DR8/E DR8/E	DRIVE	1069+35.12 1069+97.47	DRIVE.	DR#/E DR#/E	DRIVE	1068+67.12 1068+73.47		DRVE	DRIVE		DRIVE	)	DR	R9/E() R9/E()	DRM	/R( )
500	Dir-906	18	1	24.00	DHEVE	DHAVE	DHAVE	1069+97.47	DRIVE	DRAVE	DHAVE	1068+73.47		DRVE	DRIVE		DHAVE(	)	1.04	HOVE()	DRM	/H( )



#### **Staking Plan Sheet**

For complex projects, the Staking Plan Sheet is an additional reference sheet created for the benefit of the field surveyor and contractor to provide clarity for the centerline layout, major traverse control points, coordinate values of critical points and monument descriptions. The information may be expanded to show all centerlines, curve data, coordinated points, and survey baselines.

Determine the scale for the Staking Plan Sheet by length of alignment to show the layout of the plan sheets for the project.

Scale	Border Cell X & Y	Alignment Length	Minimum Font Size
20:1	0.40	700 ft stationing	5
50:1	1.00	1500 ft stationing	5
100:1	2.00	3000 ft stationing	10
150:1	3.00	4500 ft stationing	15
200:1	4.00	6000 ft stationing	20
400:1	8.00	12000 ft stationing	40

The following example will demonstrate a 20:1 Index/Plan Layout Sheet.

Open the geopaksheets\_In.cel cell library and select the 05\_Staking\_Plan\_Sheet cell. Adjust the cell scale to 0.40 for both the height and width (0.40 x 50 = 20). Place the cell additional times for the number of plan sheets you are including in the layout.

🏠 Cell Library: [\MSfiles\Cell\geopaks	sheets_In.cel]			💡 Place Active Cell 📃 💻 🗙
<u>Fi</u> le				Active Cell: taking_Plan_Sheet
Use Shared Cells	NI Cells In Path		Display: Wireframe	Active Angle: 00°00'00.00"
Name ^	Description	Туре 🔬 🔺		Y Scale: 0.400000
03_Typical_Section 04_Property_Strip_Map 05_Drainage_Data_Sheet 05_General_Construction_Note 05_Reference_Data_Sheet 05_Reference_Data_StationOffset 05_Staking_Plan_Sheet 2Proline_20	03_Typical_Section 04_Property_Strip_Map 05_Drainage_Data_Sheet 05_General_Construction 05_Reference_Data_Sheet 05_Reference_Data_Stati 05_Staking_Plan_Sheet Double profile sheet 20 scale	Grph Grph Grph		✓ Jrue Scale Relative Mirror: Horizontal ▼ Interactive Scale and Rotate ▼ Patten Top ▼ Scale Multi-line Offsets Ø Scale Dimension Values Ø Scale Annotations
Placement 05_Staking_Plan_Sheet	Point Element		Edit Delete	Association
Terminator NONE	Pattem NONE		Create Share	

Attach the \*pp.dgn design file as a reference. **Move, rotate and clip** the alignment to fit on the Staking Plan Sheet. Repeat attaching the \*pp.dgn for subsequent layout sheets as necessary to fit the entire length of the project onto sheets at 20:1 scale for this example.

**Turn on/off** levels in the referenced \*pp.dgn to properly show the following items on the Staking Plan sheets:

- 1. North Arrow in upper right corner
- 2. Scale in lower right corner



- 3. Existing and Proposed Alignments for both mainline and side roads including stationing
- 4. Road Names/Numbers
- 5. Begin/End Notes for each road with Northing/Easting Coordinates if not included on the Reference Data Sheet
- 6. 500' Stationing, Alignment Stationing, Curve Data, Bearings
- 7. Electronic Chain/Profile Names

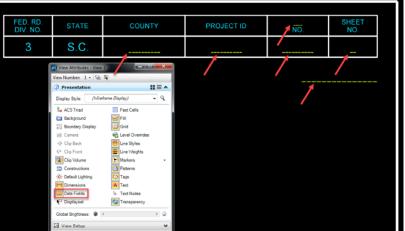
Use the Plan View Labeling tool to label the road names and begin/end notes as necessary to convey the survey information for the Staking Plan Sheet.

M Plan View Labeler Style:\scdotplanv8.lsf -> Begin/End Note - Active	
Style <u>Fi</u> les <u>Options</u> <u>S</u> cale <u>T</u> ools	
Text Params. Shape Leader Rotate Styles	SURVEY STA. XXX+XX.XX d-e-l-i-m-i-tl-:
Style Preview	PROJECT ID XX.XXXXXXXX U.S. ROUTE XX.XXXXXXX
Image: Constraint of the second s	
Begin/End Note	Space Return
B FShid Note #1     B FShid Note #2	Space Return Clear Delimit
Br Sta #1 Label	Place Label
New Style Update Style	
New Category Scale : 1.00	
BD NAKA REITERAY BD I	
CURB GRADE 6 STA, 12+63.42 END	<u>CURB GRADE 6 STA, 10+00.00 BEGIN</u> (CHAIN CG6 & PROFILE CG6CI)
(CHAIN CG6 & PROFILE CG6CI)	CURB GRADE 5 ST4. 10+00.00 BEGIN (CHAIN CGS & PROFILE CG5TA)
CURB GRADE 5 STA, 13+63.76 END (CHAIN CG5 & PROFILE CG5TA)	RD_S-450A REL. (PETIGRU DR.)
	<b>T</b> 1
	<u>CURB GRADE 4 STA. 10+ 24.13 BEGIN</u>
	(CHAIN CG4 & PROFILE CG4RT)
<u>CURB GRADE 2 STA, 24+ 57.62 END</u> (CHAIN CG2 & PROFILE CG2RT)	



Data Fields have been setup in the cell to ensure fonts choice, font sizes, levels, and justification are predefined for each Index Layout sheet.

To utilize, zoom into the upper right corner to complete the title block information. If you do not see the "Data Fields", select Settings > View Attributes and turn on "Data Fields".



If you are utilizing the reference border sheet, you will need to set the following attributes:

Level: RD\_SHT\_TX Weight: By Level (3) Font: Arial

- County, Project ID, Road No., Sheet No. use font size: 5 x Scale Multiple (5 x 3 for 150' scale = 15), Justification: Center Center
- Road/Route No. use font size: 3 x Scale Multiple, Center Center Justification
- Road Name use font size:: 8 x Scale Multiple, Right Top Justification

Press the "Edit Text" button to edit each of the data fields with the appropriate title block information.

$A \xrightarrow{A} \xrightarrow{A} \xrightarrow{B} \xrightarrow{ABC} \xrightarrow{C} \xrightarrow{ABC} \xrightarrow{A} \xrightarrow{A} \xrightarrow{A} \xrightarrow{A} \xrightarrow{A} \xrightarrow{A} \xrightarrow{A} A$	FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
	3	S.C.	GEORGETOWN	0039004	S-456 S-450B REL	5E

Repeat for additional sheets or pipe the title block information by selecting the text, selecting the copy command, then enter dx=0,x|y where x is the distance you want to move it and y is how many times to copy it.

FED, RD, DIV, NO,	STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.	🚍 Key-in
3	S.C.	GEORGETOWN	0039004	S-456 S-450B REL	5E	dx=0,1150 6
						ux=0,1130j0

Enter the Scale and RPG/Initials in the lower right Sheet Block information. Repeat as necessary for additional sheets.

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SOUTH CAROLINA DEPARTMENT OF TRANSPOF COLUMBIA, S.C.	RTATION
STAKING PLAN SH	EET
SCALE 1" = 20'	RPG 2 - AHS

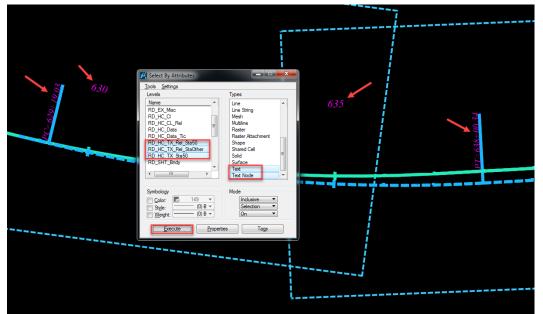


**Scale the text** to a legible size when plotted, use the same multiple as used for the 05\_Staking\_Plan\_Sheet cell. In this example, you will need a minimum font size of 5. Larger fonts can be utilized to distinguish notes and labels.

Text	Height = 5
Text	Width = 5

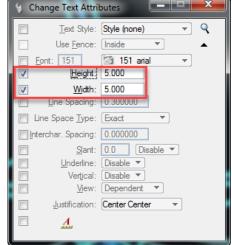
Scale	Border Cell X & Y	Alignment Length	Minimum Font Size
20:1	0.40	700 ft stationing	5
50:1	1.00	1500 ft stationing	5
100:1	2.00	3000 ft stationing	10
150:1	3.00	4500 ft stationing	15
200:1	4.00	6000 ft stationing	20
400:1	8.00	12000 ft stationing	40

Use the Edit > Select By Attributes tool to select text on each of the levels.



Select the **Change Text Attributes** tool and check on Height and Width. Enter the Font Size and data click to accept the changes to the fonts. Realign and shift text as necessary to "clean up" and make the plan sheet as legible as possible. Repeat these steps for the other text levels and font sizes.

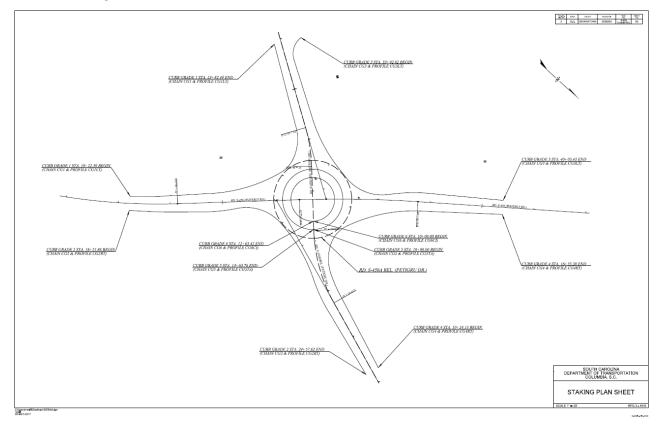






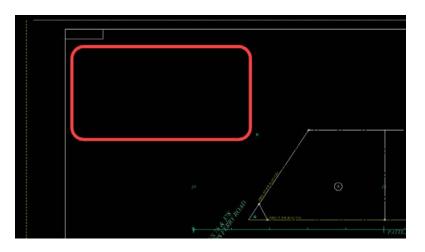
Select **File > Save Settings** to ensure all of the levels which are turned on/off are properly saved to the view for plotting.

The final Staking Plan sheet will look similar to this:



## **Placing Utility Property Owners**

In the \*pf.dgn file, ensure there is room in the upper left corner of the plan section to place the Utility Property Owners information.





Open the **Cell Library** window and choose the "UNote\_##box". Dependent upon the scale of your plan sheets, there are cells for 20:1 and 50:1 plans. These cells are located in the **RoadV8.cel** file provided with the SCDOT workspace.

🝳 Cell Library: [\MSfiles\cell\RoadV8.cel]						
<u>F</u> ile						
Use Shared Cells	Display All Cells In Path			Display: Wireframe		
Name ^	Description	Туре 🔬	Where			
ТУНН	CABLE TV HAND HOLD	Grph	Lbry			
TYPET1	TYPE T TREAT BEG	Grph	Lbry			
TYPET2	TYPE T TREAT END	Grph	Lbry	UTILITY COMPANY INFORMATION		
UNote_20box	Utility owner note-table (Sheet 6) - 20:1 Scale	Grph	Lbry	MATS LA DAMAGE 2 13 1		
UNote_20chk	Utility owner note-check symbol - 20:1 Scale	Grph	Lbry			
UNote_20ext	Utility owner note-extension - 20:1 Scale	Grph	Lbry			
UNote_50box	Utility owner note-table (Sheet 6) - 50:1 Scale	Grph	Lbry			
UNote_50chk	Utility owner note-check symbol - 50:1 Scale	Grph	Lbry			
UNote_50ext	Utility owner note-extension - 50:1 Scale	Grph	Lbry			
UOT	UNDERGROUND OIL TANK	Grph	Lbry	*		
Active Cells						
Placement UN	Note_50box	Element		Edit Delete		
Terminator NC	DNE P <u>a</u> ttern	NONE		Create Share		

With the applicable cell selected data-click into your drawing and place the cell.

	Place Active Cell        Active Qell     UNote_50bit       Active Active Cell
	X Scale: 1.00000 X X Scale: 1.00000 X X Scale: 1.00000
6	Cell Library: [_\Cadd. Design. Bulletins\RoadV8.cet]     Fig
	UTILITY COMPANY INFORMATION
	UNete 500x Ulitiy owner note-table (Sheet 6) - 50.1 Scale UNete 500x Ulitiy owner note-tack symbol - 50.1 Scale UNete 500x Ulitiy owner note-deck symbol - 50.1 Scale UNete 500x Ulity owner note-deck symbol - 50.1 Scale UNete 500x Ulity owner note-deck symbol - 50.1 Scale UNET UNET UNET SHEEL ULITY OWNER SHEEL ULITY O
L	VAC VACUM COMMERCIAL WAR WATEA AR RELEASE WELL HOUSE
	Active Cells Placement UNote_50box Pgint Element Edit Delete Terminator NONE Pattern NONE Create Share



Next, open the **Survey Excel** file and locate the Utility tab. Copy the applicable data from the survey file into your Microstation drawing by "double-clicking" on each **SERVICE** and **OWNER** field.

A B	C D	E	F G	H	
	Utility/Ra	ilroad Su	irvey Wo	rk Sh	eet
Road/Route		County:		Pin No.	-
Road/Route		county.		Fill NO.	
Railroad Located					
	aod involved in Survey				
If so,how?	Crossing	Parallel	🗌 Grade Sepa	aration	Drainage
Comments:					
Jtilites Located o	n Project:				
Power					
<ul> <li>Above Ground</li> </ul>	South Carolina Elect	tric & Gas			
Buried					
Both					
Telephone	1				
Above Ground	AT&T				
Buried					
<ul> <li>Both</li> </ul>					
Gas	1				
Size Line	South Carolina Elect	tric & Gas			
	4				
Sewer					
Size Line	City of Columbia				
	4				
Cable T.V.					
	Time Warner Cable				
Above Ground					

Use the cell "UNote\_##chk" to place a check symbol in the appropriate boxes for NA, above ground, below ground or both.

Cell Library: [\SCDOT_Design\MSfiles\cell\RoadV8.cel]						
<u>F</u> ile						
Use Shared Cells	lay All Cells In Path			<u>D</u> isplay: Wireframe ▼		
Name ^	Description	Туре 🔬	, Where			
TRENCH60	TRENCH60	Grph	Lbry			
TSJB	TRAFFIC SIGNAL JUNCTION BOX	Grph	Lbry			
TSP	TRAFFIC SIGNAL POLE	Grph	Lbry			
TV	CABLE TV PEDESTAL	Grph	Lbry			
TVHH	CABLE TV HAND HOLD	Grph	Lbry			
TYPET1	TYPE T TREAT BEG	Grph	Lbry			
TYPET2	TYPE T TREAT END	Grph	Lbry			
UNote_20box	Utility owner note-table (Sheet 6) - 20:1 Scale	Grph	Lbry	Ť		
UNote_20chk	Utility owner note-check symbol - 20:1 Scale	Grph	Lbry			
UNote_20ext	Utility owner note-extension - 20:1 Scale	Grph	Lbry			
UNote_50box	Utility owner note-table (Sheet 6) - 50:1 Scale	Grph	Lbry			
UNote_50chk	Utility owner note-check symbol - 50:1 Scale	Grph	Lbry			
UNote_50ext	Utility owner note-extension - 50:1 Scale	Grph	Lbry			
UOT	UNDERGROUND OIL TANK	Grph	Lbry			
US	US ROUTE SHEILD	Grph	Lbry	Ξ		
VAC	VACUUM_COMMERCIAL	Grph	Lbry			
WAR	WATER AIR RELEASE	Grph	Lbry	-		
Active Cells	WELL HOUSE	0	164.			
Placement UNote_50chk	Point Element			Edit Delete		
Terminator AH	P <u>a</u> ttern NONE			<u>C</u> reate S <u>h</u> are		



The check cell origin is aligned with the bottom left corner of each box.

ANY INFORMATION	BURRIED	ROVE	вотн
OWNER:	BL	GF	
DLINA ELECTRIC & GAS	<b>~</b>		
DLINA ELECTRIC & GAS			
UMBIA		Cell: UNote_50t Level: RD_SHT_	
RCABLE			

Additional rows can be added using the "UNote\_##ext" cell. The origin of this cell is aligned with the left most border line.

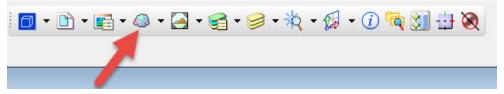
UTILITY COMPANY INFORMATION			ABOVE GROUND	вотн
SERVICE:	OWNER:	BURRIED	GR	æ
POWER	SOUTH CAROLINA ELECTRIC & GAS			
TELEPHONE	AT&T		-	
GAS	SOUTH CAROLINA ELECTRIC & GAS			
SEWER	CITY OF COLUMBIA	-		
CABLE TV	TIME WARNER CABLE		-	
$\sim$				
1				



## **Point Clouds & Terrain Models in Geopak SS4**

The following instructions can be utilized to process lidar tiles as point clouds and create terrain models when using the Geopak SS4 software version. This takes the place of the steps outlined (starting on page 187) using the Data Acquisition tools for Geopak SS2 or SS3 software versions.

- 1. Create a new <u>3d</u> design file.
- 2. Select File > Point Clouds or choose the point cloud icon from the primary tool bar.



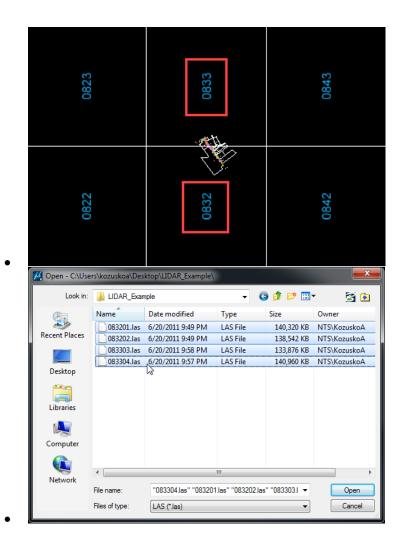
3. Select File > Attach from the Point Clouds dialog



- 4. Browse to locate the \*.las file and press Open.
  - A few extra tips concerning this step are:
    - Locate all necessary \*.las files and copy the files to a temporary folder on your desktop. This will decrease the time to process the \*.las files into a \*.pod file.
    - Close any unnecessary programs (word documents, outlook, adobe files, etc.). This will also decrease processing time.
    - By including all necessary LIDAR files during this step, the user should not have to merge terrain models or \*.tin files multiple times later.
    - Locate which LIDAR tiles are needed by attaching \*\_RPG.dgn file into the \*pp.dgn file. <u>\\nts\hq\SCDOT-APPS\SCDOT-LIDAR\LIDAR\Lidar\_Documentation\RPGs</u> Each tile is broken into four quadrants starting with 01 in the upper right and ending up with 04 in the bottom right going counterclockwise direction.

References (7 of 7 unique, 2 displayed)	• X				
<u>Iools</u> <u>Settings</u>					
🗄 🗸 🛍 🕵 🗁 🌾 😂 🖓 🏠 🏂 🖓 🛱 🔛 🕸					
Slot 🏱 🗔 🤳 K 🗋 File Name Model Description Logical Orientation Presentation 🔓					
1 🗸 🗸 r30001pp.dgn Default Master Model Coincident - World Wireframe					
6 🗸 🗸 Midlands_RPG.dgn Default Master Model Coincident - World Wireframe					
2 🗸 🗸 30001dtm.dgn Default Global Orig Coincident - World Wireframe					
3 🗸 🗸 topo.dgn Default Master Model Coincident - World Wireframe					
4 🗸 🖌 aerial.dgn Default Master Model Coincident - World Wireframe					
5 🗸 🗸 aerial crash.dgn Default Master Model Coincident - World Wireframe					
Scale         1.000000         :         1.000000         Rotation         00'00'00''         Offset X         0.000         Y         0.000					
💽 💽 🔖 🔓 🏢 🎢 🤣 🕼 🔯 🛃 🏚 🏠 💆 🔝 Nested Attachments: Live Nesting 🔍 Display Overrides: Always 🔻 Nesting Depth: 2					
New Level Display: Always   Georeferenced: No					





5. Verify Geometry Unit is in Feet and all other fields are defaulted to as shown below. Press OK to Continue.

Convert LAS	
Action	^
Attach	Yes
Options	^
Import RGB	Yes
Import Intensities	Yes
Import Classification	Yes
Geometry Unit	Feet
Normalize Intensities	Yes
Compression	Aerial LIDAR data 0.050 (50mm)
Spatial Filtering	Disabled
Spatial Spacing	0.00100
Geographic Information	^
Reproject	No
Source GeoCS	
Name	<none></none>
Description	<none></none>
	OK Cancel



6. When prompted, select a directory to save the \*.pod file. The name should default to the same as the LIDAR tile name. The path should default to the same directory the \*.las files were selected from (should be a temp folder on your desktop). Press the Save button to continue. If you have attached more than one \*.las file, you will repeat this step for each file.

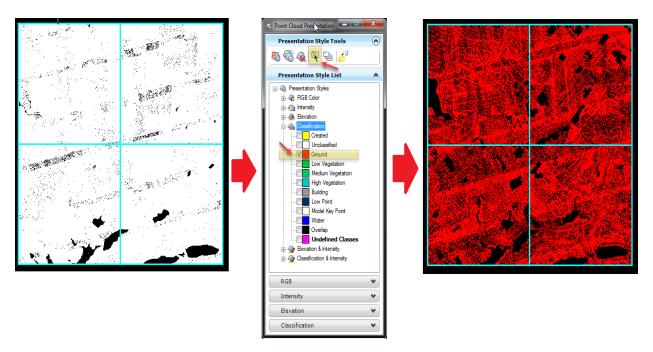
🥂 Specify new po	🔏 Specify new pod file - C:\Users\kozuskoa\Desktop\LIDAR_Example\					
Save in:	🔋 LIDAR_Exan	🐌 LIDAR_Example 🚽 💶 🗸 🌀 🎓 🖽 🗸				
Ca	Name	Date modified	Туре	Size	Owner	
Recent Places		No item	s match your se	arch.		
<b>Desktop</b>						
Libraries						
Computer						
	4					
Network						
	File name:	083201.pod		-	Save	
	Save as type:	Pointools POD (*.pod)		•	Cancel	

7. Highlight the attached \*.pod file and select Settings > Presentation.

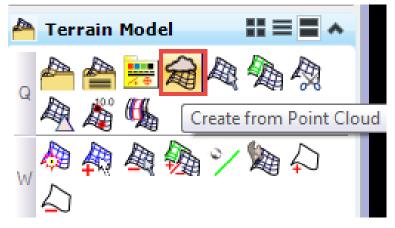
Point Clouds (4 of 4 list	;ted)			x
<u>File Edit Vi</u> ew <u>S</u> etting				
🗄 - 🔚 🍇 🍕 🕒				
File Name	Description	Q 3	× 1	J ا
083201.pod		100 🗸	V V	(
083202.pod		100 🗸	V V	(
083303.pod		100 🗸		(
083304.pod		100 🗸	V V	/
12345678	2 👌 🕹			



8. Under Classification, "Uncheck" all of the classifications except for Ground. Highlight the word Classification in the list and press the Apply to Selected View button. You will need to data (left) click in MicroStation to apply the new view.



9. Select the Create from Point Cloud icon from the Terrain Model task menu.





10. Set the Filter, Feature and Triangulation Options as show below and press the Import button. By setting the Feature Definition to E\_DTM\_Survey (under the Terrain folder) only the boundary is displayed.

🥂 Create Terrain From Point Clou	d	
<b>Ⅲ</b> × ↔	Options	
Point Cloud	Terrain Models	*
	Append to existing Terrain Model	
	Terrain Model to append to	<b>•</b>
	Filter	*
	Filter	Tin
Suggested Z Tolerance:	Z Tolerance	0.25
0.1 for Flat Terrain 0.25 for Uneven Terrain	Granularity	Coarse
0.25 for Oneven Terrain	Reinsert Points	
		Test Filter
	Feature Definition	*
	Feature Definition	E_DTM_Survey
	Include Spot Features	
	Triangulation Options	*
	Edge Method	Max Triangle Length
	Maximum Side Length	200.0000
		Import
C:\Users\kozuskoa\AppData\Local	\Temp\Point Cloud.xvz	.:
11. Processing could take 1 to 2		
when finished. Open point c	loud manager and detach	~~~~~
all Point Clouds from the r		
Detach. The final product w the Terrain Model and now o	_	ζ Ι
Point Clouds (1 of 1 listed)		0
File Edit View Settings Ut	lities	
Attach 3 💥 Attach		
🕺 Detach	×, m d	

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12

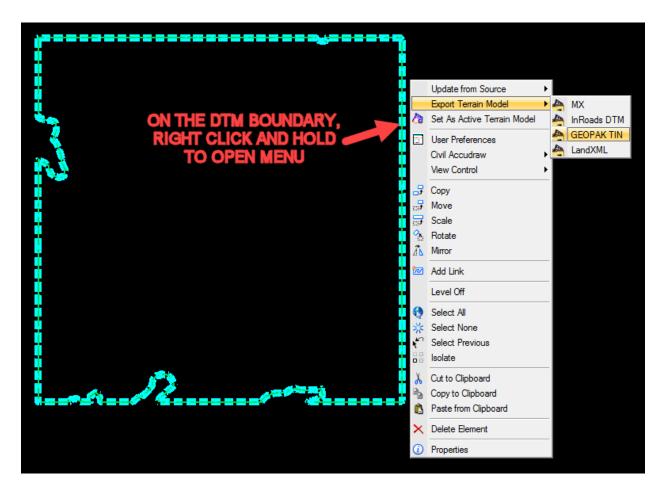
ς

Description

Convert...

Export...





12. Save the Point Cloud.tin file.

🥂 Export Terrain	- C:\Users\kozus	koa\Desktop\LIDAR_E	kample\			<b></b>
Save in:	LIDAR_Exam	nple	- (	) 🌶 📂 🖽	•	3 🖲
Ca	Name	Date modified	Туре	Size	Owner	
Recent Places		No ite	ems match you	r search.		
Desktop						
Libraries						
Computer						
	4					
Network						
	File name:	Point Cloud.tin			[	Save
	Save as type:	*.tin			▼	Cancel

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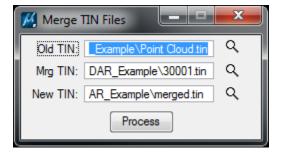


13. Next merge your newly created point cloud .tin file with your project .tin file using the SS2 DTM toolbar. The toolbar is located Applications>GEOPAK>ROAD>DTM Tools. Click on the 1<sup>st</sup> Icon to launch the DTM Menu Bar. From here you want to select Build>Merge TINs. Next select your two .tin files to merge. The data found in the Mrg TIN will supersede the data of the Old TIN. Check your Status Bar at the bottom of the screen to see when your merge process is completed.

OldTIN : = the newly created point cloud .tin file you made from the LIDAR data (less accurate data) MrgTIN: = the project.tin file (30001.tin used in this example) from survey data (more accurate data)



M DTM									
<u>S</u> ettings	<u>E</u> xtract	<u>B</u> uild	<u>E</u> dit	<u>D</u> rape	<u>L</u> oad	<u>R</u> eports	<u>A</u> nalysis	<u>U</u> tilities	
		<u>T</u> riar	ngles						
		<u>L</u> atti	ice						
		<u>M</u> en	ge TIN	s					
		<u>Cl</u> ip	TIN						
		Pad							
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14. Go to your temporary folder you made on your desktop and view your final product. The rest of the files in this folder (copies of files on the network) can be deleted. Create a new fresh 3d file and load your .tin file created from the merge process.

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辑 Network	Your Final	Product !!!						
12 items								



# **Consultant Workspace Installation Checks**

Please check the following files to confirm the workspace is installed on your local pc. The workspace may be modified for a network configuration as necessary.

1) Run the Complete Workspace .EXE file the first time you are installing the SCDOT standards.

## SCDOT Complete Microstation and Geopak Workspace

### Complete SCDOT Workspace in a self extracting .exe (ZIP 25.8 Mb) 11/2015

(Includes Road, Bridge and Traffic files for Microstation and GEOPAK Standards)

2) The ZIP files below the EXE are for updates to individual files so you do not have to re-run the entire EXE every time there are minor modifications. Simply download the updated zip file and paste the contents to the respective workspace folder.

	SCDOT Design Roadway	, Hydraulic, Subsurfac	e Utility Engineerin	ng (SUE), and Surve	ey Files
	MicroStation Files				
	Cell Libraries (ZIP 1.23 Mb) 07/2015				
	Color Table (ZIP 1 Kb) 05/2005				
	DGN Libraries (ZIP 81.6 Kb) 08/2015				
	Fonts (ZIP 1.63 Mb) 11/2011				
	Line Styles (ZIP 12.1 Kb) 08/2015				
	Reference Sheets (ZIP 2.63 Mb) 08/201	Conv B Day	te the contents of	the	
	Seed Files (ZIP 33.6 Mb) 01/2015	oopja. as	P files into the	uie	
	SUE Files (ZIP 5.67 Kb) 04/2014		folder when there	are	
	VBA ADDS (ZIP 441 Kb) 11/2014	updates			
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- Confirm the scdot.cfg file is located in the folder
   C:\Program Files (x86)\Bentley\MicroStation V8i (SELECTseries)\MicroStation\config\appl
- 4) Confirm the scdot.cfg file points to c:\SCDOT by opening it in Notepad. (Note: this is where the network path can be added to configure for a network workspace.)

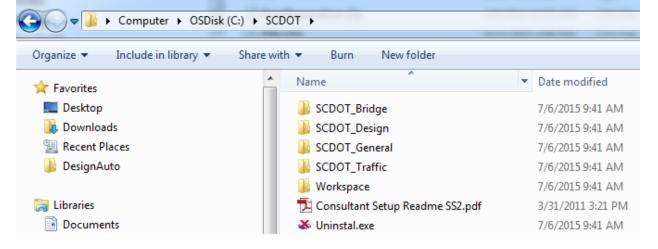
Page 343



5) If the user has another workspace for their company with a cfg, it will need to be renamed to "filename" without the cfg extension – see the "server" file below – if both have the cfg extension, they will conflict with each other and it would pic the first one based on abc orde

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vorites	^	Name	Date modified	Туре	Size	
esktop	E	PrintPreparation.cfg	4/9/2011 12:53 AM	CFG File	3 KB	
ownloads		PW.CFG	6/22/2015 2:09 PM	CFG File	3 KB	
cent Places		Rebis.cfa	6/16/2009 10:42 AM	CFG File	2 KB	
signAuto		scdot.cfg	7/6/2015 9:41 AM	CFG File	1 KB	
		server	6/22/2015 1:42 PM	File	1 KB	
aries		sketchup.cfg	t.cfg - Notepad	100.00	1.00	
ocuments	-	sue.cfg	dit Format View Help			

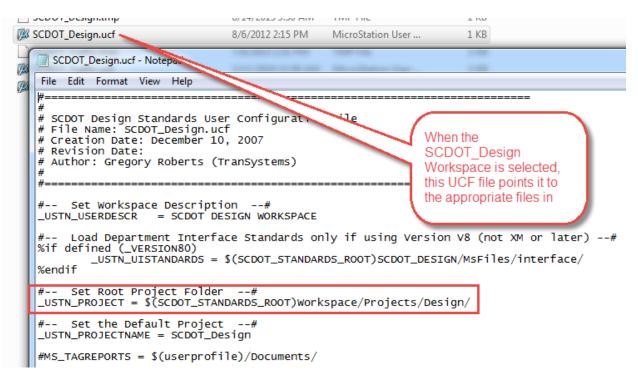
6) Confirm the workspace files exist at c:\SCDOT (or network location)



Confirm the \*ucf file is located in the appropriate folder
 C:\Users\All Users\Bentley\MicroStation V8i (SELECTseries)\WorkSpace\Users

🚱 🔵 🗢 🕌 ト Computer ト OSDisk (C:) ト Users ト All Users ト Bentley ト MicroStation V8i (SELECTseries) ト WorkSpace ト Users							
Organize 🔻 🦳 Open with NOTEPAD	✓ Share with ▼ Burn New folder						
☆ Favorites	A Name	Date modified	Туре	Size			
E Desktop	💯 AutoTURN90.ucf	6/23/2015 7:52 AM	MicroStation User	1 KB			
〕 Downloads	💯 examples.ucf	8/19/2008 9:28 AM	MicroStation User	2 KB			
🕮 Recent Places	geo_example_designer.ucf	12/13/2012 8:07 PM	MicroStation User	3 KB			
퉬 DesignAuto	geo_example_dialogs.ucf	12/13/2012 8:07 PM	MicroStation User	3 KB			
	E Ø msgeo.ucf	4/8/2011 11:38 PM	MicroStation User	2 KB			
🥽 Libraries	Msgeo_mapfinishing.ucf	1/28/2011 12:48 PM	MicroStation User	2 KB			
Documents	💯 mytown.ucf	11/24/2007 10:10	MicroStation User	4 KB			
👌 Music	💯 SCDOT_Bridge.ucf	11/25/2008 1:22 PM	MicroStation User	1 KB			
📔 Pictures	SCDOT_Design.tmp	8/14/2015 9:50 AM	TMP File	1 KB			
📕 Videos	SCDOT_Design.ucf	8/6/2012 2:15 PM	MicroStation User	1 KB			
	SCDOT_Traffic.tmp	7/6/2015 2:31 PM	TMP File	2 KB			
👰 Computer	SCDOT_Traffic.ucf	12/1/2010 11:59 AM	MicroStation User	2 KB			
🏭 OSDisk (C:)	💯 untitled.ucf	7/30/2008 3:58 PM	MicroStation User	1 KB			

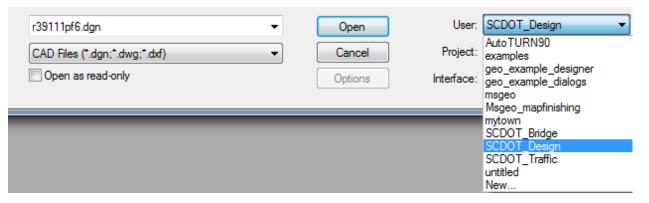




8) Confirm the \*pcf is located in the appropriate directory C:\SCDOT\Workspace\Projects\Design

→ Computer → OSDisk (C:) → SCDOT → Workspace → Projects → Design →							
✓ Include in library ▼ Share w	ith 🔻 Burn New folder						
rites	Name	Date modified	Туре	Size			
ktop	🐌 SCDOT_Design	7/6/2015 9:41 AM	File folder				
vnloads	💯 General.pcf	12/31/2008 1:00 PM	MicroStation Proj	1 KB			
ent Places	💯 SCDOT_Design.pcf	1/6/2010 1:56 PM	MicroStation Proj	2 KB			
signAuto							

9) Open MicroStation/Geopak from the icon – pick SCDOT\_Design – this is showing up in the drop down based on the \*ucf file in step 5 above





10) The SCDOT\_Design will auto select in the Project based on the ucf pointing to the pcf in step 6 above.

User:	SCDOT_Design -	
Project:	SCDOT_Design 🔹	
Interface:	No Project General	
	SCDOT_Design New	

In the design file, check the levels, cells, seed files, etc. to ensure the workspace is working correctly.