

CONNECTICUT DEPARTMENT OF TRANSPORTATION

DIGITAL DESIGN ENVIRONMENT GUIDE

CONNECT EDITION

Volume 4 -OpenRoads Designer Survey

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Course Overview

This volume focuses on the OpenRoads Survey tools and covers the post-processing of field data. The main topics contained in this volume are the importing and editing of field data once brought into a design model and the creation and editing of the Terrain Model. This volume also introduces users to the custom CTDOT placement and drawing tools available on the Ribbon (this replaces the Custom Tasks used in V8i).

The underlying configuration that drives the survey engine has changed significantly since InRoads V8i SELLECTSeries 2. The Graphical engineering elements have become "intelligent" so have survey elements. There are no longer external database files (.dtm or .alg) to keep track of and sync with the graphical survey data as the survey information is stored within the graphical elements themselves in the design (.dgn) file. The elements keep track of how they were created (from what data files), what their terrain attributes are and how to display annotation. Modify the element's terrain attributes and the Terrain Model updates, change its point code and the graphics update. This now allows for single file to deliver as a final product (even terrain elements are now contained within the DGN file itself).

MODEL USES

WHAT IS A TERRAIN MODEL?

A terrain model is a set of triangles mathematically computed from point data collected from the surface being modeled. They are typically used to model highly irregular surfaces, like the surface of the earth. A terrain model is created from 3D features such as points, breaklines, and contours. Terrain models are also referred to as digital terrain models (DTMs), triangulated irregular networks (TINs), or triangulated surfaces. A terrain model is stored as a 3D mesh element in an OpenRoads/OpenRail Designer 3D design (.dgn) file, similar to what used to be stored in a GEOPAK TIN, InRoads DTM, or MX FIL file. When you select a terrain model in the design file, the Element Selection tool recognizes it as a Terrain Model, and the Properties and Explorer Windows will show it as a Terrain Model Element. The display of a terrain model in the product is controlled by using a Feature Definition and Element Template. Being an element stored in a 3D design file, terrain models are easily shared and used by anyone using any DGN based application like OpenBuildings Designer (formerly AECOsim Building Designer), OpenPlant Modeler, or MicroStation CONNECT Edition.

WORKING DIRECTORY

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

- CTDOT users should have the CTDOT CONNECT DDE synced through SharePoint with the COMPASS Project Synced along with the CAD Configuration.
- Consultants should have CTDOT DDE properly installed or be syncing to the CTDOT DDE SharePoint/COMPASS system.

• Make note of the **Coordinate System** you will be working in.

There are two Sub-Modules to complete to properly set up the CTDOT CAD Environment:

- Syncing the SharePoint DDE This is equivalent to the old network W Drive storage location for the CAD Workspace and when synced will show up under the Enterprise lcon.
- Syncing a COMPASS Project This is equivalent to the old Network P and X Drive Project locations and when synced will show up under the Enterprise Icon.

The COMPASS Project is the working Directory. After Syncing there will be a **Design** folder available that has a sub-folder for each discipline.

- District Survey will work in the **SVY_District** folder.
- Central Survey will work in the **SVY_Central** folder.

When a file is ready for designer to reference, a copy of the file will be placed in the **Active_Survey** folder. Central Survey will notify the Design team to let them know it is available.

All edits will be made in the **SVY_District** or the **SVY_Central folders** and pushed up to **Active_Survey** as needed.

SEED FILES

Seed file is a term for a template. When a user selects File/New, the application makes a copy of the selected seed file, puts it in the desired folder, and the dgn is given a new name. The CTDOT Survey seed file is set to

CT_Configuration | Organization | Seed | Survey | CT_SurveySeed.dgn

This is a file with a 3D Design Model that has been assigned a default Geographic Coordinate System (GCS) of NAD 1983 State Plane Connecticut with a North American Vertical Datum of 1988 to allow interaction with geospatial applications.

For more on Seed files and GSC, please see Volume 2.

Exercise 1 – Base Survey File Creation

In this module you will learn how to access OpenrRoads Designer to create a new DGN file.

Skills Taught

- Learn how to access the Application to get the proper workspace to appear.
- Learn how to create a DGN file from the proper seed file.
- Learn how to update the Geographic Coordinate System.

1.1 Startup

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

- 1. CTDOT users should have the CTDOT CONNECT DDE synced through SharePoint with the COMPASS Project Synced along with the CAD Configuration.
- 2. Consultants should have CTDOT DDE properly installed or be syncing to the CTDOT DDE SharePoint/COMPASS system.
- 3. Make note of the Coordinate System you will be working in.
- 4. Log on to the CONNECTION Client.

Bentley Connect licensing requires users to log into their Bentley account to secure a software license. CTDOT users should log in using your CTDOT email address and Bentley password. If you do not see the dialog box, select the \land icon on the bottom Windows Screen. Click on the Connection Client Icon and select **Open.**

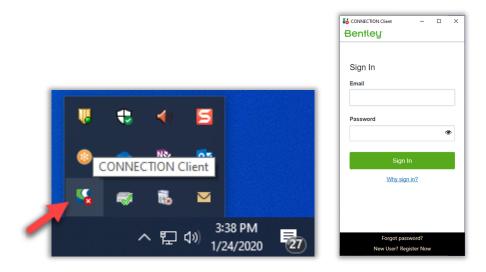
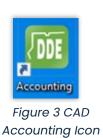


Figure 1 CONNECTION Client System tray

- 5. Launch the Application.
 - **Consultants** Start the software via an appropriate CTDOT DDE icon and skip to step 5.
 - CTDOT employees
 On your desktop double click on the
 CAD Accounting Icon.





- On the CT DOT Accounting Menu there will be several applications to pick. Select Compass OpenRoads CE.
- 7. In the *Run Program* field select the needed program, the *Available Account* (funding source) and *Resource Type*. Click on the **Start** button to load the program.

🜃 CT DOT Accounting Menu - 🗆 🗙									
File Help Debug									
Run Program:	Non-Proje	cts OpenRoads	CE 🔻	Start					
Elapsed Time:		OpenBridge CE	Â	Close					
Selected Account:	Compass	OpenBuildings C OpenRoads CE							
Frequently Used Acco	MicroStatio Non-Project	on V8i HQ cts OpenBridge (CE S						
		cts OpenBuilding cts OpenRoads (87CN-IN010					
	non-rioje.			90PE-PE01C					
				55PE-PE010 56PE-PE010					
				57PE-PE010					
				58PE-PE010					
				59PE-PE010 89PE-PE010					
				39PE-PE01C					
1		DOT57192	2-0015-03	68PE-PE01C ¥					
Clear Frequently Use	ed Accounts	, Configu	ure Locatio	on					
Resource Type:	Resource Type:								
Limit to Project #:		Filter	Sho	ow All Projects					
Instructions:									
Select a program	to run, th	en click 'Star	ť						
User: richardeh		Computer:	оот-wh	3AEC015					
Environment NewPr	oduction		-						
Process: (none)									

Figure 4 CAD Accounting dialog box

- 8. After launching the program, the following a Welcome Screen will appear.
- Ensure you are using the Custom Configuration and CT_WorkSpace, then select the relevant WorkSet and Role > Survey.

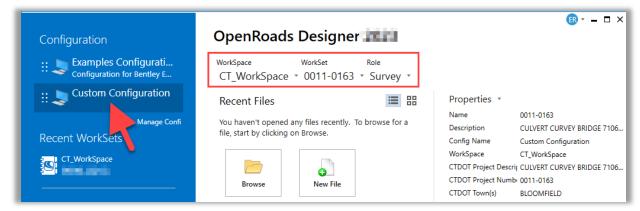


Figure 5 OpenRoads Welcome Splash Screen

If you do not see the Project Number listed, please request a Compass/CAD Setup using this link <u>New CAD Project Request</u>

1.2 Create a Design File

- 1. Select the **New File** Icon. In the New dialog box browse to the **SVY_District** folder.
- 2. The Seed file should be set to the Survey Workspace. If this is not the case, click on the **Browse** button to pick the seed file.

To select a seed file browse to:

CT_Configuration |Organization |Seed |Survey | and select: CT_SurveySeed.dgn Seed3D - CT SurveyDesign.dgn

- In the File name field enter a name for your file using the CTDOT File Naming structure. Example: SV_D2_1234_1234_Ground TOPO - Terrain.dgn
- 4. Select **Save** and the new file will open.

Note: Do not copy DGN files created with V8i SELECTseries or InRoads SS2, SS3, SS4, or SS10 to the new CTDOT CONNECT Project/WorkSet folders.

 After the DGN file is created open File Explorer and browse to the file, right click and select View online.

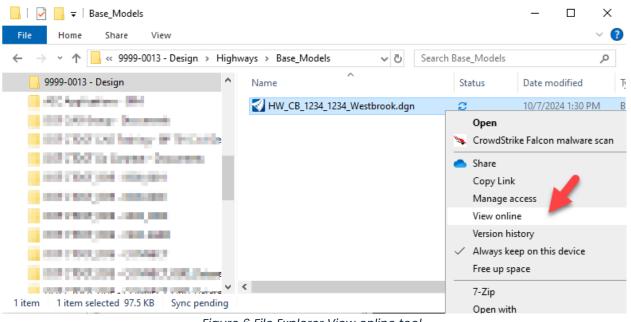


Figure 6 File Explorer View online tool

 The Projects SharePoint site will open, sort by Date, click on the three dots, select More > Check Out

Note: When you are done working on the DGN file, exit the program and go back to the SharePoint Site and **Check In** the file.

		Search this library
ŝ		
	99 9999-0013	
	+ New V 🗄 Edit in grid view 🖄 Share 👄 Copy link 🗓 Delete	\diamondsuit Pin to top $\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$
C	Design a trickense a Des Madela	Open >
€	Design > Highways > Base_Models	Preview
\oplus	⊘ Created ∨ □ Name ↑ ∨	Share ked Out To $ \lor $ Created By
	S minutes ago I: HW_CB_1234_1234_Westbrook 🖄 …	Copy link Richard, Elain
		Manage access
		lote
		Aleru
		More > Properties
		Check DocuSign Status Workflow Properties
		Get signatures with DocuSign Compliance details Workflow
		Details Check out Compliance deta
		Check in

Figure 7 SharePoint Check out

Exercise 2 – Exploring the Interface

In this module you will learn how to review and navigate the new CONNECT Edition interface, the ribbon tool bars, and review User Preferences. In this module you will also explore the Standard Survey Feature Definitions that have been set up for CTDOT.

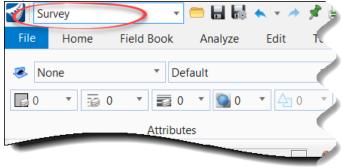
Skills Taught

- To become proficient finding needed tools in ORD.
- To become familiar with the custom CTDOT Ribbon.
- To gain a basic understanding how the User Preference Settings work.
- To become familiar with the CTDOT OpenRoads Survey Standards.

2.1 The CONNECT EDITION Interface

1. Continue in the file created in Module 1. On the pull-down menu on the top left next to the OpenRoads Icon select **Survey**, this is the Workflow Pick list.

ORD and **MicroStation CONNECT** are ribbon based. The ribbon interface is driven by workflow picklists. Different workflows contain different tab options for the ribbon. Each tab exposes specific groups and tools.





2. Select different **Tabs** and **Workflows** and notice the Ribbon change.

These Tab sets replace the Tasks that were available in **V8i.** In the image below, the Survey workflow displays a Drawing tab. The Drawing tab contains the Placement group which includes Line and Arc tools.

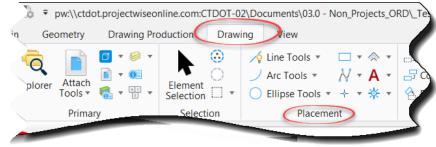
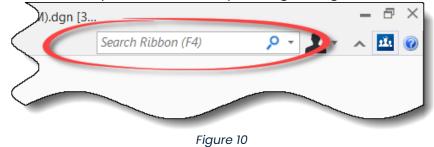


Figure 9

3. In **Search**, Type in a tool name or a portion of one and a list will pop up, select as needed. The **Search** function is very useful for initially finding dialogs, tools, etc.



2.2 User Preferences

 User settings have been moved to what is referred to as the Backstage. Access this through the main menu: *File> Settings> User> Preferences* to open the Preferences dialog box.

${igodot}$		C:\Users\richardeh\State of Conn	ecticut\DOT CTDOT_DDE - CE00-EHR0\Active_Survey\Test Fieldbook.dgn (3D - V8 DGN) - Oper
New	Settings	User Settings	
Open	User User	AccuDraw Settings	Change settings for the operation and performance of AccuDraw
Save	System (PC)	Ч Ф	
Save As	Configuration	Button Assignments	Assign key-ins and add key combinations to keyboard logical buttons
Save Settings	Conngatation		
Send Mail		Customize Ribbon	Customize the Ribbon and Quick Access Toolbar
Close			
Tools		C Explorer Settings	Change settings for browsing and managing the content within the file and linked data
Settings		FP Function Keys	Assign key-ins and add key combinations to keyboard function buttons
Properties			
Print		Gesture Assignments	Assign key-ins to gestures for touch-enabled devices
Import Export		(A)S	
Civil Tools		Keyboard Shortcuts	Assign key-ins to be executed when pressing keyboard keys while in the Home position
Publish iModel		Message Center Settings	Change settings for the display of messages in the Message Center window
Feedback		Preferences	Change preferences and settings related to how the product operates
Exit			
		Tasks	Open the Task Navigation user interface
		Tool Boxes	Open, close and customize tool boxes

Figure 11

2. On the Preferences dialog box, select **View Options**. *Check on* Scroll Bars and turn *Off* Antialias Lines and Anti-alias Text.

Veferences [Personal]	×
Category	
Database	Name for Preferences: OpenRoads User Preferences
Descartes	View Tool Box: Top
Help Settings	
Input	Scroll Bars
Language	Black Background -> White
Look and Feel	Preserve Aspect Ratio
Mouse Wheel	
Operation	Anti-alias Lines: Off Line Weights
Position Mapping	Anti-alias Text: Off
Raster Manager	And and Te <u>A</u> L
Reference	Update Refresh: 1.0
Render	Frame Rate: 5.0
Ribbon	
Spelling	Gamma Correction: 1.70
Tags	: Transparency:
Text	Dynamics: (0.25)
Update Settings	Auto-Locate: (0.65)
View Options	_
View Options - Civil	Opaque Clear
	Auto-Locate Display Thin Edges in Overlay
	No Animation On View Rotation
	Design Background:
	Drawing Background: Selection Set:
	Sheet Background:
	Focus Item Description:
	Display scroll bars in the view windows.
	Defaults OK Cancel

Figure 12

3. Explore **View Options – Civil** to view or **change civil preferences**. You can display and set point label preferences such as Number and Elevation under **Survey Decorators**.

The intent here is to standardize and automate, these options don't need to be modified but it is important to be aware of the settings. **Survey Decorators** appear the same size regardless of zoom level; however, they will resize according to the size of the view window.

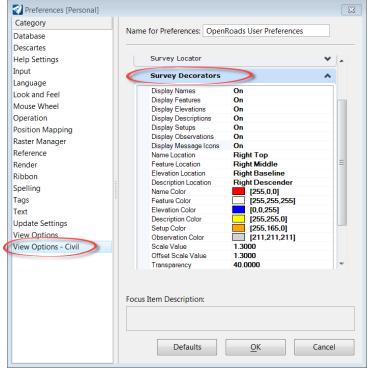


Figure 13

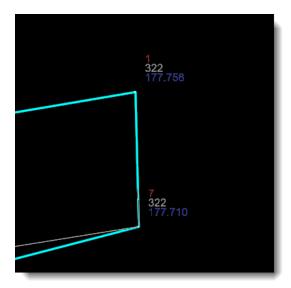
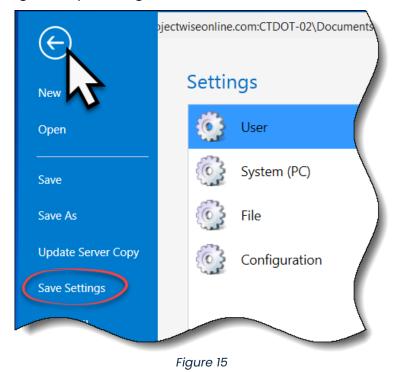


Figure 14

- 4. With the Preferences dialog still open, explore other Preferences such as **Survey Locator**.
- 5. Save settings if desired by choosing *File> Save Settings*.
- 6. Return to the design file by clicking the **back arrow**.



2.3 The Survey Ribbon

Familiarize yourself with the Survey Workflow, ensure that the ribbon Workflow is set to the **Survey.**

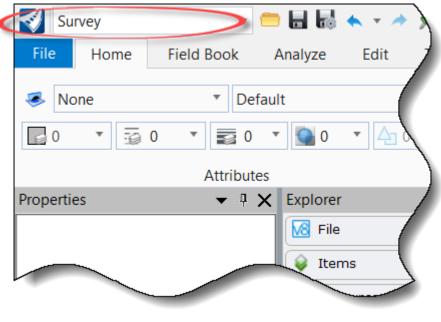


Figure 16

1. Open the Details dialog box.

(1) Click the **Field Book** tab [Note that the ribbon groups and tools are quite different from the **Home** tab].

- 2 Click **Details** to toggle Survey Details.
- 3 Drag the Details dialog box and dock on the Screen as needed.

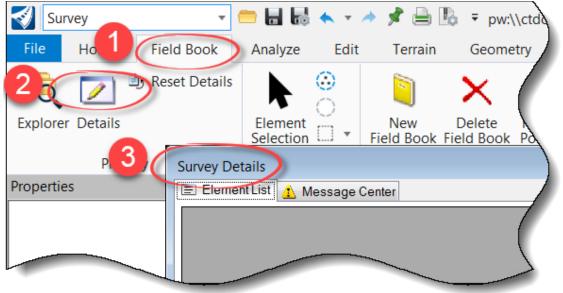


Figure 17

- 2. You may wish to open the Feature Definition toolbar.
 - 1 Begin by typing *feature* into the Ribbon Search.
 - 2 Hover over the *Feature Definition Toolbar* result.

3 Note the Survey workflow tip.

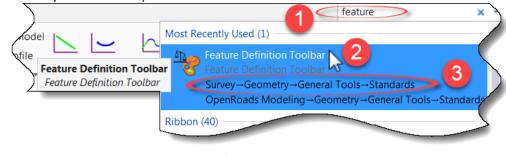
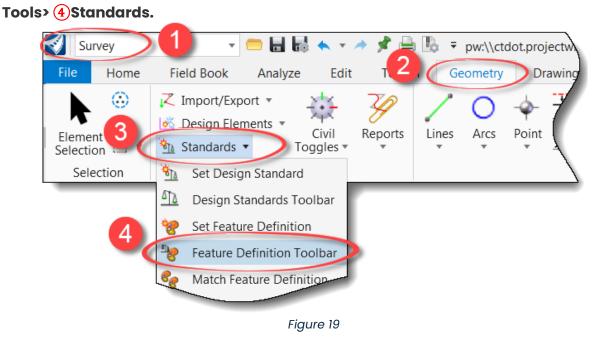


Figure 18

Options above are available to either click the (2) *Feature Definition Toolbar* result or to follow the (3) interface tip.

3. You can also find this on the Ribbon, (1)Survey> (2)Geometry> (3)General



4. Dock the resulting Feature Definition Toolbar if desired.



Figure 20

2.4 CTDOT OpenRoads Standards

Default resources are listed in the OpenRoads Standards group Libraries. If they have been changed by the user, they will become part of the design file.

1. From the **Explorer** interface, select the **OpenRoads Standards** group, expand **Standards**, and expand **Libraries**.

This may take a moment since files need to be cached.

Explorer	- # X
M File	~
📦 Items	*
Resources	*
🔮 OpenRoads Model	~
🕼 Sheet Index	1
OpenRoads Standards	
🔇 💽 🗩 📳	
Search	ዾ
Carry Standards	
Libraries	
Feature Definitions	Ι
Feature Symbologies	}
Annotation Groups	
Annotation Definitions	/
Civil Cells	
Design Standards	
Terrain Filters	
Survey Settings	
Utility Filters	
CV_ORDSeed3D_Design(adv-FT).dgn (NAD)	83 (USS

Figure 21

2. Explore **Standards** *Libraries Feature Symbologies Feature Symbology Model* (*CV_Survey_Feature_Definitions.dgnlib*).

Note the Symbology names in the right pane.

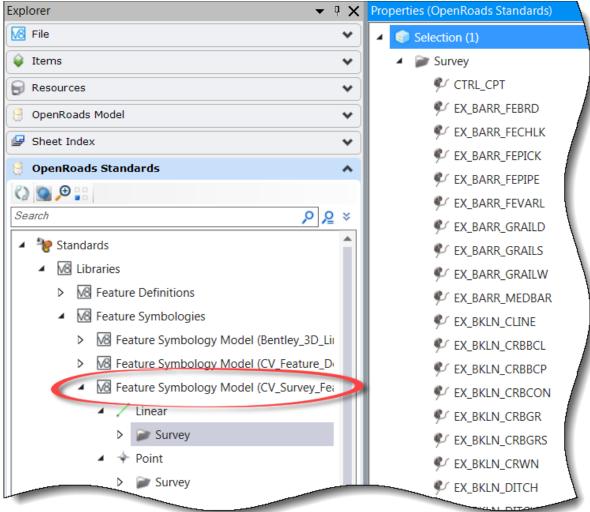


Figure 22

3. Expand Survey Settings to explore Linking Codes, etc.

[Linking Codes are further discussed in **Module 3**]

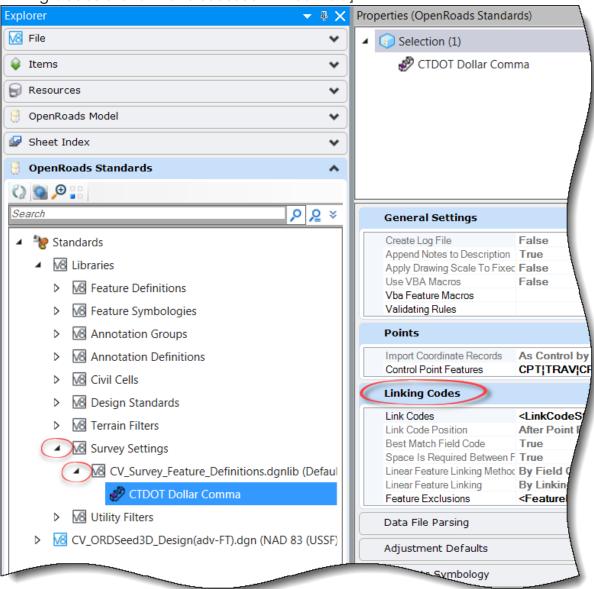


Figure 23

2.5 The CTDOT Ribbon

Tasks are no longer supported in CONNECT; therefore, AEC Applications has customized ORD with specific workflows for CTDOT users. The customized workflow is named **CTDOT**.

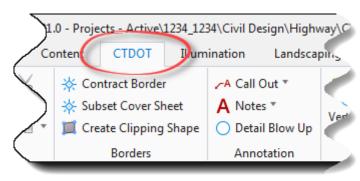
1. On the pull-down menu on the top left next to the OpenRoads Icon select **CTDOT**, this is the Workflow Pick list.



Figure 24

This Workflow contains the Tabs that will be useful for Survey:

- CTDOT
- Prop Maps
- Survey





2. The **CTDOT** tab includes a **Publishing** group. The **Publishing** group includes **Type**, **Color**, and **Print** tools.

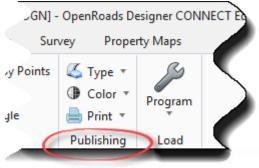


Figure 26

In this example, the *Print* tools are expanded.

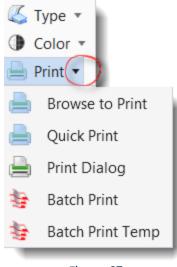


Figure 27

For further information on printing and publishing please visit CTDOT CONNECT DDE eBook Volume 014 - Publishing and Printing.

3. Select the **Survey** tab. The **Open** tools will open Cell Libraries. The **Pull Downs** will set Element Templates (Color, Weight, Line styles, and Levels) and trigger the Place Line command to activate.

🚰 CTDOT 🚽 🐼 🗧 🖶 🛃 🦓 🦘 🛪 🍂 🚔 📅 =									
File Home View Annotate Attach Analy	ze Curves Constraints	Utilities Drawing Ai	ds Content C	CTDOT Alt Detailing	Facilities H	Highway Illuminatio	n Landscaping	Survey	
Image: None ▼ Default ((none)) ▼ Image: 0 ▼ Image: 0 ▼ Image: 0 ▼	Explorer Attach Tools +	Element Selection	Open Notes Notes	Open Features Open Features	Barriers *	Roadway * Utilities * Structures * Veg * Traffic * Walks *			
Attributes	Primary	Selection Su	rvey Sheet Annotation	E	xisting Features	;			
Figure 28									

Exercise 3 – Base Survey File Set up

Once inside a MicroStation design file, there may be some initial verification/set up that could be performed for each file, such as: a default Cell Library, a default Text Style, and Drawing Scale.

Skills Taught

- Learn how to open navigate through the interface to Activate a Cell Library, set a Text Style and the Drawing Scale.
- Get familiar with the CTDOT OpenRoads Survey Standards.

3.1 Activate Cell Library

From the **CTDOT** workflow, select the **Survey** tab, in the **Existing Features** section select **Open Features**. The Cell Library **CTDOT_ORD_Features_Existing.cel** will open.

CTDOT - Mome View Ann	💌 🧰 🛃 🖬 🖍 tate Attach	Analyze	Curves	Constraints	Utilities	Drawin	g Aids	Content	CTDOT	Alt Detailing	Facilities	Highway	Illumination	Landscaping	Survey
None * Defa 0 *	ılt ((none)) ▼ 💽 0 ▼ 🚑		olorer Attach Tools *	□ •		X 00 	Oper Note	n Notes	Onen	⊘ Open Control Boundary * Breaklines *	Drainage * Barriers * Misc *	Roadway * Structures * Traffic *			
Attribute			Prima	ary	Selec	tion	Survey She	eet Annotatio	P	Đ	cisting Feature	25			



3.2 Set Text Style

You may wish to set a default text style of **CTDOT_100** for annotation. **Note:** This is no longer critical since ORD decorator text for nodes is now set in preferences.

Choose Text Styles through **Survey**> **Drawing Production**> **Text**> **Text Styles**, double click the **CTDOT_100** Text Style to activate it.

M Text Styles - CTDOT_100							
St <u>y</u> le Vi <u>e</u> w							
E - 📮 🖬 🗅 🗙 📴 🦂 .	Ą						
Text Styles	^	General Spa	acing	Under/Overline	Background	Advanced	
Sectdot_080							
SectDOT_080_Center		Font:	Ŧ	Century Gothic	-	Color:	0 🔻
CTDOT_080_Italic		Justification:	Left C	enter	-	<u>B</u> old	
CTDOT_100	=	Height:	0.008	<u>ر</u>		Italics	
SectDOT_100_Bold		Width:	0.008			Underline	
SCTDOT_100_Center	-11		_			Overline	
Section_100_Italic		Slant:	0°0'0'	·			
Sectdot_120						Fractions	
SectDOT_120_Bold						Vertical	
SCTDOT_120_Center						Full Justification	
Section_120_Italic							
Sectdot_175							
SectDOT_175_Bold					VOT	_100	
SCTDOT_200					∇		
	•		_				

Figure 30

3.3 Set the Drawing Scale

Drawing Scale can be set so that annotation is visually pleasing. It can be changed at any time.

Set the **(4)** Drawing Scale dialog box through **(1)**Survey> **(2)**Drawing> **(3)**Drawing Scales.

File 1 None	Field Book A	Analyze	_\Documents\03.	
	Trawing Pro	Element Selection	Line O Tool annotation scale	
			Measure Radius Measure Angle Measure	ACS Plane Lock

Figure 31

Exercise 4 – Processing Survey Data

In this Module, you will learn how to import an ASCII survey data file and edit the imported data.

Skills Taught

- Learn how to Import Field Data (ASCII data file).
- To become familiar with the available tools and dialog boxes.
- To become proficient editing the imported field data.

4.1 Review and Edit Data Files

Raw data and coordinate files should be reviewed and can be edited before the import in to OpenRoads. One option is to edit field files via a text editor before loading them into the field book.

Numerical order is irrelevant. The important thing is the order in how link codes define the shape.

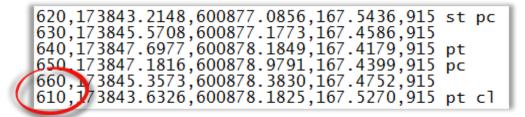


Figure 32

Additional points (i.e. Stored Points) can be entered, but ensure that they stand out from actual shots taken (i.e. Observation Points.) ORD will resolve double link codes by using an underbar and number suffix (e.g. 1018_1) so a good practice is to use a letter suffix.

```
SS,OP745,FP1014,AR351.162010,ZE89.002180,SD107.065926,--915 ST PC
SS,OP745,FP1015,AR351.114632,ZE88.585606,SD103.331517,--915
SS,OP745,FP1016,AR351.334338,ZE88.561748,SD99.367252,--915 PT
SS,OP745,FP1017,AR350.492982,ZE88.524054,SD99.078636,--915 PC
SS,OP745,FP1018,AR350.383858,ZE88.575453,SD103.593130,--915
SS,OP745,FP1018A,AR350.411248,ZE89.002503,SD107.368222,--915 PT CL
```

Figure 33

String Substitutions - ORD no longer uses multiple Linking Codes; however, double coded shots such as "**st pc**" are automatically converted through String Substitutions (e.g. "**startPC**".) CTDOT has added "**pt cl**" to simply "**cl**" behind the scenes. This allows field personnel to continue using familiar InRoads coding for the time being.

String Substitutions								
Accept New	× Delete	Paste Special I						
WholeWord	Substitute	With /						
True	1	ST						
True	6	END						
False 🤇	PT CL	CL \						
True	PCST	SC \						
True 🤇	ST PC	sc \						
True	PCPT	A2A						
True	PT PC	A2A /						
True	PC NT	NTC /						
True	NT PC	NTC /						
True	PT NT	NTT						
► True ▼	NT PT	NTT						
		\searrow						

Figure 34

720,173843.2148,600877.0856,167.5436,915 st pc
730,173845.5708,600877.1773,167.4586,915
740,173847.6977,600878.1849,167.4179,915 pt
750,173847.1816,600878.9791,167.4399,915 pc
760,173845.3573,600878.3830,167.4752,915
710,173843.6326,600878.1825,167.5270,915 pt c

Figure 35

Coming Soon - Click here for a listing of Linking and Control Survey Codes.

4.2 Create Field Book

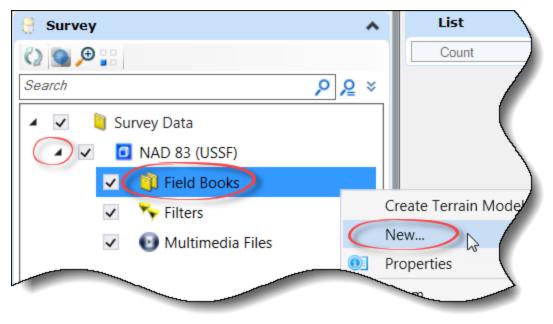
 From the Explorer interface, select the Survey group. Note: The model name, "Default" is listed as the default under Survey Data – not the design file name. This could be renamed to something more relevant such as: Terrain, Ground File, Annotation, etc.

Explorer	▼ # ×			
K File	*			
📦 Items	*			
🕞 Resources	*			
🖯 OpenRoads Model	*			
🕼 Sheet Index	*			
🖯 OpenRoads Standards	*			
Bubsurface Utilities Model	*			
Survey	^			
🔇 🕥 🗩 📑				
Search	∕⊳ פ ×			
🔺 🔽 🔋 Survey Data				
NAD 83 (USSF)				

Figure 36

- 2. Expand the model tree.
- 3. Right-click on Field Books to review the menu options.
 - **Create Terrain Model From Field** Book Selection Set Depending on your system configuration Terrain Models can be created dynamically. The benefit to this is you can see how edits affect the Terrain Model in real time (we will use this functionality later in this course). Also any additional data collected is added to the Terrain Model automatically. If you elect to turn this functionality off however, it's a simple matter to create a Terrain Model using this menu choice. You may also notice that it will use a selection set, this might be highly useful if you need a specialized Terrain Model made from certain data types or Feature Codes.

- **New** This menu choice creates a new Field Book. As noted before it's entirely up to you how many (or few) Field Books you utilize in your projects.
- **Properties** Properties will display all of the properties of a survey feature.
- **Zoom** Zoom will allow you to zoom into a specific area of data in your project. Within a large project (with several Field Books) it may be beneficial to be able to Zoom into a specific data collection session.
- **Isolate and Clear Isolate** This will modify the display to highlight specific collection sessions. Useful if you have several Field Books.
- 4. In the Survey panel, **right-click** on **Field Books** and select **New...**
- 5. On the Selecting Settings dialog select **Accept**. Note that a new drop-down arrow appears as a Field Book is added.





6. Expand Field Books.

When a new Field Book is created, it will be created under the Field Books folder with a default name of Field Book 1. To view the newly created field book you must expand the Field Books folder using the drop-down arrow next to Field Books in the Survey pane

7. Expand the newly created Field Book 1, additional Survey information will appear once data has been imported.

Under Field Books is where the survey data you import is stored. You can create the data structure to fit your operational needs.

• Do you need a single "Job" where all the collected field data is stored? You can do that.

• Do you need to separate each and every collection into it's own book? That's easy as well.

Basically, it is up to you to decide what a "Field Book" contains.

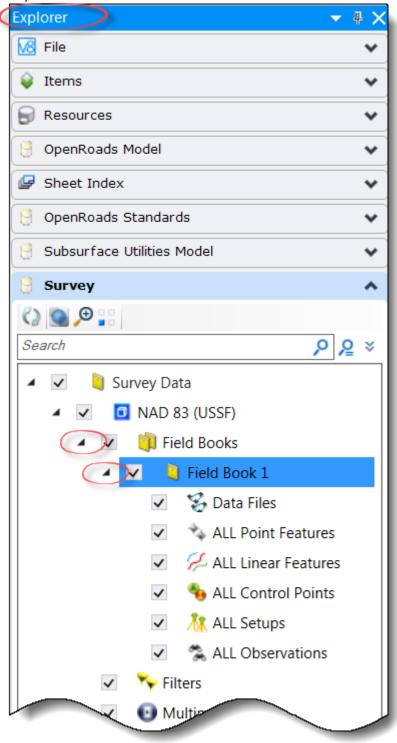


Figure 38

4.3 Rename the Field Book

- 1. Click Field Book 1 in Explorer to select its properties as shown in the previous image.
- 2. Using the Properties (Survey) interface, rename **Field Book 1** to something more appropriate if desired.

 Selection (1) Field Book 1 				
Field Book		*		
Name	Field Book 1			
Control Points	0			
Data Files	0			
Linear Features	s O			
Point Features	0			
Setup Points	0			
Observation Po	oints 0			

4.4 Import Field Data

All project field data should be stored in the COMPASS Project folder with the ground file. OpenRoads can import multiple files at once.

1. From the Explorer Survey group, right click the new field book to Import> File...

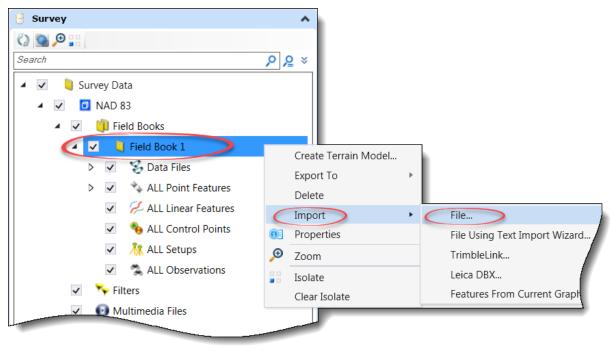


Figure 40

- 2. Browse to the field data folder in your COMPASS Project.
- 3. First select a control file if present.
- 4. Click OK. Files with an asc extension will not work.

For *.txt, use ...code or ...code, code?

5. Continue to import multiple field files to Field Book 1. You can Add them or simply click OK.

At this point it's important to mention that all of the resulting survey data is contained within the DGN file. There are no external files and no need to ensure synchronization between the "data" and the resulting graphics or terrain. The resulting graphic elements contain the "intelligence" and "know" certain survey properties such as Terrain Model attribute (Spot, Break, None) how they should display and other properties that used to be controlled by multiple external files. As you will shortly see this is very powerful and makes editing data very intuitive and the resulting changes are seen in real-time as the graphics update. However, sometimes this does necessitate a different mindset. Such as, to make changes to

the Terrain Model best practice would be to edit the terrain properties of the point rather than the resulting "Triangles".

6. Review the imported survey data. Use the Fit View tool to see the results.

4.5 Address Duplicate Points

Address duplicate points using the ①"Differences" tab if necessary.

NOTE: I have been selecting the (2) "Skip" option, but this may need to be addressed further. In this example, the Control file information was brought in first and should take precedence. (3) Apply All.

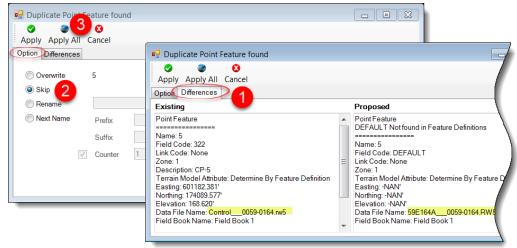


Figure 41

The field book tree is now populated.

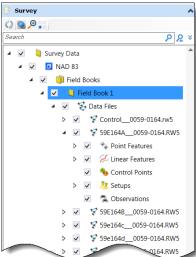


Figure 42

4.6 View Options

4.6.1 Examine Survey Features

In this section, you will examine Survey Features.

1. Fit View. All Observations and Triangles are displayed by default.

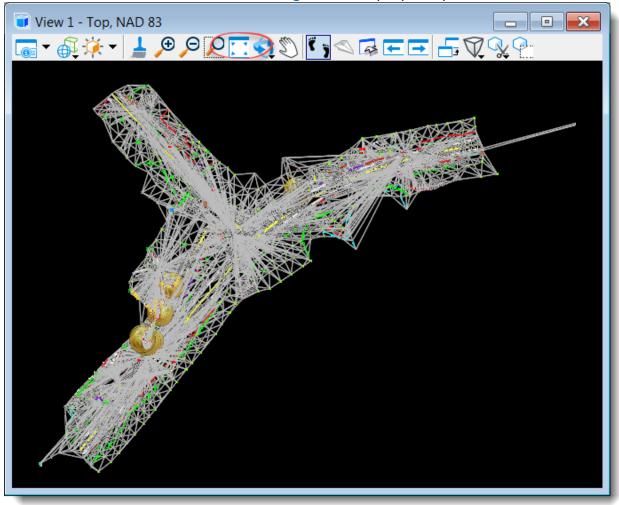


Figure 43

2. You may toggle off All Observations through Explorer if desired.

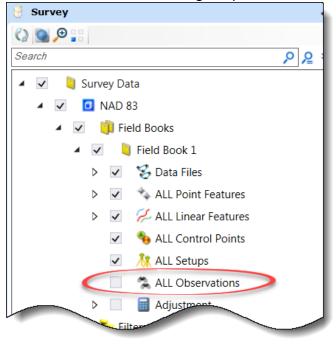


Figure 44

- 3. Zoom into the view.
- 4. Use Element Selection to click and highlight the Terrain Model outer boundary.

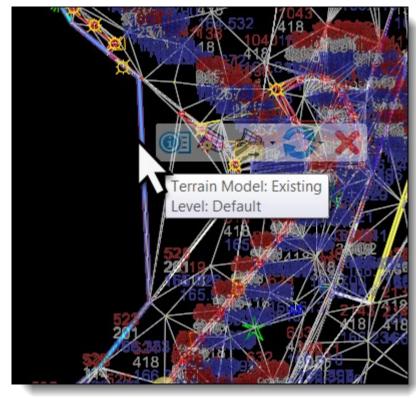


Figure 45

5. Toggle displays such as Triangles by double clicking the **Off** or **On** through **Properties**. The display immediately changes.

Feature Information Extended Extended Event Contours Information Edge Method Edge Method Features Source Source Source Features Source Source Source Features Source Source Source Features Source Features Source Features Source Source Source Features Source Source Source Features Source Source Features Source Source<	Properties 🔹 🖣 🗙					
Calculated Features Source Features Survey Generated General Element Description Terrain Model: Existing Name Terrain Model: Existing Level Default Color 0 Line Style 0 O Class Primary Template (None) Transparency 0 Extended ✓ Feature ✓ Information ✓ Edge Method ✓ Major Contours Off Minor Contours Off Triangles Off Spots Off Flow Arrows Off Low Points Off Breaklines Off Breaklines Off Inported Contours Off Inported Contours Off Holes Off Voids Off	4	C Elements (1)				
Source Features Survey Generated Ceneral Element Description Terrain Model: Existing Name Terrain Model: Existing Level Default Color 0 Line Style 0 Weight 0 Class Primary Template (None) Transparency 0 Extended V Feature V Information Edge Method V Galculated Features Display Major Contours Off Minor Contours Off Spots Off Low Points Off Breaklines Off Breaklines Off Inported Contours Off Holes Off Holes Off Voids		🔺 👰 Terrain Model: Existing				
Survey Generated Ceneral Element Description Terrain Model: Existing Level Default Color 0 Line Style 0 Class Primary Template (None) Transparency Extended Extended Edge Method Calculated Features Display Major Contours Off Minor Contours Off Spots Off Flow Arrows Off Low Points Off Breaklines Off Ilands O		A Calculated Features				
General Element Description Terrain Model: Existing Name Terrain Model: Existing Level Default Color 0 Line Style 0 Weight 0 Class Primary Template (None) Transparency 0 Extended Feature Information Edge Method Major Contours Off Mojor Contours Off Spots Off Flow Arrows Off Source Features Display Source Features Display Breaklines Off Broaklines Off Imported Contours Off Imported Contours Off Islands Off Holes Off Voids Off		> 🔌 Source Fea	tures			
Element Description Terrain Model: Existing Name Terrain Model: Existing Level Default Color 0 Line Style 0 Weight 0 Class Primary Template (None) Transparency 0 Extended ✓ Feature ✓ Information ✓ Edge Method ✓ Major Contours Off Minor Contours Off Minor Contours Off Flow Arrows Off Low Points Off High Points Off Breaklines Off Breaklines Off Imported Contours Off Insol ✓ Kource Features Display And Source		🗮 Survey Ger	nerated			
Name Terrain Model: Existing Level Default Color 0 Line Style 0 Weight 0 Class Primary Template (None) Transparency 0 Extended ✓ Feature ✓ Information ✓ Edge Method ✓ Major Contours Off Minor Contours Off Minor Contours Off Spots Off Flow Arrows Off Jopts Off Breaklines Off Boundary Off Imported Contours Off Imported Contours Off Holes Off Joundary Off Joids Off		General		^		
Name Terrain Model: Existing Level Default Color 0 Line Style 0 Weight 0 Class Primary Template (None) Transparency 0 Extended ✓ Feature ✓ Information ✓ Edge Method ✓ Major Contours Off Minor Contours Off Minor Contours Off Spots Off Flow Arrows Off Jopts Off Breaklines Off Breaklines Off Imported Contours Off High Points Off Jopts Off Jopts Off Jopted Contours Off Jinported Contours Off Jopted Contours Off Jopte		Element Description	Terrain Model: Existing			
Level Default Color 0 Line Style 0 Weight 0 Class Primary Template (None) Transparency 0 Extended ✓ Feature ✓ Information ✓ Edge Method ✓ Calculated Features Display ▲ Major Contours Off Minor Contours Off Flow Arrows Off Low Points Off High Points Off Breaklines Off Boundary Off Imported Contours Off Holes Off Voids Off						
Line Style 0 Weight 0 Class Primary Template (None) Transparency 0 Extended Feature Information Edge Method Calculated Features Display Major Contours Off Minor Contours Off Minor Contours Off Flow Arrows Off Low Points Off High Points Off Boundary Off Islands Off Holes Off Holes Off Voids Off		Level				
Weight 0 Class Primary Template (None) Transparency 0 Extended Feature Information Edge Method Calculated Features Display Major Contours Off Minor Contours Off Spots Off Flow Arrows Off Low Points Off Breaklines Off Breaklines Off Boundary Off Imported Contours Off Holes Off Voids Off		Color	0			
Class Primary Template (None) Transparency 0 Extended Feature Information Edge Method Calculated Features Display Major Contours Off Minor Contours Off Triangles Off Sots Off Flow Arrows Off Low Points Off High Points Off Breaklines Off Boundary Off Imported Contours Off Islands Off Holes Off Voids Off		Line Style	0			
Template (None) Transparency 0 Extended Extended Feature Information Edge Method Calculated Features Display Major Contours Off Minor Contours Off Triangles Off Spots Off Flow Arrows Off Low Points Off Breaklines Off Breaklines Off Imported Contours Off Islands Off Holes Off Voids Off						
Transparency 0 Extended Information Feature Information Edge Method Edge Method Calculated Features Display Image: Calculated Features Display Major Contours Off Minor Contours Off Spots Off Flow Arrows Off Low Points Off Breaklines Off Breaklines Off Imported Contours Off Islands Off Holes Off Voids Off		Class	Primary			
Extended Image: Second Sec		Template	(None)			
Feature Information Information Edge Method Edge Method Calculated Features Display Major Contours Off Minor Contours Off Triangles Off Spots Off Flow Arrows Off Low Points Off Breaklines Off Breaklines Off Imported Contours Off Imported Contours Off Voids Off		Transparency	0			
Information Edge Method Calculated Features Display Major Contours Off Minor Contours Off Spots Off Spots Flow Arrows Off Low Points Off High Points Source Features Display Breaklines Off Imported Contours Off Holes Off Voids		Extended		*		
Edge Method Calculated Features Display Major Contours Off Minor Contours Off Triangles Off Spots Off Flow Arrows Off Low Points Off High Points Off Breaklines Off Imported Contours Off Islands Off Holes Off Voids Off		Feature		*		
Calculated Features Display Major Contours Off Minor Contours Off Triangles Off Spots Off Flow Arrows Off Low Points Off High Points Off Breaklines Off Breaklines Off Imported Contours Off Holes Off Voids Off		Information		*		
Major Contours Off Minor Contours Off Triangles Off Spots Off Flow Arrows Off Low Points Off High Points Off Breaklines Off Breaklines Off Imported Contours Off Islands Off Voids Off		Edge Method				
Minor Contours Off Triangles Off Spots Off Flow Arrows Off Low Points Off High Points Off Breaklines Off Breaklines Off Imported Contours Off Islands Off Voids Off		Calculated Features Display				
Triangles Off Spots Off Flow Arrows Off Low Points Off High Points Off Source Features Display Image: Contour source of features of fea		Major Contours	Off			
Spots Off Flow Arrows Off Low Points Off High Points Off Source Features Display Breaklines Off Boundary Off Imported Contours Off Islands Off Holes Off Voids Off		Minor Contours	Off			
Flow Arrows Off Low Points Off High Points Off Source Features Display Breaklines Off Boundary Off Imported Contours Off Islands Off Holes Off Voids Off 		Triangles				
Low Points Off High Points Off Source Features Display Image: Constraint of the state of the st						
High Points Off Source Features Display Image: Constraint of the state of the s						
Source Features Display Breaklines Off Boundary Off Imported Contours Off Islands Off Holes Off Voids Off						
Breaklines Off Boundary Off Imported Contours Off Islands Off Holes Off Voids Off		High Points	Off			
BoundaryOffImported ContoursOffIslandsOffHolesOffVoidsOff		Source Features Display				
Boundary Off Imported Contours Off Islands Off Holes Off Voids Off		Breaklines	Off			
Imported Contours Off Islands Off Holes Off Voids Off						
Islands Off Holes Off Voids Off						
Voids Off						
		Holes	Off			
Feature Spots Off		Voids	Off			
		Feature Spots	Off			

Figure 46

4.6.2 Decorations

In this section, you will become familiar with decorations. Decorations provide surveyors a quick display tool to access vital survey point information. They can be utilized during the quality control process and differ from the annotation tools which place permanent labels in the project.

1. Change the active tab from Home to Analyze.

Note the Decorations section of the menu, these tools control the display of survey data such as the survey point Names, Field Codes, Elevations, Descriptions, Setups, Observations and Icons. All of these tools function as **ON/OFF** display toggles.

- 2. In the **Decorations** section of the ribbon, *left-click* on the Names tool and notice that the point names disappear. Left-click on Names again and the display returns.
- 3. Display the Field Codes and Elevations.

In the **Decorations** section of the ribbon, *left-click* Field Codes to display the feature codes.

Left-click Elevations, to display the elevations of the survey points. The display properties of the Decorations can be configured from the Back Stage view.

Select File to get to the back stage and then select Settings > User > Preferences > View
 Options - Civil > Survey Decorators. The Colors have been set up to follow standards
 and should not be changed.

Click **OK** to accept any changes and return to the drawing view and note the changes.

4.7 Process Survey Data

Be aware that any editing after this point will become self-contained in the MicroStation file, and there presently is not an option to export the edited field book.

4.7.1 Survey Details Reminder

- 1. Display **Survey Details** if not already.
- 2. Click All Observations to list them.

xplorer	👻 🖣 🗙 Pr	operties (Survey)			▼ ‡	X View 1	- Ton
🔀 File	*	Selection (1	.)				
	Survey Details	>					
G Resources	😑 Element List 👍	Message Center					
🖯 OpenRoads Model	Name	Field Code	LinkCode	Zone	Description	Terrain Mod	Att
Sheet Index	676_1	915	None	1		Determine By	
OpenRoads Standards	676	NTC	None	1		Determine By	
Subsurface Utilities Model	677	915	Close	1		Determine By	
Survey	678	915	Start	1		Determine By	
	679	915	None	1		Determine By	
Search	680	915	None	1		Determine By	
	681	915	Close	1		Determine By	
 Survey Data NAD 83 	682	915	Start	1		Determine By	
 NAD 83 Field Books 	683	915	None	1		Determine By	
Field Books Field Book 1	684	915	None	1		Determine By	
Note Files	685	915	Close	1		Determine By	
 ALL Point Features 	686	915	Start	1		Determine By	
ALL Linear Features	687	915	None	1		Determine By	
ALL Control Points	688	915	None	1		Determine By	1
ALL Setups	689	915	Close	1		Determine By	T
ALL Observations	690	915	Start	1		Determine By	
Adjustment	691	915	None	1		Determine By	
	692					Determine Burn	

Figure 47

4.7.2 Review Flags and Messages

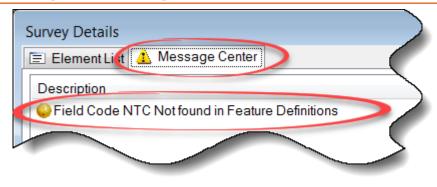


Figure 48

Points in question are also flagged by a **Survey Locator**.

Re: NTC - it's CASE SENSITIVE - see substitutions email!

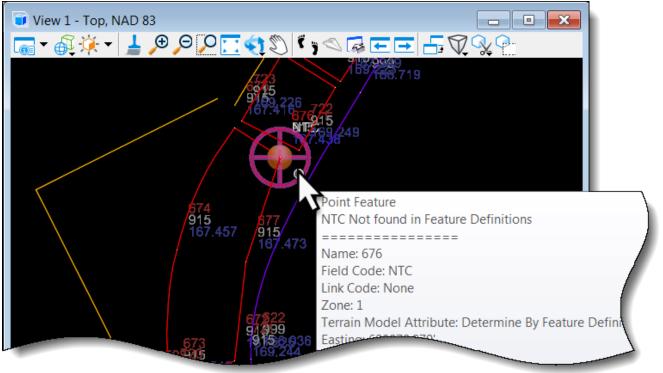
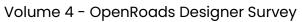


Figure 49

- 1. Hover over one of the points to display information about it.
- 2. Click the Message Center tab to view notifications.
- 3. Right click the far left empty column or double click within each field of the row of the **Survey Details** to **Edit selected items**.



	ement List 🛕 N	lessage Center							
	Name	Field Code	Link	cCode	2	Zone	Descrip	tion	Terrain Mod
	675	915	ArcF	т	1				Determine By
	676_1	915	Non	е	1				Determine
•	 Edit selecte 	ed items.	<u> </u>	2	Name	2		•	Determine
	View		•	1	Field	Code		۰L	Determine B
3	Selection		•	1	LinkCo	ode			Determine By
Z	Report on a	selected items.		1	Zone			•	Determine By
_		ected items.		1		iption		• [Determine By
	Reset Deta	als als	CIOS	1		n Model Att utes Pair	ribute		Determine By
	682	915	Start	-		ol Codes		•	Determine
	683	915	Non	1	Instru	ment Orienta	ation	•	Determine
	CO4	915	Non	1	Set N	umber	-	•	Determine B

Figure 50

	ey Details	à 14		Ot			
	lement List				LinkCode	7	
	Name	1	Field (Jode		Zone	
	664	(NTC	J.	None	1	
	665		915		Close	1	
	666		915		Start	1	
hand			915				

Figure 51

4.7.3 Heads-Up Editing

- 1. Use **Element Selection** to select feature.
- 2. Hover over the selection for the Heads-up Tools to appear.



Figure 52

3. Move the cursor over the Heads-up Tools to select a tool.

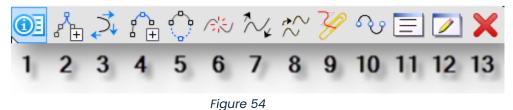
Point feature tool choices are as follows:



rigu

- 1. Properties
- 2. New Point Feature
- 3. Turn on/off All Annotations
- 4. Report
- 5. Create Control Point
- 6. Edit Observations
- 7. Delete

Linear feature tool choices are as follows:



- 1. Properties
- 2. Append Point In Linear Feature
- 3. Move Point Along Linear Feature
- 4. Insert Point In Linear Feature
- 5. Close Linear Feature
- 6. Break Linear Feature
- 7. Transpose Linear Feature Changes linestyle direction
- 8. Move Linear Feature
- 9. Report
- 10. Convert to Point List Linear Feature
- 11. Manage Point List
- 12. Edit Point Features
- 13. Delete

4.7.4 Survey Codes

Linking Codes - Linking Codes is a way to connect features in the field. They are placed after Feature Codes. Some have been customized to avoid conflicts with feature codes.

HinkCodes			×
) 😑 se Exclude	ोर Reset
Use	LinkCode	Alpha	Numeric
True	None	None	0
True	Start	ST	1
True	StartPC	SC	-1
True	ArcPC	PC	3
True	NonTanPC	NT	8
True	ArcSingle	SPC	-1
True	ArcToArc 🤇	A2A	-1
True	NonTanPT	NTT	-1
True	ArcPT	PT	4
True	ArcToggle	OC*	-1
True	End	END	-1
True	CloseShape	CLSR	7
True	Close	CL	2
True	CircleDiame	CD*	-1
True	CircleRadiu 🤇	RAD*	-1
True	RectangleW	R	-1
True	TapeDistan	DIST	-1
True	JoinPoint	JPT	-1
True	NewTempla	TMPL	-1
True	Elevation	LV*	-1
True	UpDown 🤇	UP*	-1
True	LeftRight	LR*	-1
True	FrontBack 🔇	FR*	-1
True	AttributeNa	AN*	-1
True	AttributeVal	AV*	-1
True	AttributeArr	AA*	-1
True	Terrain Mod	RND	6
True	Terrain Mod	DNC	5
True	Terrain Mod	DB*	-1
True	Terrain Mod	DNC	-1

Figure 55



Figure 56

Control Codes – Control Codes can be used to draw additional planimetrics for circles, rectangles, and lines; and can also modify a location.

Control Codes	Alpha	Description
		draws a circle of specified diameter around this point
CircleDiameter	CD*	(must be within Linear Feature)
		draws a circle with specified radius around this point
CircleRadius	CR*	(must be within Linear Feature)
		draws a rectangle from two points and specified width
RectangleWidth	RECT	(must be within Linear Feature)
		applies field measured distances to the Linear
		Feature. All measurements are applied 90 degrees
		from previous segment. Positive values turn right, and
		negative values turn left. (must be within Linear
TapeDistance	DIST	Feature)
		joins this point to specified point name
JoinPoint	JPT	(does NOT have to be in linear feature)
		same as InRoads TMPL Consecutive Start codes will
		get this linear feature paralleled and translated based
NewTemplate	TMPL	off of initial points
Elevation	LV*	sets the Elevation of this point
		changes final elevation coordinate of point by value
UpDown	UD*	entered
1.65.1.		changes final coordinate of point by adjusting left (-) or
LeftRight	LR*	right (+) of measured observation by value entered
	584	changes final coordinate of point by adding or
FrontBack	FB*	subtracting a distance from the measured distance
A 10 11 11 11 11		one method of getting attributes for a point (pairs with
AttributeName	AN*	Value)
A		one method of getting attributes for a point (pairs with
AttributeValue	AV*	Name)
Attaile to America		one method of getting attributes for a point (Names
AttributeArray	DS*	and Value in array)
TerrainSpot		include in DTM as spot
TerrainNoSpot	DB*	do not Include in DTM
TerrainBreak	DX*	include in DTM as break
TerrainNoBreak	DNC	do not include in DTM

You are able to use a JPT code **from a line** see below.

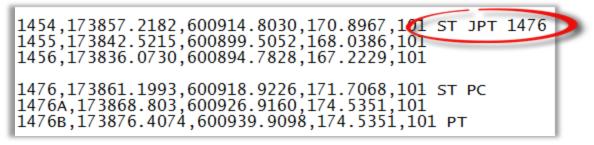


Figure 58

You are able to use a JPT code **from a line** but **not from a pc** see below.

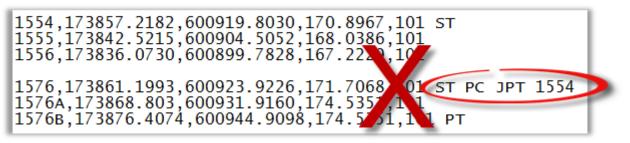
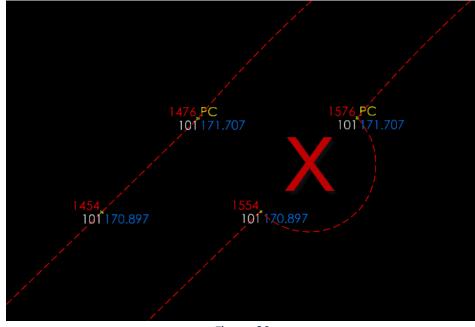


Figure 59

The following demonstrates results from each of these examples:



Exercise 5 – Processing Terrain Data

In this module you will learn how to view element that make up a terrain. You will also learn how to edit the terrain, by adding brake lines, void regions and an exterior boundary.

Skills Taught

- To become proficient with the terrain viewing and editing tools and option.
- To become familiar with the CTDOT Standards set up for Terrains.

Terrain Attribute Descriptions

- Not Set
- Determine By Feature Definition
- Do Not Include
- **Break Line** Breaks are used to designate linear features such as edges of pavement, ditch bottoms, ridges, etc. where an abrupt change of slope occurs. Any longitudinal element may be defined as a break line. Triangles will not cross a break line in the terrain model.
- **Soft Break Line** A soft break line is a break line; however, if it crosses a break line, it will not affect the triangulation and is ignored.
- Boundary The external boundary of the surface.
- **Drape Boundary** A surface boundary that determines its elevations by draping on the underlying surface.
- **Void** An area defined by a closed shape that demarcates a region of missing data or obscure areas. No point or break data located within the void area is utilized and no triangles are created inside the void areas. The Void coordinates are included in the triangulation and void lines between successive void coordinates are inserted as drape lines on the surface; therefore, they do not change the slope or elevations of the surface.
- **Drape Void** An area defined by a closed shape that demarcates a region of missing data or obscure areas. No point or break data located within the void area is utilized and no triangles are created inside the void areas. In the drape void, the void coordinates are not included in the triangulation. Voids are inserted post triangulation. The void coordinates and lines are draped on the terrain model surface. Even though a user must provide an elevation for Drape Void vertices, the user elevations are changed to the elevation of the terrain model surface at the XY Drape Void coordinate position.
- **Break Void** An area defined by a closed shape that demarcates a region of missing data or obscure areas. No point or break data located within the void area is utilized and no triangles are created inside the void areas. It differs from Voids and Drape Voids in that it

utilizes the vertex elevations of the graphical element, while the void lines between successive void coordinates are inserted as break lines; therefore, break voids change the slope and elevations of the surface.

- **Island** An area defined by a closed shape that demarcates a region of data wholly within a void. Example, islands in the middle of rivers, lakes, etcetera.
- **Contour -** Element or set of elements of the same elevation. Contours may be used as source data to generate a terrain model or may be computed (drawn based on terrain model). Contour interval is the elevation difference between two adjacent contours.
- **Hole** An area defined by a closed shape that demarcates a region where the current terrain is ignored, and the underlying terrain is utilized.

5.1 View Settings: Triangles/Contours

Breaklines and points can be edited to change their terrain model attributes; however, terrain commands such as deleting triangles will not work until Survey Processing Rules are deactivated.

Contour and triangle appearances are set by a template. To change their appearance to the familiar orange triangles:

- 1. Select the Boundary element using Element Selection.
- 2. From the Properties dialog, click Terrain Model: Existing Template.
- 3. Choose Template> Existing Terrain> Existing Contours and Triangles.

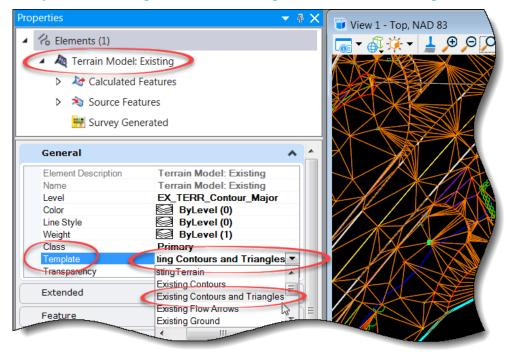


Figure 61

 CTDOT will add more predefined choices based on District Survey input; however, the contour interval in the active file can be changed. Choose *Template> Existing Terrain> Existing Contours and Triangles> Manage Templates.*

General	^ <u>^</u>
Element Description	Terrain Model: Existing
Name	Terrain Model: Existing
Level	EX_TERR_Contour_Major
Color	ByLevel (0)
Line Style	ByLevel (0)
Weight	ByLevel (1)
Class	Primary
Template	ting Contours and Triangles 💌 🚊
Transparency	stingTerrain
	Existing Contours
	Existing Contours and Triangles
	Existing Flow Arrows
	Existing Ground
C	Manage Templates
	13

Figure 62

- 5. Click the active file.
- 6. Expand Existing Terrain.
- 7. Click Existing Contours and Triangles.

	CalculatedFeatureSet	tings 🔹 🔨
⊿	Contours	
	MaxSlopeOption	None
	MaxSlopeValue	0.0000
	ContourLabelPrecision	2
	SmoothingFactor	10
	Smoothing	Vortex
	MajorInterval	5.000'
	MinorInterval	5.000'
	MinorContours	
	MajorContours	
⊳	Triangles	
⊳	TriangleVertices	
⊳	FlowArrows	
\triangleright	LowPoints	
\triangleright	HighPoints	

Figure 63

8. It the default Minor Interval of "5" is not desirable double click the value of "5" and enter "1"

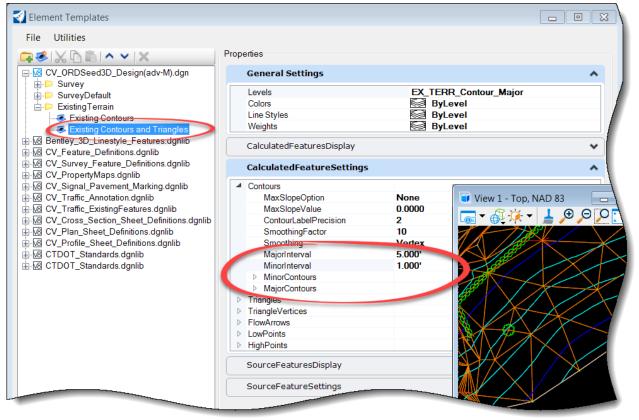


Figure 64

If contours do not appear correct, Choose Existing Terrain> Existing Contours and delete.

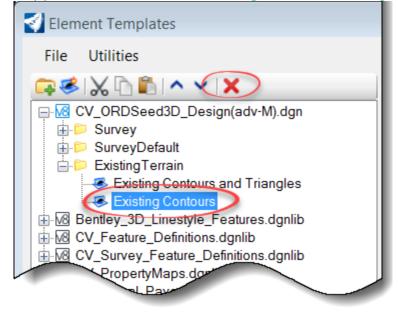


Figure 65

5.2 Inspect Contours

- 5.2.1 Top View Hi Spots or Depressions
- 1. Visually inspect for abnormalities in top view.

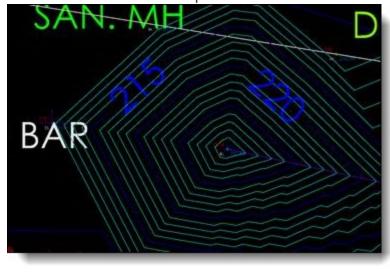


Figure 66

2. Use the tools at the top of the view window to zoom, fit, and pan.

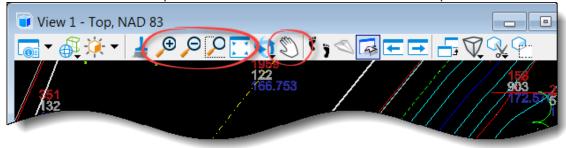
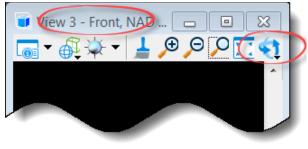


Figure 67

3. Edit features if necessary, through Survey Details.

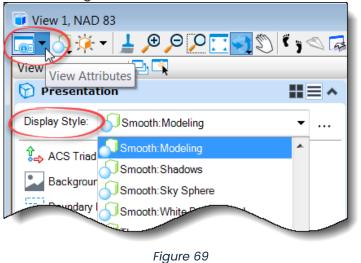
5.2.2 Front View Spikes

1. Visually inspect for vertical abnormalities in front view. Rotate the view using the View Rotation tool.





2. Render the view through View Attributes. Try different Display Styles such as Smooth: Modeling or Thematic: Height.



3. You can also use isometric views for inspection.

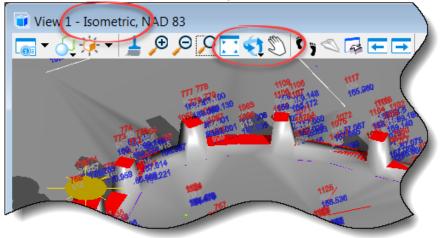


Figure 70

5.3 Process Terrain Features

5.3.1 Edit Terrain Model Attributes

Change the Terrain Model Attributes of an existing feature. In this example, we will modify a linear feature since it contains both a line and point elements.

1. Use Element Selection to select the linear feature.



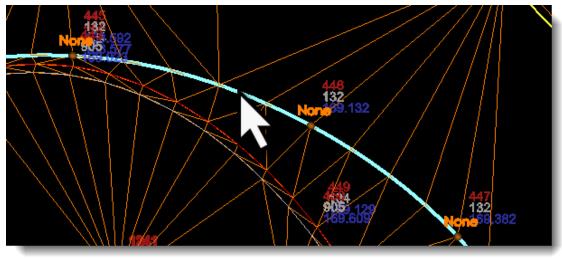


Figure 72

2. Use the **Heads-up tool** to click **Edit Point Features**.





Survey Details now reflects the elements of the selected Linear Feature.

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Name	Display	Field Code	Link C	Zone	D	Terrain Model Attribute	Attributes
420	True	132	Start	1		Determine By Feature Definition	
427	True	132	None	1		Determine By Feature Definition	
435	True	132	ArcPC	1		Determine By Feature Definition	
440	True	132	None	1		Determine By Feature Definition	
445	True	132	None	1		Determine By Feature Definition	
446	True	132	None	1		Determine By Feature Definition	
447	True	132	None	1		Determine By Feature Definition	
448	True	132	None	1		Determine By Feature Definition	



3. Click the Terrain Model Attribute column header.

4. Right Click to Edit.

Survey Details

	lement List		1			_				
	Name	Display	Field Code	Link C	Zone	0	Terrain Model Attribute	D		
•	420	True	132	Start	1		Determine By Feature Def	Ź↓ Z↓	Sort Ascending Sort Descending	
	427	True	132	None	1		Determine By Feature Def	A 🕈	Custom Sorting	
	435	True	132	ArcPC	1		Determine By Feature Def		Rename	
	440	True	132	None	1		Determine By Feature Def		Show Columns	•
	445	True	132	None	1		Determine By Feature Def		Freeze This Column	
	446	True	132	None	1		Determine By Feature Def		Alignment	•
	447	True	132	None	1		Determine By Feature Def.		Edit	25
	448	True	132	None	1		Determine By Feature Def	⊟øi A_B	Find Replace	



5. Choose the desired property value (in this case, Do Not Include) from the drop-down list and click **OK.** This changes all Point Features that made up the line, but not the Linear Feature itself.

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Edit Property Value	×
Terrain Model Attribute	Do Not Include
	NotSet
	Determine By Feature Definition
	Do Not Include
	Spot
	OK Cancel



6. To change the **Terrain Model Attribute** of the Linear Feature, use the **Properties** dialog. From **Terrain Model** Attribute, choose **Do Not Include** from drop down.

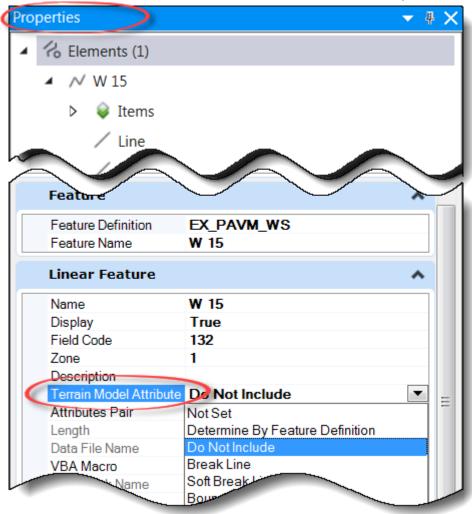


Figure 77

Triangles no longer include the edited Linear Feature.

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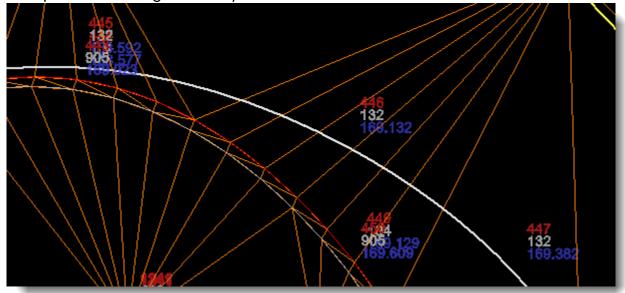


Figure 78

5.4 Add Break Lines

5.4.1 Add newly drawn 3D Linear Feature

- 1. To include a newly drawn 3D Linear Feature as a Break Line. Choose *Explorer*> *Survey*> *All Linear Features*
- 2. Right click to Add Graphic Linear feature.

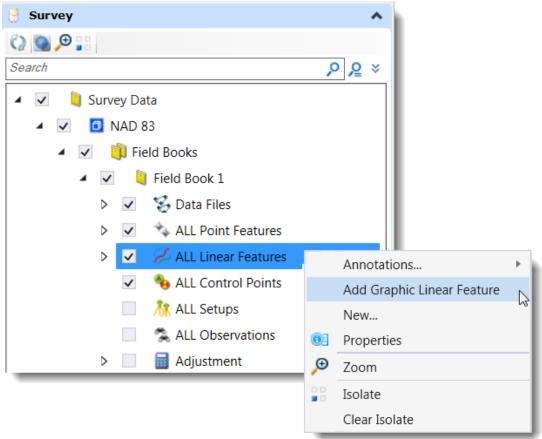


Figure 79

- 3. Select the newly drawn line when prompted.
- 4. Accept it and the re-triangulated view automatically refreshes.

5. From the model tree, click the newly added line, named Default. This is listed at the bottom of All Linear Features.

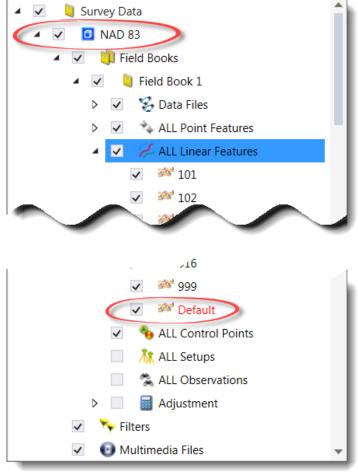


Figure 80

6. Change the field code in Survey Details.

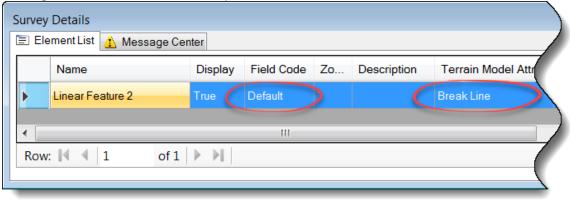


Figure 81

7. Change the Terrain Model Attribute to Determine by Feature Definition.

5.4.2 Delete Break Lines

- 1. To physically delete an existing linear feature. Select the feature using Element Selection.
- 2. Select all rows of the feature from Survey Detail to confirm.
- 3. Right click **Delete selected items**.

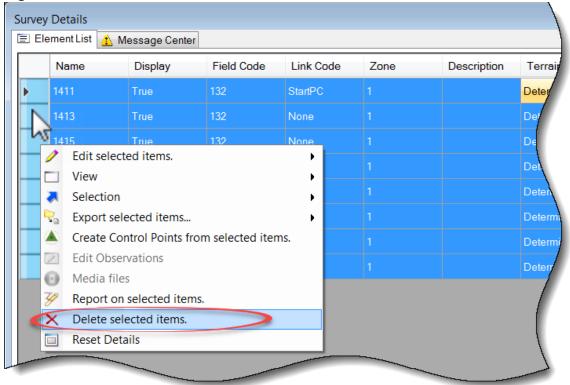


Figure 82

5.5 Add or Delete Void Regions

To add or delete a void region, or to change the Terrain Model Attribute, follow the same process for Break Lines. What follows the pull-down options is a listing of Terrain Model Attributes and their descriptions.





5.6 Fix Crossing Break Lines

Crossing break lines can be checked each time individual raw data file are processed. Choose the Report Crossing Features tool.

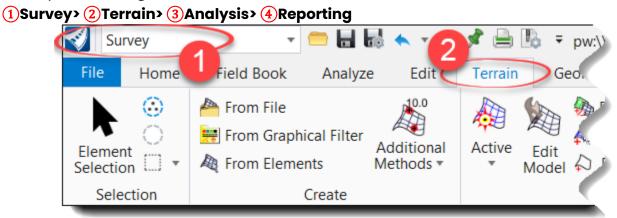
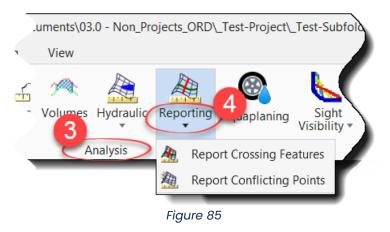


Figure 84



5.7 Edit Triangles

In order to edit triangles, etc., the terrain model must be made editable. This is done by deactivating survey processing through the **Survey** tree - <u>not</u> through the **OpenRoads Model** tree.

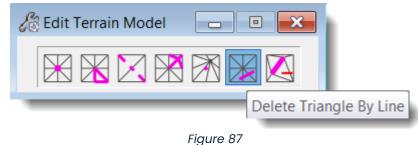
5.7.1 Deactivate Survey Processing

- 1. Choose Explorer> Survey> active model (e.g. NAD 83).
- 2. Right click the *active model* to **Deactivate Survey Processing Rules.**

Explorer	
M8 File	◆
📦 Items	►
🗑 Resources	◆
🤤 OpenRoads Model	◆
🕼 Sheet Index	◆
🤤 OpenRoads Standards	◆
🔋 Subsurface Utilities Model	◆
C Survey	^
🔇 💁 🗩 👬	
Search	× <u>م</u>
🔺 🔽 🔋 Survey Data	
✓ ☑ NAD 83	Deactivate Survey Processing Rules
▲ ✓ 🎒 Field Books	Hide Message Icons
Field P	Hide Names
	Ve Features
	Figure 86

5.7.2 Edit Triangle Tools

- 1. Use **Element Selection** to select the Terrain Model.
- 2. From the ribbon, choose *Survey> Terrain> Edit Model*, the Edit Terrain Model tools appear.



3. Edit Terrain Model choices are as follows:

It is recommended that when using Delete Triangle By Line, the user delete the outermost segment of the triangle and begin drawing the line from the outside of the perimeter inward.



5.8 Create Outer Boundary

1. The displayed boundary is not really an exterior boundary - it's merely a perimeter. Select the **perimeter** to highlight and verify it.

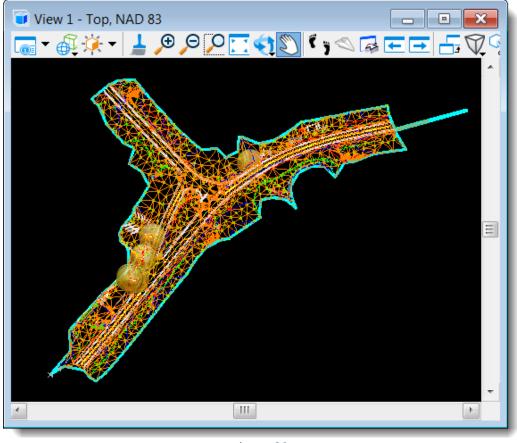


Figure 89

2. Create a graphic element to represent current triangulation limits. From the **Survey** workflow, choose *Terrain Boundary Options Add Boundary*.

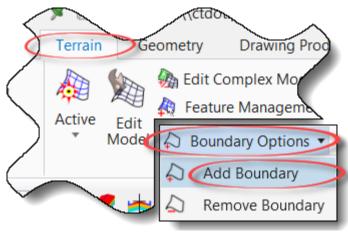


Figure 90

- Delete Vertex
- Delete Edge Triangle
- Swap Line
- Insert Vertex
- Move Vertex
- Delete Triangle By Line
- Delete Feature
- 3. Select the perimeter when prompted to Locate a Terrain Model.

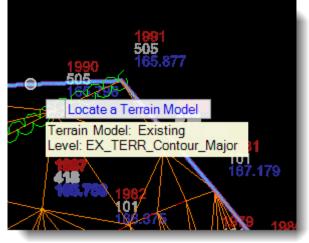


Figure 91

4. Keep the default Method of Extract Graphic.

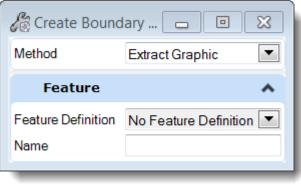


Figure 92

5. Click any blank spot in the view to accept the choice.

5.9 Import Boundary

1. Add the newly created graphic to the Field Book. Reactivate Survey Processing Rules, click **Yes** to confirm.

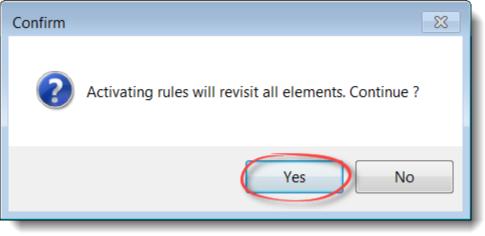


Figure 93

2. Right click All Linear Features to Add Graphic Linear Feature.

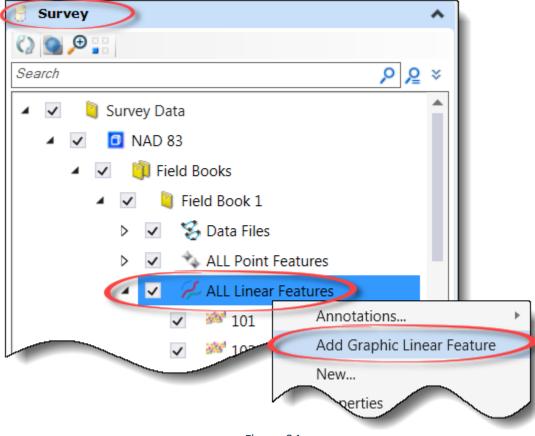


Figure 94

- Volume 4 OpenRoads Designer Survey
 - 3. Select the element when prompted Accept it.
 - Ensure that **Survey Details** is open
 - Expand All Linear Features
 - Scroll to the bottom of the list and click Default

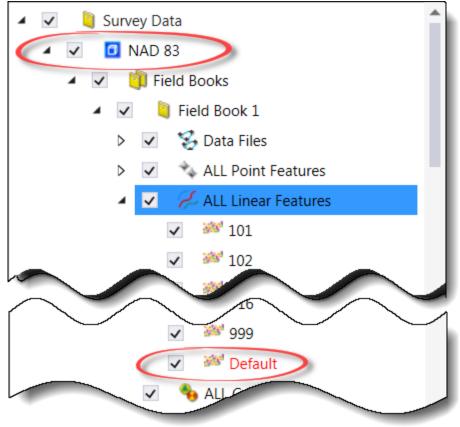


Figure 95

4. Survey Details refreshes with the new linear feature. The default Terrain Model Attribute is Break Line. Change **Break Line** to **Boundary.**

E Ele	ement List 🛕 Messa	age Cer	nter				
	Name		Display	Field Code	Zo	Description	Terrain Model Attribute
►	Linear Feature 134		True	Default	1		Break Line
•					111		Not Set Determine By Feature Definitio Do Not Include Break Line
Row	v: 🛯 🖣 🗍 1	of 1					Soft Break Line Boundary Drape Boundary /oid
						E II I	Drape Void Break Void sland Contour Hole

Survey Details						
🖃 Element List 🛕 Message Center						
	Name	Display	Field Code	Zo	Description	
	Outer Boundary	True	Default	1		B
	•					
	Row: 🚺 🖣 1 of 1					
Figure 97						

5. Rename the Linear Feature if desired.

Exercise 6 - Drawing Production

Coming Soon

Skills Taught

• Coming Soon

6.1 Border and Title Block

Coming Soon

6.2 Annotation

Coming Soon

6.3 Cells

Coming Soon

6.4 Additional Line Work

Coming Soon

6.5 Grids Ticks and Lines

Coming Soon

Exercise 7 - Deliverables

Coming Soon

Skills Taught

• Coming Soon

7.1 Export Terrain Model

Coming Soon

7.2 Export Graphics File

Coming Soon

7.3 Drainage Requests

Coming Soon Additional 3D Pipe file Copy elements into both exported files

7.4 Import (SS2 DTMs)

This process will be used to convert to an OpenRoads terrain from an old DTM SS2 Survey. The designer will request that an existing terrain DGN file be created from Survey using the DTM SS2 file. Survey will use the ORD Create from File tool to convert the existing DTM to a Terrain. In this case the delivered survey information will be in two or more files: the ORD Terrain (from the DTM) and the V8i Ground File(s) Topo. Below are the basic steps:

- 1. Create a new 3D Design Model to house the existing Terrain.
- 2. In the task menu select the OpenRoads Workflow > Terrain > from File.
- 3. Browse to the location of the DTM file to import.
- 4. The Import Terrain Model(s) dialog will appear, fill out the fields as shown:
 - Feature definition: Terrain/Existing Ground
 - Import Options: Import Terrain Only
- 5. Click Import.
- 6. Repeat for 2nd
- 7. Create Complex using merge
- 8. (3 results: new + 2 originals) Delete originals
- 9. Add feature definition for Existing triangles
- 10. **Save**

Reference (ORD)

Original is Primary, not updated topo. Be sure to 1st rename these original terrains: General>Name & Feature> Feature Name

- Open Blank file
- Reference (orig & updated topo)
- Create Complex Terrain Model
- Set Current Action to Merge
- Load & Set Primary (orig) & Merge (Updated Topo) TM info
- Set Feature Definition (EX_TERR_Ground)
- Set name (Existing)
- Finish

Note: If an Import Failed error appears, continue with the following DTM procedure.

- a. Open the DTM using an old version of InRoads.
- b. On the InRoads Explorer dialog box open the DTM.
- c. Right click on the DTM and select Properties.
- d. Toggle on Use Extended Data Checks and Lock Triangulation, click Apply and Close.
- e. Right click on the DTM and select Save.
- f. Right click on the DTM and select Properties.
- g. Toggle off Use Extended Data Checks and Lock Triangulation , click Apply and Close.
- h. Right click on the DTM and select Save. Right click on the DTM and select Close.
- *i.* Repeat Steps 3 & 4.Select Fit View tool and the terrain should appear in the file.

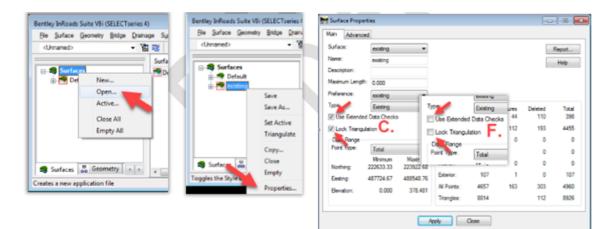


Figure 98 Old InRoads DTM Setting

Exercise 8 - Best Practices

Coming Soon

Skills Taught

• Coming Soon

8.1 Coming Soon