Chapter 8 Mapping Survey Data

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8. Mapping Survey Data

This chapter explains the procedures to import, process, and plot survey data in a MicroStation CAD file using Geopak design software. By carefully inspecting the mapped survey data, collection errors may become evident. It is necessary to correct these errors prior to submitting survey data to the Photogrammetry and Surveys Section (P&S).

Beginning in the Fall of 2013, all new WYDOT projects are being mapped in MicroStation with Geopak SELECT series 3 (SS3). However, survey additions to older projects are still being mapped in its original Geopak version. In early 2016, P&S will be introducing the latest feature code revision (PS15). Chapter 4 in this manual has been updated with the new PS15 feature codes and highlights the changes from PS09.

Survey data is submitted to P&S as measurement files and coordinate files. Measurement files are the product of conventionally collected survey data with an optical total station and consist of a series of angle and distance measurements. Due to accuracy requirements, specific features are collected in this fashion such as pavement and curb & gutter. All measurement files submitted to P&S should be in a native Trimble format as downloaded from the data collector.

Coordinate files are x, y, and z text files in a defined format. These coordinate files are submitted to P&S by WYDOT field offices for GPS/RTK surveys. Because WYDOT does not specify surveying equipment or processing software, all survey data submitted by consultants shall be submitted to P&S in this generic coordinate file format. Each coordinate file shall be accompanied by a signed and sealed cover letter. Refer to Chapter 10 in this manual regarding the transfer of survey data. The survey data in coordinate files has already been processed with other software and is mapped "as is". Because the survey data is accompanied by a signed and sealed document, P&S personnel are not able to make any corrections. It is up to the submitting party to make corrections.

A. MicroStation

1. Create MicroStation Design File

Double-click the MicroStation/Geopak SS3 desktop icon.



Figure 8-1. Desktop icon.

To create a new MicroStation design file, click on the *New file* icon from the *File Open* window.

File Open - P:\		
Look in:	🛫 Projects2 (P:) 🗸 🧿 👔	^{>}
Recent Places Reserved Places Desktop Libraries Computer Computer Network	Name N342042 N342043 n342044 N343036 N343037 N343038 n343039 N343041 N345081 File name: N345093_s.dgn Files oftype: All Files (*.*)	Date modified New file 3/15/2013 1:12 AM 3/15/2013 1:14 AM
	Open as read-only	Options Interface: default •

Figure 8-2. Create a new file.

Click the *Browse* button to select the appropriate seed file. The path to the seed file folder is: **O:\Standards\seed\PH**\. Once the seed file has been selected, it will become the default seed file for subsequent MicroStation files.

Save in:	_{Projects} 2 (P:	•	G 🦻 📂 🛄 🗸		3 🖹
œ.	Name	A	Date modified	Туре	Size
	LERP#		5/1/2013 3:43 PM	File folder	
ecent Places	👢 0c01a01		3/14/2013 2:23 PM	File folder	
	👢 0c01a02		3/14/2013 2:23 PM	File folder	
·	👢 0c13a01		3/14/2013 2:27 PM	File folder	
Desktop	👢 0C01054		3/14/2013 2:23 PM	File folder	
	👢 0C07080		3/14/2013 2:24 PM	File folder	
	👢 0C07086		3/14/2013 2:24 PM	File folder	
Libraries	👢 0c07088		3/14/2013 2:26 PM	File folder	
	👢 0c08068		3/14/2013 2:26 PM	File folder	
	👢 0c12047		3/14/2013 2:27 PM	File folder	
Computer	👢 0C13057		3/14/2013 2:27 PM	File folder	
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	0014062		2/14/2012 2:27 DM	Eilo foldor	•
Network					
	File name:				▼ Open
	Save as type:	MicroStation DGN Files (*.dgn)			▼ Cancel
	Seed:	0:\Standards\seed\PH\PS_SS3_Surve	ve. Seed day		Browse

Figure 8-3. Open a seed file.

Note: A seed file is a template for each MicroStation design file. Every new design file will have the same global origin, color table, cell library attachments, working units, views, etc.

Look in:	👢 PH		- G 👂 I	⊅▼		3 🖻
æ	Name	*		Date modified	Туре	Size
	👢 Old Seed			10/2/2015 3:55 PM	File folder	
ecent Places	JK PS_SS3_Pho	otogrammetry_Seed.dgn		10/2/2015 2:40 PM	Bentley MicroStation De	67 K
	JA PS_SS3_Pro	ject_Seed.dgn		10/15/2014 8:59 AM	Bentley MicroStation De	451 KE
Desktop	PS_SS3_Su	veys_Seed.dgn		10/2/2015 3:55 PM	Bentley MicroStation De	67 KI
Libraries Libraries Computer						
	File name:	PS_SS3_Surveys_Seed.dgn			•	Open
	Files of type:	MicroStation DGN Files (*.dgn)			▼	Cancel

Highlight the **PS_SS3_Surveys_Seed.dgn** MicroStation seed file, and click the *Open* button.

Figure 8-4. Seed file folder.

Enter a name for the new design file and click the *Save* button. In Figure 8-5, the project number is used for the file name (red oval).

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							=
Desktop							
Libraries							
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Computer							
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Network	•			III			•
	File name:	2000048.dgn			▼	S	ave
	Save as type:	MicroStation DGN Files (*.dgn)			•	Ca	ncel
	Seed:	O:\Standards\seed\PH\PS_SS3_Surve	eys_Seed.o	dgn		Bro	wse

Figure 8-5. New file name.

2. Open MicroStation Design File

Highlight the newly created design file and click the *Open* button.

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Look in:	👢 Surveyed		- 3 🕫 🛛	۶ 🛄 ◄	ءَ 🗈	*	3D - V8 DGN
Recent Places Desktop Libraries	Name	·		Date modif 7/1/2013 1: 7/1/2013 1: 3/31/2014 3	39 PM 40 PM		
Computer Network	 File name: Files of type: 	III 2000048s.dgn All Files (*.*) Open as read-only		•	Open Cancel Options	Pro	Jser: <mark>WYprintOrgSS3 ▼</mark> oject No Project ▼ face: default ▼

Figure 8-6. Open new design file.

An existing design file may be opened by highlighting the file in Windows Explorer and "dragging and dropping" it on the MicroStation/Geopak SS3 desktop icon.

	V8 MicroStation Geopak SS3		
► Proje	ccts2 (P:) ▶ 2000048 ▶ Ph ▶ Surveyed ▶		→ 4
	oStation V8i (SELECTseries 3) 🔻 Print	Burn New folder	
•	Name	Date modified	Туре
	👢 _control	7/1/2013 1:39 PM	
	👢 _raw	7/1/2013 1:40 PM	
	📝 2000048.dgn	7/1/2013 1:48 PM	

Figure 8-7. Open existing design file.

B. Geopak SS3

1. Project Explorer

Once the design file has been opened, click on the Tools header and select Tasks.

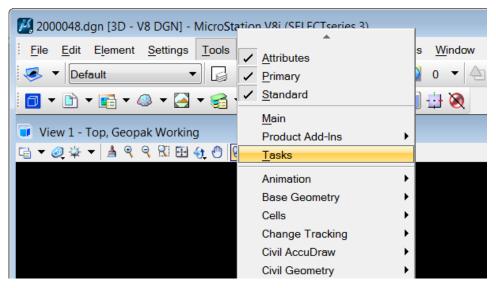


Figure 8-8. Open Tasks toolbar.

In the *Tasks* toolbar, click on the *Civil Tools* tab, then the *Survey* tab. Open the *Survey Processing* toolbox by clicking on the "Collapse/Expand Group" arrow (red circle). Next, click on the *Project Explorer* icon.

🗈 Tasks 📃 🗉 💌
Tasks
Civil Tools
1 2 3 4 5 8 9 8 5 8 4 4
Å Survey Processing ■ ■ ■ ●
a 🙀 🔼 🗔 👜 🖌
W 💋 Project Explorer
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R 🕑 🏏 🚭
🧭 Analysis & Reporting 🔹 👻
🆰 Terrain Model 🔹 👻
🖺 General Geometry 🔹
Horizontal Geometry
🖽 Vertical Geometry 🔹 👻
V Drawing
Visualization
Animation

Figure 8-9. Survey Processing toolbox.

The *Project Explorer* window may be docked into the MicroStation file or moved to a second monitor screen for a larger CADD viewing area. There should be five tabs shown in Project Explorer: Links, File, Survey, Civil Standards, and Civil Model.

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🖺 Links 🚮 File	
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📲 Active Directory 💌 🧣	
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Figure 8-10. Project Explorer.

If all of the tabs are not shown, click on the Settings header and select Project Explorer.

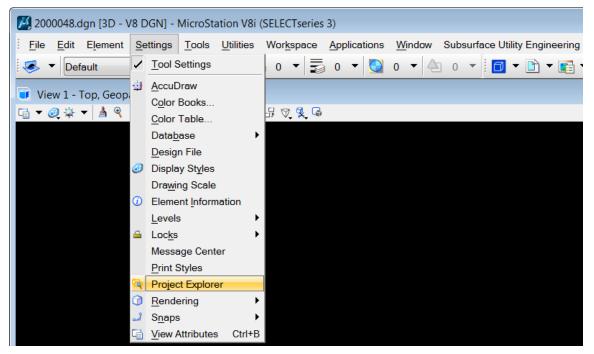


Figure 8-11. Project Explorer settings.

In the *Project Explorer Settings* window, the tabs can be turned on or off. To display the tabs, double-click on the *False* setting.

Browsers		
Survey	False	
Civil Standards	False	
Civil Model	False	[
File	True	
Links	True	
Display		
Dimension Styles	True	
Text Styles	True	
Tag Sets	True	
Saved Views	True	
Shared Cells	True	
Levels	True	
Models	True	
Levels in a Model	True	
Named Groups	True	
Attachments	True	
Rasters	True	
Point Clouds	True	
Elements	True	
Dialog Properties		
Browse Layout	Tab	
Maximum Node Count	20000	
DGN Indexing Prope	erties	
Indexing Service	Stopped	
	OK Can	

Figure 8-12. Project Control settings.

	gs	
Browsers		
Survey	True	
Civil Standards	False	
Civil Model	True	
File	I rue	_
Links	True	
Display		
Dimension Styles	True	_
Text Styles	True	
Tag Sets	True	
Saved Views	True	
Shared Cells	True	
Levels	True	
Models	True	
Levels in a Model	True	
Named Groups	True	
Attachments	True	
Rasters	True	
Point Clouds	True	
Elements	True	
Dialog Properties		
Browse Layout	Tab	
Maximum Node Count	20000	
DGN Indexing Prope	erties	
Indexing Service	Stopped	
	OK Cance	
		•

Select *True* for each setting and then click on the *OK* button.

Figure 8-13. Edit settings.

All of the *Project Explorer* tabs are now displayed.

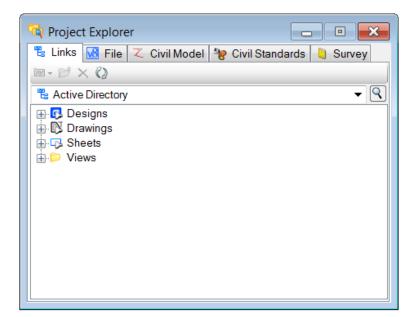


Figure 8-14. Project Explorer tabs.

2. Survey Details

Click on the *Show Details* icon under the *Survey Processing* tab. The *Survey Details* window may be docked into the MicroStation file or moved to a second monitor screen for a larger CADD viewing area.

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Tasks ▼ Civil Tools ▲ Survey
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🍞 Analysis & Reporting 🔹 👻
interrain Model 🔹
🖺 General Geometry 🔹
∠ Horizontal Geometry
🖽 Vertical Geometry 🔹
💙 Drawing 🔹
Visualization
H Animation

Figure 8-15. Survey Details.

3. Project Settings

The default survey settings may be reviewed in the *Civil Standards* tab. Under the *Libraries* section, click on the "+" symbol next to *Project Settings*, *PH_Features.dgnlib*, and *Survey*. Right-click on *WY_Settings* and select *Properties*.

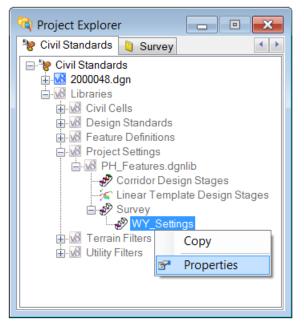


Figure 8-16. WY Settings.

The settings shown in Figure 8-17 are set by default. These settings may change with Geopak updates or changes in processing procedures.

Element Information			
General Settings	•	Points	
Create Log File	Тпе	Import Coordinate Records	As Control by Feature Definiti
Append Notes to Description	False	Control Point Features	PCPTIAUXCITCP
Use Annotation Scale	False		
Use VBA Macros	False		
Vba Feature Macros			
Validating Rules	7 22 3 850 1 Length exceeds 850		
Linking Codes	*	Terrain Model	
Link Codes	0 None 0 111 BL* 1 12 SC 2 03 P	Create Terrain Model for All Field	False
Link Code Position	Before Point Feature Definition	Name	AllFieldbooks
Linear Feature Linking Method	By Field Code	Feature Definition	Existing_Triangles
Linear Feature Linking	By Linking Codes	Edge Method	Max Triangle Length
Feature Exclusions		Length	150
Data File Parsing	~	Elements Symbology	
Adjustment Defaults	~		

Figure 8-17. WY Settings defaults.

C. Measurement files

1. Create Field Book

Select the *Survey* tab in the *Project Explorer* window, click on the "plus" sign (+) next to *Geopak Working* (red circle), right-click on *Field Books*, and select *New*.

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🖺 Links 🐱 File	🔾 Civil Model 🛛 😵 Civil Standards 🗧 Survey
🖃 🔽 🎙 Survey Da	
Geopal	k Working d Books
	New
	Create Terrain Model From Field Book Selection Set
P	Properties
_	

Figure 8-18. New field book.

Geopak will create the folder *Field Book 1*. To change the name, highlight the field book, right-click and select *Properties*.

🗟 Project Explorer		
🖺 Links 🐱 File 📿 C	ivil Model 🛭 😵 Civil Standards 🔰 Survey	
Geopak Wo Geopak Wo	oks	
Filters	Load •	

Figure 8-19. Edit field book.

Highlight the field book name as shown in Figure 8-20. A more descriptive name may now be entered. Click on the red "x" in the upper right corner when the field book has been renamed.

Selection Field Book 1		
Field Book		
Name	Field Book 1	
Control Points	0	
Data Files	0	
Linear Features	0	
Point Features	0	
Setup Points	0	
Observation Points	0	

Figure 8-20. Rename field book.

The field book has been renamed "Topography 1".

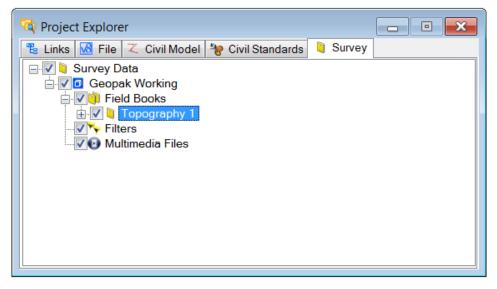


Figure 8-21. New field book name.

2. Import Survey Data

To import a survey file, right-click on the field book, select *Load*, and then *File* as shown in Figure 8-22.

🗬 Project Explorer			~	
🖺 🐮 Links 1 🔀 File 📿	Civil N	Model 🛛 😵 Civil Standards		Survey
🖃 🔽 🍳 Survey Data				
🖨 🔽 🗖 Geopak W		g		
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- Vr Filters		Load	•	File
		Delete		File Using Text Import Wizard
		Export To	•	TrimbleLink
		Create Terrain Model		Leica DBX
	1	Properties		Features From Current Graphics
L	_			

Figure 8-22. Load file.

Use the *Select file* window to locate the project control file. When the coordinate file has been selected, click the *Open* button.

Relect file			×
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Organize 🔹 New fold			0
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edit	2000048 Topography 3.cor	10/12/2012 12:13	COR Fi
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👢 A1_e			
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👢 A2_e			
👢 A2_s			
📜 АЗ_е			
👢 A3_s	· · · · · · · · · · · · · · · · · · ·		Þ
File na	2000048 Topography 1.dc	✓ All Files (*.*)	•
		Open Cance	н а

Figure 8-23. Select survey file.

After the survey file has been imported, the points, lines, and shapes from the collected survey data will be plotted. Backsight measurements and individual observations from the instrument will also be plotted as lines.

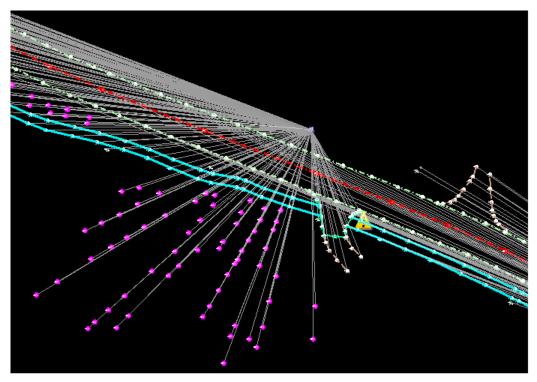


Figure 8-24. Setting point range.

The setup and observation lines may be turned off by removing the check marks in the boxes next to *All Setups* and *All Observations* (red oval).

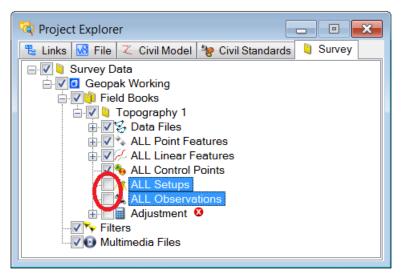
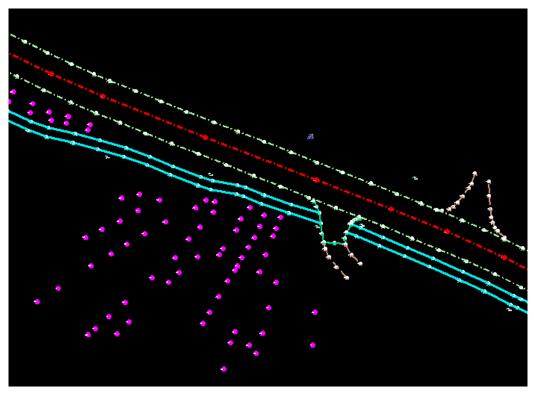


Figure 8-25. Remove observations.



The survey can now be viewed without the setup and observation lines.

Figure 8-26. Field book points.

3. Adjust Survey Data

At this point, the survey measurements have been adjusted for the prism offset and the temperature and pressure PPM constant. After the survey file has been loaded, click on the "+" sign next to *Adjustment* and *Error Ellipse*, then click in the box to place a check mark " \checkmark " (red oval). Right-click on *Adjustment* and select *Turn On*.

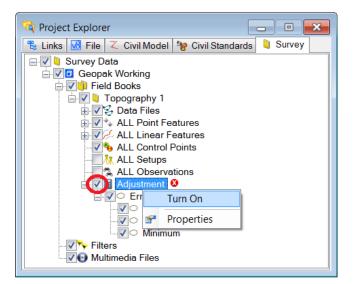


Figure 8-27. Least squares adjustment.

Prior to the least squares adjustment, a red circle with an "x" is displayed to the left of *Adjustment*. After the adjustment has been completed, a green circle with a "check mark" will be displayed.

Roject Explorer
😤 Links 🐱 File 🛛 Civil Model 🐐 Civil Standards 🍳 Survey
🖃 🔽 🖣 Survey Data
🗄 🔽 🖸 Geopak Working
🖕 🔽 🗐 Field Books
📋 🔽 🍳 Topography 1
🗄 🗹 😴 Data Files
⊕ ♥ ALL Point Features
🗄 🗹 🌽 ALL Linear Features
ALL Observations
Error Ellipse
Minimum

Figure 8-28. Adjustment completed.

Right-click on Adjustment, select Adjustment Results, then Complete.

🗟 Project Explorer			- • ×
🖺 Links 🔣 File 📿 Civil Mo	del 🛛 🍾 Civil Standards	<u>)</u>	Survey
Survey Data Geopak Working Geopak Matheore Matheore Geopak Matheore Geopak Matheore Geopak ALL Cont Geopak ALL Obse Geopak ALL Obse Geopak ALL Obse Geopak ALL Obse Geopak Cont Geopak Cont Geop	s t Features ar Features irol Points ps ervations		
	Adjustment Results	•	Complete
Filters	Properties		Summary Repetition Errors Preliminary Adjustment Vertical Least Squares Horizontal Least Squares

Figure 8-29. View results.

a. Adjustment Results

The *Least Squares Complete Report* provides a statistical analysis of the adjustment for measurements between known points. The error analysis of the misclosures (or residuals) for azimuth, angle, and distance measurements should be reviewed to determine if the processed data is within acceptable limits. It may be necessary to edit or omit survey data in an effort to correct measurements with large misclosures.

e Tools Help		
\ProgramData\Bentley\Civil\ReportBrowser\ CivilSurvey A] SurveyAdjustmentComplete.xsl	Least Squares Complet	e Report
SurveyAdjustmentHorizontal.xsl SurveyAdjustmentPreliminary.xsl SurveyAdjustmentRepetition.xsl	Report Created: 4/1/2014 Time: 1:23pm	4
AS SurveyAdjustmentSummary.xsl AS SurveyAdjustmentVertical.xsl ∷ AS SurveyControlPoint.xsl	Current Geographic System: Assumed	, Survey Feet
Ali SurveyControlPointsTable.xsl Ali SurveyDataFile.xsl SurveyDataFileTable.xsl Ali SurveyFieldBook.xsl	Least Squares Default	ts
SurveyFieldBookTable.xsl SurveyLinearFeature.xsl	Combined Scale Factor Option:	Do Not Use
SurveyLinearFeatureTable.xsl	Combined Scale Factor Value:	1.0000000000
SurveyObservation.xsl	Display Errors in Message Center:	True
SurveyObservationsTable.xsl SurveyPoint.xsl	Add-on for Distance constant:	0.010
-A SurveyPointsCompleteTable.xsl	Add-on for Distance PPM:	5.000
SurveyPointsTable.xsl	Add-on for Horizontal angle:	10.000
SurveySetup.xsl	Add-on for Azimuth:	0.100
- A SurveySetupsTable.xsl	Add-on for Trig level constant:	

Figure 8-30. Complete adjustment report.

b. Warning Messages

All warning messages (yellow triangle with a black exclamation mark) should be reviewed for potential survey errors. The error display in Figure 8-31 is an indication that the observation distance is greater than the allowable 850 ft. This will occur when the instrument and backsight are set on project control monuments which may be placed up to 1000 feet apart. However, the maximum distance for individual collection measurements should not exceed 850 feet.

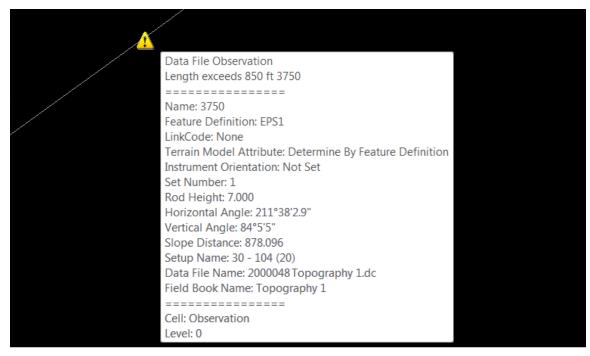


Figure 8-31. Error display.

Additional surveys will need to be imported and adjusted in separate field books. Create a new field book as illustrated in Figure 8-18. By processing survey files in separate field books, the surveyor does not have to keep track of previously used point numbers for each subsequent survey. All surveys may begin with the same point number (e.g. 1000).

D. Coordinate Files

Coordinate files contain specific point information that has already been processed by other software programs. Because coordinate files are accompanied by a signed and sealed cover letter, P&S cannot edit any data within these files. If processing errors are encountered, the PE/PLS submitting the survey will be notified. It is the responsibility of the PE/PLS to correct the errors and resubmit the survey to P&S with a revised signed and sealed cover letter.

Table 8-1 is an example of a coordinate file. All of the columns are separated by a "grave" symbol (`). The columns from left to right represent: point number, north coordinate, east coordinate, elevation, feature code with an "at" symbol (@), and attribute response(s). See Chapter 4 in this Manual for more information on feature codes and their attributes.

1000`563335.4039`678980.9867`4711.7821`FLP@ 1001`563335.8592`678980.9119`4712.5288`BL*CULS@ CMP 18" 1002`563375.9554`678969.6295`4712.1113`EL*CULS@ 1003`563376.2593`678969.5668`4711.2118`FLP@ 1004`563376.0093`678938.0726`4712.7636`TBX@ Century Link 1005`563375.8330`678937.9239`4712.6955`BL*UTEL1@ Century Link 1006`563367.3610`678930.9891`4711.8723`UTEL1@ 1007`563331.3443`678761.1151`4711.7946`UTEL1@ 1008`563312.2842`678684.9153`4713.7017`UTEL1@ 1009`563289.1477`678595.8805`4721.0141`UTEL1@ 1010`563268.6086`678514.3511`4727.8214`UTEL1@ 1011`563244.1558`678424.0831`4734.6940`EL*UTEL1@ 1012`563295.6420`678855.1280`4712.5819`FLP@ 1013`563295.8075`678855.0706`4713.9592`BL*CULS@ RCP 18" 1014`563330.3412`678844.8657`4713.5492`EL*CULS@ 1015`563330.6646`678844.5701`4712.5826`FLP@ 1016`563375.9445`678938.1829`4712.7482`BL*UTEL2@ Century Link 1017`563372.7576`678943.5732`4711.8864`UTEL2@ 1018`563383.8684`679001.3788`4712.3676`UTEL2@ 1019`563405.1268`679078.3285`4713.0624`UTEL2@ 1020`563446.8010`679185.6841`4712.2597`UTEL2@ 1021`563468.7447`679235.3597`4711.3295`UTEL2@ 1022`563510.5503`679304.7831`4709.4901`EL*UTEL2@ 1023`563510.7393`679305.3360`4709.5229`BL*UTEL3@ Century Link 1024`563510.5825`679304.9455`4709.5344`TBX@ Century Link 1025`563544.2665`679354.0814`4709.3586`UTEL3@ 1026`563575.6033`679396.9939`4708.8222`UTEL3@ 1027`563637.0938`679482.3522`4709.2658`UTEL3@ 1028`563732.0131`679608.7647`4708.3812`UTEL3@ 1029`563803.6566`679662.4698`4706.9611`EL*UTEL3@ 1030`563736.0247`679692.4220`4708.1729`BL*UPOW1@ Wheatland REA 1031`563653.1729`679615.7283`4709.3681`UPOW1@ 1032`563527.0278`679447.3153`4710.8657`UPOW1@ 1033`563470.6626`679367.2481`4710.8200`UPOW1@ 1034`563407.7908`679279.8930`4711.3330`UPOW1@ 1035`563422.9674`679247.0834`4711.7325`BL*CULS@ CMP 18" 1036`563422.6597`679247.4313`4710.2719`FLP@ 1037`563365.4050`679148.5833`4711.8455`EL*UPOW1@ 1038`563364.4090`679147.5328`4711.6770`BL*OPOW1@ Wheatland REA 2 1039`563364.3926`679147.5320`4711.6452`PP@ Wheatland REA 1040`563377.6377`679171.4362`4711.8472`DGA@ 1041`563464.1556`679217.9305`4711.1648`EL*CULS@ 1042`563464.7128`679217.6518`4710.1620`FLP@ 1043`563317.1166`679052.9017`4712.7466`PP@ Wheatland REA 1044`563317.1110`679052.8992`4712.7517`OPOW1@ 1045`563300.7647`679025.7888`4713.0840`DGA@ 1046`563483.6742`679035.6667`4711.7899`DGA@ 1047`563453.0686`679038.7415`4712.8791`PP@ Wheatland REA 1048`563453.1111`679038.7705`4712.8830`EL*OPOW1@

Table 8-1. Coordinate file example.

1. Create Field Book

Create a new field book with a right-click on *Field Books* in the *Survey* tab and select *New* (see Figure 8-18). To change the field book name, highlight the field book, right-click and select *Properties* (see Figure 8-19).

2. Import Survey Data

Import the coordinate file with a right-click on the renamed field book, select *Load*, and then *File Using Text Import Wizard*.

Roject Explorer					
🖺 🗄 Links 🐱 File 📿 Civi	il Mo	del 🛭 🔭 Civil Standards 🔍	Sur	vey	/
🖃 🔽 💐 Survey Data					
🖨 🔽 🖸 Geopak Work					
Field Books	s				
📄 🕢 🗎 👘 🗐 🗎					
📄 🔽 🎙 Topogra					
庄 🔽 🂐 Topogra	aphy	3			
Vers Filters		Load	•		File
		Delete			File Using Text Import Wizard
		Export To	+		TrimbleLink
		Create Terrain Model			Leica DBX
	1	Properties			Features From Current Graphics
	_			-	

Figure 8-32. Load file.

Use the *Select file* window to locate the project control file. When the file has been selected, click the *Open* button.

역 Select file				×
C→ C→ L ≪ 2000048	► P	'h ▶ Surveyed ▶ _raw ▶ edit ▶	✓ ✓ Search edit	Q
Organize 🔻 New fold	er			0
Surveyed	*	Name	Date modified	Туре
Lcontrol		2000048 Topography 1.dc	12/28/2015 3:16 PM	DC File
⊿ 👢 _raw	H	2000048 Topography 2.dc	12/28/2015 2:26 PM	DC File
L ctl		2000048 Topography 3.cor	10/12/2012 12:13	COR File
⊳ L raw		2000048 Utilities.cor	7/8/2013 4:00 PM	COR File
↓ A1_e				
👢 A1_s				
👢 A2_e				
👢 A2_s				
📜 АЗ_е				
👢 A3_s	Ŧ	•		•
File na	me:	2000048 Topography 3.cor	✓ All Files (*.*)	•
			Open Cance	el

Figure 8-33. Coordinate file.

The *Text Import Wizard* window will be displayed with the coordinate file. Click on the *Open* button to use an existing text import wizard with the appropriate format settings.

	ext Open Save S	ave As Open	Text		
efine text file type.	Open exis	ting tiw file			
Projections Record For	mat Uniform	• Data	Type Delimited	Start Row 1	
1000`1419864.18	3`2404140.95	5`6997.43	`GRD@		-
1001`1419870.74					
1002`1419872.7			-		
1003`1419883.84			01120		
1004`1419888.34	4`2404141.73	3`7008.13	`GRD@		=
1005`1419898.24	4`2404137.87	7012.56	`GRD@		
1006`1419912.1:	1`2404127.27	1`7018.79	`GRD@		
1007`1419928.1	5`2404117.98	3`7025.11	`GRD@		
1008`1419938.42	2`2404105.97	1`7029.83	`GRD@		_
1009`1419955.09	9`2404091.36	5`7036.80	`GRD@		
L010`1419968.59	9`2404074.06	5`7040.67	`GRD@		
L011`1419956.10	6`2404058.72	2`7035.95	`GRD@		
L012`1419951.2	5`2404067.18	[°] 7034.13	`GRD@		
013`1419942.2	5`2404045.19) 7031.21	`GRD@		
L014`1419954.9					
1015`1419937.80					

Figure 8-34. Text import wizard.

Select the *P&S Coordinate File.tiw* with the *Select text import wizard file* window. When the coordinate file has been selected, click the *Open* button. The path to the text import wizard format files is: "O:\Standards\data\Open\PH".

Select text import wizard file				×
Gereite Standards ►	data 🕨 Open 🕨 PH	- +7	Search PH	Q
Organize 🔹 New folder			· · · ·	0
s Computer 🔶	Name		Date modified	Туре
⇐ Local Disk (C:) ↓ DVD RW Drive (D:)	P&S Coordinate File.tiw		7/30/2013 10:29 A	TIW Fil
Sections (G:)	P&S Project Control File.tiw		12/1/2015 1:56 PM	TIW Fil
WYO_MAPS (J:)	WYDOT_Cor.tiw		7/16/2013 12:47 PM	TIW Fil
Projects (K:)	WYDOT_Ctl.tiw		7/16/2013 11:46 A	TIW Fil
🛫 Departments (L:) 😑				
CD Drive (M:) U3 Sy				
🧼 Removable Disk (N:				
🛫 WydotV8 (O:)				
🛫 Projects2 (P:)				
🛫 Photogrammetry (\' 🔻	•			•
File name:	P&S Coordinate File.tiw		V file (*.tiw) Open Cance	•

Figure 8-35. Text import wizard file.

The *Text Import Wizard* is formatted to begin reading the coordinate file. Click on the *Next* button.

Finish Cance	el Back Nex	t Open Save	Bave As ∣ Open Text		
Define text file ty	rpe.	Next			
• ¹ Projections	Record Form		 Data Type Delimi 	ted • Start Row 1	
1001`143 1002`143 1003`143 1004`143 1005`143 1006`143 1006`143 1007`143 1008`143 1009`143 1010`143 1011`143 1011`143 1012`143 1013`143	19870.74 19872.71 19883.84 19888.34 19898.24 19912.11 19928.15 19938.42 19955.09 19955.09 19956.16 19951.25 19951.25 19942.25	2404129.25 2404135.95 2404142.06 2404141.75 2404137.8 2404127.2 2404127.2 2404105.9 2404005.9 2404091.3 2404074.0 2404058.72 2404067.15 2404067.15 2404067.15	5`6997.43`GRD@ 5`6999.64`GRD@ 8`7005.78`GRD@ 8`7008.13`GRD@ 7`7012.56`GRD@ 7`7018.79`GRD@ 8`7025.11`GRD@ 7`7029.83`GRD@ 6`7040.67`GRD@ 2`7035.95`GRD@ 8`7034.13`GRD@ 9`7031.21`GRD@ 4`7030.31`GRD@		Ξ

Figure 8-36. Text import wizard.

The column delimiter is set to *Other* with a check mark and a "grave" symbol (`) is placed in the field to the right. An "at" symbol (@) is set in the *Text Qualifier* field. Click on the *Next* button.

Text Imp	0 0 0	Dpen Save	Save As	ب Dpen Text			×
	iters for records fo		5476775 0				
Delimite Tab Space Othe	Ce Comr		LineSetting Text Qualifie Start Line Co Start Field C	er olumn	@ 1 1	A Y Y	
1000	1419864.18	2404140.95	6997.43	GRD@			•
1001	1419870.74	2404129.25	6999.64	GRD@			
1002	1419872.71	2404135.95	6999.86	GRD@			Ξ
1003	1419883.84	2404142.08	7005.78	GRD@			
1004	1419888.34	2404141.73	7008.13	GRD@			
1005	1419898.24	2404137.87	7012.56	GRD@			
1006	1419912.11	2404127.27	7018.79	GRD@			
1007	1419928.15	2404117.98	7025.11	GRD@			
1008	1419938.42	2404105.97	7029.83	GRD@			
1009	1419955.09	2404091.36	7036.80	GRD@			
1010	1419968.59	2404074.06	7040.67	GRD@			Ψ.

Figure 8-37. Review Reports.

The column headers are set as shown in Figure 8-38, click on the Finish button.

	Back Next	Open Save	Save As O	pen Text	
)efin <u>e colum</u> n fo	rmats.				
Finish Filter:		_			
	NI	T	E 1	0-1-	
Point Name	Northing	Easting	Elevation	Code	_
1000	1419864.18	2404140.95	6997.43	GRD@	_
1001	1419870.74	2404129.25	6999.64	GRD@	
1002	1419872.71	2404135.95	6999.86	GRD@	
1003	1419883.84	2404142.08	7005.78	GRD@	
1004	1419888.34	2404141.73	7008.13	GRD@	E
1005	1419898.24	2404137.87	7012.56	GRD@	
1006	1419912.11	2404127.27	7018.79	GRD@	
1007	1419928.15	2404117.98	7025.11	GRD@	
1008	1419938.42	2404105.97	7029.83	GRD@	
1009	1419955.09	2404091.36	7036.80	GRD@	
1010	1419968.59	2404074.06	7040.67	GRD@	
1011	1419956.16	2404058.72	7035.95	GRD@	
1012	1419951.25	2404067.18	7034.13	GRD@	
1013	1419942.25	2404045.19	7031.21	GRD@	
1014	1419954.91	2404035.05	7036.67	GRD@	
1015	1419937.86	2404026.94	7030.31	GRD@	
1016	1419923.49	2404044.49	7022.62	GRD@	-

Figure 8-38. Column headers.

A *Question* window will be displayed asking if a text import wizard import file should be saved. Click on the *No* button.

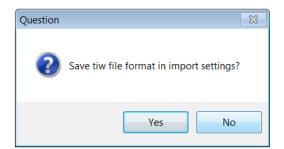


Figure 8-39. Don't save tiw file.

Because coordinate files are imported and mapped "as is", any further adjustments are not necessary. As with measurement surveys, additional coordinate files will be imported into separate field books.

3. Mapped Survey Data

Figure 8-40 is a display of a point feature. By hovering over a point, the *Point Feature* window will be displayed. Note the *Name* (point number) and the *Feature Definition* (red underlines).

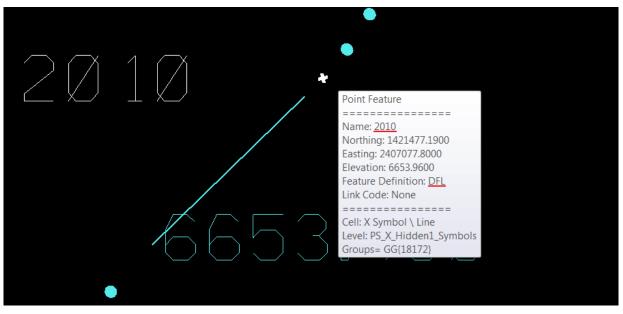


Figure 8-40. Point feature.

Figure 8-41 is a display of a linear feature. By hovering over a line or shape, the *Linear Feature* window will be displayed. Note the *Feature Definition* (red underline) and the *Data File Name* and *Field Book Name* (red box).

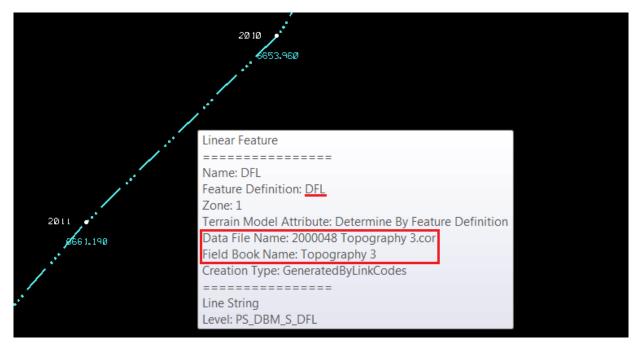


Figure 8-41. Linear feature.

Click on the Fit View icon.

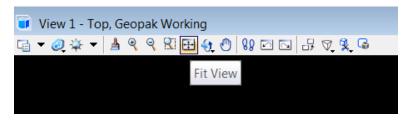


Figure 8-42. Fit view.

Figure 8-43 is a view of all the imported survey files.

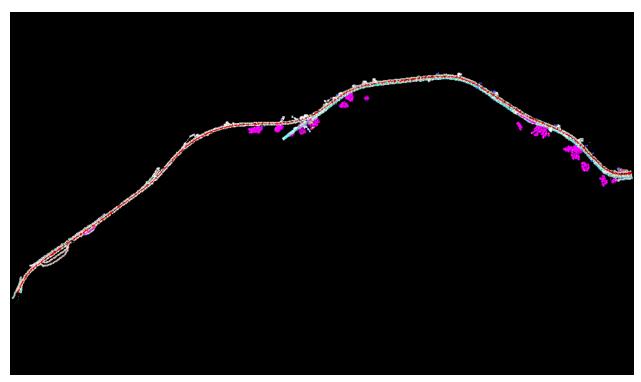


Figure 8-43. Mapped surveys.

E. Reviewing Mapped Data

After the dataset has been visualized, carefully review the survey. Zoom in to view as much detail as needed. Look for points, lines, or shapes that appear to be missing or out of place. Inspect edge of sidewalk, top of curb, curb flow line, and edge of pavement lines especially at intersections where they are mapped around a curve. These features should be collected with enough point density to form parallel lines.

Note: The curve fit (CF) control code has been eliminated due to mapping errors. The placement of survey shots around curves should be of sufficient density to accurately define the curve.

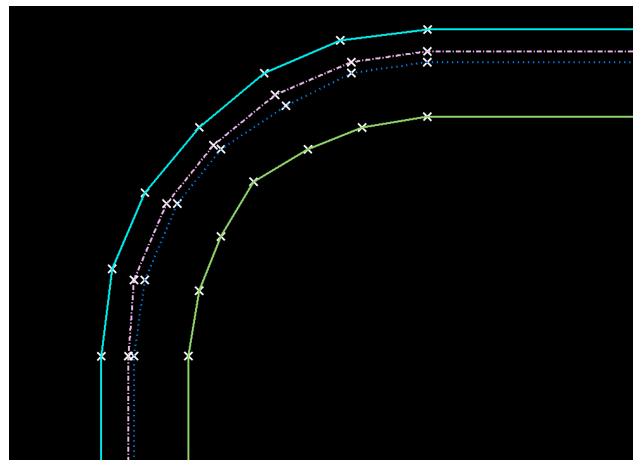


Figure 8-44. Curve detail.

Topographic data, especially natural and man-made drainage channels, must also be collected with enough point density to accurately represent the terrain. The drainage area shown in Figure 8-45, includes a drainage flow line, breaklines, and ground shots.

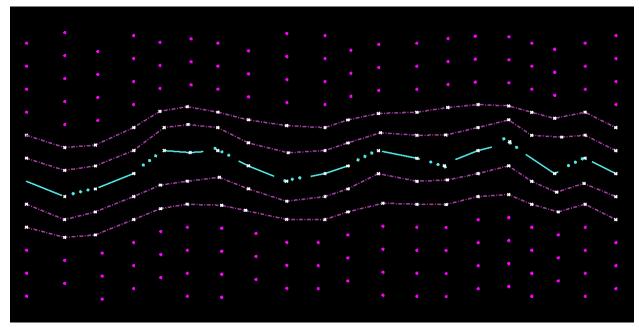


Figure 8-45. Stream channel.

The survey data can also be observed when the traditional top view is changed by clicking on the *View Rotation* icon.

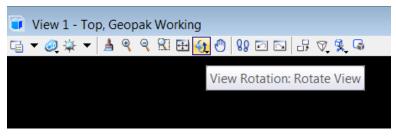


Figure 8-46. View Rotation.

There are several tools available to examine the dataset from a different perspective. The *Rotate View*, *Front View*, *Right View*, *Back View*, and *Left View* options may be selected from the *View Rotation* drop down menu.

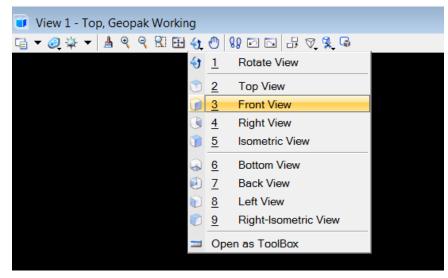


Figure 8-47. View rotation options.

As shown in Figure 8-48 the terrain is sloping down from the roadway. The slope would not be evident if viewed from the top view.

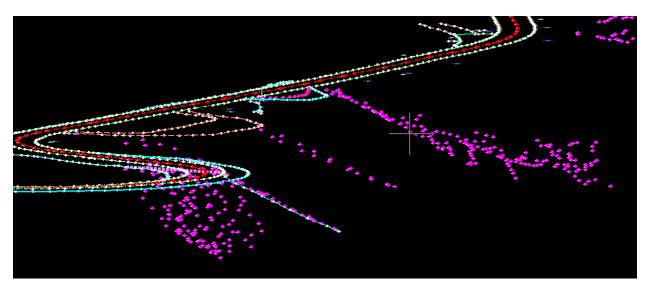


Figure 8-48.Rotated view.

F. Mapping Errors

There are a number of problems that may be encountered when processing a survey file. These errors must be identified and corrected prior to merging the dataset into the final mapping files. These problems include but are not limited to:

• A series of points which are meant to be connected as a line or shape but do not have the appropriate linking codes to map the feature.

- Points that are horizontal or vertical outliers.
- DTM features that cross one another.
- A point, line, or shape collected with an incorrect feature code.
- Attribute responses incorrectly entered or not placed in the survey file.

It is up to the Geopak user to correct these errors by editing the survey data. If the data cannot be corrected, it may be necessary for the surveyor to re-collect all or a portion of the survey.

1. Vertical Outliers

Points or lines which appear to spike above or below the majority of the mapping may be vertical outliers. These types of outliers are typically caused by measurements taken with an incorrect rod height. Figure 8-49 is a front view of the survey data, notice the point in the EPS line that is obviously above the others. In this case, the vertical offset was caused by a rod height error and easily corrected.

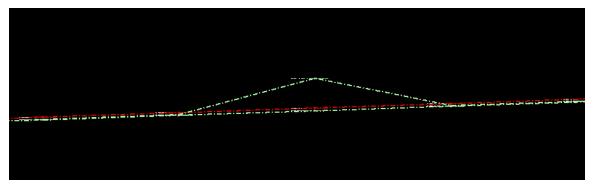


Figure 8-49. Vertical outliers.

2. Crossing Chains

First create a terrain model. Right-click on a field book and select Create Terrain Model.

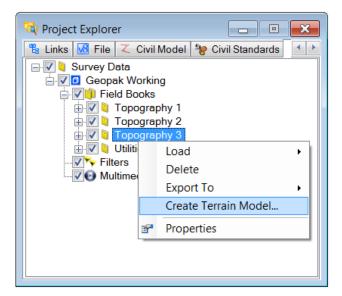


Figure 8-50. Create terrain model.

Next, in the *Tasks* tool bar, click on the *Civil Tools* tab, then the *Survey* tab. In the *Terrain Model* toolbox click on the *Report Crossing Features* icon.

🖄 Tasks 📃 🗉 💌
Tasks ▼ Civil Tools ▲ Survey
<mark>1 2</mark> ,3,4,5,8,7,8 ≝,≛,∛,
🕅 Survey Processing 🔹 👻
🏏 Analysis & Reporting
🐣 Terrain Model 🛛 🔡 🗮 🔺
。 <mark>≜ ≜ ∺</mark> ∂ & A A A & M
w @ 與 與 @ ジ @
E 🥂 📩 😫 🎘 🦓
R 🌺 🎘 🚍 🗛 🕉 🖓
▲ Ge Report Crossing Features ★
Z Horizontal Geometry
🕮 Vertical Geometry 🔹
💙 Drawing 🔹
Visualization
📕 Animation 🔹

Figure 8-51. Crossing features.

In the *Terrain Model Crossing* window, check the *Apply Elevation Tolerance* box and set the tolerance value to "0.040".

慃 Terrain Model Cross.	
Apply Elevation Tolerance	
Elevation Tolerance	0.040

Figure 8-52. Terrain Model Crossing.

Attached to the cursor is the message "Select Terrain Model element".

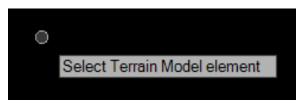


Figure 8-53. Select Terrain model element.

With the curser, click on one of the terrain model triangle legs to begin the crossing chain detection tool.

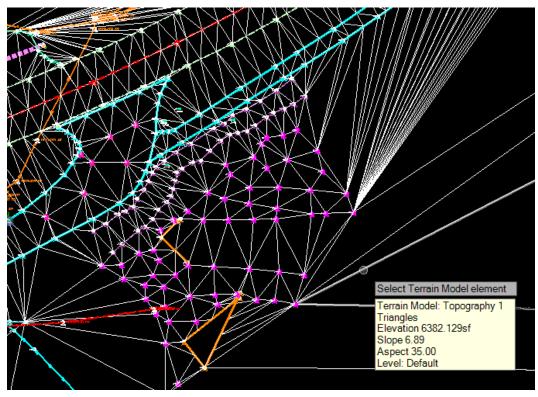


Figure 8-54. Select element.

The next message attached to the cursor is "Apply Elevation Tolerance." Left-click with the mouse to accept.

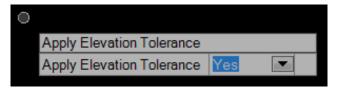


Figure 8-55. Apply elevation tolerance.

The next message is "Set Elevation Tolerance." Left-click with the mouse to accept.

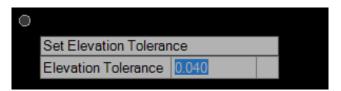


Figure 8-56. Set elevation tolerance.

When crossing chains are found, the Terrain Crossing Features Report will be displayed.

Feature Types •	Zoom Io	In View	Export					
Intersection Point	Elevation	On Feature 1	Elevation On Featu	re 2	Elevation Difference	Feature Type 1	Feature Type	. 4
2659758.726, 1082694.995	6861.473	9	6861.412 🔒		0.061	Breakline	Breakline	
2661228.791, 1082225.640	6808.626 (9	6809.580 🔒		0.954	Breakline	Breakline	
2661229.379, 1082230.042	6808.641 (9	6809.574 🔒		0.933	Breakline	Breakline	:
2661254.149, 1082779.532	6816.327 (9	6816.431 🔒		0.104	Breakline	Breakline	1
2661549.219, 1083123.963	6810.742 (9	6810.522 🔒		0.220	Breakline	Breakline	
2663264.400, 1083629.090	6814.759	9	6824.045 🔒		9.286	Breakline	Breakline	
2663265.796, 1083616.288	6814.812 (9	6824.416 🔒		9.604	Breakline	Breakline	
2663267.205, 1083603.373	6814.866	9	6824.133 🔒		9.267	Breakline	Breakline	
2663500.759, 1083706.663	6818.962	9	6821.767 🔒		2.805	Breakline	Breakline	
2663510.641, 1083725.373	6819.140	9	6824.519 🔒		5.379	Breakline	Breakline	
2663520.424, 1083743.895	6824.827	9	6819.316 🔒		5.511	Breakline	Breakline	
2663530.308, 1083762.608	6819.494 (9	6824.541 🔒		5.047	Breakline	Breakline	
2663539.210, 1083779.463	6822.379	9	6819.654 🔒		2.725	Breakline	Breakline	
2663680.396, 1083856.049	6819.796	9	6817.536 🔒		2.260	Breakline	Breakline	
2663687.615, 1083841.473	6825.062	9	6817.571 🔒		7.491	Breakline	Breakline	
2663693.109, 1083830.380	6817.598	9	6825.335 🔒		7.737	Breakline	Breakline	1
<			111					

Figure 8-57. Crossing features report.

Each crossing chain will need to be corrected. Typically, this can be accomplished by deleting one or more individual points in the chain. However, it is imperative that by deleting points the terrain is not misrepresented. All edits should be performed in the measurement file or coordinate file and not in the MicroStation design file. Highlight one of the crossing breaklines and click on the *Zoom To* button.

	Zoom To 🔊 In View				1
Intersection Point		Elevation On Feature 2	Elevation Difference	Feature Type 1	Feature Type
2659758.726, 1082694.995	6861.4 Zoom To	6861.412 🔒	0.061	Breakline	Breakline
2661228.791, 1082225.640	6808.626 🔒	6809.580 🔒	0.954	Breakline	Breakline
2661229.379, 1082230.042	6808.641 🔒	6809.574 🔒	0.933	Breakline	Breakline
2661254.149, 1082779.532	6816.327 🔒	6816.431 🔒	0.104	Breakline	Breakline
2661549.219, 1083123.963	6810.742 🔒	6810.522 🔒	0.220	Breakline	Breakline
2663264.400, 1083629.090	6814.759 🔒	6824.045 🔒	9.286	Breakline	Breakline
2663265.796, 1083616.288		6824.416 🔒	9.604	Breakline	Breakline
2663267.205, 1083603.373	6814.866 🔒	6824.133 🔒	9.267	Breakline	Breakline
2663500.759, 1083706.663		6821.767 🔒	2.805	Breakline	Breakline
2663510.641, 1083725.373	6819.140 🔒	6824.519 🔒	5.379	Breakline	Breakline
2663520.424, 1083743.895	-	6819.316 🔒	5.511	Breakline	Breakline
2663530.308, 1083762.608	6819.494 🔒	6824.541 🔒	5.047	Breakline	Breakline
2663539.210, 1083779.463		6819.654 🔒	2.725	Breakline	Breakline
2663680.396, 1083856.049	6819.796 🔒	6817.536 🔒	2.260	Breakline	Breakline
2663687.615, 1083841.473	6825.062 🔒	6817.571 🔒	7.491	Breakline	Breakline
2663693.109, 1083830.380	6817.598 🔒	6825.335 🔒	7.737	Breakline	Breakline

Figure 8-58. Zoom to crossing.

The crossing breaklines will be displayed.

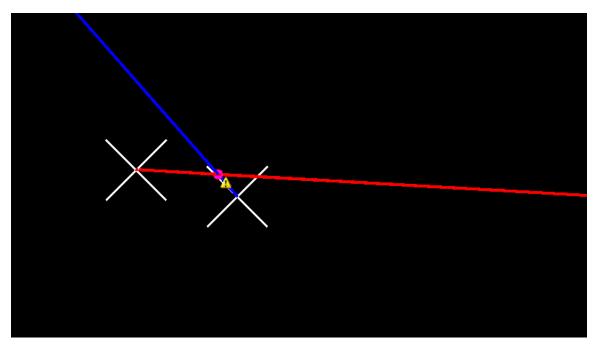


Figure 8-59. Crossing breaklines.

If there are no crossing chains, the *Terrain Crossing Features Report* will be displayed without any entries.

🕒 Feature Types 👻 🔎 Zoom To 🙎 In View 🗁 Export									
ntersection Point	Elevation On Feature 1	Elevation On Feature 2	Elevation Difference	Feature Type 1	Feature Type				
(Ш							

Figure 8-60. No crossing chains.

For projects with multiple field books, combine all of the individual terrain models into a single terrain model. It is then possible to determine if a breakline from one field book crosses a breakline from another field book.

Note: Run the *Report Crossing Features* tool for each individual field book and correct any errors prior to combining the terrain models.

In the *Terrain Model* toolbox click on the *Create Complex Terrain Model* icon.

🔄 Tasks 📃 🗉 🔀
Tasks ▼ Civil Tools ▲ Survey
▆▆▆
🕅 Survey Processing 🔹 👻
🎸 Analysis & Reporting 🔹 👻
🐣 Terrain Model 🛛 👪 🚍 🔺
o 🍋 🚔 🚟 📾 🖗 🌆 🖗 🥀 Create Complex Terrain Model
₩ 御 殿 御 御 ジ 箇
E 🖄 📩 😫 🎘 🦓
R 🎘 🎘 🛒 🐴 🦉 🔏
街 General Geometry 🔹
Z Horizontal Geometry
🕮 Vertical Geometry 🔹
V Drawing
Visualization
Animation

Figure 8-61. Combine terrain models.

In the *Complex Terrain Model* window, highlight the field book terrain models (red arrow) and then click on the *Add* button (red oval).

Komplex Terrain Model						• 🗙
Select Terrain Models Select Terrain Models to Merge or Append	\frown					
Topography 1_1 Topography 2_1	Add >	Process Order	Name	Merge/Append		
Topography 3_1	< Remove					
11	Merge					→
-	Append					
		Terrain Model Properties				
		Terrain Feature De	finition		* *	
		Feature Definition		No Feature Definition	▼ =	
		Name			~	
From Selection Set >				Cancel	Fi	nish

Figure 8-62. Select terrain models.

After the terrain models have been added, click on the Finish button.

Komplex Terrain Model				
Select Terrain Models Select Terrain Models to Merge or Append				
	Add >	Process Order	Name	Merge/Append
		1	Topography 1_1	Primary 💌
	< Remove	2	Topography 2_1	Append 🔻
	Current Action	3	Topography 3_1	Append 🔻
	Merge			
	Append			
		Terrain Model Properti	es	
		Terrain Feature	Definition	A A
		Feature Definition	No Feature	Definition
		Name		~
From Selection Set >				Cancel Finish

Figure 8-63. Finish.

The *Report Crossing Features* tool can now be used to detect crossing breaklines as previously described. Select the *Complex Terrain Model* as shown in Figure 8-64.

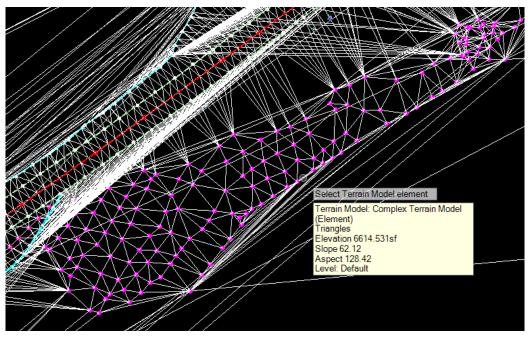


Figure 8-64. Complex terrain model.

The terrain models can be deleted by using the element selection tool to click on one of the triangles of the model, then click on the *Delete* icon.

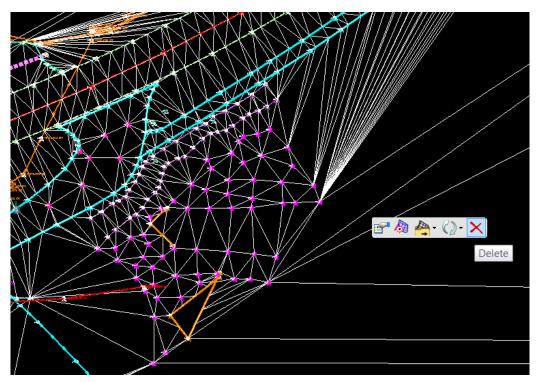


Figure 8-65.Delete terrain model.

3. Unknown Feature Codes

When features codes in the survey data do not match any of the defined feature codes in the latest feature code library, an "Alert" symbol will be displayed. By hovering over the point, a *Point Feature* window will show the message "GLR Not found in Feature Definitions" (red arrow).

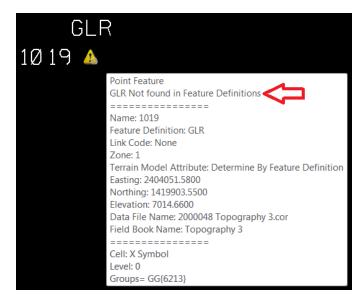


Figure 8-66. Unknown feature code.

In the *Survey Details* window, click on the *Message Center* tab. The message "Feature Definition GLR Not found in Feature Definitions" is also displayed here.

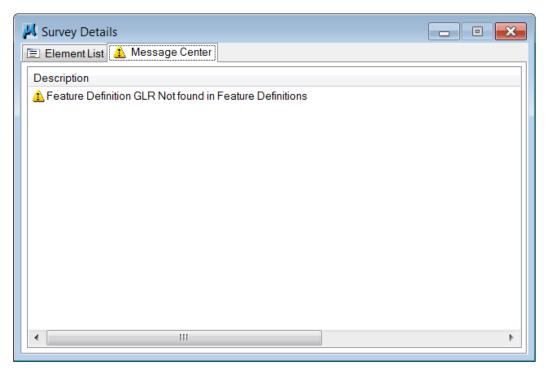


Figure 8-67. Message center.

G. Correcting Mapping Errors

When corrections to a survey dataset are necessary, the data file will need to be deleted. Click on the data file in the appropriate field book then right-click and select *Delete*. The survey file is then edited and re-loaded into Geopak SS3.

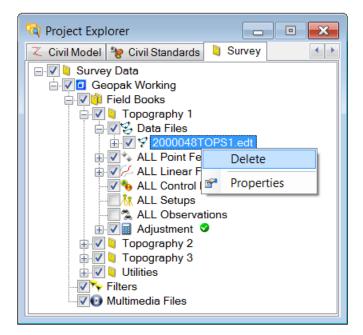


Figure 8-68. Delete data file.