

VDOT Advanced GEOPAK Survey

2004 Edition (Version 8.8)



Trademarks

AccuDraw, Bentley, the "B" Bentley logo, MDL, MicroStation and SmartLine are registered trademarks; PopSet and Raster Manager are trademarks; Bentley SELECT is a service mark of Bentley Systems, Incorporated or Bentley Software, Inc.

Java and all Java-based trademarks and logos are trademarks or registered trademarks of Sun Microsystems, Inc. in the U.S. and other countries.

Adobe, the Adobe logo, Acrobat, the Acrobat logo, Distiller, Exchange, and PostScript are trademarks of Adobe Systems Incorporated.

Windows, Microsoft and Visual Basic are registered trademarks of Microsoft Corporation. AutoCAD is a registered trademark of Autodesk, Inc.

Other brands and product names are the trademarks of their respective owners.

Patents

United States Patent Nos. 5,8.15,415 and 5,784,068 and 6,199,125.

Copyrights

©2000-2007 Bentley Systems, Incorporated. MicroStation ©1998 Bentley Systems, Incorporated. IGDS file formats ©1981-1988 Intergraph Corporation. Intergraph Raster File Formats ©1993 Intergraph Corporation. Portions ©1992 – 1994 Summit Software Company. Portions ©1992 – 1997 Spotlight Graphics, Inc. Portions ©1993 – 1995 Criterion Software Ltd. and its licensors. Portions ©1992 – 1998 Sun MicroSystems, Inc. Portions ©Unigraphics Solutions, Inc. Icc ©1991 – 1995 by AT&T, Christopher W. Fraser, and David R. Hanson. All rights reserved. Portions ©1997 – 1999 HMR, Inc. All rights reserved. Portions ©1992 – 1997 STEP Tools, Inc. Sentry Spelling-Checker Engine ©1993 Wintertree Software Inc. Unpublished – rights reserved under the copyright laws of the United States and other countries. All rights reserved.



Table of Contents

Chapter 1 – Plat Creation

OBJECTIVES 1-1
INTRODUCTION
PARCELS
GRAPHICAL COGO
LAB EXERCISE: ENTERING PARCEL DATA
LAB EXERCISE: GRAPHICAL COGO 1-11
LEGAL DESCRIPTION EDITOR 1-13
OBJECTIVES 1-13
INTRODUCTION
ACCESSING LEGAL DESCRIPTION EDITOR 1-13
GLOBAL SETTINGS
LIBRARY SETTINGS
EDIT LIBRARY
INSERTING PHRASES
LEGAL DESCRIPTION EDITOR

Chapter 2 – ASCII Import for Plat Creation

2-1

OBJECTIVES	
INTRODUCTION	
LAB EXERCISE: IMPORTING ASCII	
LAB EXERCISE: STORING PARCELS	
PLAN VIEW LABELING	
INTRODUCTION	
ACCESSING THE PLAN VIEW LABELER	
PLAN VIEW LABELING TEXT PARAMETERS SHAPE LEADER ROTATE	2-16 2-16 2-17 2-17 2-17 2-18 2-18
STYLES MENUS	

Chapter 3 – Borrow Pits

OBJECTIVES	
INTRODUCTION	
IMPORTING ASCII DATA	
CREATING A TERRAIN MODEL	
LAB EXERCISE: BORROW PITS	
VOLUME CALCULATIONS	
LAB EXERCISE: PRISMOIDAL VOLUMES	
CROSS SECTIONS	
LAB EXERCISE: END AREA VOLUMES	
CROSS SECTION SHEETS	
ACCESSING THE CROSS SECTION SHEET LAYOUT	
TOOL	
FILE > SHEET LIBRARY	
FILE > SHEET	
FILE > LOAD V7 INPUT FILE	
FILE > SAVE SETTINGS	
FILE > LAYOUT SHEETS	
FILE > EXIT	3-31
CROSS SECTION SHEETS DIALOG	
LAB EXERCISE: CROSS SECTION SHEETS	
LAYOUT	

Chapter 4 – Cross Section Reports

INTRODUCTION	
ACCESSING CROSS SECTION REPORTS	
CUSTOM HEADER	
BLUE AND RED TOP	
CLEARING	
CLOSURE	
DTM INPUT	
DTM PROPOSED 3D	
HEC – 2	
HEC RAS	
MULTI-LINE	
PROFILE GRADE	
RADIAL STAKING	
RT 40	
SEEDING	
SLOPE STAKE	
STAKING DETAIL	
WSPRO	
XS LIST	
LAB EXERCISE: CROSS SECTION REPORTS	

3-1

4-1

INTRODUCTION	
ANALYSIS TOOLS	
LAB EXERCISE:	

Chapter 6 – Survey

6-1

7-1

OBJECTIVE	6-1
INTRODUCTION	6-1
EXTRACTION OF GRAPHIC ELEMENTS	6-1
DIALOG FIELDS	
IMPORTING ASCII FILES	
SURVEY CHAINS	6-9
CHAIN EDITOR	6-9
CONVERT SURVEY CHAINS	6-10
LAB EXERCISE: SURVEY CHAINS	6-11

Chapter 7 – Geodetic Conversions

OBJECTIVES
INTRODUCTION
GEODETIC CONVERSIONS
CONVERSION OPERATIONS
SUPPORTED SYSTEMS AND PROJECTIONS
FILE CONVERSIONS
POINT CONVERSIONS
DEM CONVERSIONS
GLOBAL GEODETIC DATA
SCALE, ROTATE, TRANSLATE7-7
ELEMENT SELECTION
INCREMENT / OVERWRITE
PROCESSING
TRANSLATE
ROTATION
SCALE
PLACE COORDINATE TABLE
PLACE COORDINATE TABLE
LAB EXERCISE: COORDINATE CONVERSIONS

Chapter 8 – Least Squares Adjustments

OBJECTIVE	
INTRODUCTION	
NETWORK LEAST SQUARES	
LAB EXERCISE: FIELD TRAVERSE	
LAB EXERCISE: EXPORTING DATA	



Plat Creation

OBJECTIVES

This chapter will cover several different issues dealing mainly with Plat Creation. Different topics to be covered will include:

- Parcel Editor
- Legal Description Editor
- R/W Staking Reports
- Survey Plan Preparation Tools
- ASCII Import for Plat Creation

INTRODUCTION

GEOPAK provides several different methods for entering parcel data. Each of these has its own purpose and proves beneficial in different circumstances. Depending on the type of initial data you start with will most likely dictate the approach to storing that data in coordinate geometry.

PARCELS

The parcel interface and additional attributes have been greatly enhanced with version 8.8. Enhancements include:

- Additional Occupied Type
- User Defined Attributes
- Interface Modifications

OCCUPIED TYPE

Store Parcel From Elements	
Parcel Name:	
Occupied 💌	
Element List:	
	1

The new occupied type can be added to a parcel to represent a portion of a parcel that is set aside for something such as an inhabited area. This would then be reflected in area totals where a right-of-way taking has occurred and it overlaps a portion of a parcel designated as occupied. The resulting areas would be indicated as shown below:

Total occupied area:	59542.65531 m ² =	5.95427 ha =	14.71325 a
Occupied in taken area:	58519.61057 m ² =	= 5.85196 ha =	= 14.46045 a
Net taken area:	23754.67123 $m^2 = 2$	2.37547 ha =	5.86988 a

USER DEFINED ATTRIBUTES

Functionality had been added to the parcel element type to attach user defined attributes. These can include any information that the user wishes to associate with a parcel such as address, deed books, etc.

The command line syntax for adding attributes to parcels is shown below.

Maximum attribute name length = 24 and string size = 256

STORE ATTRIBUTE elementType elementName PARCEL parcelName NAME attributeName TYPE NUMERIC/STRING VALUE attributeValue

DELETE ATTRIBUTE elementType elementName PARCEL parcelName NAME attributeName TYPE NUMERIC/STRING

CHANGE ATTRIBUTE elementType elementName PARCEL parcelName NAME attributeName TYPE NUMERIC/STRING VALUE attributeValue

Note The user attribute may be specified in graphic COGO and COGO's Store Parcel dialog without using the command line.

The ability to setup a list of default preferences is also available. This is accomplished by accessing the **Default Attributes Preferences** option from the Element > Parcel pulldown.

웅 Coordina	ate Geomel	try Jo	ob: 1	Operator:	_ 🗆 X
Eile Edit	Element V Point Line Spiral Chain Parcel Profile	(jew]	ettings	 OFF (Feature) Browse Edit 99.1234 Utility Copy Store Subdivide Editor Default Attribute Preferences 	
1					

The dialog is used to compile a list of default preferences that will be displayed when storing any parcel. Values for each attribute can be changed as parcels are added to the database.

Nama	Turne	No.	7
INAME	Туре	value	
ADDRESS	String	4915 Waters Edge Dr.	
DEED	String	482.0000	51
TAX	String	A5	믣
OWNER	String	Shag	
Apple	,	Cancel	

Store Parcel From Parcel Name	n Elements	Element Selection	×
Parent Tract 💌		Element Type. Font	
Element List:		Point Name:	
Owner Name: ✓ Owner Name:		< Add	
Attributes		<u> </u>	
Aundules		101	
Name	Type	Value	
ADDRESS	String	4915 Waters Edge Dr.	
	String	482.0000	
OWNER	String	Shan V	
OWNER	Journg		
	Store	Parcel	

When the Store Parcel dialog is accessed the list of defaults will be displayed in the bottom.

The attribute values are changed by simply clicking on any one of the three columns and providing an overriding value.

Parcel attributes can also be changed directly from the COGO Navigator. This is done by highlighting the previously stored parcel and right clicking. This action will present a menu where one option will be **Change Parcel Attribute** as shown below.

8 Navigato	(1)			_	
Select Too	ls				
× × -] id 📥 🗎	D3			
Element : Pa	arcel 🔻				
Name	Description	Туре	Parent Tract	Area	
MAIN	Boundary	Parent Trac	t MAIN	Add Element	
				Delete Element	
				Edit Element	
				Print/Describe Element	
				Edit Element Feature	
				Edit Element Description	
				Visualize Element	
				Unvisualize Element	
				Soloot Highlighted Down	
				Highlight Selected Rows	
				Compute Area	
				Export Selection	
				Change Parcel Type	
				Change Parcel Attribute	

<mark>3</mark> Change F	arcel Attribu	ite	_ 🗆 X
+	→ ^{1 of 1}	: MAIN	
Name	Туре	Value	
ADDRESS	String	4915 Waters Edge Dr.	
DEED	String	482	
OWNER	String	Shaq	×
TAX	String	A5	
	- 1		
Appl	у	Done	

Once selected, the attribute editing dialog will appear allowing for the adding, deleting or changing of the user attributes.

GRAPHICAL COGO

Graphical COGO also supports the addition of user defined attributes when storing graphically. This is accessed via the Store Parcel dialog as shown below.

😤 Store Parc	el:		_ 🗆 🗡
	Id: PAR1		
Ty	ype: Parcel	-	
Opposing Elem	ent: Transp	ose 🔻	
Meth	nod: Flood	•	
Element Ty	pe: DGN E	lements 🔻 🕻	2
Max G	ap: 0.0010	00	
			- 🔺
🔲 Owner N	lame:		
Improver	ment:		
🔽 Attribute	s		
Mana	Tune	Mahaa	1
Name	туре	value	
ADDRESS	String	4915 Wate	
DEED	String	482.0000	×
TAX	String	A5	
OWNER	String	Shag	$-\mathbf{X}$
1			1

The functionality is identical to assigning the attributes in classic COGO.

The new **Occupied** type has also been added to the graphical Store Parcel dialog as shown below.

名 Store Parc	el:		_ 🗆 🗵
	ld: 🕅	IAIN]
Dpposing Elem Meth Element Ty Max G	ype: I ent: hod: pe: iap: 0	 Parcel Building Easement Taking Occupied 001000 	٩
Owner N Improve Attribute	lame: [ment: [s		
Name ADDRESS DEED TAX OWNER	Type String String String String	Value 4915 Wa 482.0000 A5 Shaq	te

New Flood functionality has also been incorporated into the store graphical parcel dialog. This will allow the use of MicroStation's flooding capabilities for generating areas.

Store Parcel		_ 🗆 🗙
ld:	MAIN	
Туре:	Parcel 🔻	
Opposing Element:	Transpose 🔹 🔻	
Method:	Flood 🔻	
Element Type:	DGN Elements 🔻	Q
Max Gap:	0.001000	

LAB EXERCISE: ENTERING PARCEL DATA

- > PARCEL EDITOR
- 1. Open the MicroStation file *C:\60843\s60843.dgn*
- 2. Attach the saved view *ISTAR*
- 3. Access GEOPAK Survey and open the existing project 60843.
- 4. Use the user *Mary* to access the project.
- 5. Click on the button to open Coordinate Geometry
- 6. Select the Editor from the *Element > Parcel > Editor* pulldown.

名 Coordina	te Geometry Job: 101	Operator: mw
<u>F</u> ile <u>E</u> dit	Element <u>V</u> iew <u>T</u> ools	
	<u>P</u> oint	' k + / / / / / / / / / / / / / / / / / /
244 P	Line	Redefine Temperary Visualization TOEF (Cashura) - Browse Edit
39K /#2	<u>D</u> urve	
99.12	<u>5</u> piral	• < > >>
COGO Key-ir	Chai <u>n</u>	· · · · · · · · · · · · · · · · · · ·
	P <u>a</u> rcel	
	Pro <u>f</u> ile	▶ С <u>о</u> ру
	Next Available Settings	Store
		S <u>u</u> bdivide
		Editor
		Default Attribute Preferences

7. Begin by clicking the Starting NEZ button and entering the POB coordinates.

Northing	301688.7532
Easting	3876313.6897

8. Begin with point number D150

SEnter Starting Coordinates	_ 🗆 🗵
Pt. Num: D150	
Coordinates	
North (Y): 301688.7532	
East (X) 3876313.6897	DP

9. Close the *Starting NEZ* dialog.

10. Next, enter the *Name* 4200 for the parcel and set the *Parcel Type* to Parent.

ŧ	Map Check / Store	Parcel Tool						_ 🗆 X
F	arcel Name: 4200 Type : Parent 💌 Course Description		Load	i Ir Curve	Owner: nprovement: Parameters:	Radius 💌	Arc 💌	Preferences Starting NEZ
	Bearing	Distance	Radius	Arc	Chord	Delta	Direction	Pt./Cur. Name
	N 0000.00 E				_	_	- Rt. ▼ [
ŀ			i la companya di seconda di second			1	<u> </u>	
	Bearing		•	· · · ·		Clr Inpt		
	1.000000 🗖 Sca	ale Factor		Clear Parcel	Store F	'arcel	Describe	Closure

11. Begin entering the metes and bounds outlined below.

Note

Pay attention to the direction of the bearings in regards to the North Arrow.



12. When completed you should have all of the metes and bounds entered in the dialog as shown below.

Map Check / Store Parcel Name: 4200 Type : Parent Course Description	Parcel Tool	▼ Loa	ad Cur	Owner: Improvement: ve Parameters:	Radius 💌	Arc	Preferences Starting NEZ
Bearing	Distance	Radius	Arc	Chord	Delta	Direction	Pt./Cur. Name
S 17 20 34.00 E S 15 03 8.00 E N 72 39 26.00 E N 14 40 18.00 W N 17 20 34.00 W N 72 39 26.00 E N 17 20 34.00 W S 82 28 2.00 W	375.2200 82.3500 199.7400 82.3700 129.7300 120.9100 190.0000 325.6700						D151 D152 D153 D154 D155 D156 D156 D157 D158
S 17 20 34.00 E Bearing ▼	375.2200		.+ +		Cir Inpt	<u>Rt</u>	2151
1.000000 🔲 Sc	ale Factor	[Clear Parc	cel Store	Parcel	Describe	Closure

13. Click the *Closure* button and review the closure in COGO.

Note The Closure should be approximately 1:5200

14. Click the *Store Parcel* button to store the parcel.

> STORING PARCEL ATTRIBUTES

- 1. Select from the COGO *Element* pulldown *Parcel > Default Attribute Preferences*
- 2. Add each attribute into the dialog as shown below.

Name	Туре	Value	
DWNER	String	ISTAR Bowling Centers	
NSTR#	String	040007050	
PB	String	10	
PG	String	14	<u>></u>
TAX#	String	S05D-3423-2349	
Ħ	String	4200	

- 3. Click the *Apply* button.
- 4. Now select *Element > Parcel > Store*.

5. Include the points as shown below and store the parcel.

😤 Store Parcel From	n Elements		_ 🗆 X
Parcel Name: 🔽	4200A	Element Selection	
Parent Tract 💌		Element Type: Point	-
Element List:		Point Name:	
D150-D157 D150		< Add [D150-D157	
🔲 Owner Name: 📘			
🔲 Improvement: 🗍			
Attributes			
Name	Туре	Value	
OWNER	String	ISTAR Bowling Centers	
INSTR#	String	040007050	
PB	String	10	- 2
PG	String	14	×
TAX#	String	S05D-3423-2349	
#	String	4200	-
Store Parcel			

6. From the *Navigator* print the parcel and review the information.

E	Coordinate Geometry Job: 101	Operator: mw	
	<u>File E</u> dit E <u>l</u> ement <u>V</u> iew <u>T</u> ools		
	Image: Constraint of the state of	Image: Second state Image: Second st	☐ <u>1+234</u> →
Ĩ	OGO Key-in) DESCRIBE PARCEL 4200		
	Parcel 4200A : D150 D15 Attribute T # St INSTR# St OWNER St PB St PG St TAX# St Total parent tract area	1 D152 D153 D154 D155 D156 D157 D150 ype Value ring 4200 ring 040007050 ring ISTAR Bowling Centers ring 10 ring 14 ring S05D-3423-2349 = 112,380.2336 ft ² = 2.5799	a
	Total taken area	$= 0.0000 \text{ ft}^2 = 0.0000$	a
	Remaining area	= 112,380.2336 ft ² = 2.5799	a
	Description of parcel:	4200A	
	Beginning parent tract d	escription	_
			·
	Point D150 N	301,688.7532 E 3,876,313.6897 Sta	0+00.00
	<u> </u>	0 454 461 64 661 5 5 · · 655 6666	•

LAB EXERCISE: GRAPHICAL COGO

- > STORING A RIGHT-OF-WAY TAKE
- 1. Create a new MicroStation file called *Parcel.dgn*
- 2. From the main Survey Menu bar select Plans Preparation > D&C Manager
- 3. Navigate the database to the item *Survey* > *Property Line*



- 4. Highlight the item and then click the *Draw Plan & Profile* button on the companion dialog.
- 5. Make sure the *Property Lines* and *Labels* are toggled ON and that the *Label Scale* is set to 50.

웅 Draw Plan & Pro	file 🔤 🖂 🗙
Item: Pro	perty Line
Element Type: Par	cels 💌 Label Scale: 50
Key-in Points:	
Select Parcel to Drav	
4200	Property Lines
4200A	Taking Lines
	Easement Lines
	Occupied Lines
	🔲 Buildings
	Property Line Labels
	🔲 Taking Line Labels
	Easement Line Labels
	Occupied Line Labels
	Parcel Number Labels
	Owner Names
	Parcel Quantities

6. Now click on the Parcel 4200 in the list window to plot it.

7. Select *Applications > GEOPAK Road > Geometry > Graphical Coordinate Geometry*.



- 8. Set the active level to *Default*.
- 9. Place a line representing a proposed right-of-way similar to the image below.



10. Click the icon to store a Parcel.

11. Enter the information as shown below.

8 Store Parc	el		_ 🗆 X
	ld: 4200	-	
Ту	pe: <u>Taking</u>	•	ROW
Opposing Eleme	ent: Transp	ose 💌	
Meth	od: Flood	-	
Element Typ	be: DGN E	lements 💌	Q
Max G	ap: 0.0010	00	
Owner N Improver Attributes	ame: <mark>ISTAF</mark> nent: I	3]
Name	Type	Value	-
INSTR#	String	04000	,
PB	String	10	
	String	14	

- 12. Data point inside the area making up the right-of-way take.
- **13**. Enter a second data point to accept the direction for storing the right-of-way take. (A right mouse button click will reverse the direction of the arrows).
- 14. Next, move your cursor around the perimeter of the area making up the right-of-way take and pick a POB for beginning the area and enter a data point.
- 15. Print the Parcel in Coordinate Geometry and review the data.

Coordinate Geometry Job: 101 Op File Edit Element View Tools	erator: m w	_ _ ×			
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $					
COGO REGIN: [DESCHIBE PARCEL 4204					
<* 127 DESCRIBE PARCE	L 4200	_			
Parcel 4200 : D150 CUR OR4	D151 D152 CUR OR5 D153 D154 D155 CUR O	R6			
Owner # 1: ISTAR					
Attribute Type	Value				
# Strin	g 4200				
INSTR# Strin	g 040007050				
OWNER Strin	g ISTAR Bowling Centers				
PB Strin	g 10.00				
PG Strin	g 14.00				
IAA# Strin	g 505D-3423-2349				
Taken : D214 D215 D21 Name: ROW	5 D217 D218 D219 D220 D221 D222 D214				
Taken area	= 21,036.19 ft ² =	0.48 a			
Total parent tract area -	112 202 22 f+2 = 2	50 S			
Total taken area =	$21 036 19 ft^2 = 0$.30 a 48 a			
Remaining area =	91.347.02 ft ² = 2	.10 a			
		-			

LEGAL DESCRIPTION EDITOR

OBJECTIVES

In this session we will review how to set up and access the legal description database and become proficient in using the Legal Description Editor.

INTRODUCTION

The Legal Description Editor is a powerful tool for the automated generation of legal descriptions. Its power lies in the completely customizable terminology, styles, and preferences, all easily accomplished via dialogs.

ACCESSING LEGAL DESCRIPTION EDITOR

When the Legal Description Editor is accessed a dialog box prompting for the coordinate geometry database will appear like the one below.

Job Number				
۹				
Cancel				

Once the desired job number is selected the main Editor dialog will appear.

S Legal Description	Editor		_ 🗆 ×
<u> </u>	rary <u>S</u> ettings <u>C</u> losure		
🗋 🛩 🖶 👗	🗎 🚹 🗠 😋 🛛 Ref.Chain :		<u> </u>
<u> </u>			
		Line: 1	Col: 1

This dialog has several pull-downs allowing for customization of the Editor and default settings for how descriptions will be written.

GLOBAL SETTINGS

The first selection should be to set global settings.

😤 Legal Descript	tion Editor	_ 🗆 ×
<u>F</u> ile <u>E</u> dit <u>I</u> nsert	Library Settings Closure	
	Define Global settings	
<u> </u>		
	Line: 1	Col: 1

This will invoke the following dialog.

alobal Settings	
CL Alignment	
Choose chain which defines the cen	terline alignment :
Sequencing	
Next or starting numeric sequence d	esignation : 1
Next or starting alphabetic sequence	e designation : A
Macros	Dist. Units
chains/parcels : Non-expanded	Dist. Units : Feet
	Ft. Definition : US Survey
- Tolerances	Area computations
Curve tangency (sec.) : 1.000	Full Precision
	OK Cancel

Most of these settings are rather self explanatory however probably the most important one is the very first one allowing the designation of a COGO chain for referencing stations in the description.

LIBRARY SETTINGS

The Library Settings and the Library itself are without a doubt the most important part of the Legal Description Editor. The library provides a way for the user to establish default phrases and add customized phrases to a central location for recall at any time.

😪 Legal Description	Editor			_ 🗆 ×
<u> </u>	orary <u>S</u> ettings <u>C</u> losure			
	S <u>e</u> t Current Library/Style Edit Library	Ref.Chain : 🗚	RMORY	
			Line: 1	Col: 1

The first selection is the **Set Current Library/Style** option. If this is the first time this option has been selected you will be prompted to provide a **Style** name.

Enter Style Name
Style Name ROW
<u>0</u> K

If this is not the first time this has been accessed and there is already a default or custom style name then you will be prompted with the following dialog where you can create a new style or select an existing one.

🔗 Set Current Library 💦 🗖	
Current Library :	
tley\geopak273\bin\default.ldb	٩
Current Style :	
default	21
ROW	
	<u> </u>
	\mathbf{X}
OK	

This allows the user to select the library from which to work from or to store defaults to. There is an option here to set various styles such as right-of-way, condemnations, etc. This provides the user with the flexibility to store and recall various styles depending on the type of descriptions that will be written.

Once a style has been created, that style can be edited from the dialog below by selecting the *EDIT* button.

🔁 Set Current Library 💦 📕	. 🗆 🗙
Current Library :	
tley\geopak273\bin\default.ldb	<u> </u>
Current Style :	
default	2
ROW	
	\mathbf{X}
1	
ОК	

There are several tabs across the top of this dialog to allow the user to make settings according to phrase and defaults he wishes to use for this particular style.

Define Styles		
Default Phrases	Precision	Bearing Format 🕕
	Line Phrase : Lines	EndCommence
Tangent C	Curve Phrase : Curve	\StandardCrve
Non-Tangent C	Curve Phrase : Curve	\StandardCrve
9	Spiral Phrase : Spirals	s\StndSpiral
Coord	inate Phrase : NEZ\	SPC_Phrase
	Area Phrase : 🛛 🗛 🖓	Standard_Area 💌
Docume	ent Template : DocTe	emps\StndrdDocTemp 📃
Parcel Owner's N	lame Phrase : Owner	r\StndrdOwner 📃
C	Chain Phrase :	•
		<u>O</u> K Cancel

The first, as shown above, is for setting up default phrase for when a particular element is encountered.

Define Styles			
Default Phrases	Precision	Bearing Format	} 📭
	Sq.Ft.: 1		
	Sq.Mt.: 2		
	Acres : 5		
	Hectares : 6		
	NEZ (feet) : 2		
N	EZ (meters) : 3		
Dis	tance (feet) : 2		
Dista	ince (meter) : 3		
	Bearing : <u>1 sec.</u>		
		<u>0</u> K (Cancel

The next option, as shown below, allows the setting of precision variables.

As you review the various tabs the next **BEARING FORMAT** tab, gives the user the flexibility to control how bearings are displayed when the description is automatically written.

Define Styles	
Precision Bearin	ng Format General 🕴 💶
Deg. Min. Sec. Text Style Degrees, minutes, secon Decimal degrees Deg.: deg. Min.	inds i: min. Sec.: sec.
Direction Style ● North 30 [^] 45' 26'' East ○ Northeast 30 [^] 45' 26'' ○ 30 [^] 45' 26'' (azimuth) ○ 30 [^] 45' 26'' Right (defle	North : N South : S East : E West : W
Sample Bearings S 89 deg. 30 min. 00 sec. E N 44 deg. 30 min. 00 sec. V	:
Cardinal Direction Style O Text (Due North) O Standard	Wrap Bearings Wrap bearings : Yes
	<u>Q</u> K Cancel

Notice how this dialog displays a sample of the desired bearing as the different options are set.

Define Styles	General	Pt Geometry Physic Late
bearing roimat		
Numbers O Alphabetic O Numeric	Sequencing Alphabetic Numeric	Case • Lower: • Upper:
Area Threshold Acres : 1.00 Hectares : 1.00 Approximate Directio	n Style	Area Text Phrases Acres : acres ectares : hectares Sq.Ft.: sq. feet Sq.Mt.: sq. meters
O Northwest O northwesterly O Northwesterly		Right : right Left : left Station Format
	_	Feet : 12+34 Meters : 1+234
		<u>O</u> K Cancel

The next dialog provides *GENERAL SETTINGS* for areas and directions. Probably the most important settings here is the **column width**, as this will control the line wrapping and how the description is formatted.

The **POINT GEOMETRY PHRASE** option allows the user to set default phrases for when the description encounters particular elements such as a PC or a reverse curve, etc.

Define Styles	
General	Pt. Geometry Phrases Parcel default Phra
Line	to Line : a point
Line to Tangent	Curve : The PC of a circular curve
Line to Non-tangent	Curve : The PC of a non-tangent circular curve
Tangent Curve	to Line : The PT of a circular curve
Non-tangent Curve	to Line : The PT of a non-tangent circular curve
Compound	Curve : a point of compound curvature
Reverse	Curve : a point of reverse curvature
Line to	Spiral : the start of a spiral curve
Spiral to	Curve : the start of a circular curve
Curve to	Spiral : the start of a spiral curve
Spiral	to Line : the end of the spiral curve
	<u> </u>

These phrases are inserted into the description using the <PTGEOM> variable. The <PTGEOM> variable may be included as part of a line phrase. It is completely up to the user whether to use the <PTGEOM> as part of his line phrases.

The *PARCEL DEFAULT PHRASE* option is very similar to the *POINT GEOMETRY PHRASES* in that the user can establish defaults for parcel descriptions from beginning to end. These phrases determine what line style will be used for the first line of a parcel, the body of a parcel, and the last line of the parcel.

efine Styles	
Pt. Geometry Phrases Parce	el default Phrases Chain default Phra
First Line	
Line :	Lines\EndCommence
Tangent Curve Phrase :	curve\StandardCrve
Non-Tangent Curve Phrase :	curve\StandardCrve
- Body	
Line :	Lines\EndCommence
Tangent Curve Phrase :	curve\StandardCrve
Non-Tangent Curve Phrase :	curve\StandardCrve
Last Line	
Line :	Lines\EndCommence
Tangent Curve Phrase :	curve\StandardCrve
Non-Tangent Curve Phrase :	curve\StandardCrve
	<u> </u>

First Line	
Line :	Lines\EndCommence
Tangent Curve Phrase :	curve\StandardCrve
Non-Tangent Curve Phrase :	curve\StandardCrve
Body	
Line :	Lines\EndCommence
Tangent Curve Phrase :	curve\StandardCrve
Non-Tangent Curve Phrase :	curve\StandardCrve
Last Line	
Line :	Lines\EndCommence
Tangent Curve Phrase :	curve\StandardCrve
Non-Tangent Curve Phrase :	curve\StandardCrve

The same goes for the CHAIN DEFAULT PHRASES.

EDIT LIBRARY

Once the Library and Style have been selected the user can edit the selected library or add to it. This is where the standard phrases are created and stored.



When selected the user must confirm/specify which library he wants to edit.



The following dialog will appear once the desired library is selected and the *EDIT* button is selected.

8 Legal Description
<u>F</u> ile <u>E</u> dit F <u>a</u> vorites <u>H</u> elp
👬 🔁 🞦 🛃 🔍
C\Program Files\Bentley\geopak273\bin\default.ldb C\Program Files\Bentley\geopak273\bin\default.ldb Text DocTemps NEZ Curve Area Lines Owner

The setup of the library interface is very similar to the SMD file and the DDB file as discussed in previous chapters.

It is a hierarchy database allowing the user to create categories and items. In the dialog below the category *CLAUSES* has been created with various standard clauses set up as items within it.

File Edit Favorites Help File Edit Favorites Help File Export Favorites Favorites File No_1 Reference No_1a_Reference No_1a_Reference No_3 Partial Take No_3 Partial Take No_4_Utility No_5_Fee Simple No_7_Controlled Access No_8a_Slope Easement No_9c_Temporary Construction No_9d_Temporary Construction No_9d_Temporary Construction No_10a_Improvements Partly ON/OFF R/W No_11a_Permanent Drainage (Ponding) No_12_Road Clause No_13_Driveway Easement	
Image: Provide and the system of the system Image: Provide th	
C:\D_Drive\cec\DOT_Tennessee\TDOT_RW\tdot\standards\ Export Clauses No1 Reference No2 Deed Reference No3 Partial Take No5 Fee Simple No6 Public Highway Right-of-Way No7_ Controlled Access No8 Slope Easement No9C_Temporary Construction No9C_Temporary Construction No9C_Temporary Construction No9C_Temporary Construction No10_Improvements Partly ON/OFF R/W No10_Improvements Partly ON/OFF R/W No11_Drainage Easement No11_Prainage Easement No12_Road Clause No. No. No. No12_Road Clause No.	<u>File Edit Favorites Help</u>
 C:\D_Drive\cec\DOT_Tennessee\TDOT_RW\tdot\standards\ Export Clauses No_1 Reference No_2_Deed Reference No_3_Partial Take No_4_Utility No_5_Fee Simple No_6_Public Highway Right-of-Way No_7_Controlled Access No_8_Slope Easement No_9_Temporary Construction No_9_Temporary Construction No_9_Temporary Construction No_9_9_Temporary Construction No_9_1_Temporary Construction No_9_2_Temporary Construction No_10_Improvements Partly ON/OFF R/W No_10_Improvements Partly ON/OFF R/W No_11_Drainage Easement No_11_Prainage Easement No_11_Reduction No_11_Prainage Easement No_11_Reduction No_11_Reference 	ñ 🔁 🗋 📴 🛕
 Export Clauses No_1 Reference No_2, Deed Reference No_3, Partial Take No_4, Utility No_5, Fee Simple No_6, Public Highway Right-of-Way No_7, Controlled Access No_8, Slope Easement No_8, Slope Easement No_9, Temporary Construction No_10_ Improvements Partly ON/OFF R/W No_10_ Improvements Partly ON/OFF R/W No_10_ Improvements Partly ON/OFF R/W No_11_ Drainage Easement No_11_ Prainage Easement No_11_ Road Clause No_13_ Driveway Easement 	🛛 📼 C:\D_Drive\cec\DOT_Tennessee\TDOT_RW\tdot\standards\
 Clauses No1 Reference No2. Deed Reference No3. Partial Take No4. Utility No5. Fee Simple No6. Public Highway Right-of-Way No7. Controlled Access No8. Slope Easement No8. Slope Easement No9. Temporary Construction No10. Improvements Partly ON/OFF R/W No10. Improvements Partly ON/OFF R/W No10. Improvements Partly ON/OFF R/W No11. Drainage Easement No11. Prainage Easement No12. Road Clause No13. Driveway Easement 	Export 👘
 No1 Reference No1a_Reference No2_Deed Reference No3_Partial Take No4_Utility No5_Fee Simple No6_Public Highway Right-of-Way No7_Controlled Access No8_Slope Easement No8a_Slope Easement No9c_Temporary Construction No9c_Temporary Construction No9c_Temporary Construction No9c_Temporary Construction No9c_Temporary Construction No10_Improvements Partly ON/OFF R/W No10b_Improvements Partly ON/OFF R/W No11b_Driveway Easement No12_Road Clause No13_Driveway Easement 	🗁 Clauses
 No1a_Reference No2_Deed Reference No3_Partial Take No4_Utility No5_Fee Simple No6_Public Highway Right-of-Way No7_Controlled Access No8_Slope Easement No8a_Slope Easement No9_Temporary Construction No9d_Temporary Construction No9d_Temporary Construction No9d_Temporary Construction No10_Improvements Partly ON/OFF R/W No11_Drainage Easement No11_Prainage Easement No12_Road Clause No13_Driveway Easement 	🖹 No1 Reference
 No2_ Deed Reference No3_ Partial Take No4_ Utility No5_ Fee Simple No6_ Public Highway Right-of-Way No7_ Controlled Access No8_ Slope Easement No8a_ Slope Easement No9b_ Permanent Easement No9c_ Temporary Construction No10_ Improvements Partly ON/OFF R/W No10b_ Improvements Partly ON/OFF R/W No11b_ Improvements Partly ON/OFF R/W No11b_ Improvement Drainage (Ponding) No12_ Road Clause No13_ Driveway Easement 	🖺 No1a_ Reference
 No3_ Partial Take No4_ Utility No5_ Fee Simple No6_ Public Highway Right-of-Way No7_ Controlled Access No8_ Slope Easement No8a_ Slope Easement No9b_ Permanent Easement No9c_ Temporary Construction No9c_ Temporary Construction No9c_ Temporary Construction No9c_ Temporary Construction No10_ Improvements Partly ON/OFF R/W No10b_ Improvements Partly ON/OFF R/W No11b_ Improvements Partly ON/OFF R/W No11b_ Improvement Drainage (Ponding) No12_ Road Clause No13_ Driveway Easement 	No2_Deed Reference
 No4_ Utility No5_ Fee Simple No6_ Public Highway Right-of-Way No7_ Controlled Access No8. Slope Easement No8a_ Slope Easement No9_ Temporary Construction No9c_ Temporary Construction No9d_ Temporary Construction No9d_ Temporary Construction No9e_ Temporary Construction No10_ Improvements Partly ON/OFF R/W No10b_ Improvements Partly ON/OFF R/W No11b_ Improvement Drainage (Ponding) No12_ Road Clause No13_ Driveway Easement 	🖹 No3_ Partial Take
 No5_Fee Simple No6_Public Highway Right-of-Way No7_Controlled Access No8. Slope Easement No8a_Slope Easement No9_Temporary Construction No9c_Temporary Construction No9d_Temporary Construction No9e_Temporary Construction No10_Improvements Partly ON/OFF R/W No10b_Improvements Partly ON/OFF R/W No10b_Improvements Partly ON/OFF R/W No10b_Improvements Partly ON/OFF R/W No11b_Drivements Partly ON/OFF R/W No11b_Improvements Partly ON/OFF R/W 	🖹 No4_ Utility
 No6_Public Highway Hight-of-Way No7_Controlled Access No8a_Slope Easement No8b_Permanent Easement No9_Temporary Construction No9d_Temporary Construction No9d_Temporary Construction No9d_Temporary Construction No9e_Temporary Construction No10_Improvements Partly ON/OFF R/W No10b_Improvements Partly ON/OFF R/W No10b_Improvements Partly ON/OFF R/W No10b_Improvements Partly ON/OFF R/W No11b_Drivements Partly ON/OFF R/W No11b_Drivements Partly ON/OFF R/W No11b_Drivements Partly ON/OFF R/W No12_Road Clause No13_Driveway Easement 	No5_Fee Simple
 No7_ Controlled Access No8_ Slope Easement No8a_ Slope Easement No8b_ Permanent Easement No9_ Temporary Construction No9d_ Temporary Construction No9d_ Temporary Construction No9d_ Temporary Construction No9e_ Temporary Construction No9e_ Temporary Construction No10_ Improvements Partly ON/OFF R/W No10b_ Improvements Partly ON/OFF R/W No10b_ Improvements Partly ON/OFF R/W No11b_ Trainage Easement No11a_ Permanenet Drainage (Ponding) No12_ Road Clause No13_ Driveway Easement 	No6_ Public Highway Right-of-Way
 No8_Stope Easement No8a_Stope Easement No8b_Permanent Easement No9_Temporary Construction No9d_Temporary Construction No9d_Temporary Construction No9e_Temporary Construction No9e_Temporary Construction No9e_Temporary Construction No9e_Temporary Construction No10_Improvements Partly ON/OFF R/W No10b_Improvements Partly ON/OFF R/W No10b_Improvements Partly ON/OFF R/W No11b_Drainage Easement No112_Road Clause No13_Driveway Easement 	No/_ Controlled Access
No_8a_Stope Easement No_8b_Permanent Easement No_9c_Temporary Construction No_9c_Temporary Construction No_9e_Temporary Construction No_9e_Temporary Construction No_10_Improvements Partly ON/OFF R/W No_10a_Improvements Partly ON/OFF R/W No_11b_Improvements Partly ON/OFF R/W No_11b_Drainage Easement No_11a_Permanent Drainage (Ponding) No_12_Road Clause No_13_Driveway Easement	E No8_Slope Easement
No_30_ remonent Easement No_30_ remonent Easement No_30_ Temporary Construction No_9c_ Temporary Construction No_9c_ Temporary Construction No_9c_ Temporary Construction No_10_ Improvements Partly ON/OFF R/W No_10a_ Improvements Partly ON/OFF R/W No_10b_ Improvements Partly ON/OFF R/W No_11b_ Improvements Partly ON/OFF R/W No_11_ Drainage Easement No_12_ Road Clause No_13_ Driveway Easement	B No8a_ Slope Easement
 No9c_ Temporary Construction No9c_ Temporary Construction No9c_ Temporary Construction No9c_ Temporary Construction No10_ Improvements Partly ON/OFF R/W No10b_ Improvements Partly ON/OFF R/W No10b_ Improvements Partly ON/OFF R/W No11_ Drainage Easement No12_ Road Clause No13_ Driveway Easement 	B No. 9 Temperan Construction
 No_36_ Temporary Construction No_96_ Temporary Construction No_96_ Temporary Construction No_10_ Improvements Partly ON/OFF R/W No_10a_ Improvements Partly ON/OFF R/W No_10b_ Improvements Partly ON/OFF R/W No_11b_ Improvements Partly ON/OFF R/W No_12b_ Improvements Partly ON/OFF R/W No_13b_ Improvements Partly ON/OFF R/W No_13b_ Improvements Partly ON/OFF R/W 	No. 3 Temporary Construction
 No_3e_Temporary Construction No_10_Improvements Partly ON/OFF R/W No_10a_Improvements Partly ON/OFF R/W No_10b_Improvements Partly ON/OFF R/W No_11b_Improvements Partly ON/OFF R/W No_11_Drainage Easement No_11a_Permanent Drainage (Ponding) No_12_Road Clause No_13_Driveway Easement 	B No. 9d. Temporary Construction
 No_10_ Improvements Partly ON/OFF R/W No_10a_ Improvements Partly ON/OFF R/W No_10b_ Improvements Partly ON/OFF R/W No_11b_ Improvements Partly ON/OFF R/W No_11_ Drainage Easement No_11a_ Permanent Drainage (Ponding) No_12_ Road Clause No_13_ Driveway Easement 	No. 9e Temporary Construction
 No10a_Improvements Partly ON/OFF R/W No10b_Improvements Partly ON/OFF R/W No11_Drainage Easement No11a_Permanent Drainage (Ponding) No12_Road Clause No13_Driveway Easement 	No. 10 Improvements Partly ON/OFE B/W/
 No10b_Improvements Partly ON/OFF R/W No11_Drainage Easement No11a_Permanent Drainage (Ponding) No12_Road Clause No13_Driveway Easement 	No. 10a Improvements Partly ON/OFF BAW
 No11_ Drainage Easement No11a_ Permanent Drainage (Ponding) No12_ Road Clause No13_ Driveway Easement 	No. 10b Improvements Partly ON/OFF B/W
 No11a_ Permanenet Drainage (Ponding) No12_ Road Clause No13_ Driveway Easement 	No. 11 Drainage Easement
■ No12_ Road Clause ■ No13_Driveway Easement	No. 11a Permanenet Drainage (Ponding)
No. 13 Driveway Easement	No. 12 Road Clause
	No. 13 Driveway Easement
🗈 No14_ Permanent Utility Easement	🕒 No14_ Permanent Utility Easement 🗸 🗸

The clauses will be available for selection when writing the legal description and automatically inserted into the description.

Icons appear on the upper portion of the dialog for creating and editing items and categories.

🔁 Legal Description 📃 🗖 🗙
<u>F</u> ile <u>E</u> dit F <u>a</u> vorites <u>H</u> elp
m 🗢 🗅 🗹 🔍
C:\D_Drive\cec\D0T_Tennessee\TD0T_RW\tdot\standards\di Export Clauses Spirals Text DocTemps NEZ curve Area Lines Owner

Here you can see an item for *DEED REFERENCE* that has been set up. This particular item has a list created in it so that when inserted into a description the user will have the opportunity to select from a list of counties to insert.

Create Legal Description Insertable Items	
Item ID No_2_ ID Description Deed Reference Item Type: Text Phrase	Insert Variables Insert Key in text
DEED recorded in Book {Enter D Page Number}, in the Register's [Anderson]Bedford Benton Bledso Carroll Carter Cheatham Chester kett Cumberland Davidson Decatu tress Franklin Gibson Giles Gra ton Hancock Hardeman Hardin Haw man Houston Humphreys Jackson J dale Lawrence Lewis Lincoln Lou	eed Book Number}, Page {Enter Office of e Blount Bradley Campbell Cannon Claiborne Clay Cocke Coffee Croc r Dekalb Dickson Dyer Fayette Fen inger Greene Grundy Hamblen Hamil kins Haywood Henderson Henry Hick efferson Johnson Knox Lake Lauder don Macon Madison Marion Marshall

INSERTING PHRASES

When the library has been set up and stored the user is ready for writing a legal description.

This is done by selecting from the *INSERT* pull-down.

😤 Legal De	escription Editor	
<u>F</u> ile <u>E</u> dit	Insert Library Settings Closure	
	Insert Library Settings Closure Line/Curve/Spiral Phrase Ref.Ch Calls by Parcel/Chain Image: Closure Coordinate Phrase Image: Closure Area Phrase Image: Closure Literal Text Parcel Owner's Name Phrase Document Template Image: Closure Run Macro Chain Chain Phrase Image: Closure	ain : 💽 👔
		Line: 1 Col: 1

The user uses the insert option to select the desired type of phrase to insert. Once selected, dialogs will appear allowing for the selection of that particular type of phrase from the items that were saved in the library.

Insert Text Ph...
Export
Clauses
Spirals
Text
DocTemps
NEZ
curve
Area
Lines
Insert

For example a TEXT PHRASE could be selected and the following dialog will appear.

The user then selected the type of *TEXT PHRASE* such as *CLAUSES*... and then the following dialog appears allowing for the selection of the desired clause.

CINSERT Text Ph	- 🗆 🗵
<mark>™</mark> ■ No1 ■ No1a_ ■ No2_ ■ No3	
B No3_ B No4_ B No5_ B No6_ B No7_	•
Insert	J

Once highlighted and the *INSERT* button selected, the phrase will be inserted into the description in its entirety. In this case part of the phrase is automatically placed in the description and then the user is prompted to provide some variable information.

Clegal Description Editor	
<u>File Edit Insert Library Settings Close</u>	lie
	🗅 Ref.Chain : 💽 📓
DEED recorded in Book	
	SInsert Enter Deed Book Number
	Frequently Used List
	<u>O</u> K Cancel

Notice the top bar of the secondary dialog is asking for a Deed Book Number. When keyed-in, it will be placed in the description and the program will continue building the standard text until another variable is encountered.

In this case once the book and page are provided, yet another variable is encountered but this time the user is prompted to select from a list of known options, (counties).

Į	Choose Item F	rom List	_ 🗆 ×
	Anderson Bedford Benton Bledsoe Blount Bradley Campbell Campbell Cannon Carroll		
		Insert Cancel	

Here you can see the final product of inserting this one phrase.

Cegal Description Editor	
<u>File Edit Insert Library Settings Closure</u>	
🗋 🚘 🖬 👗 🖻 🛍 🗠 🗠 🛛 Ref.Chain : 🗔 🛣	
DEED recorded in Book , Page 652, in the Register's Office of Tennessee.	Campbell, County,
	Line: 2 Col: 11

Remember the above dialog is nothing more than an editor and you have the option of simply typing anything in it to supplement or modify what an insert has placed there.

The last thing to remember is that you can use the *FILE>SAVE* option to save your completed legal description and then import into Microsoft WORD or any other editor of your choice.

To insert the entire metes and bounds of a stored parcel, you return to the insert option and select the *CALLS BY PARCEL/CHAIN* option.



This will invoke the following dialog.

名 Insert Calls by Parcel or C 🗖 🔲 🗙		
Parcels : 4200 Parcel Items : MAIN TRACT Taken - 1	Insert By O Chains O Parcels	
	Insert	

The user must then select whether it is a chain or a parcel he wishes to describe and then select the *INSERT* button. This will continue the writing of the description.

Cegal Description Editor
<u>File E</u> dit <u>I</u> nsert <u>L</u> ibrary <u>S</u> ettings <u>C</u> losure
🗋 🗃 🖬 🛍 🗠 🗠 🛛 Ref.Chain: 🗚 MORY 🔽 🎽
DEED recorded in Book , Page , in the Register's Office of Campbell, County, Tenness north 82 degrees 28 minutes 00 seconds east , 324.03 to a point thence south a distance of 1.69 feet (0.52 meters) along a non-tangential curve concave east having a radius of 0.75 feet (0.23 meters) and a central angle of 129 degrees 05 minutes 00 seconds; thence south 17 degrees 20 minutes 30 seconds east , 189.67 to a point thence south 72 degrees 39 minutes 30 seconds west, 120.91 to a point thence south 17 degrees 20 minutes 30 seconds east , 129.21 to a point thence southwest a distanc of 2.00 feet (0.61 meters) along a non-tangential curve concave southeast having a radius of 0.75 feet (0.23 meters) and a central angle of 152 degrees 30 minutes 30 seconds; thence south 14 degrees 40 minutes 30 seconds east , 81.43 to a point thence south 72 degrees 39 minutes 30 seconds west, 199.67 to a point thence north 15 degrees 06 minutes 00 seconds west, 82.35 to a point thence north 17 degrees 20 minutes 30 seconds west, 374.62 to a point thence north 17 degrees 20 minutes 30 acconds west, 374.62 to a point thence south a feet (0.28 meters) along a non-tangential curve concave north having a radius of 0.75 feet (0.23 meters) and a central angle of 68 degrees 59 minutes 00 seconds;
Line: 1 Col: 1

LEGAL DESCRIPTION EDITOR

- > SETUP OF LEGAL DESCRIPTION EDITOR
- 1. Access the *Legal Description Editor* from the following pulldown on the *Survey Menu* bar:



2. When the Legal Description Editor is accessed a dialog prompting for the coordinate geometry database will appear like the one below. Select the job (job101.gpk) for this project.

Job Number	
Job 101	Q
<u>0</u> K	Cancel

3. Once the desired job number is selected the main Editor dialog will appear.

CLegal Description Editor		_ 🗆 ×
<u>File E</u> dit Insert Library <u>S</u> ettings <u>C</u> losure		
🗋 🗃 🖬 👪 🛍 🎁 🗠 🖙 Ref.Cha	ain : ARMORY	I 🖆
	Line: 1	Col: 1

NoteWe will be attempting to create the following description.Federal Project Number APD-NHE-111(36)State Project Number 77041-2219-64Richmond County, Tract 4200Owner ISTAR Bowling CentersGrantee State of Virginia

DESCRIPTION

EXHIBIT "A"

Beginning at a point of intersection between the south property line of ISTAR Bowling Centers and the proposed right of way line of George Washington Memorial Highway on highway project no. APD-NHE-111(36), 88.1 feet right of centerline station 59+20.1; thence South 17 deg. 20 min. 30 sec. East, 375.2 to a point thence South 15 deg. 03 min. 00 sec. East, 82.3 to a point thence North 72 deg. 39 min. 30 sec. East, 199.7 to a point thence North 14 deg. 40 min. 30 sec. West, 82.4 to a point thence North 17 deg. 20 min. 30 sec. West, 129.7 to a point thence North 72 deg. 39 min. 30 sec. East, 120.9 to a point thence North 17 deg. 20 min. 30 sec. West, 190.0 to a point thence South 82 deg. 28 min. 00 sec. West, 325.7 to the point of BEGINNING 4. Select from the **Settings** pulldown, **Define Global Settings** to make global settings for our description.

Clegal Description Editor		_ 🗆 ×
<u>File Edit Insert Library Settings Closure</u>		
Chain :	MAINLINE	- C 🖄
	Line: 1	Col: 1

5. Make sure that all of the settings match those as shown below.

Global Settings	
CL Alignment	
Choose chain which defines the cen	terline alignment
Sequencing	
Next or starting numeric sequence d	esignation : 1
Next or starting alphabetic sequence	e designation : 🛛 🖌
Macros	_ Dist. Units
chains/parcels: Non-expanded	Dist. Units : Feet
	Et Definition : US Survey
Tolerances	Area computations
Curve tangency (sec.) : 1.000	Full Precision
	<u>O</u> K Cancel

- *Note* Be sure that the centerline chain is set to *Mainline* so that all the station references in our description will be automatically calculated from this alignment.
- 6. Once the global settings have been made, select the OK button to close the dialog.
7. Select from the Library pulldown, *Set Current Library/Style*.



8. Using the *File* button select the library as shown below. If the GEOPAK environment variable *Gpk_ldedit_ldbfile* was set properly, then the correct library should be selected by default.

名 Set Current Library 💦 📕	. 🗆 🗙
Current Library :	
C:\60843\standards\default.ldb	Q
Current Style :	
rw	1
	\times
OK	

9. Once the library is set and the current style selected, choose the *Edit* button to access the dialog.

10. Make the settings as shown in the dialog below.

Default Triases Precision Default Triases Line Phrase : Lines\EndCommence Image: Curve\StandardCrve Tangent Curve Phrase : curve\StandardCrve Image: Curve\StandardCrve Non-Tangent Curve Phrase : curve\StandardCrve Image: Curve\StandardCrve Spiral Phrase : Spirals\StndSpiral Image: Coordinate Phrase : Coordinate Phrase : Export\Coords_ Image: Coordinate Phrase : Document Template : DocTemps\StndrdDocTemp Image: Chain Phrase : Parcel Owner's Name Phrase : Owner\StndrdOwner Image: Chain Phrase :		Brasisia		L Bearing Formal	्रात
Line Phrase : Lines\EndCommence Tangent Curve Phrase : curve\StandardCrve Non-Tangent Curve Phrase : curve\StandardCrve Spiral Phrase : Spirals\StndSpiral Coordinate Phrase : Export\Coords_ Area Phrase : Area\Standard_Area Document Template : DocTemps\StndrdDocTemp Parcel Owner's Name Phrase : Owner\StndrdOwner Chain Phrase :	Derduit Fillases	j Flecisio	ri	peaning rounia	
Tangent Curve Phrase: curve\StandardCrve Non-Tangent Curve Phrase: curve\StandardCrve Spiral Phrase: Spirals\StndSpiral Coordinate Phrase: Export\Coords_ Area Phrase: Area\Standard_Area Document Template: DocTemps\StndrdDocTemp Parcel Owner's Name Phrase: Owner\StndrdOwner Chain Phrase:		Line Phrase :	Lines\EndCom	mence	-
Non-Tangent Curve Phrase : curve\StandardCrve Spiral Phrase : Spirals\StndSpiral Coordinate Phrase : Export\Coords_ Area Phrase : Area\Standard_Area Document Template : DocTemps\StndrdDocTemp Parcel Owner's Name Phrase : Owner\StndrdOwner Chain Phrase : Image: StndrdOwner	Tangent (Curve Phrase :	curve\Standa	rdCrve	T
Spiral Phrase : Spirals\StndSpiral Coordinate Phrase : Export\Coords_ Area Phrase : Area\Standard_Area Document Template : DocTemps\StndrdDocTemp Parcel Owner's Name Phrase : Owner\StndrdOwner Chain Phrase :	Non-Tangent (Curve Phrase :	curve\Standa	rdCrve	-
Coordinate Phrase : Export\Coords_ Area Phrase : Area\Standard_Area Document Template : DocTemps\StndrdDocTemp Parcel Owner's Name Phrase : Owner\StndrdOwner Chain Phrase :		Spiral Phrase :	Spirals\StndSp	piral	-
Area Phrase : Area\Standard_Area Document Template : DocTemps\SthdrdDocTemp Parcel Owner's Name Phrase : Owner\SthdrdOwner Chain Phrase :	Coord	finate Phrase :	Export\Coords	<u> </u>	-
Document Template : DocTemps\StndrdDocTemp Parcel Owner's Name Phrase : Owner\StndrdOwner Chain Phrase :		Area Phrase :	Area\Standard	i_Area	•
Parcel Owner's Name Phrase : Owner\StndrdOwner	Docum	ent Template :	DocTemps\St	ndrdDocTemp	-
Chain Phrase :	Parcel Owner's N	Name Phrase :	Owner\Stndrd	Owner	-
	(Chain Phrase :			-
				ΠΚ	Cancel



11. Next select the *Precision* tab and make the settings as shown below.

D	efine Styles			
	Default Phrases Precisio	n	Bearing Format	}
	Sq.Ft.:	1		
	Sq.Mt.:	2		
	Acres :	1		
	Hectares :	1		
	NEZ (feet) :	1		
	NEZ (meters) :	1		
	Distance (feet) :	1		
	Distance (meter) :	1		
	Bearing	30 sec.		
			<u>0</u> K (Cancel

12. Select the *Bearing* tab and enter the settings as shown below.

Define Styles		
Precision Bearing Format	General } 💶	
Deg. Min. Sec. Text Style Degrees, minutes, seconds Decimal degrees Deg.: deg. Min.: min.	Sec.: sec.	
 Direction Style North 30[^] 45' 26'' East Northeast 30[^] 45' 26'' 30[^] 45' 26'' (azimuth) 30[^] 45' 26'' Right (deflection) 	North : North South : South East : East West : West	
Sample Bearings South 89 deg. 30 min. 00 sec. East North 44 deg. 30 min. 00 sec. West		
Cardinal Direction Style	Wrap Bearings Wrap bearings : <u>Yes</u>	
	<u>O</u> K Cancel	

Note Notice how this dialog displays a sample of the desired bearing preferences as they are set.

13. The next tab provides *GENERAL SETTINGS* for areas and directions. Probably the most important settings here is the **column width**, as this controls the line wrapping and controls how the description is formatted. Enter the settings as shown below.

Define Styles			
Bearing Format	General		Pt. Geometry Phra
Numbers Alphabetic Numeric Area Threshold Acres : 0.50 Hectares : 0.50 Approximate Direction Approximate Direction Northwest Northwesterly Column Width : 80	Sequencir Alphab Numeri	g etic c Hectarr Sq. Sq.t Right Rig Le Static Fe Mete	Case Case Upper: Upper: Text Phrases es: acres es: hectares Ft: sq. feet Mt: sq. meters /Left Text Phrases /Left Text Phrases
			<u>O</u> K Cancel

14. The *POINT GEOMETRY PHRASE* option allows the user to set default phrases for when the description encounters particular elements such as a PC or a reverse curve, etc.

D	efine Styles
	General Pt. Geometry Phrases Parcel default Phr
	Line to Line : a point
	Line to Tangent Curve : the PC of a circular curve
	Line to Non-tangent Curve : the PC of a non-tangent circular curve
	Tangent Curve to Line : the PT of a circular curve
	Non-tangent Curve to Line : the PT of a non-tangent circular curve
	Compound Curve : a point of compound curvature
	Reverse Curve : a point of reverse curvature
	Line to Spiral : the start of a spiral curve
	Spiral to Curve : the start of a circular curve
	Curve to Spiral : the start of a spiral curve
	Spiral to Line : the end of the spiral curve
	<u> </u>

Note These phrases are inserted into the description using the <PTGEOM> variable. The <PTGEOM> variable may be included as part of a line phrase. It is completely up to the user whether to use the <PTGEOM> as part of his line phrases.

15. Enter the settings as they are shown below for the *Parcel Default Phrases*.

Pt. Geometry Phrases Parce	el default Phrases Chain default Phra
First Line	
Line :	Lines\StdLine 💌
Tangent Curve Phrase :	curve\StandardCrve
Non-Tangent Curve Phrase :	curve\StandardCrve
Body	
Line :	Lines\EndCommence
Tangent Curve Phrase :	curve\StandardCrve
Non-Tangent Curve Phrase :	curve\StandardCrve
– Last Line –	
Line :	Lines\EndCommence
Tangent Curve Phrase :	curve\StandardCrve
Non-Tangent Curve Phrase :	curve\StandardCrve
	ΟΚ Γ

Note

The *PARCEL DEFAULT PHRASE* option is very similar to the *POINT GEOMETRY PHRASES* in that the user can establish defaults for parcel descriptions from beginning to end. These phrases determine what line style will be used for the first line of a parcel, the body of a parcel, and the last line of the parcel.

16. *CHAIN DEFAULT PHRASES* will also be set as in the dialog shown below.

efine Styles	
Parcel default Phrases Chair	n default Phrases
First Line	
Line :	Lines\StdLine
Tangent Curve Phrase :	curve\StandardCrve
Non-Tangent Curve Phrase :	curve\StandardCrve
Body	
Line :	Lines\EndCommence
Tangent Curve Phrase :	curve\StandardCrve
Non-Tangent Curve Phrase :	curve\StandardCrve
Last Line	
Line :	Lines\EndCommence
Tangent Curve Phrase :	curve\StandardCrve
Non-Tangent Curve Phrase :	curve\StandardCrve
	<u> </u>

17. Once completed select the **OK** button to close the dialog and then select the **OK** button on the dialog shown below to close the edit option.

🔗 Set Current Library 💦 📮	
Current Library :	
C:\60843\standards\default.ldb	<u> </u>
Current Style :	
rw	2
	\times
OK	

> EDITING THE LIBRARY

Note Once the Library and Style have been selected the user can edit the selected library or add to it. This is where the standard phrases are created and stored. In the exercises below we will attempt to create some desired phrases for our descriptions.

1. Select the **Edit Library** option from the **Library** pull-down.



2. When selected the user must confirm/specify which library he wants to edit. Select the library as shown below and then select the **Edit** button.



3. Once selected the following dialog will appear. Now we can begin to set up commonly used phrases. Begin by double clicking on the **Clauses** category.



4. Highlight the Clause category, as shown below, and then select the icon to Create New Item.



Note

Below is an example of the standard clause that we want to create.

CLAUSE NO. 1
<u>REFERENCE</u> : All boundaries and descriptions as shown on plans for Highway Project No Right-of-Way on file in the Office of the Department of Transportation in Richmond, Virginia.

5. When the following dialog appears, enter the following information for *ID*, *Description*.

Create Legal Description Insertable Items		
Item ID No_1_ ID Description Reference Item Type: Text Phrase	Insert Variables	
,	Upd	ate Cancel

6. The **Item Type** depends on what type of phrase you wish to create. As seen from the dialog there are several options. The most logical selection from the available list will be a **Text Phrase.**

Create Legal Description Insertable Items	
Item ID No_1_ ID Description Reference	Insert Variables
Item Type Text Phrase	
Composition Pie Curve Prinase Spiral Phrase Coordinate Phrase Area Phrase	
Text Phrase Parcel Owner's Name Phrase Document Template Chain Phrase	
	Update Cancel

7. Once the *Type* is set we can begin to compile the clause. To do this, simply key-in the text for the clause up to the point where we encounter a *variable*.

Create Legal Description Insertable Items		_ □ ×
Item ID No_1_ ID Description Reference Item Type: Text Phrase	Insert Variables Insert Key in text	
Composition Field REFERENCE: All boundaries and d Highway Project No.	escriptions as shown on plans	for
	Update Cance	1

8. Once the variable is encountered we can utilize the *Insert Variables* option to build a prompt so that the user can be prompted for what is expected next. To do this we decide between the two options for *Text Variables*. In this case we will want to create a key-in as opposed to a list. To do this, simply select *Key in text* as the type and select *Insert*.

Create Key In Field		
Enter Key in prompt	Enter Project Number	
<u>0</u> K	Cancel	

9. This action provides a dialog so that you can key-in a logical prompt that will be presented to the user when it's time for the insertion. Once entered select the **OK** button. This will insert the prompt into the description as shown below.

웅 Create Leg	al Description Insertable Items			_ 🗆 ×
Item ID ID Description Item Type:	No_1_ Reference Text Phrase	Insert Variables	ı text	
REFERENCI	E: All boundaries and d Project No. {Enter Pro	escriptions as ject Number}	shown on plan:	s for
			Update Can	cel

10. Now the remainder of the clause can be enter as shown below.

名 Create Legal Description Insertable Items 📃 🔲 🔀
Item ID No_1 Insert Variables ID Description Reference Insert Key in text Item Type: Text Phrase Insert Key in text Composition Field Item Type: Text Phrase REFERENCE: All boundaries and descriptions as shown on plans for Highway Project No. {Enter Project Number} Right-of-Way on file in the office of the Department of Transportation in Richmond, Virginial
Update Cancel

11. Once this is completed select the *Update* button and the clause is completed and stored in the library.

C Legal Description	_ 🗆 X
<u>F</u> ile <u>E</u> dit F <u>a</u> vorites <u>H</u> elp	
ă 🛅 🞦 🗳 🖻	
📟 C:\60843\standards\default.ldb	
💼 Export	
🗁 Clauses	
No_1_ Reference	
No1a_ Reference	
No2_ Deed Reference	
🖹 No3_ Partial Take	
🖹 No4_ Utility	
No5_ Fee Simple	
🖹 No6_ Public Highway Right-of-Way	
No7_ Controlled Access	
No8_ Slope Easement	
No8a_ Slope Easement	•

12. We will create one more insert, called a *HEADER*. This will contain the Project number, county etc. Begin by opening the *Text* category and selecting the icon to create a new item.

8 Legal Description	_ 🗆 ×
<u>F</u> ile <u>E</u> dit F <u>a</u> vorites <u>H</u> elp	
🛱 는 🎦 🕑 द	
🚥 C:\60843\standards\default.ldb	
Export Export	
Clauses	
🗖 Spirals	
🗁 Text	
🖹 Opening Standard Opening	
🖹 TitleGrant Title Grant Phrase	
ParcelNum Parcel Number Phrase	
DocTemps	
nez	
Curve	
🗖 Area	
🗖 Lines	•

13. Enter the information for the item as shown below.

```
Federal Project No. APD-NHE-111(36)
State Project No. 77041-2219-64
Richmond County, Tract 4200
Owner: ISTAR Bowling Centers
Grantee: State of VIRGINIA
```

Create Legal Description Insertable Items	
Item ID Header ID Description Header/Project/Owner/Gantee Item Type: Text Phrase	Insert Variables
Lomposition Field:	
	Update Cancel

14. When compiling the header below, remember press the <Enter> key after each entry so that it appears correctly when inserted.

Create Legal Description Insertable Items Item ID Header ID Description Header/Project/Owner/Gantee Item Type: Text Phrase	Insert Variables
Composition Field Federal Project Number{Enter Fe	deral Project Number}.
1	Update Cancel

15. Continue until the header is completed. Once complete select the *Update* button.

Create Legal Description Insertable Items
Item ID Header ID Description Header/Project/Owner/Gantee Item Type: Text Phrase Composition Field
Federal Project Number {Enter Federal Project Number}. State Project Number {Enter State Project Number}. {Enter County} County, Tract {Enter Tract No}. Owner {Enter Owners Name}. Grantee {Enter Grantees Name}
Update Cancel

> WRITING A LEGAL DESCRIPTION

1. Access the main editor dialog and begin by entering several carriage returns (**CR**). This is necessary to create several blank lines above and below the active cursor. Once you have created 5 blank lines, move the cursor to the third line.

😤 Legal Descript	ion Editor				_ 🗆 ×	1
<u> </u>	<u>L</u> ibrary <u>S</u> ettings	<u>C</u> losure				
	🐰 🗈 🚹 🕨	$\circ \circ$	Ref.Chain : [MAINLINE	- É	
				Line: 1	Col: 1	

2. Next select from the *Insert* pulldown, the option to insert *Text Phrases*.

<mark>2</mark> Legal D	escription Editor				_ 0	X
	Insert Library Settings Clos Line/Curve/Spiral Phrase Call <u>s</u> by Parcel/Chain Coordinate Phrase Area Phrase Literal Text Parcel Owner's Name Phrase Document Template Run Macro Chain Phrase	Ref.Chain :	MAINLINE			
			Line: 1	Col	: 1	_

3. This will invoke the following dialog.



4. Select the option to insert *Text* phrases. And then insert the *Header*.

웅 Insert Text Ph 💶 🖂 🗙	
1	
E Header	
TitleGrant	
🖹 ParcelNum	
J	
Insert	

5. After answering all of the prompts, you should end up with this portion of the description as shown below:

Clegal Description Editor		_ 🗆 ×
<u>File E</u> dit <u>I</u> nsert <u>L</u> ibrary <u>S</u> ettings <u>C</u> losure		
🗋 🗃 🖬 🛍 🗠 🗠 🛛 Ref.Chain : MAINLINE 🖃 🎽		
Federal Project Number APD-NHE-111(36) State Project Number 77041-2219-64 Richmond County, Tract 4200 Owner ISTAR Bowling Centers Grantee State of Virginia		
DESCRIPTION		
EXHIBIT "A"		
	Line: 11	Col: 1

6. Now select from the *Text* phrases, the option to insert the *Opening*.



7. Selecting *SOUTH* for the first variable will complete the description up to the variable for the owner's name. When prompted for this you can use the *Frequently Used* pulldown to select from previous remembered key-ins. Select the owner from the list as shown below.

8 Insert Enter Name	
Frequently Used List	
State of Virginia	▼ Add
State of Virginia	
ISTAR Bowling Centers	
Bichmond	
77041-2219-64	
APD-NHE-111(36)	
<u>O</u> K Cancel	

8. Then select the Add button to use this as the inserted variable as shown below and select OK.

8 Insert Enter Name	
ISTAR Bowling Centers	
Frequently Used List ISTAR Bowling Centers	Add
<u>O</u> K Cancel	

9. Next provide the variable for the road name.

名 Insert Enter Name 💶 🗆 🗙
George Washington Memorial Highway
Frequently Used List orge Washington Memorial Highway
<u>O</u> K Cancel

Note Repeat step 7 & 8 when prompted for the *Project No.* Select from the *Frequently Used List* the project number that was used in steps 7 & 8. This should complete the Opening Text phrase as shown below.



11. Close the *Insert Text Phrase* dialog and return to the *Insert* pull-down.



12. This time choose to insert a *Coordinate* phrase.



13. Choose from the line types the *Lines**Point*.

REZ Phra	Coordina se	
Points :		
D1		
D2		
D3		
D4		
D10		BN
D11		
D12		
D13		N
D15	-	<u></u>
		-
	Insert	

14. Once selected use the MicroStation Power Selector to select graphically the beginning point you wish to use.



15. Once you have made a MicroStation selection set with the point, you can then use the icon on the *Coordinate Insert* dialog to get the point number from that selection set.

SInsert NEZ Phra Lines\Poi	Coordina se	
Points :		
D152		
D153		
D154		
D155		
D156		
D157		國
D158		
D159		N
D160	-	<u></u>
		- 1
	Insert	

16. Once selected choose the *Insert* button. This should complete the following portion of the description.



17. Now we are ready to insert the metes and bounds around the entire Tract. Select from the *Insert* pulldown the option for inserting Lines/Curves/Spiral Phrases.

😤 Legal De	escription Editor		
<u>F</u> ile <u>E</u> dit	Insert Library Settings Closu	ure	
	Line/Curve/Spiral Phrase Call <u>s</u> by Parcel/Chain	Ref.Chain : MAINLINE	
Federal	<u>C</u> oordinate Phrase	VHE-111(36)	
Richmon	<u>A</u> rea Phrase	2219-64	
Owner I	<u>T</u> ext Phrase		
Grantee	<u>L</u> iteral Text		
DESCRIP	Parcel Owner's Name Phrase		
EXHIBIT	<u>D</u> ocument Template		
Denin	<u>R</u> un Macro		CTID
Begin Bowling	C <u>h</u> ain Phrase	ptersection between the south property line of 1 posed right of way line of George Washington Mem	orial
Highway	on highway project i	no. APD-NHE-111(36), 88.1 feet right of center	line
Station	59+20.1;		
<u> </u>			
		Line: 14	Col: 18

18. Make the following settings in the dialog shown below.

8 Insert Lines/Cu	urves/Spir	als	_ 🗆 ×
Insert By O Elements : O Chains : O Parcels :	Pa Parcel	arcels : 4200 Items : MAIN TRACT	-
Line Phrase : Lines\StdLine Tangent Curve Phra- [curve\StandardCrve Non-Tangent Curve [curve\StandardCrve Sciint Physics :	se : Phrase :	D151 > D152 D152 > D153 D153 > D154 D154 > D155 D155 > D156 D156 > D157 D157 > D158	
Spirals\StndSpiral		Invert List	

19. Now highlight the desired calls that we wish to describe, that being all the calls from our P.O.B. (#4) to the last call. Once selected choose the **Insert** button.

Insert Lines/Cur	ves/Spirals	_ 🗆 ×
 Insert By Elements : Chains : Parcels : 	Parcels : 4200 Parcel Items : MAIN TR	ACT 🔽
Line Phrase : Lines\StdLine Tangent Curve Phrase [curve\StandardCrve Non-Tangent Curve P [curve\StandardCrve Spiral Phrase : [Spirals\StndSpiral]	D151 > D152 D152 > D152 D152 > D153 D153 > D154 D154 > D155 D155 > D156 D156 > D157 D156 > D157 D157 > D158	at

Note

You should now have a completed Legal Description





ASCII Import for Plat Creation

OBJECTIVES

In this session we will review importing ASCII formatted data in order to create parcels in coordinate geometry.

INTRODUCTION

There are several options for importing ASCII data in Coordinate Geometry. Each requires a little different approach. One of the simplest ways is to use the Import > ASCII option directly from within Coordinate Geometry.

This tool will directly store a plain ASCII XYZ file; no Survey Chains will be created. The ASCII file must have one line of data per point. Enter the name of the file or click Select. Then set the delimiter (character between each field in the data). If a comment is in the file, it must be at the end of the line, and separated by a unique delimiter. Set the None or Invalid Point Name and Chain name. If the Duplicate Filter Tolerance is on, any point within the specified tolerance of another point is ignored. The last step is to set the order of the fields within each row (Field Order). If the first row is Point#, X, and Y, set the Field Order to Point#, East(X), North(Y), and the rest to None. Click **Apply** to commence processing.

😤 Import ASC	CII File to COGO 📃 🖂 🖂 🗙
Field Order Point# ▼	File to Import :
North(Y) 🔻	Field Delimiter :
East(X) Elev(Z)	Comment Delimiter :
Station 💌	If None/Invalid Point Name use : 1
Offset	Chain to use for Station and Offset : 🛛 🗛 📃 💌
Desc 🔻	Use Duplicate Filter Tolerance : 0,000010
	Apply

Another option would be to import the ASCII data via a Survey dataset. This method would require setting up a Survey project and then creating a parcel dataset.

😤 Dataset New		_ 🗆 X
Name :	parcel Overwrite 💌	
Description :		
Data Source :	ASCII File(s) 💌 XYZ to Coordinates 💌	
Output Directory :		<u> </u>
	Use dataset name as output sub-directory	
Source Format	t : XYZ to Coordinates	
	File(s) to Use	: 2
	File(s) to Use	
	File(s) to Use	

Once a dataset has been created and an ASCII file selected, the interface will allow the user to specify the content of the file and control how it is imported.

😤 XYZ to Coordina	ites User : test	Dataset : parcel		
File C:\60843\coord	ds.txt	<u> </u>		
	Delimiter Space	▼ Co	omment Delimiter <u>Da</u>	sh 🔻
Pt D550 N 301330.5 Pt D551 N 301902.6 Pt D552 N 302086.3 Pt D553 N 302178.4	5491 E 3876425.5524 3420 E 3876246.8330 3594 E 3876163.2274 4476 E 3876517.1986	Z 35.6126 Fea 3020 Z 38.6214 Fea 3020 Z 42.1759 Fea 3020 Z 0.0000 Fea 3020		4
0101	3373988.3763	1102185.3514	284.6212	-32.4196
None None Keset	None	None 🔻	None 🔻	None 🔻
 Load ASCII Diald Open Editor After Process LoodePoint 	og On Dataset Open r Processing code same as Raw Da	Process	 Import After Proce Store Elements in 	to GPK

LAB EXERCISE: IMPORTING ASCII

- > IMPORTING VIA COGO
- 1. Open the MicroStation file *C:\60843\plat.dgn*.
- 2. Select from the Survey menu bar *Project > Open* and open the project *60843*.

Survey (No Proje	ct)				2
<u>P</u> roject	<u>D</u> ataset	<u>V</u> isualization	<u>G</u> eometry	D <u>т</u> м	Plans Preparations	<u>T</u> ool Boxes
<u>N</u> ew				-		
<u>O</u> pen.						
<u>S</u> ave						
<u>C</u> lose						
<u>D</u> elete	э					
<u>U</u> sers.						
<u>P</u> refer	ences					
<u>A</u> ctive	e Chain Cor	ntrol				
<u>E</u> leme	ent Attribute	s				
<u>3</u> PC A	Adhoc Attrib	outes				
<u>E</u> xit						
C:\60	843\60843	l.prj				
C:\D_	Drive\cec	\troubles\iadot\	\survey\test.	prj		

- 3. Once in the Project select *Geometry > Classic COGO*.
- 4. In Coordinate Geometry select *File > Import > ASCII Points*.

名 Import ASCII File to COGO 📃 📃 🗵				
Field Order Point# ▼	File to Import :			
North(Y) 💌	Field Delimiter :			
East(X) ▼ Elev(Z) ▼	Comment Delimiter :			
Station 💌	If None/Invalid Point Name use : 1			
Offset 💌 Feature 💌	Chain to use for Station and Offset : ARMORY			
Desc 🔻	Use Duplicate Filter Tolerance : 0.000010			

5. Using the toggles on the left side of the dialog, set each one based on the format of the ASCII file as shown below.

E	🗲 Text Ed	litor: C:\60843\cc	oords.txt			_ 🗆 ×
	<u>F</u> ile <u>E</u> dit	<u>C</u> riteria				
	<u> </u>		ရီးပြ			
	D550 D551 D552 D553 D554 D555 D556 D557 D558 D559 D560 D561 D562 D564 D563 D564 D565	301330.5491 301902.8420 302086.3594 302178.4476 302070.7328 301836.6006 302107.8250 301868.3320 301901.8423 301729.0521 301901.8414 301731.4851 301688.7532 302139.6164 301868.3320 302173.0668	3876425.5524 3876246.8330 3876163.2274 3876517.1986 3876170.3178 3876374.2428 3876290.0210 3876476.4294 3876584.3465 3876618.4525 3876618.4525 3876618.4525 3876636.8413 3876313.6892 3876392.1891 3876476.4294 3876500.1248	$\begin{array}{c} 35.6126\\ 38.6214\\ 42.1759\\ 0.0000\\ 42.2427\\ 39.1975\\ 39.0856\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 37.0149\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.0000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.000\\ 0.$	3020 3020 3020 3020 3020 3020 3020 3020	
ĺ					Line: 1	Col: 1

6. The completed toggle settings should look like the dialog below.

名 Import ASC	🔁 Import ASCII File to COGO					
Field Order Point# ▼	File to Import : C:\60843\coords.txt	<u> </u>				
North(Y) ▼	Field Delimiter :					
	Comment Delimiter :					
Feature	If None/Invalid Point Name use : X1					
None						
None 🔻	🔲 Use Duplicate Filter Tolerance : 🚺 0,000010]				
	Apply					

- 7. Complete the remaining portions of the dialog by using *Space* as a delimiter.
- 8. Select the *File to Import > Coords.txt*.
- 9. Click the *Apply* button.
- 10. The dialog below will display when completed.

Informat	Information				
1	Processed 17 Points.				
	<u><u> </u></u>				

11. Review the coordinates in COGO.

S Navigator(101)				
Select To	ols			
× × [🖪 id 📥 🗎	₿ <mark>8</mark>		
Element : F	Point 🔻			
Name 🛆	Northing	Easting	Feature	Elevation 📥
D451	303429.8230	3875635.5310		
D500	307608.3440	3874369.1360		
D501	307658.5170	3875192.8680		
D550	301330.5491	3876425.5524	3020	35.6126
D551	301902.8420	3876246.8330	3020	38.6214
D552	302086.3594	3876163.2274	3020	42.1759
D553	302178.4476	3876517.1986	3020	0.0000
D554	302070.7328	3876170.3178	3020	42.2427
D555	301836.6006	3876374.2428	3020	39.1975
D556	302107.8250	3876290.0210	3020	39.0856
D557	301868.3320	3876476.4294	3020	0.0000
D558	301901.8423	3876584.3465	3020	0.0000
D559	301729.0521	3876618.4525	3020	0.0000
D560	301901.8414	3876584.3421	3020	0.0000
D561	301731.4851	3876636.8413	3020	0.0000
D562	301688.7532	3876313.6892	3020	37.0149
D563	302139.6164	3876392.1891	3020	0.0000
D564	301868.3320	3876476.4294	3020	0.0000
D565	302173.0668	3876500.1248	3020	0.0000
D566	301901.8423	3876584.3465	3020	0.0000
D600	309411.2480	3873550.5070		
D601	309636.6840	3873924.4900		
D700	305825.1760	3874926.0580		
D701	305947 1680	3875269 8220		
 				•

> IMPORTING ASCII VIA SURVEY

1. From the main Survey Menu bar select *Dataset > New*.

2Dataset New	_ 🗆 ×
Name parce Overwrite	
Description :	
Data Source : ASCII File(s) 🔻 XYZ to Coordinates 💌	
Output Directory :	٩
Use dataset name as output sub-directory	
Source Format : XYZ to Coordinates	
File(s) to Use	: 2
<u> </u>	•

- 2. Provide a new name for the dataset.
- 3. Make sure that the *Data Source* is set to *ASCII Files & XYZ to Coordinates*.

- 4. Select the top icon located on the right side of the lower portion of the dialog.
- 5. Select the file *Coord.txt*.

8 Dataset New	×
Name] parce Overwrite	
Description :	
Data Source : ASCII File(s) 🔻 XYZ to Coordinates 💌	
Output Directory :	
Use dataset name as output sub-directory	
Source Format : XYZ to Coordinates	
File(s) to Use : 📶	
C:\60843\coords.txt	1
X	1
· · · · · · · · · · · · · · · · · · ·	1
1	
	1

- 6. Click OK.
- 7. In the following dialog make sure the *Delimiter* toggle is set to *Space*.

😤XYZ to Coordina	tes User : mary	Dataset : parce	I	
File C:\60843\coord	s.txt	<u> </u>		
	Delimiter Space	Ca	omment Delimiter <u>Da</u> s	sh 🔻
D550 301330.5491 D551 301902.8420 D552 302086.3594 D553 302178.4476	3876425.5524 35.61 3876246.8330 38.62 3876163.2274 42.17 3876517.1986 0.000	26 3020 114 3020 159 3020 10 3020		▲
D550	301330.5491	3876425.5524	35.6126	3020
None Reset	None ▼ Next>>	None 🔻	None 🔻	None 🔻
Load ASCII Dialo Open Editor After Process LoodePo	g On Dataset Open Processing code same as Raw Da	Process	 Import After Proce Store Elements inf 	to GPK

8. Highlight one of the rows in the display window.

9. Set the toggles to the appropriate columns of data beneath the display window.

					1-1
ZYZ to Coord	dinates User:ma	ry Dataset : parc	el		_ 🗆 ×
File C:\60843\coords.txt					
	Delimiter Space	– (Comment Delimiter	r Dash 🔻	
D550 301330.5 D551 301902.8	491 3876425.5524 35 420 3876246.8330 38	.6126 3020 .6214 3020			
D552 302086.3 D553 302178.4	476 3876517.1986 0.0	0000 3020			•
D550	301330.5491	3876425.5524	35.6126	3020	
PNum	▼ <u>Y</u> ▼	× •	Z	▼ PCode	
Re	eset Next>>		Link w/ Gap (AL	L) 🔻	
🔽 Load ASCII (Dialog On Dataset Oper	Process	Import After	Process	
Dpen Editor.	After Processing		🔽 Store Eleme	ents into GPK	
I∕ Process Lco	dePcode same as Raw	Data			

- 10. Click the *Process* button.
- 11. When the dialog below appears click OK.

Alert		
	Chain Name from PCode field Link w/Gap. PCode does not have linear	t. code.
	<u>0</u> K	Cancel

12. Allow the point to overwrite the previously stored points be clicking *Apply All* on the following dialog.

Over Writing Information in GPK				
The point [D550]	already exists.			
Existing N: 301330.549 E: 3876425.552 Z: 35.613 Dataset : PARCEL Feature : 3020 Zone : 1	New N: 301330.549 E: 3876425.552 Z: 35.613 Dataset : PARCE Feature : 3020 Zone : 1	+0.000 +0.000 +0.000		
Over Write Do Not Over	/rite			
 Change Point. 	/Chain Name			
O Add Prefix				
O Add Suffix				
O Merge Chains				
Apply	Apply All	Stop Import		

- 13. Review the points in COGO.
 - *Note* This method would be preferable if linking codes are provided in the field data. This method would draw the boundary line work where the first import method would not.

LAB EXERCISE: STORING PARCELS

- > STORE PARCEL FROM POINTS
- 1. This exercise will store each of the two parcels shown below. (4300 & 4301)



2. From the COGO pulldowns select *Element > Parcel > Store*.

Store Parcel From Parcel Name: Parent Tract Element List Owner Name:	Elements	Element Selection Element Type: _ Point Na Add	Point *	×
Improvement: Attributes Name	Туре	Value		
	Store F	Parcel		

- **3**. Provide a Parcel name in the dialog.
- 4. Place cursor in the *Element List* window of the dialog.
- 5. Graphically click on each point that makes up parcel 4300 as shown above.

Store Parcel From Elements	
Parcel Name: 4300	Element Selection
Parent Tract 💌	Element Type: Point
Element List	Point Name:
D555 D556 D563 D557	< Add
🔲 Owner Name:	
Improvement:	
Attributes	
Name Type	Value
Store P	arcel

6. Toggle on the Owners Name and type in Heritage Associates.

Store Parcel From Elements Parcel Name: 4300 Parent Tract	Element Selection Element Type: Point
D555 D556 D563 D557	Point Name:
Improvement: Attributes Name Type	Value
Store F	'arcel

7. Toggle on the *Attributes* option and provide the following attributes by clicking on the *Add* icon to the right side of the window.

8 Store Parcel From	Elements		_ 🗆 ×
Parcel Name: 4	300	Element Selection	
Parent Tract 💌		Element Type: Point	•
Element List:		Point Name:	
D555 D556 D563 D55	57	< Add	
✓ Owner Name: IF	eritage Associates		
Attributes			
Attributes	1-	1	-
Name	Туре	Value	
DB	String	840	
PG TAV#	String	611 COED 2000 2000	1
TAX#	String	5008-3263-2803	
			\mathbf{X}
	Store F	Parcel	

- 8. Click the *Store Parcel* button.
- 9. Describe the parcel in COGO and review.
- 10. Repeat the process for parcel 4301.

- > SURVEY PLAN PREPARATION TOOLS
- 1. Create and open a new file called *4300.dgn*.
- 2. From the main Survey Menu Bar, select *Plans Preparation > D and C Manager*.
- 3. Navigate to the **Property Line** item as shown below.



4. Click the *Draw Plan & Profile* button on the secondary dialog.

_ 🗆 ×
Match Point Text
Draw Plan & Profile

5. Make sure the settings are as shown below and click on the parcel 4300 in the list window.

궁 Draw Plan & Profile	
Item: Property Li	ne
Element Type: Parcels	▼ Label Scale: 50
Key-in Points:	
Select Parcel to Draw 4200 4200A 4300	 Property Lines Taking Lines Easement Lines Occupied Lines Buildings Property Line Labels Taking Line Labels Easement Line Labels Occupied Line Labels Occupied Line Labels Parcel Number Labels Parcel Quantities
	 Occupied Lines Buildings Property Line Labels Taking Line Labels Easement Line Labels Occupied Line Labels Parcel Number Labels Øwner Names Parcel Quantities







- 6. From the main Survey Menu Bar select *Plans Preparation > Place Border*.
- 7. Complete the settings as shown below then click the *Place* button to place the border.

2 Place Border
Sheet Size : E
☑ Draw Title Block
Border Margin
Top : 0.00 Bottom : 0.00
Left: 0.00 Right: 0.00
Place

- 8. Next select the *Place North Arrow* from the *Plans Preparation* pulldown.
- 9. Complete the settings as shown below then click the *Place* button to place the arrow.

웅 Place North	Arrow
F North Arrow Par	rameters
	Length: 6.00 inches
	Reverse Polar Direction
Label Paramete	rs
Sample	Use Plot Scale 🔻
Label: NOR1	[H]
	Place

10. Next select the *Place Coordinate Table* from the *Plans Preparation* pulldown.
| <mark>8 Place</mark> (
Settings | Coordinate T | able | | | | | - | X |
|------------------------------------------------------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|-----------------------------------------------------------|----------------------------------------------------------------------------------|---------------------------------------------------------------------|------------------------------------------------------|-------------|-----------------|
| - Table Fo
Prefix | rmat/Column Or
Text
Point# | rder
Suffix
▼I | C:\60840 | to Output Fi
3\coord.txt | le : | | Create File | र
 Q |
| | North(Y) ▼
East(X) ▼ | | | Replace ''N
Beplace ' | lo Elevation
'No Feature | n" With : ⊡
∍" With : ⊡ | .0000 | |
| | Elev(Z) ▼
Station ▼ | | | Compute Station value from Ref. Chain | | | | |
| | None | | Chain to m | easure Statio
Use Duplica | on and Offs
te Filter To | et from : ┃M | | |
| Select Points for Table or Export : | | | | | | | | |
| Point# | North(Y) | East(X) | Elev(Z) | Station | Offset | Feature | Desc 🔺 | |
| D557
D558
D559
D560
D561
D562
D563 | 301868.3320
301901.8423
301729.0521
301901.8414
301731.4851
301688.7532
302139.6164 | 3876584
3876584
3876584
3876584
3876536
3876313
3876392 | 0.0000
0.0000
0.0000
0.0000
37.0149
0.0000 | 65+00.30
65+00.32
63+25.22
65+00.32
63+22.06
63+77.61
67+84.57 | 413.2585
394.3014
413.2540
412.5793
91.3823
300.7240 | 3020
3020
3020
3020
3020
3020
3020 | - | |
| V Heade | r: Gan
Text | n ple
Spacing (% d | Table Text :
of Text Size) : | €amp1
75.00000 | •
• | Horz. Line
Vert. Lines | s: | |
| Point: | North: | East:
East | Elevation:
Elevation | Station:
Station | Offset: | None: | None: | |
| | | | | | | | | |

11. Complete the settings as shown below then click the *Place* button to place the table.

- *Note* You have to highlight the point numbers in the list window that you wish to be included in the table.
- *Note* The size of the table itself is controlled by the size of the text.



12. You should now have a plat similar to the one shown below.

PLAN VIEW LABELING

INTRODUCTION

GEOPAK's labeling tools allow a user to place "smart" labels in a MicroStation drawing. These labels have the ability to calculate XYZ coordinates, station, offset, direction, length, radius, degree of curvature, etc. of the associated element.

ACCESSING THE PLAN VIEW LABELER

The Plan View Labeler can be accessed by selecting *Plans Preparation > Plan View Labeling* from the main Survey Menu Bar.

PLAN VIEW LABELING

When the Plan View Labeling icon is selected, the dialog depicted below is displayed.

🔗 Plan View Labeler - Style:\bir	\def_plan.lsf -> Unnamed Style	
Style <u>Fi</u> les <u>O</u> ptions <u>S</u> cale <u>T</u> ools		
Text Params. Shape Leader Ro	otate Styles	
Job No.: 101	Computed Inserts O User Inserts	
Element: Point	Computed Text	
Chain:	X Coordinate Y Coordinate Z Elevation GPK Z Elevation TIN Z Elevation Modeler Station Partial Station	Space Return Clear Delimit Place Label
	Not Available	

The label to be placed is displayed in the box on the right side of the dialog as shown above. The Space button places a space in the label at the cursor position. The Return button starts a new line of text. The Clear button starts a new label. The Delimit button places a line above or below a line of text. The Place Label button attaches the label to the cursor for placement in the drawing.

The user can select the various tabs to define / modify the label appearance.

Техт

For data to be computed, the job number and the chain need to be selected. If elevations are to be calculated, a TIN file needs to be chosen.

The Computed Inserts are items that GEOPAK has the ability to calculate for the chosen item. The list of Computed Inserts changes with the type of element that is chosen. If a line is chosen, the list of Computed Inserts will show inserts of bearing, and length. If a curve is chosen the list of Computed Inserts will change to show inserts of radius, curvature, chord length, etc.

The User Inserts are inserts that a user may use on a regular basis. This list can be customized for a specific user's needs.

The Identify Element button allows the user to choose the element to use for calculations in the label. The Data Point button will let the user pick a specific point to calculate the coordinates, station, or offset for.

PARAMETERS

Plan View Labeler - Style:\bin\def_plan.lsf -> StaOff - Active	
Style <u>Fi</u> les <u>O</u> ptions <u>S</u> cale <u>T</u> ools	
Text Params Shape Leader Rotate Styles Text Preferences / Symbology Justification: Sample Output Width: 2.000 Image: Styles Sample Output Width: 2.000 Image: Styles Sample Output Font: Image: Styles Sample Output Styles Font: Image: Styles Styles Styles Weight: Image: Styles Image: Styles Styles Image: Styles Image: Styles Image: Styles Styles Image: Styles	Sta 39+828.572. d-e-l-i-m-i-t Off 19.649 RT Space Return Clear Delimit Place Label

The **Parameters** tab enables the user set up the text size and symbology for the label.

By Current sets the symbology to the current MicroStation settings. **By Element** allows the user to set the symbology by choosing a MicroStation element. **D&C Symbology** allows the user to set the symbology based on a item stored in the D&C Manager database. **Set All** sets the symbology for all elements in the label (text, delimiters, leader lines, etc.).

SHAPE

8 Plan View Labeler - Style:\bin\def_plan	n.lsf -> StaOff - Active	_ — ×
Style <u>F</u> iles <u>O</u> ptions <u>S</u> cale <u>T</u> ools		
Text Params. Shape Leader Rotate Style Shape Preferences So So So So So XX XX XX So So So So Offset: 0.00 Level: Level 1 Image: Color: Image: Color:	les Sample Output 5+a 39+828,572 Dff 19,649 RT	Sta 39+828.572. d-e-l-i-m-i-t Off 19.649 RT Space Return Clear Delimit Place Label

The Shape tab allows the user to place a shape around the label, and set the symbology for the shape.

Leader

8 Plan View Labeler - Style:\bin\def_plan.lsf -> StaOff - Active	
Style <u>Fi</u> les <u>O</u> ptions <u>S</u> cale <u>T</u> ools	
Text Params. Shape Leadel Rotate Styles Leader Type Terminator Sample Dutput Variation Image: Style state style state style state style state style state style state style	Sta 39+828.572. d-e-1-i-m-i-t Off 19.649 RT Space Return Clear Delimit Place Label

The Leader tab allows the user to attach a leader from the label to the point. Different leader types and terminators can be chosen. The active terminator can also be used.

Rotate

ZPlan View Labeler - Style:\bin\def_plan.lsf -> StaOff - Active	
Style <u>F</u> iles <u>O</u> ptions <u>S</u> cale <u>T</u> ools	
Text Params. Shape Leader Rotate Styles Text Angle Sample Output Image: 26.565 Image: Element Angle: Image: Image: Alignment Angle: Image: Set Angle By Image: Image: Image: Image: Image: Image: Image: Image: Image: Image: Image: Image: Image: Image: Image: Image: Image: Image: Image: Image: Image: Image: Image: Image: Image: Image: Image: </td <td>Sta 39+828.572 d-e-l-i-m-i-t Off 19.649 RT Space Return Clear Delimit Place Label</td>	Sta 39+828.572 d-e-l-i-m-i-t Off 19.649 RT Space Return Clear Delimit Place Label

The **Rotate** tab allows the label to be rotated. The rotation can be determined from the current angle, the angle of the element, or an angle relative to the alignment. The angle can also be set by two data points (first data point set the location, next data point sets the angle) or the active angle.

STYLES

2 Plan View Labeler - Style:\bin\def_plan.lsf -> StaOff - Active	
Style <u>Fi</u> les <u>O</u> ptions <u>S</u> cale <u>T</u> ools	
Text Params. Shape Leader Rotate Styles Item Selector Item Selector Style Preview Image: Line Labels Image: Line Labels Image: Line Labels Image: Line Labels Image: Arc Labels Image: Line Labels Image: Line Labels Image: Line Labels Image: Line Labels Image: Arc Labels Image: Line Labels Image: Line Labels Image: Line Labels Image: Line Labels Image: Arc Labels Image: Line Labels Image	Sta 39+828.572. d-e-1-i-m-i-t Off 19.649 Space Return Clear Delimit Place Label

The Styles tab allows a user to choose label symbology from a library of pre-defined styles. When the user chooses the style, all symbology, leaders, shapes, etc. is set up for the user.

MENUS

The Style Files menu allows the user to open a new style library. You must be under the **Styles** tab in order to open a style library.

Options > Minimize Dialog minimizes the main dialog (when the Place Label button on the main dialog is pressed) to allow for easier label placement. The Label Viewer can be used in conjunction to still view the sample contained in the Label dialog.

The main labeling window can be maximized by selecting the **Restore Label Dialog** icon within the appropriate View Label Control tool frame or the labeling tool on the main Road, Site, or Drainage tool frame.

Options > Use Reference File Coordinates - When labeling elements within a reference file, it is useful to utilize the reference file coordinates, rather than the current active file. Simply activate the toggle, and subsequent computed text inserts using reference file elements or data points will reflect the reference file coordinates, if the snap and locate in the reference file are active.

Options > Use DP Element Association - This option will enable the association between MS elements and DP (data point) labels that are snapped to the element. If the element is modified, the point labels will move with the element when the Label Update feature is used. Note: This only applies to elements within the active design file.

Options > Label Tools invokes the tool frame shown below which enables the user to modify GEOPAK labels.

Plan View Label Control		×
************	+ # 🖉 🗇 🖉) _A A

Options > Label Viewer brings up a dialog that allows a user to view and place a label.

🔁 Label View 🔳 🗖 🗙
5ta 39+828.572 Dff 19.649 RT
Place Label
Automatic Label

The **Scale** > **Scale Style** menu allows the user to choose a plan scale. All labels will be adjusted according to the plan scale. The user simply keys in a scale, and chooses a **Labeling Style**. The corresponding label will be placed at the correct size for the scale that was chosen.

Tools > Label Updater - The Label Update tool is a powerful tool for updating GEOPAK labels. When alignments are updated, TIN files modified, labels moved, etc., GEOPAK remembers the computed text information utilized in the placement of the original label. Therefore, the software can update the label based on updated data. The tool utilizes the dialog depicted below.

🔁 Update Labels 💦 🔳 🗖 🗙
Select By: Single Select 🔹 💌
Center Label
<u>S</u> tart <u>U</u> pdate Label
S <u>ki</u> p U <u>p</u> date All
Highlight Labels
Content Correct 🔹
Highlight

Tools > Selection Set Labeling - The Selection Set Label tool is a powerful tool for placing or updating labels within a selection set.

When the Selection Set Labeling tool is activated from the pulldown menu, the dialog depicted below opens.



Tools > Plan Label Preferences – Allows for the customization of the plan view labels. Options include Bearing, Distance, Elevation, and Area.

When the Plan Label Preferences tool is activated from the pulldown menu, the dialog depicted below opens.

Plan Label Preferences	
Use Label Preferences:	
Bearing Distance Elevation Area	
Leading Characters: Zero 💌	
Allow Due Cardinal Direction	y Length
Min Dist Max Dist Increment Component	Drop 00
	571
0.000 0.000 0.001 Seconds 🔻	
	Apply

LAB EXERCISE: LABELING

- > ACCESSING THE LABELER
 - 1. While still in 4300.dgn select Plan View Labeling from the main Survey Menu Bar. (Plans Preparation > Plan View Labeling).

名 Plan View Labeler - Style:\bir	\def_plan.lsf -> Unnamed Style	
Style <u>Fi</u> les <u>O</u> ptions <u>S</u> cale <u>T</u> ools		
Text Params. Shape Leader Ro	otate Styles	
Job No.: 101	Computed Inserts O User Inserts	
Element: Point	Computed Text	
Chain: ARMORY	X Coordinate A Y Coordinate Z Elevation GPK Z Elevation TIN Z Elevation Modeler Station Partial Station	Space Return Clear Delimit Place Label
	Not Available	

> Using Predefined Label Styles

- 1. Select the *Styles* Tab.
- 2. Traverse with the Item Selector box to locate the following style: *Labels > Point Labels > StaOffEleTIN*
- 3. Next, double click the *StaOffEleTIN* style.

🔗 Plan View Labeler - Style:\bin	\def_plan.lsf -> StaOff - Active	
Style <u>Fi</u> les <u>O</u> ptions <u>S</u> cale <u>T</u> ools		
Text Params. Shape Leader Ro Item Selector C Labels Line Labels Arc Labels Arc Labels NEStaBox StaOff StaOffEleTIN New Style Update Style	tate Styles Style Preview Style Preview Style Preview Style Preview Style Preview Style Preview Style Preview Style Preview Style Preview Style Preview	Sta 13+41.33· d-e-l-i-m-i-t Off 7872.68 LT Space Return Clear Delimit Place Label
New Category Scale : 1.00	Node and Shape Only ▼	

3. Move back to the Text tab and complete as defined below:

Job No.	101
Chain	MAINLINE
TIN File	S60843.tin

In the following steps, we will use the *Plan View Labeler* to label the station and offset for the corners of parcel 4300.

4. To begin the process, select the **DP** button and then identify the location that you wish for the Station and Offset to be computed. The labeler automatically calculates the information.

😪 Plan View Labeler - Style:\bin\def	f_plan.lsf -> StaOff - Active	
Style <u>Fi</u> les <u>O</u> ptions <u>S</u> cale <u>T</u> ools		
Text Params. Shape Leader Rotate Job No.: 101 Q Element: Point Com Chain: MAINLINE TIN File: C:\60843\s60843.tin Q Label Feature Tin File: C:\60843\s60843.tin Q Element: MAINLINE T TIN File: C:\60843\s60843.tin Q Element: MAINLINE T T TIN File: C:\60843\s60843.tin Q Element: MAINLINE T T T T T T T T T T T T T T T T T T T	Styles Computed Inserts User Inserts Inputed Text Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate Coordinate C	Sta 65+00.68· d-e-1-i-m-i-t Off 193.26 RT Space Return Clear Delimit Place Label

- 5. Use the *Params.*, *Shape*, *Leader* and *Rotation* tabs to experiment with different labeling styles.
- 6. To place the label, return to the *Text* tab and click the *Place Label* button.
- 7. The label is now attached to your cursor (without the leader for the delimiter).
- 8. Data point at the location you wish the text to be located.
- 9. A second data point will define the side of the label, which the leader line will be drawn from the delimiter line to the computed location.



> CREATING AND SAVING A NEW LABEL STYLE

- 1. Select the *Text* tab then click *Clear* below the label composition window.
- 2. On the *Plan View Labeler* dialog, click the *Select GEOPAK or MS Element* icon, then identify any of the lines representing the parcel and accept. The computed text inserts should now contain items such as *Bearing, Azimuth*, and *Length*.
- Click on the *Bearing -> DMS* insert. This should show the current value below the Computed Text window in addition to a user definable toggle for the number of decimal places. Set this to θ, then double click *Bearing -> DMS*. Click *Return* to start a new line for the label.

Plan View Labeler - Style:\bin\def_plan.lsf -> Unnamed Style 📃 🔲 🗙				
Style <u>F</u> iles <u>O</u> ptions <u>S</u> cale <u>T</u> ools				
Text Params. Shape Leader Ro	otate Styles	N 17^ 15' 3" W		
Job No.: 101	Computed Inserts O User Inserts			
Element: LINE D555/D556	Computed Text			
Chain: MAINLINE 🖃	Bearing -> D			
TIN File: C:\60843\s60843.tin	Bearing -> DM Bearing -> DMS	Space Return		
	Azimuth -> D	Clear Delimit		
Label Feature	Azimuth -> DM	Place Label		
	Azimuth -> DMS			
	Length			
	N 17^ 15' 3" ₩			

- *Note* Your Bearing may be different depending on which MicroStation line you identified.
- 4. Single click on the *Length* item, set its number of decimal places to 2, then double click *Length*.

名 Plan View Labeler - Style:\bir	\def_plan.lsf -> Unnamed Style	
Style <u>Fi</u> les <u>O</u> ptions <u>S</u> cale <u>T</u> ools		
Text Params. Shape Leader Ro Job No.: 101	otate Styles Computed Inserts O User Inserts	N 17^ 15' 3" W· 284.00
Element: LINE D555/D556	Computed Text	
Chain: MAINLINE TIN File: C:\60843\s60843.tin	Azimuth -> DM Azimuth -> DMS	Space Return
Label Feature	Length (Alt. Units) Line Name Line Feature Length (US Survey Foot)	Clear Delimit Place Label
	284.00 2 💌	

Note Your Distance may be different depending on which MicroStation line you identified.

5. Select the *Params*. Tab and set the *Height, Width*, and *Line Sp.* to 5.0 and the *Justification* to *Center-Center*.

ZPlan View Labeler - Style:\bin\def_plan.lst -> Unnamed Style	
Style <u>Fi</u> les <u>O</u> ptions <u>S</u> cale <u>T</u> ools	
Text Params. Shape Leader Rotate Styles Text Preferences / Symbology Justification: Sample Output Height: 5.000 Justification: Sample Output Width: 5.000 Sample Output N Ine Sp.: 5.000 Sample Output N Level: Level: Sample Output N Color: 3 Sample Output N Weight: 2 Sample Output Sample Output	N 17 ^{15'3" W·} 284.00 Space Return Clear Delimit Place Label

- 6. Select the *Shape* tab, set the *Shape Preferences* to *No Shape*.
- 7. Select the *Leader* tab and set the *Leader Type* to *NO Leader* and the set the *Terminator* to *No Terminator*.
- 8. Click Continuous Place.
- 9. Set the MicroStation snap to Midpoint. Snap the previously identified line and accept.
- 10. Data point and accept each of the remaining lines of the parcel.
- 11. Select the *Styles* tab.
- 12. In the *Item Selector* window, double click *Labels* then double click *Line Labels*.
- 13. Click New Style.
- 14. Set the Style name to *Bear_Dist*.
- 15. Click *OK* to save the style.
- 16. Click *Style Files > Save* to update the *def_plan.lsf* file.
- 17. Exit MicroStation.



Borrow Pits

OBJECTIVES

This chapter will focus on the critical process within the districts of creating data for borrow pits. Attention will be focused on creation of digital terrain models, both existing and proposed, from multiple data sources as well as calculating volumes using both the prismoidal and end area methods.

INTRODUCTION

Compiling data to create a digital terrain model for the existing ground will allow the user to create volumes after construction or excavation. After construction a secondary terrain model provides the surface to compute differences with the existing model.

IMPORTING ASCII DATA

The first step in processing the ASCII data is to appropriately define the settings in the *Dataset* dialog. This involves the selection of the desired ASCII field data file to be processed.

😤 Dataset New		_ 🗆 X
Name :	field1 Create 💌	
Description :	[
Data Source :	ASCII File(s) 🔻 XYZ to Coordinates 💌	
Output Directory :		<u> </u>
	Use dataset name as output sub-directory	
Source Format	: XYZ to Coordinates	
	File(s) to Us	e: 🔁
	<u>O</u> k <u>C</u> ancel	<u> </u>

				
ZYZ to Coordinate	s User:john	Dataset : field		
File C:\60843\borrow_	pits\original.txt	<u> </u>	Commont Dolimitor Dod	. .
	Penniker space •			
2640 3315160.561 583 2640 3315152.965 583 2640 3315138.057 583 2640 3315119.231 583	9099.993 372.512 9107.447 375.410 9118.554 379.001 9123.507 379.498			
2640 3	3315160.561	589099.993	372.512	
PCode	< ▼ Next>>	<u>Y</u>	Z Link w/ Gap (ALL)	None 🔻
Load ASCII Dialog (Open Editor After Pr Process LcodePcoe	On Dataset Open rocessing de same as Raw Dat	Process ta	 Import After Proces Store Elements into 	s 9 GPK

Once the ASCII file has been selected for processing it is simply a matter of identifying the appropriate information in each column.

CREATING A TERRAIN MODEL

Once the data is imported then a digital terrain model can be compiled using the ground shots. Since the ground shots have been imported through *Survey* all information about each shot is known regarding DTM inclusion. This information is read directly from the feature code for each shot in the SMD feature table.

8 Survey Manager	名 Survey Manager Preferences Item Review 2640 📃 🗖 🛛			
Feature Name Point Feature Label Symbology Label Positions Desc Parameters Adjust Size Linear Feature Linking Code DTM Control	DTM Control Include as a Spot in DTM Zone Control			
Ar	Cance	!		

Build GEOPAK DTM TIN File Parameters	
DTM TIN File original.tin	Files
Dissolve Option : Side	Side Length: 50.000
DAT File Parameters	
🔲 Create DAT File	Write Comments in data file
DTM Data File	Files
File Open Create File	
File Mode ASCI	
Stroking Parameters Arc Stroke Tolerance 0,100	Stroke Curves
Linear Stroke Distance 5.000	🔲 Stroke Linear
Determine DTM Inclusion from :	Feature Table (SMD)
- Supplemental DAT File	
🗖 Dat File 📃	Files
Set Search	Process

After importing the ground data, the *Build GEOPAK DTM* tool is then used to triangulate the data and create the terrain model or *TIN* file.

LAB EXERCISE: BORROW PITS

- > IMPORTING ASCII DATA
- 1. Open the MicroStation file *C:\60843\borrw_pits\S18897BPO.dgn*.
- 2. Access GEOPAK Survey from *Applications > GEOPAK Survey > Survey*.
- 3. Open the existing project *Borrow*.
- 4. Create a new *Dataset* called *Field1*.

궁 Dataset New 💶 🗆 🗙
Name : field1 Create
Description :
Data Source : ASCII File(s) 🔻 XYZ to Coordinates 💌
Output Directory :
✓ Use dataset name as output sub-directory
Source Format : XYZ to Coordinates
File(s) to Use :
릴

5. Using the *Dataset Add Source File to List* icon on the right of the list window, add the file *original.txt*.

Select File(s)		
Files:	Directories:	
original.txt	C:\60843\borrow_pits\	
borrow.log borrow.prj borrow.spp default.con job1.gpk original.tin original.tin original.txt S18897BPF.dgn S18897BPF.dgn S18897BPO.dgn S18897BPO.dgn	C:\ 60843 borrow_pits field1 projdbs	
List Files of <u>Type</u> :	Dri <u>v</u> es:	
All Files (*.*) 🔻		Help

- 6. Click OK.
- 7. Change the *Delimiter* to *Space* and highlight one of the lines in the list window.

8XYZ to Coordinate	es User:john	Dataset : field	1	_ 🗆 ×
File C:\60843\borrow_	_pits\original.txt	<u> </u>		
	Delimiter Space 🔻	·	Comment Delimiter <u>Da</u>	ash 🔻
2640 3315160.561 58 2640 3315152.965 58 2640 3315138.057 58 2640 3315119.231 58	9099.993 372.512 9107.447 375.410 9118.554 379.001 9123.507 379.498			
2640	3315160.561	589099.993	372.512	
PCode Reset	X ▼ Next>>	<u>Y</u> •	Z ▼ Pcode w/Lc	None No Chain
Open Editor After F Process LoodePcc	Processing ode same as Raw Dat	<u>P</u> rocess	Store Elements in	nto GPK

- 8. Now set the toggles for each column.
- 9. Once completed click the *Process* button.
- 10. When the following prompt appears, make sure the point is set to 1 and click OK.

No field was assigned to Point Number
Initial Point Number : 1
<u>0</u> K

11. You should now have points displaying similar to the ones shown below.



12. Repeat this process for the ASCII file *Final.txt* beginning with creating a new dataset called *Final*.

13. When the *Chain* warning appears provide a prefix name of *Final*.

Over Writing Informa	tion in GPK
The Chain [2640] alrea	ady exists.
ExistingNFirst Point : 2FLast Point : 256LTotal Points : 255TDataset : FIELD1DFeature : 2640FZone : 1	ew irst Point : 258 ast Point : 599 otal Points : 342 ataset : FINAL eature : 2640 Zone : 1
O Over Write	
O Do Not Over Write	
O Change Point/Cha	in Name
Add Prefix	final
O Add Suffix	
O Merge Chains	
Apply App	oly All Stop Import

14. Click Apply.

> CREATING A TIN FILE

To create the TIN file for the existing ground select *Build DTM* from the *DTM* pulldown. (*DTM* > *Build DTM* > *From Survey Data*)

🔁 Build GEOPAK DTM	_ 🗆 ×
TIN File Parameters	Files
Dissolve Option : Side Side Length: 100	.000
DAT File Parameters	
Create DAT File	in data file
DTM Data File	Files
File Open Create File	
File Mode ASCI	
Stroking Parameters Arc Stroke Tolerance 0.100 🔽 Stroke Curves	:
Linear Stroke Distance 5.000 🔽 Stroke Linear	
Determine DTM Inclusion from : Feature Table (SMD)	
Supplemental DAT File	
Dat File	Files
Set Search Process	

- 2. Provide a TIN file name of *Original*.
- 3. Set the *Dissolve* option to *Side* and provide a length of 50'.

- 4. Toggle OFF the *Stroking Parameters*.
- 5. Make sure the *Determine DTM Inclusion From* option is set to *Feature Table (SMD)*.
- 6. Click the *Set Search* button and select the existing dataset *Field1*.

8 Set Search	_ 🗆 ×
Select Datasets	
FIELD1	ОК
FINAL	Cancel
	More Detail
Mark All	
Clear All	

Note Toggle OFF the *Final* dataset.

- 7. Click OK.
- 8. Click *Process* on the main dialog.

🔁 Build GEOPAK DTM 📃 🗆 🗙
TIN File Parameters DTM TIN File Origina Files
Dissolve Option : Side Side Length: 50.000
DAT File Parameters
Create DAT File Write Comments in data file
DTM Data File
File Open Create File
File Mode ASCII
Stroking Parameters
Arc Stroke Tolerance 0.100 🔲 Stroke Curves
Linear Stroke Distance 5.000 📃 Stroke Linear
Determine DTM Inclusion from : Feature Table (SMD)
Supplemental DAT File
Dat File Files
Set Search Process

9. Create a TIN file named *Final* using the Final dataset.

VOLUME CALCULATIONS

The Volumes Tool computes volumes between TIN models or a TIN model and plane. The quantities are displayed in the dialog, and can be optionally written into an ASCII file.

For each volume option, the area about which volume calculations are performed is defined by a MicroStation shape or complex shape element (Select mode). An alternative method of defining the area about which volume calculations are performed is by interactively defining the area (Place mode). Both Select and Place mode operations will be discussed for each volume calculation option. In addition, depth ranges may also be utilized for each Volume option.

🔁 Volume Calculations 📃 🗖 🗙
Calculation Method
Prismoidal O Grid Points: 100
Calculation Options
Calculation: TIN to TIN
From TIN: final.tin
To TIN: original.tin
Use Range: Range
Volume Calculations
Use Factors:
Cut: 1.000 Fill: 1.000
Cut Volume :
Fill Volume : Reference :
Area :
Create File
Q
View
Boundary Selection
Use Boundary: Place Select
Volumes By Region: Regions
Volume Polygons
🔽 Display Only
Fill Volume Polygons
Process

Calculation Method:

Activate one of the two methods to determine the method of calculation. Prismoidal utilizes the triangulation models, while the Grid Points utilizes lattice models created on the fly.

Prismoidal

When activated, triangulated models are utilized to compute the prismoidal volume.

Grid Points

When activated, the program utilizes the user-specified number of **Grid Points** to create a lattice, and then computes lattice volumes.

Calculation Options

This group box specifies which TIN files or planes are to be utilized for volume calculations. As the Calculation type is selected, the From and To fields directly below dynamically change to reflect the selection.

Calculation

When **TIN to TIN** is selected, the fields directly below are **From TIN** and **To TIN**. This configuration would be common for determining the project volumes, i.e., from existing ground terrain to the proposed surface.

When **Plane to TIN** is selected, the fields directly below are **From Plane** and **To TIN**. In this case, a key-in field for the elevation is provided. This example is common for determining volumes between a water level (elevation) and the proposed pond.

Use Range

Clicking **Range** opens the dialog depicted below. Note the button is un-ghosted only when the **Use Range** toggle is active. If the toggle is active and no ranges are defined, the **Process** button remains ghosted.

File			
-			
Range:	Auto Range Increm	nent 🔻	
– Auto Range Op	ptions		
Range Increr	ment: 5.000		
Minimum Eleva	ation: 365.000	365.496	
Maximum Eleva	ation: 384.319	384.319	
[
<u>E Set Ha</u>	nge		
	11-1	A - Corr	
LOW	High	Active	
365.000	370.000	YES	
370.000	375.000	YES	
375.000	380.000	YES	1
380.000	384.319	YES	\mathbf{X}
0.000	0.000		

The dialog contains a list box, with edit fields directly below. Options are supported (button to the right of the list box) to **Add**, **Modify**, and **Delete** ranges. When the **Active** toggle is activated, the selected range is utilized for computations. A range can be activated or deactivated at any time during the processing by highlighting the desired line and changing the **Active** toggle in the lower right corner of the dialog. In this manner, the user has complete control over which ranges are computed at any one time.

To add a single range, simply key in the desired values, set the **Active** toggle, and click **Add**. The created line is added to the list box. To modify a line, highlight the desired line. The current values are displayed in the edit fields. Change the desired field, and then click **Modify**. GEOPAK updates the list box. To delete a line, highlight the line and click **Delete**. The line is removed from the list box. A maximum of 50 ranges is supported. When more than five ranges are specified, the scroll bar and arrows on the right side of the dialog are automatically invoked for easy scanning.

The top of the dialog supports automatic creation of ranges. Two options are supported:

- Auto Number of Ranges the number of ranges is specified, along with the Minimum and Maximum elevations. GEOPAK divides the Minimum and Maximum elevation difference into the specified number of elevation ranges.
- Auto Range Increment the range increment is specified, along with the Minimum and Maximum elevations. GEOPAK divides the elevation into as many elevation ranges as necessary at the specified increment.

Note the buttons to the right of the Elevations are the Min /Max values for the current TIN Model. They are displayed only when TIN file names are specified within the main dialog. To utilize them in populating the fields, simply press the appropriate button.

To utilize the specified ranges for subsequent sessions, several File functions are supported: Save, Save As, and Open.

Volume Calculations

This group box contains the **Cut Volume**, **Fill Volume**, **Balance**, and **Area** tools. Units are determined by the User Preferences. In English projects, units are cubic and square yards, while metric projects are cubic and square meters. Fields are supported for Cut Factor and Fill Factor.

Fill Factor Cut Factor

To utilize the **Fill Factor** or **Cut Factor**, activate the toggle to the left of the Fill Factor. When activated, the **Fill Factor** is applied to the Fill volume, while the **Cut Factor** is applied to the Cut Volume. The calculations displayed in the Volume Calculations and in the optional report reflect the adjusted volumes. The Factors are also applied to the range totals.

Output

An optional output can be generated, placing the results in an ASCII file.

Output to ASCII File

When activated, the results are placed in the specified ASCII file.

Files

Name of ASCII file to be created or appended. In lieu of typing, clicking **Files** invokes the Create ASCII Output File dialog, wherein the desired file may be selected.

Create File Append File

Setting the option to **Create File** creates a new output file, while setting the option to **Append File** adds the results of the current processing to the bottom of the previously created output file.

View

Pressing this button invokes the Text editor, and automatically loads the output report for review.

Boundary Selection

Volume calculations can be performed in a user-defined area(s), rather than the entire model, utilizing information within this group box.

Use Boundary

When activated, a single user-defined boundary is utilized, rather than computing volumes for the entire model. When activated, both the **Place** and **Select** buttons are un-ghosted.

Place

Clicking **Place** enables the user to subsequently identify data points within the model to define the boundary limits. To close the boundary, place the last data point within the circle at the initial point of the boundary.

Select

Clicking this button enables the user to identify a previously defined closed element, wherein volume calculations can be computed.

Volumes by Region

When activated, the Volumes for multiple boundaries based on element symbology can be computed. Clicking **Regions** opens the Volumes by Region dialog.

😤 Volumes By	Region _	
Description	Symbology]
Pond	Lv:Level 1, Co:4, Lo:0, Wt:1	2
Pad	Lv:Level 2, Co:2, Lc:0, Wt:3	
Pond		

To add region(s), enter a Description, and then set the symbology. Click **Add** to add the items to the list box. To modify a listing, highlight the desired line to be modified, which places the current line in the edit fields. Make the desired changes, and then click **Modify**. The list box is updated. To delete a line, simply highlight the line to be deleted, and then click **Delete**.

Note numerous regions of the same symbology can be computed by a single entry in the list box. If defined areas overlap, their union is utilized for volumes, so the volumes are not included twice in the computations. The regions must be closed shapes, as any non-closed shapes are ignored. Closed areas comprised of other elements (i.e., lines or line strings) are also not utilized, only MicroStation shapes.

Each region (one line in the list box) and its associated volume are listed separately within the output report, while only the total volume is shown within the Volume Calculations part of the dialog.

Volume Polygons

The areas where volumes are computed are displayed or drawn into the design file. The area of the volume polygon is identical to the Area value displayed within the Volume Calculations group box.

Fill Volume Polygons

When activated, polygons are filled, rather than just outlined. Note the MicroStation fill attribute must be active for the fill to display.

Display Only

When activated, the polygons which outline the area where volumes have been computed are visually displayed, but not drawn into the design file. Therefore, they disappear when the screen is refreshed or any view control command is executed. When not activated, the polygons are drawn into the design file.

Process

Commences the volume calculations. Note this button is ghosted until sufficient data has been incorporated within the dialog.

LAB EXERCISE: PRISMOIDAL VOLUMES

- > **COMPUTING VOLUMES**
- 1. Open the MicroStation file C:\60843\borrw_pits\S18897BPO.dgn.
- 2. Access GEOPAK Survey from *Applications > GEOPAK Survey > Survey*.
- 3. Open the existing project *Borrow*.
- 4. From the main *Survey Menu* bar select *DTM* > *Volumes*.

Survey (Project :	borrow	Use	r : john)				×
<u>P</u> roject	<u>D</u> ataset	<u>V</u> isualiza	ition	<u>G</u> eometry	D <u>т</u> м	Plans Preparations	<u>T</u> ool Boxes	
					. DT <u>N</u>	<u>1</u> Tools		
					<u>S</u> tro <u>B</u> uile	king Options d DTM •		
					<u>L</u> oa DTN	d DTM Features 1 <u>C</u> amera		
					Build Build <u>E</u> dit	d Merge TINS d Clip TI <u>N</u> S DTM		
					Volu	imes		
					Viev	v <u>P</u> rofiles		
					<u>H</u> eig	ght Query		
					<u>T</u> IN	Statistics		
					<u>D</u> rai	nage Tool		

5. Use the Browse buttons to select the From and To TIN files as shown below.

🔁 Volume Calculations 📃 🗖 🗙
Calculation Method
Prismoidal O Grid Points: 100
Calculation Options
Calculation: TIN to TIN 🔹
From TIN: final.tin
To TIN: original.tin
E Use Banger Bange
Volume Calculations
Use Factors:
Cut: 1.000 Fill: 1.000
Cut Volume :
Fill Volume :
Balance:
Area : 📃
Uutput To ASCIT File: Ureate File
<u> </u>
View
Boundary Selection
Use Boundary: Place Select
Volumes By Region: Regions
Volume Polygons
🔽 Display Only
Fill Volume Polygons
Process

- 6. Toggle ON the *Output to ASCII File* and provide a file name.
- 7. Click Process.

8. Review the volumes in the dialog and ASCII file.

Lalculation Method Side Reinter 100
Calculation Uptions
From TIN: final.tin
To TIN: original.tin
Use Range: Range
- Volume Calculations
Use Factors:
Cut: 1.000 Filt 1.000
Cut Volume : 25 176 CY
Fill Volume : 18944.975 CY
D 1 40010 700 CV
Balance : -18919.799 LY
Area : 5246.774 SY
Balance : -18919.799 CY Area : 5246.774 SY
Balance : -18919.799 CY Area : 5246.774 SY ▲ Output ✓ Output To ASCII File: Create File ▼
Balance : -18919.799 CY Area : 5246.774 SY Output ✓ Output To ASCII File: Create File ✓ volumes.txt
Balance : -18919.799 CY Area : 5246.774 SY ▲ Output ✓ Output To ASCII File: Create File ▼ Volumes.txt
Balance : -18919.799 CY Area : 5246.774 SY ▲ Output ✓ Output To ASCII File: Create File ▼ Volumes.txt View Boundary Selection
Balance : -18919.799 LY Area : 5246.774 SY ▲ Output ✓ Output To ASCII File: Create File Volumes.txt View Boundary Selection Use Boundary: Place Select
Balance : -18919.799 CY Area : 5246.774 SY ▲ Output ✓ Output To ASCII File: Create File ✓volumes.txt View Boundary Selection Use Boundary: Place Select ✓ Volumes By Region: Regions
Balance : -18319.799 CY Area : 5246.774 SY Output ✓ Output To ASCII File: Create File ✓ olumes.txt ✓ View Boundary Selection ✓ Use Boundary: Place Select ✓ Volumes By Region: Regions
Balance : -18319.799 CY Area : 5246.774 SY Output ✓ Output To ASCII File: Create File ✓ olumes.txtl ✓ View Boundary Selection ✓ Use Boundary: Place Select. ✓ Volumes By Region: Regions ✓ Volume Polygons ✓ Display Only
Balance : -18319.799 CY Area : 5246.774 SY Output ✓ Output To ASCII File: Create File ✓ olumes.txt ✓ Volumes.txt ✓ Use Boundary: Place Select ✓ Volumes By Region: ✓ Volume Polygons ✓ Display Only Fill Volume Polygons
Balance : -18319.799 CY Area : 5246.774 SY Output ✓ Dutput To ASCII File: Create File ✓ olumes.txtl ✓ View Boundary Selection Use Boundary: Place Select: ✓ Volumes By Region: Regions ✓ Volume Polygons ✓ Display Only Fill Volume Polygons Process

9. Exit MicroStation.

CROSS SECTIONS

In this section we will review how to create a baseline in order to calculate end area volumes using the same two TIN files from the previous section.

LAB EXERCISE: END AREA VOLUMES

> CREATING A BASELINE

- 1. Open the MicroStation file C:\60843\borrw_pits\S18897BPO.dgn.
- 2. Access GEOPAK Survey from *Applications > GEOPAK Road > Project Manager*.

Project Manager	
<u>Projects</u> <u>Directory</u> <u>A</u> o	dmin
C:\60843\borrov	v_pits\
Filter: .prj	Type: Project 💌
Projects: borrow.prj	Directories:
Job Number: 1	Unit System: English
Description:	
<u>D</u> K	Cancel

- 3. Open the existing project *Borrow*.
- 4. Use the User Name *John*.

5. Using the MicroStation *Place Line* command, place a line to be used as a baseline in the location as shown below.



- 6. Select from the Applications pulldown *Applications > GEOPAK Road > Geometry > Store Graphics*.
- 7. Populate the dialog as shown below and then click on the *ID Element* button.

😤 Store Graphics 💦 💶 🗙	
<u>S</u> ettings	
Job: 1	
Operator Code: id	
Chain 🔻 BL	
Beginning Point: 1000	
Beginning Station: 10+00	
Mode Single Element 🔻	
ID Element Store	

- 8. Data point on the baseline element previously drawn.
- 9. Issue one more data point anywhere on the screen to accept the baseline.
- 10. Click the *Store* button that is now un-ghosted on the dialog.
- 11. Click *OK* to finish storing the chain in the COGO database.

- > **CREATING PATTERN LINES**
- 1. Return the main **Project Manager** dialog.
- 2. Click on the button *Draw Pattern*.
- 3. Select *Run > New* on the RUN dialog and create a new RUN named *Volumes*.

New Run Na	me		
Run Name:	volumes		
Description			
	<u>0</u> K	Cancel	

- 4. Click *OK*.
- 5. Open the new RUN.
- 6. Make the settings in the dialog as shown below.

BDraw Pattern Lines	
Job 1 Chain: BL	💌 💦 Profile: <none></none>
Beginning Left Offset(+): 1 Station: 10+00.00 Right Offset(+): 200	Ending Left Offset(+): 1 Station: 15+08.71 +\$+ Right Offset(+): 200
Even	Skew Angle 0.00 Draw Pattern Lines

Set Feature
Symbology
Level: Level 50
Color: 📕 3 💽
Style: 📃 0 💌
Weight: 🔂 💽
OK Cancel

- *Note* It is important to provide a distance other than zero for the offset values. The Pattern Lines MUST cross the baseline.
- 7. Click the Draw Pattern Lines button.
- 8. Close the Draw Pattern Lines dialog.



> CREATING GROUND CROSS SECTIONS

- 1. Click the button for *Existing Ground Cross Sections* on Project Manager.
- 2. Create a new RUN named *volumes*.

3. Make the settings in the dialog as shown below.

8 Draw Cross Sections
File Edit Update Options
Job Number: 1 Chain: BL Draw
X5 Cells Surfaces
Pattern
By DGN File 🔻
Design File: S18897BPO.dgn
🔽 Levels: Level 50
Colors: 3
☑ Styles: 0
☑ Weights: 3 Display
Scale Spacing
Horizontal: 10.00000 Horizontal: 1000.000
Vertical: 10.00000 Vertical: 500.000
Number of XS by Column: 40

- 4. Click the *Surfaces* tab and complete the remaining settings.
- 5. In the *Details* portion of the dialog set the TIN file to *Original* and the *Method* to *Triangles* and the *Type* to *Line*,

Cross Sections	
File Edit Update Options	
Job Number: 1 💌 Chain: BL	Draw
XS Cells Surfaces	
Type Name Display Settings	Method
	X
┌ Details*	
TIN File: original.tin	_ <u>a</u>
Method: Triangles 💌	Type Line 🔻
Display Settings	Filter Tolerances
By Level Symbology 🔻	Horizontal: 0.300
Feature: < No Entries > 💌 💾	Variance: 0.100
Text Settings	
Elevation 🛃	

- 6. In the *Display* portion of the dialog set the toggle to *By Feature*.
- 7. Use the Browse button and select the item *Road Design > Cross Section > Existing > EXGR*.
- 8. Click the *Add Item* on the right side of the list window.

😤 Draw Cross Sectio	ns	-	
File Edit Update Op	tions		
Job Number: 1 💌	Chain: BL	💌 Dra	aw
		🗖 DP	Origin
XS Cells Surfaces			
Type Name	Display Settings	Method	1
TIN original.tin	EXGR	Triangles	
			모
			\mathbf{X}
🗆 Details			
TIN File:	original.tin	ব	
Method:	Triangles 💌	Type: Line	▼
Display Settings		🕝 Filter Tolerances —	
By Feature	▼	Horizontal: 0.300	
Feature: EXGR		Variance: 0.100	
- Tout Sottings			
		🗖 Void 📃	-
Lievation			

9. Change the TIN file to *Final*.

- 10. In the *Display Settings* portion of the dialog change the toggle to *By Level Symbology*.
- 11. Double click on the symbology window and set the dialog as shown below.

Set Feature
Symbology
Level 2
Color: 📘 2
Style: 📃 0 💌
Weight: 🗾 5 💌
-
OK Cancel

12. Click OK.

13. Click the *Add Item* on the right side of the list window.

8 Draw Cross Section	ons		□ ×
File Edit UpdateOp	itions		
Job Number: 📘 💌	Chain: BL	💌 Dra	w
XS Cells Surfaces		🗖 DP	Origin
Type Name	Display Settings	Method	1
TIN final.tin	Lv: Level 2, Co: 2,	Lc:\5 Triangles	
	EAUN	i narigies	
Details			
TIN File:	final.tin	<u>_</u>	
Method:	Triangles 🔻	Type: Line	▼
Display Settings		Filter Tolerances	
By Level Symbology	, -	Horizontal: 0.300	
Display EXGR		Variance: 0.100	
- Text Settings		1	
Elevation	<u>1634</u>	🗖 Void 📃	-

- 14. Create and open a new 2D MicroStation file named *xs_volumes.dgn*.
- 15. Click the Draw button on the Existing Ground Cross Section dialog.
- 16. You can click *OK* if you receive the warning below.

Information
Some Patterns are outside the DTM or there is no surface. XS Cells without any surface are not created.
<u>O</u> K

Note

You should now have both original and final cross sections.

- > CLOSURE REPORT
- 1. Access the *Reports & XS Quantities* from the main Project Manager dialog.
- 2. Click on the *Closure* report.

궁 Closure Report 📃 🖂 🗙
File
Job 1 Q Chain: BL 🔽 14+80.00R1
Search Criteria
Single 🔻 Existing Ground Line: Display
Proposed Finish Grade: Display
Closure
Horizontal Tolerance: 0.750
Vertical Tolerance: 0.750
Beg Sta End Sta LT/RT Option
10+20.54R1 14+79.00R1 RT V Slope Extension V
Output Options
Pause on Each XS
Apply

3. Using the toggles directly below the list window set the *LT* & *RT* sides to *Slope Extension* by adding each to the list window separately.

Closure Report		
File		
Job: 1 Q Chain: BL 🔽 14+80.00R1		
Search Criteria		
Single 🔻 Existing Ground Line: Display		
Proposed Finish Grade: Display		
Closure		
Horizontal Tolerance: 0.750		
Vertical Tolerance: 0.750		
Beg Sta End Sta LT/RT Option		
10+20.54R1 14+79.00R1 LT S		
10+20.54R1 14+79.00R1 RT S		
비		
10+20.54R1 14+79.00R1 RI V Slope Extension V		
Output Options		
Pause on Each XS		
Apply		

4. Click the *Output Options* button.

5. You can visualize the affects of running the report by making the settings as shown below.

2 Output Options	_ 🗆 X
Feport	<u> </u>
□ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □	
Closure Element: Extend 💌 New Symbology 💌	
Trim Element: New Symbology	
<u> </u>	

Set Feature
Symbology
Level: Level 2
Color: 📃 2
Style: 📃 0 💌
Weight: 🗾 5 💌
OK Cancel

Set Feature	
Symbology	
Level: Level 2	
Color: 📕 3	T
Style: 2	T
Weight: 2	-
OK	Cancel

- 6. Once the settings have been made close the *Output Options* dialog.
- 7. Click the *Apply* button on the main dialog.
- 8. Close the *Closure Report* dialog and review the sections.
 - *Note* The reason the Closure Report did not perform much in the way of clean up on these particular sections is the fact that there are multiple line segments beyond the intersection of existing and proposed or the fact that an extension of proposed would not tie to existing. Because of this we can opt to step through each section and fix or continue on with the Earthwork application and perform inter-active corrections as we are computing end area volumes.
- > END AREA VOLUMES
- 1. Click on the *Earthwork* button on the main Project Manager dialog.
- 2. Create a new RUN named *volumes*.

New Run Na	ne		
Run Name:	volumes		
Description			
	<u>0</u> K	Cancel	

- 3. Click *OK*.
- 4. Open the new RUN.
- 5. Input the *XS DGN File* information as shown below.

😤 Earthwork - volumes	
<u>F</u> ile	
XS DGN File	XS DGN File: C:\60843\borrow_pits\xs_volum
Soil Types	Tolerance: 0.010000
Earthwork Shapes Output Format	Vertical Search Distance: 500.00
Add/Subtract Volume	Baseline: BL
Centroid Adjustment Skip Areas	Begin Station: 10+20.54 R 1
Ignore Areas	End Station: 14+79.00 R 1
Sheet Quantity	

- 6. Click on Soil Types.
- 7. Set the *Class* toggle to *Existing Ground* and provide a name like *DIRT*.

8. Toggle on the desired symbology toggles and using the *Match* button data point on an existing ground element and accept it.

ZEarthwork - volumes	
Lite XS DGN File Soil Types Earthwork Shapes Output Format Add/Subtract Volume Centroid Adjustment	Soil Type Items
Skip Areas Ignore Areas Sheet Quantity	Search Criteria
Class Existing Ground Soil Type: DIRT Multiplication Factors Roadway Excavation: 1.000	Ly Names: Ly Numbers: 1 Colors: 1 Styles: 2
Subsoil Excavation: 1.000 Fill: 1.000	Weights: 5 Types: Match Display
Add	Delete Modify

- 9. Click the *Add* button to add it to the list window.
- 10. Repeat this process for the *Proposed Finish Grade*.

Barthwork - volumes	
<u>F</u> ile	
XS DGN File	Soil Type Items
Soil Types	Existing Ground
Earthwork Shapes	Proposed Finish Grade
Output Format	
Add/Subtract Volume	
Skip Areas	I
Ignore Areas	- Search Criteria
Sheet Quantity	Use Working Alignment Definition
Class Proposed Finish Grade	
Soli Type: [DIRT	
Multiplication Factors	✓ Lv Numbers: 2
Roadway Excavation: 1 000	Colors: 2
	🔽 Styles: 0
Subsoil Excavation: 11.000	🔽 Weights: 5
Fill: 1.000	Tunes:
I	
	Match Display Reset
Add	Delete Modify

- 11. Click on Output Format.
- 12. Using the toggles change the format to only *Excavation and Fil*.

名 Earthwork - volumes	
Eile XS DGN File Soil Types Earthwork Shapes Dutput Format Add/Subtract Volume Centroid Adiustment	Accumulate Adjusted Volume Column Accumulate Unadjusted Volume Column Calculate only between Excavation Limits End Area Decimal Places
Skip Areas Ignore Areas Sheet Quantity	Excavation Fill

- 13. Select *File > Run*.
- 14. Provide a file name to write the volume information into.

8 Earthwork	×
To Log File	
To Log File 🔻 Volumes.txt	
Pause On Each Section	
Interactive Error Checking	Apply

- 15. Click Apply.
- 16. When the following error message appears it is warning of an error at a specific coordinate location. You can navigate to this location by clicking on the MicroStation *Zoom In* tool and then clicking the *DP* button on the error dialog.

É	Earthwork Error Message	
	Error Message	
	Station = 10+20.54	
	XS-W-DANGPROP Proposed finish grade element between points:	
	145.3009, 2.5796 and	
	144.8342, 2.3541	
	does not connect with any other element at:	•
	X-Value 145.300869 Y-Value 2.579617	_
	Redo Skip Skip All Abort	DP

- 17. Once zoomed into the problem use any MicroStation commands to fix it and then click on the *Redo* button on the dialog.
- 18. Repeat this process on all sections that report back an error.

19. Once completed you can review the total volumes.

8Pr	ocess Cross Se	ctions Display					_ 🗆 ×	¢
•		Fill 0.0 GRAND SU	0 M M A R Y	ТОТАЗ	1.00 188: 1 S	17	_	
		Material Name	Volumes (cu. yd.)	Adjusted Volumes (cu.yd.)	Mult Factor			
	DIRT							
		Fill S P L	1881/ 0 IT SU	18817 O M M A R Y	1.00 1.00 TOTAL!	S		
		Material Name	NS Quant Unadjusted Volume (cu. yd.)	Adjusted Volume (cu.yd.)	Unadjusted Volume (cu. yd.)	Adjusted Volume (cu. yd.)	Mult Factor	
	DIRT	Excavation Fill	 18817 0	 18817 0	0	0 0	1.00 1.00	
	Next Run				E	xit		

20. Exit the *Earthwork* RUN.

Note The less distance there is between cross sections the more accurate the end area volumes will be.

CROSS SECTION SHEETS

The GEOPAK sheet layout component provides an automated tool to draw cross section data in a format suitable for producing hard-copy cross section construction drawings. The input includes specifying sheet layout parameters as well as the graphic design file where the cross sections were originally created by GEOPAK. The output is a MicroStation design file of the cross sections. Each cross section is displayed as a reference file and labels such as baseline, station, offsets and elevation are added. There are several advantages to using sheet input:

- The cross sections will be sorted in numeric order for the specified baseline.
- The cross sections will be spaced closer together.
- The original cross section file is left intact and any modifications to the cross sections will be automatically displayed in the sheet file due to the use of reference files.
- The cross sections are placed into "sheet format" according to user specified criteria.

The parameters for each sheet are defined in a Sheet Library. In order to lay out sheets, a Sheet Library must be attached to the current session. The name of the currently attached Sheet Library is shown in the title bar. Sheet Libraries have an extension of xssl. An unlimited number of different sheets can be stored within one library. When the user begins the sheet process, he selects the desired sheet layout from the attached library, which loads the associated parameters.

If a different Sheet Library is needed, it can be attached via the menu items File > Sheet Library > Attach. Detailed information on the set-up of the Sheet Library can be found in the online help section entitled "Sheet Library Set-up."

ACCESSING THE CROSS SECTION SHEET LAYOUT TOOL

The Cross Section Sheet tool can be accessed by selecting Applications > GEOPAK ROAD > Cross Sections > Cross Section Sheet Composition. It can also be invoked from Project Manager by clicking the Cross Section Sheets button or by selecting the Cross Section Sheet Composition icon from the GEOPAK ROAD tool frame.

Cross Section Sheet Composi File Active Cross Section Sheet	tion: default.xssl	Layout Sheets
XS DGN File Sheet DGN File Sheet Dimensions / Cell XS Search Criteria Sheet Stack Orientation Sheet Stack Columns Margins and Spacing Station Labels Offset Labels	XS DGN File: C:\60843\d60843xsma XS Baseline: MAINLINE Begin Station: 10+00.00 End Station: 158+50.00	inline.dgn
	Ŗ	

FILE > SHEET LIBRARY

TOOL	DESCRIPTION
New	Create a new Sheet Library.
Attach	Attach a Sheet Library.
Save	Saves a Sheet Library.
Save As	Save a Sheet Library as a new name.

Note //coapp52/proj/geopakv8/road/standards/

FILE > SHEET

TOOL	DESCRIPTION
New	Create a new Sheet in a Sheet Library.
Delete	Delete a Sheet in a Sheet Library.
Сору	Copy a Sheet in a Sheet Library.
Update	Update a Sheet in a Sheet Library.

FILE > LOAD V7 INPUT FILE

This option gives the user the ability to load an ASCII input file that was created in previous versions of GEOPAK.

FILE > SAVE SETTINGS

Saves all dialog settings in Project Manager.

FILE > LAYOUT SHEETS

Layout cross sections into sheet format.

FILE > EXIT

Exit the Cross Section Sheet Composition application.

CROSS SECTION SHEETS DIALOG

The left side of the dialog contains the list of parameters required to compute earthwork. When each parameter is selected, the dialog changes as do the key-in fields to reflect the selected parameter.

XS DGN File – Tells the software where to locate the cross sections. The Chain and stationing will be filled out automatically if defined via the project manager. By default, the software will find all elements within the confines of the cross section cell.

Cross Section Sheet Co	mposition: default.xssl	
<u>F</u> ile		
Active Cross Section	Sheet XS SHT WO CL	Layout Sheets
XS DGN File Sheet DGN File	XS DGN File: C:\60843\d60843xsma	ainline.dgn 🔍
Sheet Dimensions / Cell	XS Baseline: MAINLINE 💌	
XS Search Criteria	Begin Station: 10+00.00	
Sheet Stack Orientation Sheet Stack Columns Margins and Spacing Station Labels Offset Labels	End Station: 158+50.00	

Sheet DGN File - Specifies which file the cross section sheets will be placed in. Also allows you to set the horizontal and vertical scale at which they are to be laid out and the coordinate location in the MicroStation Design file at which the sheets will be placed.

Cross Section Sheet Compo	osition: default.xssl
<u>F</u> ile	
Active Cross Section She	et: XS SHT WO CL
XS DGN File	Sheet DGN File: c:\documents\cfms_local\60843\dE
Sheet Dian File Sheet Dimensions / Cell	Horizontal Scale: 10.00
XS Search Criteria	Vertical Scale: 10.00
Sheet Stack Orientation Sheet Stack Columns Margins and Spacing Station Labels Offset Labels	Sheet Placement Point Lower Left X (mu): 1000.000000 Lower Left Y (mu): 1000.000000
	Detach Existing Sheets before Processing
	Attachment: All Sheets In Active Model

If the **Detach Existing Sheets before Processing** option is toggled on then all elements are removed and reference files are detached before new sheets are processed.



Attachment:

All Sheets In Active Model – All sheets are placed in the Active Model.

One Sheet Per Model – Sheets are placed in separate models and no sheets are placed in the active model.

One Sheet Per Model / Display All – Sheets are placed in separate models and all sheets are attached to the active model as reference files.

Note Models are named XS_SHEET_ and the sheet number is added to the name.

Sheet Dimensions/Cell – Sheet Dimensions defines the Sheet Height and Sheet Width to be used for the cross section sheet. When Place Sheet Cell is toggled on, the application will place a sheet border cell from the specified cell library. A scale can be applied and the sheet cells can be placed as Shared Cells. Sheet Offset from Cell Origin is the X and Y offset from the sheet border cell origin.

Cross Section Sheet Composit	ion: default.xssl
<u>F</u> ile	
Active Cross Section Sheet: XS DGN File Sheet DGN File Sheet Dimensions / Cell XS Search Criteria Sheet Stack Orientation Sheet Stack Orientation	XS SHT WO CL Image: Layout Sheets Sheet Dimensions
Sheet Stack Lolumns Margins and Spacing Station Labels Offset Labels	Library: default.cel Q Name: SHXSGT Scale: 1.00 Place as Shared Cell Chart Official Scale Cell Science
	Sheet Urrset from Cell Urigin X Offset: 0.00 Y Offset: 0.00 +++++++++++++++++++++++++++++++++

There are two options for **Sheet Cell Placement**. The sheet border cell can be placed in the sheet file with the cross section reference files as shown above. It can also be placed once in a reference file then the sheet cell file is attached to the file that contains the cross section reference files as many times as it is needed.

XS Search Criteria – Indicates the search criteria (symbology) for the data to be used as input to the sheet layout software. If you need to look farther than that (i.e. outside of the cell), you can use the Lower and Upper Range Limit values to extend beyond the cell limits. There is also a Horizontal Search to look outside the limits of Sheet Width setting.

Cross Section Sheet Compositi	on: default.xssl
Active Cross Section Sheet:	XS SHT WO CL Layout Sheets
XS DGN File Sheet DGN File Sheet Dimensions / Cell XS Search Criteria Sheet Stack Orientation Sheet Stack Columns Margins and Spacing Station Labels Offset Labels	XS Element Search Criteria Lv Names: Lv Numbers: 1-49,51-62 Colors: Styles: Styles: Weights: Types: Match Display Reset Vertical Range Lower Limit: 0.00 Upper Limit: 0.00

Sheet Stack Orientation – Determines whether you want the sheets to be stacked vertically or horizontally. Also allows you to set the maximum number of sheets you want placed per column in the file as well as the Horizontal and Vertical spacing between sheets.

Cross Section Sheet Composition	: default.xssl		_ 🗆 ×
<u>F</u> ile			
Active Cross Section Sheet: 🔀	S SHT WO CL	•	Layout Sheets
XS DGN File Sheet DGN File Sheet Dimensions / Cell XS Search Criteria Sheet Stack Orientation Sheet Stack Columns Margins and Spacing Station Labels Offset Labels	Sheet Stack Orientation: Horizontal Spacing: Vertical Spacing Imber of Sheets per Column:	Vertical 1.10 1.00 25	

Sheet Stack Columns – Determines whether you want a single stack or a double stack of cross sections per sheet. Baseline X Offset defines the distance from the left-hand edge of the sheet to the zero offset position (i.e. baseline) of the cross sections. If you select Double Stack, you can give an offset value which is the distance of the second stack from the left hand edge of the sheet. There are also options for Triple and Quadruple stacking.

🔁 Cross Section Sheet Composition: default.xssl 📃 🗖 🗙			
_ <u>F</u> ile			
Active Cross Section Sheet:	XS SHT WO CL	_	Layout Sheets
XS DGN File	Single Stack	Baseline X Offset:	8.00
Sheet DGN File Sheet Dimensions / Cell	O Double Stack	Col 2 Left Edge Offset:	0.00
XS Search Criteria	O Triple Stack	Col 3 Left Edge Offset:	0.00
Sheet Stack Orientation Sheet Stack Columns Margins and Spacing Station Labels Offset Labels	O Quadruple Stack	Col 4 Left Edge Offset:	0,02

Margins and Spacing – Cross Section Clip Limits defines the clipping limits from the left hand edge of the sheet. To the left of the Left Clip X Offset remains clear space and to the right of the Right Clip X Offset remains clear space. All minimum spacing requirements as well as the maximum allowable vertical size of any cross section is also set here.

SCross Section Sheet Composit	ion: default.xssl	_ 🗆 X
<u>F</u> ile		
Active Cross Section Sheet:	XS SHT WO CL	Layout Sheets
XS DGN File 📃	Cross Section Clip Limits	
Sheet DGN File Sheet Dimensions / Cell	Minimum Spacing From Top: 👖	.00
XS Search Criteria	Minimum Spacing From Bottom: 🔽).80
Sheet Stack Orientation	Left Clip X Offset:).50
Margins and Spacing	Right Clip X Offset: 👖	5.00
Station Labels		
Offset Labels	Minimum Spacing Between Sections:	.00
Minimum Tap Spacing	Maximum Vertical Size: S	9.00

Cross Section Sheet Composit	ion: default.xssl	
Active Cross Section Sheet:	XS SHT WO CL	Layout Sheets
XS DGN File	Label Stations	
Sheet Dimensions / Cell XS Search Criteria	Plot Parameters: Sample	
Sheet Stack Orientation	Station Label X Offset 1: 13.00	
Margins and Spacing	Station Label X Offset 2: 0,00	_
Offset Labels	Station Label Y Offset: 0.00	
2154200		

Station Labels – Allows you to define the station label locations and plot parameters.

Offset Labels – Allows you to define the offset label positions, increments and plot parameters.



Elevation Labels – Allows you to control the elevation label locations, increment and plot parameters. Add Top Elevation Label - Activating this toggle adds another elevation label above the current labels placed within the elevation labels parameters. If two sets of elevations labels are placed (one on each side of the section), the top elevation is added to both.

Add Bottom Elevation Label - Activating this toggle adds another elevation label below the single label placed within the elevation labels parameters. If two sets of elevations labels are placed (one on each side of the section), the bottom elevation is added to both.

Cross Section Sheet Composit	ion: default.xssl
Active Cross Section Sheet:	XS SHT WO CL Layout Sheets
Sheet Stack Orientation	☑ Label Elevations
Margins and Spacing	Plot Parameters: Sample
Offset Labels Elevation Labels	Elevation Label × Offset 1: 0.50
Earthwork Quantity Labels	Elevation Label X Offset 2: 0,00
Digital InterPlot	Elevation Increment (mu): 2.00
	Add Top Elevation Label
280 275 mm 270 270 77 265	Add Bottom Elevation Label

Earthwork Quantity Labels – The user can define the ASCII file that contains the earthwork quantity information, as well as set the symbology and location of the earthwork quantity labels. This will use the information gathered during the earthwork run to place the earthwork quantity labels on the cross section sheets.

Cross Section Sheet Compositi	on: del	ault.xssl			_ 🗆 ×
<u>F</u> ile					
Active Cross Section Sheet:	XS SH1	r wo cl		– L	ayout Sheets
Sheet Stack Orientation	🗹 Lab	el Earthwork I	Quantities		
Margins and Spacing	ID	X Offset	Y Offset	Display	Plot
Station Labels	1	13.65000	0.000000	Sample	
Offset Labels	2	14.15000	-0.40000	Sample	
Elevation Labels	3	14.65000	0.000000	Sample	Z
Earthwork Quantity Labels	4	15.15000	-0.40000	Sample	
Sheet Labels					
Digital InterPlot	L				
243.75 C.M.	Earthwo	rk Quantity Fil	le:		<u> </u>

Sheet Labels – Allows the placement of numerous labels. There are three sets of labels that can be placed where the labels change from sheet to sheet. These labels include Sheet Number, Begin Station, and End Station. Any number of custom labels can also be placed. These labels would be something that does not change from sheet to sheet such as Project Number, Designer, etc. A list of labels can be created and each label can have its own symbology. Location of the labels is controlled by the DP Origin and DP Label Justification Point buttons. The DP Origin button locates the origin of the sheet cell and the DP Label Justification Point button sets the X and Y Offset from the sheet cell origin for the placement of the label.

Cross Section Sheet Composition	ition: default.xssl	
<u>F</u> ile		
Active Cross Section Sheet	: XS SHT WO CL	Layout Sheets
Sheet Stack Orientation 🛛 🔺	Name	Label X Offset Y Offset D
Sheet Stack Columns Margins and Spacing Station Labels Offset Labels Elevation Labels Earthwork Quantity Labels Sheet Labels Digital InterPlot	I	
	Name: 0.000000 X Offset: 0.000000 DP Origin Label: 0.000000	Type: Sheet Number ▼ Y Offset: 0.000000 ↔

LAB EXERCISE: CROSS SECTION SHEETS LAYOUT

- > GENERATING CROSS SECTION SHEETS
 - 1. Open the MicroStation file *c:\60843\borrow_pits\xs_volumes.dgn*.
 - 2. Access Project Manager.
 - 3. Open the project, *borrow*.

8 Project Manager	_ 🗆 ×
<u>Projects Directory A</u>	dmin
C:\60843\borrov	w_pits\
Filter: .prj	Type: Project 💌
Projects:	Directories:
borrow.prj	[] [field1] [final] [projdbs] [C:] [D:]
Job Number: 1	Unit System: English
Description:	
<u>0</u> K	Cancel

- 4. Click Cross Section Sheets from the Project Manager dialog and create a new run named BL.
- 5. Open the new run.
- 6. Select File > Sheet Library > Attach.
- 7. Select C:\60843\standards\VDOTENG.xssl.

Note \\coapp52\proj\geopakv8\road\standards\VDOTENG.xssl

Cross Section Sheet Composil	ion: VDOTENG.xssl
Active Cross Section Sheet: XS DGN File Sheet DGN File Sheet Dimensions / Cell XS Search Criteria Sheet Stack Orientation Sheet Stack Columns Margins and Spacing Station Labels Offset Labels	xsheet Layout Sheets XS DGN File: C:\60843\borrow_pits\xs_volumes.c XS Baseline: BL Begin Station: 10+20.54 End Station: 14+79.00

- *Note* We will be using "XSSHEET" as the sheet name for our Cross Section Sheet layout.
- 8. Click Select Sheet DGN File and select the sheet design file xs_sheet.dgn.

Cross Section Sheet Compo	sition: VDOTENG.xssl
<u>F</u> ile	
Active Cross Section She	et: xsheet Layout Sheets
XS DGN File Sheet DGN File Sheet Dimensions / Cell XS Search Criteria Sheet Stack Orientation Sheet Stack Columns Margins and Spacing Station Labels Offset Labels V	Sheet DGN File: C:\60843\borrow_pits\xs_sheet.dgn Horizontal Scale: 10.00 Vertical Scale: 10.00 Sheet Placement Point Lower Left × (mu): 10000.000000 DP Lower Left Y (mu): 10000.000000 DP Lower Left Y (mu): 10000.000000 DP Attachment: All Sheets In Active Model

9. Select **Sheet Dimensions / Cell** and verify the settings below.

SCross Section Sheet Composi	tion: VDOTENG.xssl
<u> </u>	
Active Cross Section Sheet:	xsheet
XS DGN File Sheet DGN File Sheet Dimensions / Cell XS Search Criteria Sheet Stack Orientation Sheet Stack Columns Margins and Spacing Station Labels Offset Labels	Sheet Dimensions Width: 32.00 Height: 20.00 Place Sheet Cell Library: sheet2000.cel Name: xsect Scale: 1.00 Place as Shared Cell Sheet Offset from Cell Origin × Offset: 2.00 Y Offset: 1.08
+	Sheet Cell Placement

Cross Section Sheet Compos File	sition: VDOTENG.xssl
Active Cross Section Sheet	t: 🗴 xsheet 💽 Layout Sheets
XS DGN File	XS Element Search Criteria
Sheet DGN File	🗖 Ly Names: 👘
XS Search Criteria	🔽 Ly Numbers: 1-2
Sheet Stack Orientation	Colors:
Sheet Stack Columns	Strifeer
Margins and Spacing	
Offset Labels	Weights:
	Types:
. Heller	Match Display Reset
	Vertical Range — Horizontal Search
الم الم الم الم	Lower Limit: 0.00 Left Offset: 0.00
	Upper Limit: 0.00 Right Offset: 0.00

10. Select **XS Search Criteria** and make settings as shown below.

11. Select Sheet Stack Columns and change the Baseline Offset to 8.

SCross Section Sheet Composi	tion: VDOTENG.xs	sl	_ 🗆 ×
<u>F</u> ile			
Active Cross Section Sheet:	xsheet	_	Layout Sheets
XS DGN File Sheet DGN File Sheet Dimensions / Cell XS Search Criteria Sheet Stack Orientation Sheet Stack Columns Margins and Spacing Station Labels Offset Labels	 Single Stack Double Stack Triple Stack Quadruple Stack 	Baseline X Offset: Col 2 Left Edge Offset: Col 3 Left Edge Offset: Col 4 Left Edge Offset:	8.00 0.00 0.00

Active cross section sheet.	xsheet			Layo	out Shee
Sheet Stack Orientation 🛛 🔺	🗖 Lat	oel Earthwork	. Quantities		
Sheet Stack Columns		10000-0	10.04	I Disatau	L Di-
Margins and Spacing		A Unset	T Unset	Display	FIG
Station Labels	1	11.5	0.00	Sample	
Offset Labels	2	20.5	0.00	Sample	\checkmark
Elevation Labels					
Earthwork Quantity Labels					
Sheet Labels					
Digital InterPlot 📃					
	Earthwo	ork Quantity P	File:		
243.75 C.M.					

12. Select Earthwork Quantity Labels and toggle OFF Label Earthwork Quantities.

- 13. Turn off level, Level 63.
- 14. Process the cross sections onto the sheets using either the File > Layout Sheets pulldown or by clicking the Layout Sheets button.
- 15. Close the Cross Section Sheet Composition dialog.
- 16. When prompted to Save Settings, click Yes.
- 17. When the Cross Section Sheet Layout process is completed, you will be in the sheet file. Review your work.
- 18. Exit MicroStation.



Cross Section Reports

OBJECTIVES

In this chapter, we will create various cross section reports:

- for plan use (design elements and quantities).
- as input for other programs and/or applications of GEOPAK.
- for construction layout.

Create and draw construction limits in the plan view file.

INTRODUCTION

The GEOPAK Cross Section Report Utility can extract up to sixteen different reports from original and design cross-sections. For each report generated, the user must set the parameters of the existing and/or design cross sections. GEOPAK also provides an option to make custom headers for each of the reports via the User pull down menu.

ACCESSING CROSS SECTION REPORTS

The Cross Section Reports dialog can be accessed by selecting Applications > GEOPAK ROAD > Cross Sections > Reports. It can also be invoked from Project Manager by clicking the Reports & XS Quantities button or by selecting Cross Section Reports from the GEOPAK ROAD tool frame.

CUSTOM HEADER

From the XS Report dialog, select **User > Preferences.** To activate the individual fields simply toggle on the box next to the desired field. Once you have completed the dialog box, the information will be saved as an .hdr file. This allows for the creation of a separate header for each type of report. The tolerance field determines the maximum gap allowed between cross section elements.

Report Header	
File	
Date	Mo/Day/Year 🔻
🔲 🛛 Master Header1	
🔲 🔲 Master Header2	2
Master Header3	}
🔽 Number Page	
Tolerance	0.100000
Radius of Display Circle	4.000000
Adjust Output File	Extension According to Beport

🔁 X5 Report 💶 🗙
User
Blue & Red Top
Clearing
Closure
DTM Input
DTM Prop 3D
HEC-2
HEC RAS
Multi-Line
Profile Grade
Radial Staking
RT40
Seeding
Slope Stake
Staking Detail
WSPRO
XS List
🗖 Hilite

BLUE AND RED TOP

Based on the dialog box settings, GEOPAK determines the offset and elevation of a slope and its breakpoints. Blue refers to the top of pavement and Red is the top of subgrade. The user must determine this by indicating text and level, color, weight and style for each surface.

CLEARING

The Clearing Report is useful for obtaining clearing and grubbing quantities. For each station, GEOPAK will list the clearing distance on each side of the chain and the width of any exception. You can obtain the results in the appropriate units. Toggle boxes for Cut Slope Rounding, Additional Clearing in Cut and Fill, and Minimum Clearing Width are provided for increased control over the output. GEOPAK can also generate quantity sub-totals based on the value specified in Sub Every.

To use the Except Width option, you must have an existing ASCII file that includes the Beginning and Ending Station and Exception Width.

Once everything is set, you can output the information to an ASCII file.

CLOSURE

The **Closure Report** provides information on the intersection point between the user defined proposed finish grade and existing ground. In addition to the ASCII report, the designer may instruct GEOPAK to close any gap either by drawing a vertical line between the endpoint of the proposed finish element and the existing ground or extending the slope of the last proposed element to intersect existing ground. The procedure will not extend existing ground. The **Closure Report** can be accessed within any MicroStation cross section file by selecting Closure from the main XS Reports dialog.

DTM INPUT

This process generates XYZ coordinates from cross section elements and places this information into an ASCII file for use by the DTM portion of GEOPAK. To use this dialog box simply enter the .gpk job number, chain name and station range. GEOPAK will read the cross section elements based on level, weight, color and style.

DTM PROPOSED 3D

This report is similar to DTM Input except that you can set both original and proposed cross sections at the same time. This report also differs in that it makes break lines across the cross sections.

HEC – 2

This process reads cross section elements and formats the information in an ASCII text file suitable for use in the HEC-2 hydraulic program.

HEC RAS

This process reads cross section elements and formats the information in an ASCII text file suitable for use in the HEC RAS hydraulic program.

MULTI-LINE

This report is useful in creating cross-sections for staged construction. Begin by entering the job number, chain name and station limits. Primary cross section element parameters must be completed before secondary element parameters. This is important due to the order in which GEOPAK reads the information. Once all the parameters have been entered, the new cross sections may be drawn to the design file or you may choose the display only option. An ASCII text file will be generated.

PROFILE GRADE

The **Profile Grade Report** is one of the most versatile reports available. It prints existing ground and design grade elevations and low point elevations for each cross section. Additionally, this report has the ability to search either for the low points or any text string that you specify and create horizontal and vertical alignments and store them directly into the .gpk. Horizontal alignments created from this report will have no curves.

RADIAL STAKING

The **Radial Staking Report** is a specialized report created for the U.S. Federal Highway Administration (FHWA).

RT 40

The RT 40 Report produces RDS based RT40 data. To use this dialog box simply fill in the job chain name, stationing range and the parameters of the cross section elements you wish to use.

SEEDING

Other than the usual entries, the user must enter the parameters of the elements to be seeded.

This dialog box includes slope and subtotal options as well as a way to limit the number of segments read (By-Pass Segments). The user may also establish additional seeding specifications (Additional Distance).

Once all of the settings are complete, the report will produce seed or sod quantities written to an ASCII output file for use in plan quantities.

SLOPE STAKE

The Slope Stake Report is a special format report developed for the FHWA. This report generates offsets, elevations and superelevation information for each cross section. To generate this report fill in the usual cross section parameters plus Subgrade and Hub Staking information. When complete, push Apply and the report is written into an ASCII file.

STAKING DETAIL

The Staking Detail Report determines the tie down point between the proposed finished grade and the existing ground. GEOPAK will list the right and left offset, elevation, and slope of the finish grade and superelevation rate for each cross section. To create this report, fill in the project information and desired cross section elements' parameters. Once complete, you have the choice between two formats, a FHWA ASCII report or a Montana DOT report (includes ditch elevations).

WSPRO

This report takes the cross section elements and turns them into an ASCII file for use as input in the WSPRO hydraulic analysis program.

XS LIST

This report creates a listing of elevations and offsets for each cross section element according to user defined parameters. You have the option of creating either an original cross section list or a design cross section list. These reports are very similar to RDS cross section lists.

LAB EXERCISE: CROSS SECTION REPORTS

- > **REPORTING**
- 1. Open the MicroStation file *c:\60843\d60843xsmailine.dgn*.
- 2. Open the project 60843 via Project Manager.
- 3. Click on the button *Reports & XS Quantities*.

🔁 XS Rep 💶 🗖 🗙
User
Blue & Red Top
Clearing
Closure
DTM Input
DTM Proposed 3D
HEC-2
HEC RAS
Multi-Line
Profile Grade
Radial Staking
RT40
Seeding
Slope Stake
Staking Detail
WSPRO
×S List
🗖 Hilite

4. Select from the main dialog *User > Preferences* and set as shown below.

🔗 Rep	ort Header		_ 🗆 ×
File			
	Date:	Mo/Day/Year	v
	Master Header1:		
	Master Header2:		
	Master Header3:		
	Number Page		
	Tolerance:	0.010000	-
Radiu	is of Display Circle:	4.000000	
	Adjust Output File E	Extension Accordi	ng to Report

5. Close the Preference dialog.

6. Click on the *Slope Stake* button and make the settings as shown below.

Slope Stake Report	_ 🗆 ×
Job: 101 Q Current Station:	10+00.00 R 1
Chain: MAINLINE	-
Begin Station: 10+00.00 R 1	10+00.00 R 1
End Station: 158+50.00 R 1	158+50.00 R 1
Search Criteria	-
Existing Ground Line:	 Display
Proposed Finish Grade:	- Display
Report Format: FHWA Version 1 💌	
🗖 Reference Hub Cell Nam	ne:
Pause on Each XS	
ASCII File: ss.txt	٩
Apply	

7. The *Existing Ground* symbology should be set as follows.

8	Existing Gro	ound Line	_ 🗆 ×
☑	Ly Names:	Level 1	2
☑	Lv Numbers:	1	2
V	Colors:	1	<u>2</u>
☑	Styles:	2	<u>_</u>
☑	Weights:	5	2
	Match	Display	Reset

8. The *Proposed Finish Grade* should be set as follows.

욷 Proposed Finish Grade 💦 🗖 🗖 🗙				
☑	Ly Names:	110,Level 2,Level 3	2	
	Lv Numbers:		ř.	
	Colors:	0,2,12,17	2	
	Styles:	0	2	
	Weights:	3,5	2	
	Match	Display Rese	t	

Note The Levels include 4, 11, 10, 2, 3.

- 9. Change the *Ending Station* to 15+00.
- 10. Click Apply.

11. Review the report.

8	Text Editor: C:	\60843\ss.txt							_ 🗆 ×
_!	<u>File E</u> dit <u>C</u> riteria	1							
		🐰 🗈 🚹	50						
ſ						SI	OPE STAK	E REPORT (Ft)	-
	Chain	LT Ref.		C	CENTERLINE			RT Ref.	
	MAINLINE	C 0.00 0.00 0.00	IN = UP = SLOPE=	0.00 - 0.00 -9.35	28.81	OT = UP = SLOPE=	0.00 0.00 -2.00	C 0.00 0.00 0.00	
-	Station	LT Stake	SUPER=	-0.002		SUPER=	0.175	RT Stake	
	10+00.00 Reg 1	F 0.20 10.77 30.82 LT Hinge	0.00	0.00	F 0.00 0.00 28.81	2.30	2.28	F 1.02 58.45 29.54 RT Hinge	
l		31.02	0.00	0.00	28.81	14.01	15.00	30.56	
		2.21 12.61	0.00 0.00	0.00 0.00	0.00 0.00	2.21 12.61	2.04 27.00	1.75 56.40	
									•
ſ								Line: 1 Co	ok 1

- 12. Review some of the other reports on the main dialog.
- **13**. Close the Report dialog.

- > HEC-RAS
- 1. Open the MicroStation file c:\60843\d60843work.dgn.
- 2. Attach the saved view *creek1*.
- 3. Review the creek pattern lines.
- 4. Open the MicroStation file *c:\60843\xscreek.dgn*.
- 5. Review the cross sections.
- 6. Open the project 60843 with *Project Manager*.
- 7. Click the button *Reports & XS Quantities*.



8. Click the button for *HEC-RAS*.

CHEC RAS Report	3
Job 101 Q	
Search Criteria HEC RAS Elements: Display	
HEC RAS Report File:	
Apply	

9. Set the *HEC RAS Element* to match existing ground as shown below.

8	IEC RAS S	elect Element	Sy 💶 🗖 🗙
	Lv Names:	Level 1	
	Lv Numbers:		百
	Colors:	1	<u></u>
	Styles:	2	<u></u>
	Weights:	5	<u></u>
	Match	Display	Reset

- 10. Close the symbology dialog.
- 11. Provide a report file name of *creek1.geo*.

8 HEC RAS Report	_ 🗆 ×
Job: 101 Q	
Search Criteria HEC RAS Elements:	Display
HEC RAS Report File	<u> </u>
Apply	

- 12. Click Apply.
- 13. Review the report.

Z Text Editor: C:\60843\creek1.geo	
<u>File Edit Criteria</u>	
BEGIN HEADER: UNITS: ENGLISH	-
NUMBER OF REACHES: 1 NUMBER OF CROSS-SECTIONS: 10 END HEADER:	
BEGIN STREAM NETWORK: ENDPOINT: 3876943.70, 298973.38, 0.00, 1 ENDPOINT: 3876595.75, 299248.83, 0.00, 10	
REACH:	
STREAM ID: 101 REACH ID: CREEK1 FROM POINT: 1 TO POINT: 10 CENTERLINE: 3876595.75, 299248.83, 0.00, 0 3876674.50, 299191.66, 0.00, 1 3876674.50, 299191.66, 0.00, 2 3876774.72, 299154.12, 0.00, 4 3876817.00, 299080.44, 0.00, 5 3876817.00, 299053.67, 0.00, 6 3876943.70, 298073.38, 0.00, 9 END: END: END: EGIN CROSS-SECTIONS:	
CROSS-SECTION:	-
Line: 1	Col: 1

14. Exit MicroStation.



Digital Terrain Models

OBJECTIVE

In this session we will review the DTM tools for analyzing the TIN files.

DTM Analysis Tools provide a means to query the terrain model for critical information ranging from drainage areas to volumes along with thematic mapping. The tools that will be addressed in this section are listed below.

- Height
- Elevation Differences
- Slope Areas
- Themes
- Drainage Tools
- Visibility
- Trace Slope Path
- Camera
- Trench Volumes

INTRODUCTION

A Digital Terrain Model (DTM) represents the topography of a project in the form of a triangulated network. The DTM can be drawn in a 2D or 3D file, and then rotated to see the existing surface of the project area.

Digital Terrain Models can be generated from various sources including MicroStation Elements, survey data, photogrammetry data, GEOPAK cross sections, and geometry data.

Triangulation is a mathematical process applied to ground points and vertices along longitudinal features to create planar surfaces. The result of triangulation is the creation of triangles connecting these points. These triangles are included in the GEOPAK TIN file from which existing ground profiles and existing ground cross sections can be generated.

ANALYSIS TOOLS

Tools	Analysis X Image: Second se
Menu Bar	Analysis > Height Analysis > Profile Analysis > Volumes Analysis > Elevation Difference Analysis > Slope Area Analysis > Themes Analysis > Drainage Tools Analysis > Visibility Analysis > Trace Slope Path Analysis > DTM Camera Analysis > Trench Volumes

The Analysis tools allow the user to visually analyze the digital terrain model utilizing numerous tools as a profile analysis, thematic analysis, drainage flow patterns, and visual portions on the model from any given location.

Height	To determine the height and other associated data dynamically based on user- defined data points within the model.
Profile	View a profile based on a user defined MicroStation element.
Volumes	To compute the volume between two TIN models, the volume between a TIN model and a plane, or the cut and fill totals between two TIN models while applying a shrinkage/swell factors.
Elevation Difference	Will display the elevation difference or the amount of cut and fill between two TIN models, or a TIN model and a plane of constant elevation.
Slope Area	The Slope Area tool displays the horizontal area and actual slope area (area following the terrain of the Model).
Themes	Displays the digital terrain model based on different user definable themes such as elevation ranges, slope percentage, slope degree, or aspect.
Drainage	Displays and analyzes drainage patterns within a TIN model. Tools include delineating watersheds, drawing flow arrows, determining upstream and downstream traces, finding high and low points, and ridge and sump lines.
Visibility	Based on a user-defined point of origin, GEOPAK visually displays which triangles can and cannot be seen, or what is visible between two points.
Trace Slope Path	From a user-defined point of origin, GEOPAK visually displays or writes into the dgn file the route a user-specified slope will follow into the DTM.
DTM Camera	Provides a drive-thru navigation tool along the DTM.
Trench Volumes	The Trench Volume tool utilizes a TIN file (and optional offset) to compute trench and bedding volumes.

LAB EXERCISE:

- > Height
- 1. Open the MicroStation file *c:\60843\spo60843.dgn*.
- 2. Select Applications > GEOPAK Road > DTM Tools.



3. Tear off the tool box from the lower left icon.



4. Click the first icon from the left.

궁 Height / Slope 📃 🗆 🗙	🛿 Height / Slope
TIN File: s60843.tin	TIN File: \$60843.tin
Mode : Elevation 💌 🔽 Display Only	Mode : Slope 🔻 🔽 Display Only
Coptions	Slope Display Options
Text: Sample	Text: Sample
Show Contour:	Display Slope % 🔻
🔽 Show Triangle: 📃	 Triangle Slope
Show Flow Arrow:	O Slope between points
Cursor Point Values	Cursor Point Values
X : 3876284.6437	X : 3876284.6437
T : 296192.1039 7 - 20 1027	T : 236132.1039 7 · 30 1037
Sione : 1 6449%	Slope : 1 6449%
Start	Start

To Determine an Elevation or Slope

- 1. Click Select File and browse to the desired TIN file.
- 2. Select Mode (Elevation or Slope).
- 3. If the Mode is Elevation, turn on the desired Show features.
- 4. If the Mode is Slope, set the Display Options.
- 5. Turn on **Display Only** if you do not want the data drawn into the MicroStation file.
- 6. Click Start.
- 7. Move the cursor over any location within the boundary of the triangulated model. If the Slope between points is used, data point per the prompt then move the cursor for data display.

8. If a data point is selected outside the hull, the message displayed is: "Point External To Tin." The **Plan View Coordinates**, **Elevation**, and **Slope** of the triangulated model are displayed.

Note The number of decimal places is based on the GEOPAK User Preferences.

Display Options for Elevation Mode

Three options are supported within the dialog:

Show Contour - displays a contour of the same elevation as the selected point.

Show Triangle - identifies the triangle wherein the point is located.

Show Flow Arrow - displays an arrow to indicate direction of flow from the selected point.

名 Height / Slope 📃 🗆 🗙
TIN File: s60843.tin Q
Options
Text: Sample
🔽 Show Contour:
🔽 Show Triangle:
Show Flow Arrow:
Cursor Point Values
X : 3876284.6437 Y : 296152.1039 Z : 28.1927 Slope : 1.6449%
Start



The affected triangle (wherein the identified point is located) displays the flow arrow and elevation and the identified point as well as the contour for that elevation.

Display Options for Slope Mode

Slopes can be displayed in a variety of formats, such as rise:run, run:rise, percent, and unit/unit. The slope can be the specified as the triangle slope at the point of the cursors, or between points. In this case, click Start and the user is prompted for a data point as the origin. Then as the cursor is moved, the slope between the origin and the current cursor position is displayed.



> **Profiles**

The Profile tool drapes a user defined MicroStation element onto a TIN model. It creates a series of line strings by draping each linear reference element onto the triangulated model, or in the case of site modeler, an object.

The dialog has three tabs:

Selection

TIN file specifications, profile element symbology and create legend button.

Profile

Profile placement buttons and viewing dialog before drawing the actual profile into the MicroStation file.

Preferences

Profile and grid scales, text parameters, elevation and station ranges.

To Draw a Profile

Identify the TIN file(s) through which the profile intersects and set symbology.

Select or draw the element whose X,Y values are utilized to generate a profile along the TIN, This is accomplished via the Profile tab.

Set the element symbology and text parameters for the grid. In addition, Minimum and Maximum Stations and Elevations may also be set. This is accomplished via the Preferences tab.

Generate the profile and view in the Profile window. Optionally, draw the profile into the MicroStation file. These are accomplished via the Profile tab.

(Optional) Create a Legend or Store the profile into COGO. These are accomplished via the Selection tab.

- 1. Open the MicroStation file *c:\60843\borrow_pits\s18897bpo.dgn*.
- 2. Access Applications > GEOPAK Road > DTM Tools.
- 3. Tear off the *Analysis* tool bar.

4. Select the second icon from the left for *Profiles*.

Profile <u>F</u> ile					-	. 🗆 🗙
Selection	Profile Prefer	ences				
Туре	Feature	Level	Color Weig	ht Style	Extract	
Create	TIN File S188	97BPO.tin	া এ			

- 5. Use the browse option to identify the original ground TIN file.
- 6. Set some symbology for the profile.
- 7. Use the icon to the right of the list window to ADD the item to the list.

election	Profile Preferenc	es)					
Туре	Feature	Level	Color	Weight	Style	Extract	[
Create	TIN File S18897E	IPO.tin	এ ।				

8. Repeat the process using the final ground TIN file and different symbology.

<mark>3 Profile</mark> <u>Fi</u> le							_ 🗆 >
Selection	Profile Preferenc	es]					
Туре	Feature	Level	Color	Weight	Style	Extract]
TIN	S18897BPO.tin	Level 1	2	3	3	On	
TIN	S18897BPF.tin	Level 1	3	3	0	On	믝
	TIN File S188978	3PF.tin	<u>२</u>		-	V	
Create	Legend						

- 9. Click on the *Profile tab*.
- 10. Click on the *Place Element* and identify two points on the TIN files.

8 Profile	X
File	
Selection Profile Preferences	
Select Element Place Element Place Profile Curve Stroking: 0.000	
Extracted Profile View	
11. Click the *Preference* tab and make the settings as shown below.

Profile		
Selection Profile Preferences Scale Horizontal: 10.000 Vertical: 1.000	s Elevations Minimum: 364.324 Maximum: 382.361 Reset Vertical	Stationing Minimum: 0.000 Maximum: 136.036 Reset Stations
Horizontal Grid Major Interval: 50.000 Minor Interval: 25.000 Major Symbology: Minor Symbology: Major Text: 12.344	Vertical G Ma Major S 56	irid jor Interval: 5.000 hor Interval: 1.000 Symbology:

12. Click back on the *Profile* tab and review the grid.

🔗 Profile		_ 🗆 🗙
<u>F</u> ile		
Selection Profile P	references	
Select Element	Place Element Place Profile	Curve Stroking: 0.000
Extracted Profile Vie	w	

- 13. Click on the *Place Profile* tab and data point in the MicroStation view to place the profile graphically.
- 14. Close the profile tool.

ELEVATIONS DIFFERENCE

The Elevation Difference tool supports a variety of grid generation, Isopach contour drawing, and cut/fill latticing. The tools are:

- Difference Point draws the text of cut / fill elevations, i.e., the cut or fill depth between the two specified TIN files at each specified point. In a 3D design file, when in a front or side view, the grid displays T's. The T's represent the cut or fill values. The vertical part of the T is the vertical length of the cut or fill and the bar of the T is the text value of the cut or fill. The bar of the T is placed on the surface of the From TIN. Therefore, in a cut situation, a normal T is placed, while in a fill situation the T is inverted.
- Difference Grid draws a textual grid of cut / fill elevations, i.e., the cut or fill depth between the two specified TIN files at each grid point. The user specifies the grid interval; therefore, GEOPAK determines the number of text placements. In a 3D design file, when in a front or side view, the grid displays T's. The T's represent the cut or fill values. The vertical part of the T is the vertical length of the cut or fill and the bar of the T is the text value of the cut or fill. The bar of the T is placed on the surface of the From TIN. Therefore, in a cut situation, a normal T is placed, while in a fill situation the T is inverted.
- Cut / Fill Grid a lattice with a user-defined number of points determining the density with different element symbology for cut and fill. The lattice can be wireframe or filled color.
- Cut / Fill Contours (Isopach) which are simply contours of the cut and fill depths. A fill of two feet is a positive two contour, while a cut depth of six would be a negative contour. A zero contour would be where the surface and plane intersect.
- 1. Open the MicroStation file *c:\60843\borrow_pits\s18897bpo.dgn*.
- 2. Select the fourth icon from the left on the *Analysis* tool bar, *Elevation Differences*.

名 Elevation Differences
Calculation: TIN to TIN
From TIN: S18897BPF.tin
To TIN: S18897BPD.tin
C Option
Difference Point 🔻 🔽 Cut:
✓ Label: 12.34 ✓ Fill: ✓ Fill:
✓ Dynamic
Display
Boundary Selection
Use Boundary: Place Select
Process



3. Datapoint on the view to display difference elevations at random points.

> SLOPE AREAS

The Slope Area tool displays the horizontal area and actual slope area (area following the terrain of the TIN File).

- 1. Open the MicroStation file *c:\60843\borrow_pits\s18897bpo.dgn*.
- 2. Access *Applications > GEOPAK Road > DTM Tools*.
- 3. Tear off the *Analysis* tool bar.
- 4. Access the fifth icon from the left *Slope Areas*.
- 5. Select the TIN file *S18897BPF.tin*
- 6. Click Process.

😤 Slope Area 📃 🗙
TIN File: S18897BPF.tin
Area Calculations
Area : 5213.255 SY
Area Slope : 5667.843 SY
Boundary Selection
Use Boundary: Place Select
Slope Polygons
🗹 Display Only
Fill Polygons
Process

7. Close the dialog.

> **THEMES**

The four options are depicted across the top of the dialog and include (from left to right):

- Elevation Range reflects ranges of elevations.
- Slope Range (in terms of Percent or Degrees) describe the angles of individual triangles.
- Aspect Range describe the direction that the triangle plane faces. Aspect ranges are expressed in degrees. The north axis is defined as zero degrees and angles increase in a clockwise direction. Therefore, zero degrees points north, 90 degrees points east, 180 degrees points south and 270 degrees points west.

Note A level triangle is assigned a default aspect of 360 degrees.

Themes -> Elevation R
TIN File: S18897BPF.tin
Number of Grid Points: 100 Display Display Only Load Within Fence Set Graphic Group Fill
Options Planarize at Elevation: 0.000 Polygonize Results
Set Range Process

As each option is selected, the dialog title changes to reflect the selection. The remainder of the main dialog remains unchanged.

Set Ranges.

Before the Themes processing commences, the user must define the desired ranges and associated colors. This is accomplished by clicking **Set Range**.

The lower half of the dialog contains the list box, with edit fields directly below. Options are supported (button to the right of the list box) to **Add**, **Modify**, and **Delete** ranges. When the **Active** toggle is activated, the selected range is displayed or drawn when the themes are processed. A range can be activated or deactivated at any time during the processing by highlighting the desired line and changing the **Active** toggle. In this manner, the user has complete control over which ranges are visible on the screen at any one time.

To add a single range, simply key in the desired values, select a color from the color picker, and click **Add**. The created line is added to the list box. To modify a line, highlight the desired line. The current values are displayed in the edit fields. Change the desired field, and then click **Modify**. GEOPAK updates the list box. To delete a line, highlight the line and click **Delete**. The line is removed from the list box. An unlimited number of ranges are supported. When more than five ranges are specified, the

scroll bar and arrows on the right side of the dialog are automatically invoked for easy scanning. Note the lines are displayed in ascending low value order, regardless of the order in which they were created.

The top of the dialog supports automatic creation of ranges. Two options are supported:

Auto Number of Ranges - the number of ranges is specified, along with the Minimum and Maximum elevations (or slopes or aspects). GEOPAK divides the elevation into the specified number of ranges.

Auto Range Increment - the range increment is specified, along with the Minimum and Maximum elevations (or slopes or aspects). GEOPAK divides the elevation into as many ranges as necessary at the specified increment.

By pressing one of the buttons, the value is populated within the **Minimum** or **Maximum Elevation** field without typing. However, in order to utilize even value ranges, it is prudent to set the **Minimum Elevation** to a number divisible by the **Range Increment**.

- 1. Open the MicroStation file *c:\60843\3D.dgn*.
- 2. Access the *Themes* tool from the *DTM Analysis* tool bar.
- 3. Click the first icon from the left *Elevation Range*.
- 4. Use the Browse button to select the TIN file *60843.tin*.



5. Click the *Set Range* button and make the settings as shown below.

😪 Elevation Range 📃 🔳 🗵				
<u>F</u> ile				
Ra	nge: Auto Ranj	ge Increme	ent 💌	
– Auto Ran	ge Options ——			
Range I	ncrement: 5.00	0		
Minimum	Elevation: -5.00	00	-5.4	00
Maximum	Elevation: 65.0	00	64.4	158
S	et Range	Create L	.egend	
Low	High	Color	Active	<u> </u>
-5.000	0.000	0	YES	- 21
0.000	5.000	1	YES	
5.000	10.000	2	YES	
10.000	15.000	3	YES	
15.000	20.000	4	YES	•
0.000	0.000			

- 6. Close the *Range* dialog.
- 7. Toggle ON the *Set Graphic Group* option.

궁 Themes -> Elevation R 🔳 🗖 🗙
TIN File: s60843.tin
Number of Grid Points: 100
Display
🗖 Display Only
Load Within Fence
🔽 Set Graphic Group
Fill
C Options
Planarize at Elevation: 0.000
Polygonize Results
Set Range Process

- 8. Click Process.
- 9. Review the results.



OBJECTIVE

In this session we will review the tools and steps for creating survey chains and profiles form existing graphical data.

INTRODUCTION

Several tools will be used to create break lines and profiles from existing graphical elements. The tools will include the following:

- Extract Graphics
- Import ASCII
- Chain Edit
- Convert Survey Chains

EXTRACTION OF GRAPHIC ELEMENTS

Graphic elements in MicroStation 2D or 3D files can be extracted. In a 3D file where elements are drawn coordinate correct (X, Y, and Z), the extraction mode is used. In a 2D file, where the elevations are determined by tags or text labels, the interpolation mode must be used for Breaks, Contours, and Break Voids. The Extract mode is used in 2D files for contours and spots.

Extraction of elements of specified parameters include all elements visible in a view, within a fence or within a selection set, whether the elements are in the active file or reference files (with locate activated).

Extraction Mode

~			
8 Extract	Graphic	s	_ 🗆 ×
File Name:	breaks.d	at	<u> </u>
File type:	Ascii	•	Decimal: 3 💌
File open:	Create	•	
Feature:	Breaks	•	Stroking
Mode:	Extractio	n 🔻	
- Search Cr	iteria ——		
🛛 🔽 L:	v Names:	Level 14	<u></u>
Lvi	Numbers:		白い
	Colors:		白
	Styles:		白
	Weights:		白
	Types:		白
Mato	h	Display	Reset
	•	J	

Interpolation Mode

名 Extract	Graphics	\$		_ 🗆 X
File Name:	breaks.de	ət		۲.
File type:	Ascii	-	Decimal:	3 🕶
File open:	Create	-	-	
Feature:	Breaks		Strokir	ng
Mode:	Interpolat	ion 🔻		
Spots Crit	eria ——			
	v Names:			
🗖 Lv	Numbers:			
	Colors:			白
	Styles:			白
	Weights:			白
	Types:			白
0	ell Name:		Origin	V
Mate	h	Display	Rese	t
– Longitudi	nal Referer	nce Criteria -		
	v Names:			白
📃 🗖 Lv	Numbers:			i ا
	Colors:			白
	Styles:			白
	Weights:			白
	Types:			百
Mate	ch 🛛	Display	Rese	
Extract View 1	- Tolerar	nce: 0.7500	10(Ap	ply

Whereas the Extraction mode creates a DTM input data file from the coordinate vertices of MicroStation elements, the Interpolation mode must first calculate the elevations for the coordinate vertices of MicroStation elements. The interpolation process is applicable where elevations are not stored with the MicroStation longitudinal reference elements. This occurs when longitudinal reference elements are two-dimensional or three-dimensional, but are all drawn at a common elevation. In both of these topographic mapping instances, the spot elevations determine the elevations along longitudinal reference elements. Therefore, the dialog for the Interpolation mode has two sets of Search Criteria, one for the Longitudinal References and a second for the Spot Elevations.

Spot elevations can be represented by graphical elements or text. For each MicroStation longitudinal reference element, GEOPAK locates the spot elevations nearest to and on either side of the element endpoint. Then, the elevation at the element endpoint is calculated.

The interpolation mode is only valid for Feature Types: Breaks, Contours, and Break Voids. For contours within a 2D file, the associated elevation must be within the Con Z-range, more commonly known as "tagged." Elevations for spot elevations may be determined by textual value (if the origin of the text is the origin of the spot) or "tagged" elevations for other element types, i.e., zero length lines or cells.

The resulting input file includes XYZ coordinates for both source spot elevations as well as for interpolated endpoints. Inclusion of the source spot elevations is mandatory since the spot elevation data often reflects important vertical topological features such as the high and low points along the longitudinal reference. Inclusion of interpolated endpoints is mandatory since the endpoints of longitudinal reference elements define changes in the horizontal topological features. These alterations in the horizontal topology determine break lines.

DIALOG FIELDS

File Name	Name of DAT file to be created.
File Type:	The advantage of the binary format is that input data is loaded much quicker when generating the triangulated model since the point and/or
ASCII	break line data can be read much faster from a binary file than from an
Binary	ASCII file. However, other than reduced loading time, there are no functional differences between the ASCII and binary files. One advantage of the ASCII file format is that the file may be viewed and/or edited with a text editor.
Decimal	Only valid when the ASCII File option is selected, the number of decimal places displayed within the file ranges from zero to six. The binary option defaults to double precision, with no user options.

File Open: Create Append	The data file used as input to the DTM process can be created as a new file or the extracted data can be appended to the end of an existing data file. When you type the file name or use the Files button to access a file, the data file is not actually opened until you establish all entries on the dialog and press the Apply button. At that time, GEOPAK creates a new file or opens an existing file depending upon the setting of the File Open option button.
	If the File Open option is set to Create and the file already exists, an Alert dialog appears with the message "Overwrite existing <file name="">?" when the Apply button is pressed. If you press OK, the existing file is overwritten. Pressing the Cancel button permits you to return to the main Extract dialog and readjust the file name or File Open mode.</file>
	If the Open option button is set to Append and the file does not exist, an Alert dialog appears with the message "Create <file name="">?" when the Apply button is pressed. Pressing OK results in the creation of the specified file. Pressing Cancel returns control back to the main Extract dialog.</file>
Feature Type:	Spots are points that have no functional relationship to any other point. Bandom survey shots in open terrain would be an example of
Spots	random spots. Point elements such as cells, circles, and text strings are typical MicroStation elements used to define spot elevations. Lines, line strings, and other longitudinal elements are equally valid. GEOPAK simply creates a spot elevation for each vertex of each longitudinal element.
Breaks	Breaks are used to designate linear features such as edges of pavement, ditch bottoms, ridges, etc. Any longitudinal element may be defined as a break line. Circular arcs are automatically segmented by GEOPAK in a manner consistent with the arc radius.
Boundary	A Boundary is used to constrain the external boundary of the triangulated model. No triangles are created outside the boundary polygon. In addition, any point data outside the boundary polygon is ignored. A boundary polygon must start and finish with the same point. In addition, the boundary polygon must be continuous within the data file.
Contours	Contours are a special feature intended for use if the source MicroStation elements represent digitized or otherwise created contours. Use of this feature insures the integrity of the contour strata in the subsequent DTM. Processing of a DTM with contours classified as spot elevations invariably results in a DTM that, if subsequently contoured, will not match the original extracted contours.

Voids	Void areas are closed shapes to demarcate areas 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 TIN surface. Therefore, they do not change the slope or elevations of the TIN surface.
Island	Island - used to place triangulated data within a void, i.e., islands in the middle of rivers, lakes, etc.
Graphic Triangle	Graphic Triangles - by extracting as triangles, the sides of each triangle, in addition to the vertices are maintained. If spots are used, the vertices would be utilized but not the triangle sides.
Drape Void	Drape Void - 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 TIN surface. Even though a user must provide an elevation for the Drape Void vertices, the user elevations are changed to the elevation of the TIN surface at the XY Drape Void coordinate position.
Break Void	Break Void - A void utilizes the elevations of each vertex, while the void lines between successive void coordinates are inserted as break lines. Therefore, break voids change the slope and elevations of the TIN surface.
Mode: Extraction or Interpolation	The Extraction mode determines XYZ data directly from the coordinate values of three-dimensional MicroStation elements. The Interpolation mode, by contrast, derives XYZ data by locating spot elevations on longitudinal MicroStation elements and interpolating. Hence, the Interpolation mode can be applied to both two-dimensional as well as three-dimensional MicroStation files as long as a Z-coordinate reading can be ascertained from the spot elevations.
Stroking	Utilized in the interpolation mode, this shortcut button to the Settings > Stroking dialog may be used. Changing the dialog from either location automatically updates the dialog in the other location. For a detailed discussion, refer to the Settings > Stroking documentation.
Select Criteria	Before extracting MicroStation elements, a description of the desired elements must be defined in terms of element types, levels, colors, weights and styles. Not every extract operation requires the definition of every parameter; only enough parameters to uniquely differentiate the desired element from all other graphical elements in the MicroStation file. For example, if the elements desired for extraction are only present on level 25, then only the level parameter need be defined. To the left of each parameter label is a toggle. If the toggle for any parameter is deactivated, GEOPAK assumes that the full range of settings for this parameter is available. For example, if the Colors toggle is deactivated, GEOPAK searches for all colors: 0-256. Similarly, a deactivated Colors toggle is equivalent to an activated Colors toggle and a key-in of 0-256 . If a toggle is activated and no

	values given, GEOPAK searches for nothing, therefore, be sure if a toggle is on that values are defined.
Level Weight Styles Types Colors	If specific parameter settings are to be considered, the toggle must be activated. Once activated, the associated Select button becomes available. Simply toggle on the desired parameter, the click Select . The Mask dialog is displayed, wherein the desired parameter settings may be identified. You may select as few or as many parameters to identify the desired elements.
	When the Type > Cell option is activated, all cells with the other specified parameters (i.e., level, color, weight) are utilized. However, if the Cell option is activated and a cell name is typed into the field to the right of Cell toggle, then only the named cell with the other specified parameters is utilized. For example, if level 40 is specified in the Level Mask, and two cells, SPOT and X are located on level 40, and no cell name is specified in the cell field, then both cells are extracted. However, if SPOT is typed into the field, then only the SPOT cells are extracted, although other cells are located on level 40.
	The Text String also has two options: Origin and Content . When the Text String toggle is activated and the option is set to Origin , GEOPAK utilizes the origin of the text as the x, y, z coordinates for extraction. If the Content option is specified, the x, y coordinates are derived from the text origin. However, the z value is not the z value within a 3D file, but the actual value of the text, whether a 2D or 3D file.
Match	The Match tool is a method of determining and adding the symbology of elements to be extracted to the Mask dialogs. First, activate the desired toggle(s) to the left of the Select Criteria. Then click Match . You are prompted to select the desired element. After identifying and accepting the element, its select criteria is added to any criteria whose toggle is activated. In addition, any elements of the specified parameters are highlighted. The Match button can be utilized numerous times to select additional elements. The information is appended to the Mask dialogs until the Reset button in the dialog is pressed, (which clears all active criteria selections).
Display	Clicking Display displays all elements of the current parameters.
Reset	The Reset button clears all Mask dialogs, so a new match procedure may commence.
Tolerance (Interpolation mode only)	If a spot elevation is within 0.75 master units of a longitudinal reference, the software projects the spot onto the reference (perpendicular) element and uses the elevation to interpolate.
Extract Method: View 1, 2,	The View method extracts every element that is visible in the specified active view and satisfies the select criteria. This includes elements in both the active as well as reference files if the Locate is activated. Simply set the desired View number before pressing the Apply button.

The **Fence** method extracts every element that satisfies both the fence criteria as well as the selection criteria defined via the Select Criteria group box. All MicroStation fence options are supported. Place the fence prior to pressing the **Apply** button.

Complex Chain - The Select Criteria group box disappears from the dialog, since you identify the elements via the cursor; and no file-wide searches are involved. Also, notice that the **ID Element** button appears adjacent to the Extract method option button. This button initiates the "chaining" of MicroStation elements. The following outlines the sequence of operations associated with the Complex Chain method.

- 1. Establish the desired dialog settings.
- 2. Adjust the Extract method option button to Complex Chain.
- 3. Press the **ID Element** button.
- 4. Identify and accept the first element that constitutes the beginning of the chain.

Selection of subsequent elements is identical to the operation of the MicroStation automatic create complex chain command. Successive connected elements are highlighted one at a time for inclusion or rejection as long as the endpoint of the next element is within a specified tolerance to an endpoint of the current element. The Tolerance is specified on the MicroStation Automatic Create Complex Chain palette. After the first element is selected and accepted, the next connected element is highlighted.

If more than a single element is located within tolerance to the next element endpoint, the message "Fork Accept/reject" appears in the MicroStation prompt field. A data point accepts the highlighted element. Pressing the reset cursor button rejects the highlighted element and highlights another one.

Once the end of the chain is reached or the user presses the reset cursor button when no more connecting elements are available, the identification of component chain elements is complete. At the completion of the selection process, the **Apply** button becomes available. The extraction of elements to a DTM input file commences when the **Apply** button is selected.

Selection Set - This method is identical to the Complex Chain in every aspect other than the actual selection of elements. The Selection Set method employs the MicroStation **Selection Set** tool to identify the element(s) for processing. This method is particularly useful when selecting a single element or a group of disjointed elements few in number. The following outlines the sequence of operations associated with the Selection Set method.

1. Establish the desired dialog settings.

Complex Chain Selection Set

- 2. Adjust the Extract method option button to Selection Set.
- 3. Click **ID Element**.
- 4. Identify the element(s) comprising the selection set. If more than one element is being selected, the control key on the keyboard must be utilized during the selection process.
- 5. At the completion of the selection process, the **Apply** button becomes available. The extraction of elements to a DTM input file commences when **Apply** is clicked.

Commences the extraction procedure. Note that the dialog should be filled in completely, and the Extract mode selected and applicable fence, view, selection set or complex chain identified prior to clicking **Apply**.

IMPORTING ASCII FILES

All data must be imported into database before mapping, writing to DTM, etc. can be done. Although this seems like an extra step, the benefits of a binary database, rather than ASCII OBS/XYZ files as the repository of all information, is worth the extra toggle.

Having the multiple datasets incorporated into a single database provides the following benefits:

- Multi Point Editing- Change multiple points simultaneously by editing their Feature, Description, Zone, PCode, etc.
- Display by Set Search- Display uses the Set Search to select what items are displayed.
- Editing simultaneously in different runs.

The ASCII data extracted from the graphics can be imported using a dataset that specifies X, Y, Z information.

SXYZ to Coordinates User : john	Dataset : breaks	
File C:\60843\breaklines\breaks.dat	<u> </u>	
Delimiter Space	Comment Delimiter Dash 🔻	
2 3489652.897 288479.896 231.444 3 3489651.693 288461.145 222.576 3 3489651.400 288453.515 221.247 3 3489650.750 288434.676 217.564		▲ ■
2 3489652.897 None ▼ × ▼ Reset Next >>	288479.896 231.444 <u>Y</u> ▼ Z ▼ None	_
 Load ASCII Dialog On Dataset Open Open Editor After Processing Process LoodePcode same as Raw Data 	Process Import After Process Store Elements into GPK	

Apply

SURVEY CHAINS

CHAIN EDITOR

The **Chain Editing** tool enables existing chains to be modified and allows the creation of new chains. When the dialog is first loaded, the existing survey chains, if any, will be loaded into memory and the dialog will contain the first chain. The most common editing sequence of chains occurs when points need to be deleted or added to a chain or when the Geometry of the chain needs to be modified. The Geometry of a chain is controlled by the Geometry (Point or Curve) of the individual points which comprise the chain. Chains may be a combination of straight lines, circular arcs, or spline curves. The following table explains how the Geometry of a chain is constructed:

Geometry Code Sequence	Resulting Element
Р-Р	Line. Two or more consecutive P's cause a line element to be generated.
C-C-C	Circular Arc. Exactly three consecutive C's cause a circular arc to be generated that passes through each of the points.
Р-Р-С-Р-Р	Line-Circular Arc-Line. The combination of two P's, exactly one C followed by two P's causes a circular arc to be generated that is tangent to both of the lines and that passes through the C point.
C-C-C-C	Curve String. Four or more consecutive C's cause a curve string to be generated that passes through each of the points.

Once the chains have been edited and the dialog is closed, the user will be prompted to save the chain edit or not. If the edits are saved, a backup file will optionally be written.

<mark>8</mark> Chain Edit		
Chain 4 A		m 🖂 🖌 🖉 👘
Eophiro Stati	j 👫 📃 🕺 🛄 . ion 100000	
Zone Attribute Grou	nd Descr	
Point List		
Chain Points	Name	▼ X: 0.0000
	Feature	▼ Y: 0.0000
	Dataset	Z: 0.0000
	Zone	Set by DP
	Attribute Ground	Protect DP onto Chain
Auto Insert	Descr	
		· · · · · · · · · · · · · · · · · · ·

The dialog consists of the **Name**, **Feature**, **Station**, **Description**, **Attribute** and **Zone**. The **Name** field is the currently selected chain. A chain name may be selected from the list or sequenced by use of the Next Chain and Previous Chain buttons to the right. The **Feature** field holds the feature name of the currently selected chain. The feature of the chain may be changed by keying in another feature into this field. The **Station** field is the starting station of the currently selected chain. The station walue into this field in the format of 1+25.48. The **Description** field is the description of the currently selected chain. If a different description is to be associated with that chain, then enter the new description value into the field.

The **Attribute** option button depicts the DTM attribute the chain is in. The **Zone** option button to the left of the **Attribute** option button depicts which zone the chain is in. For data collectors that do not support this field, it is defaulted to one.

Icons or processing buttons located across the top of the dialog are described in the table below and process an entire chain, rather than a single vertex as in the case of the Chain Points group box processing.

CONVERT SURVEY CHAINS

The **Convert Survey Chains** tool creates COGO chains (alignments) and optionally profiles from survey chains.

궁 Geopak input file : 001.ijd 🛛 🗖 🗖 🗙		
File COGO Input File File File Mode Create File		
Preferences Coordinate Output XY 💌		
 Write Input File Only Redefine Existing Elements Write Chains As Profiles Write Points to Input File 		
Set Search Process		

The **COGO Input File** field is the name of the ASCII input file (maximum of five characters) to be generated for subsequent processing via GEOPAK Coordinate Geometry. The Job Number from the project is appended to the end of this name and the extension is in the form of .IOC where OC is the operator code as entered for the project. For example, if the name of the input file name was keyed in as CGO and the current Job Number was 99 and the current Operator Code was ZZ, then the file would be named COGO99.IZZ. Note when the COGO Input File is populated, the input file name is added to the Title Bar. Below the **COGO Input File** field is the option to **Create File** or **Append to an Existing File**.

In the case where the file name already exists and the **Create File** option is selected, the user is prompted to overwrite the existing file, while the **Append to an Existing File** will add the new data to the bottom of the existing file.

LAB EXERCISE: SURVEY CHAINS

- > EXTRACT GRAPHICS
- 1. Open the MicroStation file c:\60843\17059\sdt17059hw.dgn.
- 2. Create and open a Survey project named 17059.

2 Project	New	_ 🗆 ×
ľ	Name: 17059	
Dire	ectory :	
Job Nu	umber: 001	
Description		
	<u>O</u> k <u>C</u> ancel	

- 3. From the main Survey Menu bar select *DTM > DTM Tools*.
- 4. Create a new run called *Breaks*.

Select Run		
<u>R</u> un		_
Name	Time	
Untitled	10/29/2007 15:11:18	
breaks	10/29/2007 15:11:25	
Description		
,		
	OK Cancel	

- 5. Select the *Extract Graphics* tool.
- 6. Enter a file name for the DAT file of *Breaks*.

7. Make the settings as shown below.

😤 Extract	Graphics	_ 🗆 ×
File Name:	breaks.dat	
File type:	Ascii 🔹 🔻	Decimal: <u>3 🔻</u>
File open:	Create 🔹 💌	
Feature:	Breaks 🔹 🔻	Stroking
Mode:	Extraction 🔹 💌	
E Search Cr	iteria	
🛛 🔽 L'	v Names: Level 14	<u> </u>
📃 🗖 Lyl	Numbers:	
	Colors:	
	Styles:	
	Weights:	白
	Types:	
ki - t-	h Diaplay	Peart
	m <u>EDisplay</u>	neset
Extract -		
View 1	▼	Apply

- 8. Click Apply.
- 9. Close the *DTM Tools*.

> IMPORTING ASCII

- 1. From the main Survey Menu bar select *Dataset > New*.
- 2. Create a new dataset named *Breaks*.

BDataset New
Name : breaks Create
Description :
Data Source : ASCII File(s) 🔻 XYZ to Coordinates 💌
Output Directory :
✓ Use dataset name as output sub-directory
Source Format : XYZ to Coordinates
File(s) to Use : 🔼
↑

3. Use the *Dataset Add* to browse and add the *Breaks.dat* created in the previous step.

🔁 Dataset New 📃 🗖 🗙
Name : breaks Create
Description :
Data Source : ASCII File(s) 🔻 XYZ to Coordinates 💌
Output Directory :
Use dataset name as output sub-directory
Source Format : XYZ to Coordinates
File(s) to Use : 🔄
C:\60843\17059\breaks.dat
L
<u>O</u> k <u>C</u> ancel

- 4. Click OK.
- 5. Make the settings as shown below.

😤 XYZ to Co	ordinates – User : john	Dataset : brea	aks	_ 🗆 ×
File C:\60843	\17059\breaks.dat	<u> </u>		
	Delimiter Space	-	Comment Delimiter 🔄 Dash 📑	
2 3489652.89 3 3489651.69 3 3489651.40 3 3489650.75	7 288479.896 231.444 3 288461.145 222.576 0 288453.515 221.247 0 288434.676 217.564			
2	3489652.897	288479.896	231.444	
None	X X Reset Next>>	<u>Y</u> •	Z Vor	ne 🔻
 Load ASC Open Edito Process Lo 	II Dialog On Dataset Open or After Processing codePcode same as Raw Da	Process	Import After Process Store Elements into GPH	K

- 6. Click Process.
- 7. When prompted for a beginning point number key-in point 1 and click OK.

No field was assigned to Point Number
Initial Point Number : 1
<u>0</u> K

-

8. Once the import is complete close the import dialog.

- > CREATE SURVEY CHAINS
- 1. From the main Survey Menu bar select *Geometry > Chains > Edit*.
- 2. Click through the following prompt to begin adding chains.



- 3. Once in the *Chain Edit* dialog click on the icon for *New Chain*.
- 4. Enter the information as shown below.

궁 Add Ch	ain	_ 🗆 ×
🗆 New Chai	n	
Name	ditch1 Point List	
Feature	20 Add Points by: Selection Set	
Station		
Dataset	BREAKS Add Points	
Zone		
Attribute	Spot and Break	
Descr		
Point List		
		** **
	Create Chain	

- 5. Using MicroStation's Power Selector place all of the points for a single break line into a selection set.
- 6. Click on the *Add Points* button.

😤 Add Ch	ain		_ 🗆 ×
🕞 New Chair	n ————		
Name	ditch1	Point List	
Feature	20	Add Points by: Selection Set	
Station			
Dataset	BREAKS	Add Points	
Zone	1	Add Folinis	
Attribute	Spot and Break		
Descr			
Point List			
			** **
		Create Chain	

7. Click on the *Create Chain* button.

- 8. Repeat these steps form the remaining 3 break lines incrementing the name by 1.
- 9. Close the *Add Chain* dialog.
- 10. You should now have 4 Survey Chains listed in the chain pulldown in the Chain Edit dialog.

Chain Edit		
Chain DITCH1 I DITCH2 DITCH3 JITCH4	Station 0.0000 Detas	et BREAKS
Point List		
Chain Points	Name 1 Feature DEFAULT_PC Dataset BREAKS	▼ X: 3489652.8970 ▼ Y: 288479.8960 ▼ Z: 231.4440
5 6 V Insert After Auto Insert	Geometry Point Attribute Feature Descr	Edited Project DP onto Chain

11. Close the *Chain Edit* dialog.

> STORING CHAINS & PROFILES

- 1. From the main Survey Menu bar select *Geometry > Chains > Convert Survey Chains*.
- 2. Make the settings as shown below.



3. Close the *Convert Survey Chain* dialog.

- 4. From the main Survey Menu bar select *Geometry > Navigator*.
- 5. Set the *Navigator Element Toggle* to *Profiles*.

名 Navigator(001)		_ 🗆 ×
Select Tools		
📉 🗙 🛃 id	📥 🗎 🔊	
Element : Profile	T	
Name	Feature	Description
DITCH1	20	
DITCH2	20	
DITCH3	20	
DITCH4	20	
•		Þ

- 6. Highlight a single ditch or all ditches and click the *Print/Describe* icon.
- 7. Review the profiles in the main COGO window.

E	子 Coordina	te Geomel	try Job: 001	Operator: jd			_ 🗆 X	
_	<u>File Edit Element View I</u> ools							
	99.1234	 ▼9^99.1	 2 ▼ ₩▼		,			
i								
-								
	<*	4 P	RINT PROFIL	E DITCH4				
	Beginni:	ng prof	ile DITCH4	descriptio	n :			
	======	. 20						
		1	STATION	ELEV	GRADE	TOTAL L	Bł	
	VPI	63	0+00.00	238.0370				
	VPI	64	0+98.60	218.6960	-19.6163			
	VPI	65	1+27.59	215.7410	-10.1923			
	VPI	66	1+44.66	210.6470	-29.8380			
	VPI	67	1+48.66	203.7660	-172.2816			
	VPI	68	1+51.66	202.9510	-27.1570			
	VPI	69	1+87.16	203.3590	1.1492			
	VPI	70	1+93.74	203.7200	5.4880			
	VPI	71	2+01.87	204.3580	7.8450			
	VPI	72	2+07.52	210.2160	103.6551		-	

8. Exit MicroStation.



Geodetic Conversions

OBJECTIVES

This chapter will focus on converting coordinates from one system to another.

INTRODUCTION

The processes involved in converting coordinates are relatively simple once an understanding is gained of the various tools in GEOPAK and their uses. In this session we will use several different tools within GEOPAK as outlined below.

GEODETIC CONVERSIONS

The Geodetic conversion utility performs many of the common computations encountered when working with geodetic and grid coordinate systems. Points can be individually entered and converted or multiple points from a coordinate geometry database (GPK file) can be converted via batch mode. All output is directed to an ASCII report file, in addition to a resizable output window.

8 Geodetic Coordinate Conversions		
File User defined Systems <u>G</u> lobal Geodetics		
Pt. A Coordinate System:		Pt. B Coordinate System:
HPGN State Plane 💌		HPGN State Plane
Elipsoid: GRS80 (HPGN)	○ File● Point	Ellipsoid: GRS80 (HPGN)
Zone: 0101 Alabama East 💌	O DEM	Zone: 0101 Alabama East 💌
Vert. Datum: Not Defined 💌		Vert. Datum: Not Defined 💌
Horiz, Units: Meters 💌		Horiz, Units: Meters 💌
Vert. Units: Meters 💌		Vert. Units: Meters 💌
- Pt. A	Comments	_ Pt. B
Name:	O Inverse:	Name:
North: 0.000000	Convert >	North: 0.000000
East: 0.000000	< Convert	East: 0.000000
Elev: 0.000000		Elev: 0.000000
		Display in Output Window

GEOPAK's conversion tool supports a wide variety of conversions of latitude / longitude, grid coordinates in different zones, and systems (assuming they have a common ellipsoid). In addition, optional scale factors may also be utilized.

CONVERSION OPERATIONS

A wide variety of conversion operations are supported including:

- converting latitude and longitude to grid coordinates.
- converting grid coordinates to latitude and longitude.
- converting grid coordinate from one zone to grid coordinates in another zone.
- converting grid coordinates from one system to another system. Note that both systems must have a common ellipsoid.
- computing grid scale factor and convergence angle for grid coordinates.
- computing geodetic forward and back azimuth and distance between two geodetic positions.
- Computing grid azimuth and grid distance in addition to geodetic forward and back azimuth and distance between two points in the same zone.
- Computing the line grid scale factor and combined scale factor if elevation data is entered.

SUPPORTED SYSTEMS AND PROJECTIONS

Several common systems and projections are supported including the following:

- HPGN State Plane.
- 1983 State Plane Coordinate systems (all zones).
- 1927 State Plane Coordinate systems (all zones).
- Universal Transverse Mercator system (all zones, northern and southern hemisphere).
- Latitude / Longitude.
- User-defined zones based on either the Lambert Conformal or the Transverse Mercator projection.
- Variety of ellipsoids are supported for the user-defined and UTM projections.
- New Zealand Map Grid (1949).
- New Zealand Local Circuits (1949).
- New Zealand Local Circuits (2000).

Three options are supported for the Vertical Datum:

- Not Defined.
- NAVD 88.
- NAVD 29.

FILE CONVERSIONS

3 Geodetic	: Coordinate Cor	versions		_	I ×
File User o	lefined Systems – <u>G</u>	ilobal Geodetics			
- Input Coord	linate System ———			🗆 Output Coordinate System —————	_
F	HPGN State Plane	•		HPGN State Plane	ਹ
Ellipsoid: 🚺	GRS80 (HPGN)	7	File	Ellipsoid: GRS80 (HPGN)	3
Zone: 🛛	0101 Alabama East	•	O DEM	Zone: 0101 Alabama East	J
Vert. Datu	um: Not Defined	-		Vert. Datum: Not Defined 🔻	
Horiz. Un	iits: Meters 💌			Horiz. Units: Meters 🔻	
Vert, Un	its: Meters 🔻			Vert. Units: Meters 💌	
Pt. Num	Northing	Easting	Feature	·	
D1	296386.0050	3876020.34	10		
D2	300269.3350	3876661.26	90	Job No.:	
D3	309243.5810	3873858.41	60	job101.gpk	•
D4	310129.6780	3872518.65	40	EN N	
D10	305866.9180	3874974.91	10	<u> </u>	
D11	305927.1170	3875144.54	60		
D12	305823.5670	3874990.29	50	✓ <u>C</u> onvert Pt:	5
				Display in Output Window	

Input Coordinate System

This group box includes **System** type, **Ellipsoid**, and **Zone**. As each system is selected, the ellipsoid and zone unghost as needed. For example, when 1983 State Plane is selected, the Ellipsoid is ghosted, however, a Zone must also be selected from the list. However, when Latitude / Longitude option is selected, the Zone field is not present, however, the Ellipsoid is unghosted, as depicted in the sample below.

Output Coordinate System

The right side of the dialog contains the Output Coordinate System, which has the same fields as the Input Coordinate system. Note, however, not all combinations can be converted. For example, when converting from UTM to Latitude / Longitude, GEOPAK must utilize the same ellipsoid. Therefore, when the ellipsoid option is selected in either coordinate system group box, the other ellipsoid dynamically changes to stay in sync. If a selected combination is not supported, i.e., changing from 1927 to 1983 state plane coordinates, GEOPAK changes the Output coordinate system after the user has selected Input coordinate system to reflect a supported option. The opposite is also true, i.e., GEOPAK changes the Input coordinate system after the user has selected the Output coordinate system.

Job No.

GEOPAK database (gpk file) wherein the points to be converted are stored. The list reflects all gpk files in the current directory or project.

List box

After selecting the **Job No.**, GEOPAK displays all point numbers and associated information in the list box. To convert, simply highlight as few or as many points as desired. Points can be highlighted either of the two icons directly below the Job Number. Options include getting points from a MicroStation selection set or from the COGO navigator.

Convert Points

Commences the procedure. Once converted, the Geodetic conversion Output window is displayed.

If a conversion not supported by GEOPAK is attempted, an information message is displayed.

POINT CONVERSIONS

Ceodetic Coordinate Conversions		
File User defined Systems <u>G</u> lobal Geodetics		
Pt. A Coordinate System:		Pt. B Coordinate System:
HPGN State Plane 💌		HPGN State Plane 💌
Ellipsoid: GRS80 (HPGN)	O <u>File</u> ● Point	Ellipsoid: GRS80 (HPGN)
Zone: 0101 Alabama East 💌	o 'dem'	Zone: 0101 Alabama East 💌
Vert. Datum: <u>Not Defined</u> ▼ Horiz. Units: <u>Meters</u> ▼ Vert. Units: Meters ▼		Vert. Datum: <u>Not Defined</u> ▼ Horiz. Units: <u>Meters</u> ▼ Vert Units: Meters ▼
Pt. A	 Convert: Inverse: 	Pt. B
North: 0.000000	Convert >	North: 0.000000
East: 0.000000	< Convert	East: 0.000000
Elev: 0.000000		Elev: 0.000000
		Display in Output Window

Pt. A Coordinate System

This group box includes System type, Ellipsoid, and Zone. As each system is selected, the ellipsoid and zone un-ghost as needed. For example, when 1983 State Plane is selected, the Ellipsoid is ghosted, however, a Zone must also be selected from the list. However, when Latitude / Longitude option is selected, the Zone field is not present, however, the Ellipsoid is un-ghosted

Pt. B Coordinate System

The right side of the dialog contains the Pt. B Coordinate System, which has the same fields as the Pt. A Coordinate system. Note, however, not all combinations can be converted. For example, when converting from UTM to Latitude / Longitude, GEOPAK must utilize the same ellipsoid. Therefore, when the ellipsoid option is selected in either coordinate system group box, the other ellipsoid dynamically changes to stay in sync. If a selected combination is not supported, i.e., changing from 1927 to 1983 state plane coordinates, GEOPAK changes the Pt. B coordinate system after the user has selected Pt. A coordinate system to reflect a supported option. The opposite is also true, i.e., GEOPAK changes the Pt. B coordinate system

Pt. A.

Point Name (or Number) and associated data. Note the fields are determined by the Pt. A Coordinate system option. When the option is changed, these fields dynamically change to reflect the selection. For example, when 1927 State Plane is selected as Pt.

Note that Meters, U.S. Foot and International Foot are supported in coordinate systems that require units. In addition, Elevations are also supported. However, when Latitude / Longitude is selected, the dialog changes.

Pt. B

The second set of data, with the same options as Point A. Note that when the Convert toggle is active, the results of converting Point A are displayed in Point B. If the Inverse toggle is active, then the geodetic distance and direction between Points A and B are computed and displayed in the output window.

Convert / Inverse Toggles

Determines the type of processing and affects the action buttons directly below. If Convert is active, the user supplies all information regarding Pt. A, the Pt. B Coordinate System options and the Pt. B Name. When the Convert > button is pressed, GEOPAK converts the Pt. A data into the specified Pt. B system, and populates all fields in the Pt. B group box except the Name. The < Convert button commences the opposite process. It utilizes Pt. B data and converts to Pt. A coordinate system. Once converted, the Geodetic conversion Output window is displayed.

If a conversion not supported by GEOPAK is attempted, an information message is displayed.

When the Inverse option is active, GEOPAK computes the geodetic distance and direction between Pt. A and Pt. B. note the arrows on the Inverse > and < Inverse buttons are important as they dictate the direction. The Inverse > button inverses from Pt. A to Pt. B, while the < Inverse button inverses from Pt. B to Pt. A. To inverse, all associated data for both points must be supplied. The results of the inverse are displayed in the output display window

DEM CONVERSIONS

Geodetic Coordinate Conversions		
File User defined Systems <u>G</u> lobal Geodetics		
DEM Coordinate System		Output Coordinate System
Coordinate System:		HPGN State Plane
Ellipsoid:	O. File	
Zone:	O Point	Elipsoid: [dHooU (HPaN]
Verical Datum:		Zone: 0101 Alabama East 🗾 💌
Horizontal Units:		Vert. Datum: Not Defined 💌
Vertical Units:		Horiz. Units: Meters 💌
- Input DEM File		Vert. Units: Meters 💌
Format: DEM 🔽		
		Output DAT File
<u> </u>		Output DAT File
Number of Deinter		
Number of Points:		
Filter Points: Custom 💌 1		
	Apply	🔽 Display in Output Window

Other data sources utilized in the Geodetic Coordinate conversions tools are the various DEM formats including DEM, SDTS, and DTED. "A Digital Elevation Model (DEM), consists of a sampled array of elevations for ground positions that are normally at regularly spaced intervals. The basic elevation model is produced by or for the Defense Mapping Agency (DMA), but is distributed by the USGS, EROS Data Center, in the DEM data record format." A wealth of information on DEM formatted data can be obtained from <u>www.usgs.gov</u>. When the DEM option is selected in the center section of the dialog, the dialog changes to reflect the selection.

Within the Input DEM File group box, the data format is selected. The group box changes based on the selection. Once the selection is made, the File Name may be typed in, or selected via the **Files** button. Each format is discussed in subsequent sub-sections.

Once the file is read, the DEM Coordinate system group box is populated automatically. Therefore, the DEM Coordinate System group box is display only and the values cannot be edited.

The Output Coordinate system box includes **System** type, **Ellipsoid**, and **Zone**. As each system is selected, the ellipsoid and zone unghost as needed. For example, when 1983 State Plane is selected, the Ellipsoid is ghosted, however, a Zone must also be selected from the list.

When Latitude / Longitude option is selected, the Zone field is not present; however, the Ellipsoid is unghosted.

The Vertical Datum options include NAVD88, NAVD 29 or may be Not Defined.

Supported Horizontal and Vertical Units include Meters, U.S. Ft., and Int'l Ft.

The Output DAT File group box has a single key-in field for the file name of the DAT file to be created. This file can be used within the Build Triangles dialog in the DTM tools. Manually enter the file name or select via the **File** button.

When the dialog is completely populated, click **Apply** in the center bottom of the dialog to commence processing.

GLOBAL GEODETIC DATA

The dialog below allows the user to set a global geoid to use when converting.

Set Global Geodetic Data
Custom UDCN State Diana
Ellipsoid: Clarke 1866 (SPC 27)
Zone: 0101 Alabama East 💌
Vert. Datum: Not Defined 💌
Horiz, Units: Meters 💌
Vert. Units: Meters 💌
Geoid Model : Use BIN File 🔽 🗖 Positive East Bin or Dat File/Path
OK Cancel

SCALE, ROTATE, TRANSLATE

The **Translation** and **Rotation** tool translates and/or rotates the coordinate values of geometric elements. A variety of options to specify the distance and direction of the translation, as well as several rotation methods provide maximum user flexibility.

Scale Rotate Translate	. 🗆 🗙
Scale Rotate Translate Points Curves Spirals Chains Survey Chains Parcels Lines	
Overwrite	
Translate Method Pt to Pt	
From Point To Point	
Rotate Method By Angle	
Angle + 0.0 About Point	
Scale X/E Factor 1.00000000 Y/N Factor 1.00000000 Z/Elev Factor 1.00000000 About Point	0000 0000

ELEMENT SELECTION

The top of the dialog displays the variety of COGO elements which can be translated, rotated or scaled. To utilize an element, simply activate the toggle to the left of the element name. Then populate the input field with the names of the elements. This can be done by three methods:

Manual

Type in the names separated by comas. For a range, utilize a hyphen.

Get Elements from Navigator

For elements from the navigator, access the COGO navigator and highlight the desired element names. Then click **Get Elements from Navigator**. GEOPAK automatically populates the dialog.

Get Elements from MS Selection Set

Place the desired elements in a MicroStation selection set, activate the desired element toggles, and then click **Get Elements from MS Selection Set**. GEOPAK scans the selection set and populates the dialog automatically.

INCREMENT / OVERWRITE

When storing new points, the increment must be specified. This value is added to each existing element to obtain the translated element name. If the points are overwritten, no new point number is required; hence, the field is not shown.

PROCESSING

The rest of the dialog consists of the three types of processing supported in this dialog: Translate, Rotate, and Scale. More than one type may be processed simultaneously. For example, elements can be just translated, or just rotated, or translated and rotated and scaled. Activate the desire toggles, and then populate the appropriate fields.

TRANSLATE

Translate

When active, translation is part of the processing.

Methods

Four methods are supported. When selected, the dialog dynamically changes to reflect the selection.

Direction / Distance

In this option, the distance direction each point is moved is specified. A variety of directions are supported.

Options include Azimuth, Bearing, QDD.MMSS, two points, and direction ahead or back of curves or spirals. The direction of the chord of a curve or spiral is also supported. The distance options include: two points, curve radius, chord, length, or tangent, and spiral chord, short tangent, and long tangent.

Pa to Pb

The distance and direction between the two specified points are used to translate all points, moving them by the same distance and direction.

Delta North/East/Elev.

All points are translated by the change in coordinates, i.e., change in North, East, and Elevation. Note: For those not needed, set the Delta to 0.00.

Coordinate Value

The distance and direction from the **Translation Point** to the **Desired North** and **East** is determined, then all points are moved the same distance and direction.

ROTATION

The second type is Rotate, which can be utilized by activating the toggle to the left of **Rotate**. Two methods are supported for rotation. The dialog dynamically changes as each is selected.

Pa to Pb To Bearing

In the **About Point**, specify a previously defined point. In addition, two points (**Point Back** and **Point Ahead**) are specified, and GEOPAK computes the direction between them. It then determines the rotation angle by comparing the computed direction and the desired bearing.

Angle

In the **About Point**, specify a previously defined point. The rotation angle is specified with an optional add-on.

SCALE

The third type is Scale, which can be utilized by activating the toggle to the left of Scale.

All elements are scaled utilizing the specified scale factors. If scaling is not desired for one factor, set the value to 1.00 (default). All scaling is done about the specified point.

When the dialog has been populated, clicking **Apply** commences the procedure.

PLACE COORDINATE TABLE

The Place Coordinate Table tool draws a table using COGO points based on user-defined parameters.

One use of the table is to create a list of geodetic data including latitude, longitude, geoid height, etc.

2 Place	Coordinate T	able						_ 🗆 X
Settings								
- Table Fo Prefix	ormat/Column 0: Text	rder — Suffix	☐ Write	to Output Fil	e:		Create Fi	
	Point#							
	North[Y]	▼		Replace "N	o Elevation	n'' With :	0.0000	
	East(X) Geoid Height	₹—		Replace ''	No Feature	e" With :	DEFAULT	
	Scale Factor		Use GPK I	Point Station	n value stor	red with P	oint 🔽	
	Conv. Angle	▼	Choin to me	souro Ctotic	up and Offe	unt from a		
	Latitude	▼ .	Unain to me	asure oradio	m and Um	set nom :	ARMURT	
	Longitude		🗖 L	Jse Duplica	te Filter To	lerance :	0.010000	
Select F	oints for Tab	le or Export	:					
Point#	North(Y)	East(X)	Elev(Z)	Station	Offset	Feature	Desc	_
D1	296386.0050	3876020	No Elev	10+00.00	Off Chain	No Feat		
D2	300269.3350	3876661	No Elev	0+00.00	Off Chain	No Feat		S ‡
D3	309243.5810	3873858	No Elev	0+00.00	Off Chain	No Feat		et
D4	310129.6780	3872518	No Elev	158+7	Off Chain	No Feat		
D10	305866.9180	3874974	No Elev	10+60.00	Off Chain	No Feat		
D11	305927.1170	3875144	No Elev	12+40.00	-3819	No Feat		, A
D12	305823.5670	3874990	No Elev	10+60.00	Off Chain	No Feat		-
			<u>P</u> la	ace				

The table will appear similar to the one below.

Content Edi File Edit	Text Editor: C:\D_Drive\cec\DDT_Virginia\Advanced Training\Survey II\data\example\coord.txt File Edit Oriteria						
Point	Convergence Angle	Scale Factor	Latitude	Longitude	Elevation	Geoid Height	
101 102 103 104 105 106	- 0 51 43.44 - 0 51 43.41 - 0 51 34.79 - 0 51 32.91 - 0 53 4.87 - 0 52 36.27	0.99994765 0.99994786 0.99994741 0.99994737 0.99994733 0.99994543 0.99994644	37 14 44.13 N 37 14 51.58 N 37 15 8.84 N 37 15 13.14 N 37 21 10.18 N 37 17 4.55 N	79 55 13.38 W 79 55 13.33 W 79 54 59.14 W 79 54 56.03 W 79 57 27.55 W 79 56 40.43 W	284.6210 280.9930 278.3020 275.8890 346.1440 304.4390	-32.4190 -32.4206 -32.4260 -32.4260 -32.4270 -32.3737 -32.4242	
						Line: 1 Col: 1	

LAB EXERCISE: COORDINATE CONVERSIONS

- > CONVERTING FROM LATITUDE / LONGITUDE TO DECIMAL DEGREES
- 1. Open the MicroStation file C:\60843\coord_conversion\s71741.dgn.
- 2. Select *Applications > GEOPAK Survey > Survey*.
- 3. From the main Survey Menu bar select *Project > Preferences*.

Default Preferences : C:\60843\coord_conversion\71741.spp					
<u>D</u> efault					
Project	Dataset Visualization Geometry DTM				
Settings User	Name Directory : Image: Imag				
Configuration	Description :				
	Job Number : Job Directory : 001 Q c:\60843\coord_conversion\				
Global Working Directory :					
	<u>Ok</u>				

4. On the Project Preferences dialog select *Default > Open* and select the file 71741.spp.

Note This is a project preference file with default settings for this project.

- 5. Click *OK*.
- 6. From the main Survey Menu bar select *Project > New* and create a new project.

2 Project New	_ 🗆 ×
Name 71741	
Directory :	<u> </u>
Job Number : 001	
Description :	
<u>O</u> k <u>C</u> ancel	

7. Click OK.

8. From the main Survey Menu bar select *Geometry > Conversions > Geodetic*.

2 Geodetic Coordinate Conversions		
File User defined Systems <u>G</u> lobal Geodetics DEM Coordinate System		Output Coordinate System
Coordinate System: Ellipsoid: Zone: Verical Datum: Horizontal Units:	O File O Point ● DEM	HPGN State Plane
Vertical Units:		Output DAT File
Number of Points: Inquire Output Dat Size: Inquire Filter Points: Custom 1	Apply	Display in Output Window

9. Set the radio button in the middle of the dialog to *File*.

10. Prior to processing, be sure that the correct GEOID 03 files have been downloaded.

http://www.ngs.noaa.gov/PC_PROD/GEOID03/index.shtml

g2003u08.bin

g2003u07.bin



- 11. From the *Geodetic Coordinate Conversion* dialog select *Global Geodetics > Set Global Geodetic Data*.
- **12**. Make the settings as shown below.

Set Global Geodetic Data				
System: 1983 State Plane 💌				
Ellipsoid: GRS80 (SPC 83)				
Zone: 4502 Virginia South				
Vert. Datum: NAVD 88 💌				
Horiz. Units: Meters 💌				
Vert, Units: Meters 💌				
Geoid Model] GEOID03 ▼ Positive East Bin or Dat File/Path : c:\60843\coord_conversion\geoid\ Q				
OK Cancel				

- 13. Click OK.
- 14. Make the remaining settings as shown below.

Beodetic Coordinate Conversions					
File User defined Systems <u>G</u> lobal Geodetics					
- Input Coordinate System		- Output Coordinate System			
Latitude/Longitude		1983 State Plane 💌			
Ellipsoid: WGS84	● File ○ Point	Ellipsoid: GRS80 (SPC 83)			
	O DEM	Zone: 4502 Virginia South 💌			
Vert. Datum: NAVD 88 💌		Vert. Datum: NAVD 88			
Ver liete Marine wi		Horiz, Units: Meters			
Vert. Units: <u>Meters</u>		Vert. Units: <u>Meters</u>			
Latitude Longitude Elevation File : C:\60843\coord_conversion\s71741.asc File Delimiter :					
		<u>dd.mmss</u> ▼ <u>C</u> onvert Pts			
		🔽 Display in Output Window			

Note The *File Delimiter* should be set as a *space*.
- 15. Before converting the data we will define a point range in *COGO*. From the main Survey Menu bar select *Geometry* > *Classic COGO*.
- 16. Select *Element > Next Available Settings* and provide a beginning point as shown below.

<mark>8</mark> N	ext Avai	lable Eleme 💻	X
	Point:	101	
	Line:	L1	
	Curve:	C1	
	Spiral:	\$1	
	Chain:	CHN1	
	Parcel:	PAR1	
	Profile:	PRF1	
		Apply	

- 17. Click Apply.
- 18. Return to the *Geodetic Conversion* dialog and select *File > Output to GPK*.
- 19. Select the gpk file as shown.

GEOPAK Job Selection				
Project Name				
Project Directory	\60843\coord_conv			
Job Number	001 Select			
Operator Code				
Subject				
OK	Cancel			

- 20. Click OK.
- 21. Click Convert Pts. On the main Geodetic Conversion dialog.

22. Review the Geodetic Conversion Output.

Geodetic Conversion Dutput	_ 🗆 ×
Name: 101 Feature: DEFAULT Ellipsoid: WGS84 Vert. Datum: NAVD 88 Latitude: 37 14 44.13063 N Longitude: 79 55 13.38284 W Elev. (Z): 284.6210 Meters	<u> </u>
Name: 101 Feature: DEFAULT Ellipsoid: GRS80 (SPC 83) Vert. Datum: NAVD 88 Latitude: 37 14 44,13063 N Longitude: 79 55 13,38284 W Elev. (2): 284,6210 Meters Coordinate System: 1983 State Plane Zone: 4502 Virginia South Horiz. Units: Meters North (Y): 1102185,3514 East (X): 3373988,3763 Elev. (Z): 284,6210 Meters Scale Factor: 0.999947653 Convergence Angle: - 0 51 43,43910 Elev. Factor: 0.999955335 Combined Grid Factor: 0.999902990	
Name: 102 Feature: DEFAULT Ellipsoid: WGS84 Vert. Datum: NAVD 88 Latitude: 37 14 51.57655 N Longitude: 79 55 13.33065 W Elev. (Z): 280.9930 Meters	
Name: 102 Feature: DEFAULT Ellipsoid: GRS80 (SPC 83) Vert. Datum: NAVD 88 Latitude: 37 14 51.57655 N Longitude: 79 55 13.33065 W Elev. (Z): 280.9930 Meters Coordinate System: 1983 State Plane Zone: 4502 Virginia South Horiz. Units: Meters North (Y): 1102414.8400 East (X): 3373993.1157 Elev. (Z): 280.9930 Meters Scale Factor: 0.999947577 Convergence Angle: - 0 51 43.40742 Elev. Factor: 0.999955904 Combined Grid Factor: 0.999903484	
Name: 103 Feature: DEFAULT_Ellipsoid: WGS84_Vert. Datum: NAVD 88 Latitude: 37 15 8.84174 N Longitude: 79 54 59.13838 W Elev. (Z): 278.3020 Meters	
Name: 103 Feature: DEFAULT Ellipsoid: GRS80 (SPC 83) Vert. Datum: NAVD 88 Latitude: 37 15 8.84174 N Longitude: 79 54 59.13838 W Elev. (Z): 278.3020 Meters Coordinate System: 1983 State Plane Zone: 4502 Virginia South Horiz. Units: Meters North (Y): 1102941.7560 East (X): 3374350.8122 Elev. (Z): 278.3020 Meters Scale Factor: 0.999947407 Convergence Angle: - 0 51 34.79378 Elev. Factor: 0.999956326 Combined Grid Factor: 0.999903735	
Name: 104 Feature: DEFAULT Ellipsoid: WGS84 Vert. Datum: NAVD 88 Latitude: 37 15 13.14322 N Longitude: 79 54 56.03224 W Elev. (Z): 275.8890 Meters	
Name: 104 Feature: DEFAULT Ellipsoid: GRS80 (SPC 83) Vert. Datum: NAVD 88 Latitude: 37 15 13.14322 N Longitude: 79 54 56.03224 W Elev. (Z): 275.8890 Meters Coordinate System: 1983 State Plane Zone: 4502 Virginia South Horiz. Units: Meters North (Y): 1103073.1938 East (X): 3374429.3342 Elev. (Z): 275.8890 Meters Scale Factor: 0.999947365 Convergence Angle: - 0.51 32.90858	Ŧ

23. Open *Navigator* and review the points in COGO.

<mark>3</mark> Navigato	r(001)			_ 🗆 ×	
Select Too	ols				
Kirking and a k					
Name △		X	Feature	Elevation	
101	1102185.3514	3373988.3763	DEFAULT	284.6210	
102	1102414.8400	3373993.1157	DEFAULT	280.9930	
03	1102941.7560	3374350.8122	DEFAULT	278.3020	
04	1103073.1938	3374429.3342	DEFAULT	275.8890	
05	1114134.9775	3370866.0732	DEFAULT	346.1440	
106	1106546.1961	3371909.7121	DEFAULT	304.4390	

- > CONVERTING METRIC PROJECT COORDINATES
- 1. Open both *Navigator* and *Geometry > Conversions > Translate/Roatate/Scale*.
- 2. Toggle ON the *Points* option and set the *Scale* options as shown below.

名 Scale Rotate Translate 📃 🗖 🗙
Points
Curves
🗌 Spirals
Chains
Survey Chains
Parcels
Lines
Overwrite
Translate Method Pt to Pt
From Point To Point
Botate Method BurApple
Andle + III
About Point
✓ Scale X/E Factor [1.0001300000000
7/N Factor 1.000130000000
About Point
Apply

3. Now highlight the points in *Navigator*.

Select Too	r (001) Is Id 📥 🛅 (sint 💌	<u>8</u>		
Name 🛆	Y	X	Feature	Elevation
101	1102185.3514	3373988.3763	DEFAULT	284.6210
102	1102414.8400	3373993.1157	DEFAULT	280.9930
103	1102941.7560	3374350.8122	DEFAULT	278.3020
104	1103073.1938	3374429.3342	DEFAULT	275.8890
105	1114134.9775	3370866.0732	DEFAULT	346.1440
106	1106546.1961	3371909.7121	DEFAULT	304.4390
•				Þ

4. Use the icon on the top right of the Rotation Translation dialog to populate the points. Be sure to set the Increment value in order to preserve the original points.

Scale Rotate Translate	_ 🗆 X
Points 101-106	١D
Curves	
🗖 Spirals	<u>. 15</u>
Chains	
Survey Chains]
Lines	
Increment 1000	
Translate Method Pt to Pt	
From Point To Point	
Rotate Method By Angle	
Angle + 0.0	
About Point	
Scale X/E Factor 1.00013000	00000
Y/N Factor 1.00013000	00000
Z/Elev Factor 1.00000000	00000
About Point	

- 5. Toggle ON the *Scale* option and enter the scale factors.
- 6. Click Apply and scale the points.
- 7. Review the coordinates in the Navigator.

] id 📥 🗎 [\$ ₽		
Element : F	Point 🔻			
Name 🛆 👘	Y	X	Feature	Elevation
101	1102185.3514	3373988.3763	DEFAULT	284.6210
102	1102414.8400	3373993.1157	DEFAULT	280.9930
103	1102941.7560	3374350.8122	DEFAULT	278.3020
104	1103073.1938	3374429.3342	DEFAULT	275.8890
105	1114134.9775	3370866.0732	DEFAULT	346.1440
106	1106546.1961	3371909.7121	DEFAULT	304.4390
1101	1102328.6355	3374426.9948		284.6210
1102	1102558.1539	3374431.7348		280.9930
1103	1103085.1385	3374789.4779		278.3020
1104	1103216.5933	3374868.0100		275.8890
1105	1114279.8150	3371304.2858		346.1440
1106	1106690.0471	3372348.0604		304.4390

- > **CONVERTING IMPERIAL PROJECT COORDINATES**
 - *Note* It may be desirable to create a copy of the GPK file at this point since we are going to create Imperial coordinates.
- 1. In the Translation and Rotation dialog change the Increment value to 2000 in order to preserve the original points.
- 2. Toggle OFF the Scale option and toggle ON the Translate option.

名 Scale Rotate Translate 📃 🗖	X
✓ Points 101-106 Curves	
Increment 2000	_
✓ Translate Method Deltas	
Delta North (Y) -1000000 Delta East (X) -2500000 Delta Elevation (Z) 0.0	
Rotate Method By Angle Angle + 0.0 About Point	
Scale X/E Factor 1.000130000000 Y/N Factor 1.000130000000 2/Elev Factor 1.000000000000000000000000000000000000	0

Note Be sure to use the original points 101-106.

- 3. Click *Apply* to translate the points.
- 4. Toggle OFF the Translate option and toggle ON the Scale option.

5. In *Navigator* highlight the 2000 range points.

Select To	ols 🔄 🔒 📑 I	<u>.</u>			
Element: Point					
Name 🛆	Y	X	Feature	Elevation	
101	1102185.3514	3373988.3763	DEFAULT	284.6210	
102	1102414.8400	3373993.1157	DEFAULT	280.9930	
103	1102941.7560	3374350.8122	DEFAULT	278.3020	
104	1103073.1938	3374429.3342	DEFAULT	275.8890	
105	1114134.9775	3370866.0732	DEFAULT	346.1440	
106	1106546.1961	3371909.7121	DEFAULT	304.4390	
1101	1102328.6355	3374426.9948		284.6210	
1102	1102558.1539	3374431.7348		280.9930	
1103	1103085.1385	3374789.4779		278.3020	
1104	1103216.5933	3374868.0100		275.8890	
1105	1114279.8150	3371304.2858		346.1440	
1106	1106690.0471	3372348.0604		304.4390	
2101	102185.3514	873988.3763		284.6210	
2102	102414.8400	873993.1157		280.9930	
2103	102941.7560	874350.8122		278.3020	
2104	103073.1938	874429.3342		275.8890	
2105	114134.9775	870866.0732		346.1440	
21.00	106546,1961	871909.7121		304,4390	

- 6. Use the icon at the top of the *Translate and Rotate* dialog to bring in the point numbers.
- 7. Change the toggle from *Increment* to *Overwrite*.

8. Set the scaling options as shown below.

8 Scale Rotate Translate	_ 🗆 ×
Points 2101-2106	١
Curves	N
🗖 Spirals	<u>_</u> 43
🗖 Chains	
Survey Chains	
Parcels	
Lines	
Overwrite	
Translate Method Deltas	
Delta North Y1 -1000000	1
Delta East (X) -2500000	1
Delta Elevation (Z) 0.0	-
Rotate Method By Angle	1
Angle + 0.0	
About Point	
Scale X/E Factor 1.000130000	00000
Y/N Factor 1.000130000	00000
Z/Elev Factor 1.000130000	00000
About Point	
Apply	

9. Click *Apply* to scale.

10. Now change the scaling options as shown below and scale again.

Scale Rotate Translate	. 🗆 X
Points 2101-2106	۳Ŋ
Curves	
Spirals	<u>.</u> 43
🗖 Chains	
Survey Chains	
Parcels	
Lines	
Overwrite	
Translate Method Deltas	
Delta North (Y) -1000000	1
Delta East (X) -2500000	1
Delta Elevation (Z) 0.0	1
Rotate Method By Angle	
Angle + 0.0	
About Point	
Scale X/E Factor 3.280833333	3333
Y/N Factor 3.280833333	3333
Z/Elev Factor 3.280833333	3333
About Point	

11. Review the points in *Navigator*.

Select Tools						
📉 🗙 🔄 📩 📥 🖹 🔊						
Element : <u>P</u>	loint 🔻					
Name 🛆	Y	X	Feature	Elevation		
101	1102185.3514	3373988.3763	DEFAULT	284.6210		
102	1102414.8400	3373993.1157	DEFAULT	280.9930		
103	1102941.7560	3374350.8122	DEFAULT	278.3020		
104	1103073.1938	3374429.3342	DEFAULT	275.8890		
105	1114134.9775	3370866.0732	DEFAULT	346.1440		
106	1106546.1961	3371909.7121	DEFAULT	304.4390		
1101	1102328.6355	3374426.9948		284.6210		
1102	1102558.1539	3374431.7348		280.9930		
1103	1103085.1385	3374789.4779		278.3020		
1104	1103216.5933	3374868.0100		275.8890		
1105	1114279.8150	3371304.2858		346.1440		
1106	1106690.0471	3372348.0604		304.4390		
2101	335296.6899	2867782.9613		933.9155		
2102	336049.7016	2867798.5125		922.0110		
2103	337778.6501	2868972.2078		913.1812		
2104	338209.9315	2869229.8585		905.2635		
2105	374506.5182	2857537.8734		1135.7884		
2106	349605.7545	2860962.3239		998.9435		

- > CONVERTING TO NGVD29
- 1. In COGO set the *Next Available Point* to 3001.

<mark>8</mark> N	ext Avai	lable Eleme 💶 🔳 🗙
	Point:	3101
	Line:	L1
	Curve:	C1
	Spiral:	\$1
	Chain:	CHN1
	Parcel:	PAR1
	Profile:	PBF1
		Apply

- 2. Click Apply.
- 3. Access the *Geodetic Conversion* application and make the settings as shown below.

8 Geodetic Coordinate Conversions		
File User defined Systems <u>G</u> lobal Geodetics		
- Input Coordinate System		Output Coordinate System
Latitude/Longitude		1983 State Plane 💌
Ellipsoid: WGS84	 File Point 	Ellipsoid: GRS80 (SPC 83)
	O DEM	Zone: 4502 Virginia South 💌
Vert. Datum: NAVD 88 💌		Vert. Datum: NGVD 29 💌
		Horiz, Units: U.S. Ft. 💌
Vert, Units: Meters 💌		Vert. Units) U.S. Ft. 💌
Latitude Longitude Elevation File :	1	
C:\60843\coord_conversion\s71741.asc		<u> </u>
	File Delin	niter :
	[dd.mmss 💌
		<u>C</u> onvert Pts
		🔽 Display in Output Window

4. Select *File > Output to GPK* and select the gpk file.

GEOPAK Job Select	tion
Project Name	
Project Directory	\60843\coord_conv
Job Number	001 Select
Operator Code	
Subject	
ок	Cancel

- 5. Click OK.
- 6. Click Convert Pts.

7. Review the points in COGO.

] id 📥 🗎 [∕8		
lement : P	oint 🔻			
Name 🛆	Y	X	Feature	Elevation
101	1102185.3514	3373988.3763	DEFAULT	284.6210
102	1102414.8400	3373993.1157	DEFAULT	280.9930
103	1102941.7560	3374350.8122	DEFAULT	278.3020
104	1103073.1938	3374429.3342	DEFAULT	275.8890
105	1114134.9775	3370866.0732	DEFAULT	346.1440
106	1106546.1961	3371909.7121	DEFAULT	304.4390
1101	1102328.6355	3374426.9948		284.6210
1102	1102558.1539	3374431.7348		280.9930
1103	1103085.1385	3374789.4779		278.3020
1104	1103216.5933	3374868.0100		275.8890
1105	1114279.8150	3371304.2858		346.1440
1106	1106690.0471	3372348.0604		304.4390
2101	335296.6899	2867782.9613		933.9155
2102	336049.7016	2867798.5125		922.0110
2103	337778.6501	2868972.2078		913.1812
2104	338209.9315	2869229.8585		905.2635
2105	374506.5182	2857537.8734		1135.7884
2106	349605.7545	2860962.3239		998.9435
3101	3616086.4403	11069493.5313	DEFAULT	934.4305
3102	3616839.3542	11069509.0805	DEFAULT	922.5310
3103	3618568.0780	11070682.6232	DEFAULT	913.7055
3104	3618999.3033	11070940.2405	DEFAULT	905.7889
3105	3655291.1720	11059249.7751	DEFAULT	1136.2871
3106	3630393.6450	11062673.7805	DEFAULT	999.4501

Note The XY for this range can be converted to whichever project they will be used with.

> **R**EPORTING

- 1. From the main Survey Menu bar select *Plans Preparation > Place Coordinate Table*.
- 2. Make the settings as shown below.

2 Place	Coordinate T	able					-	. 🗆 X
Settings								
F Table F	ormat/Column C	Irder	Vrite I	to Output F	ile :		Create File	-
Prefix	Text Reint#	Suffix	C:\60843	\coord_co	nversion\ca	ord.txt		<u>م</u>
	<u>Funt</u>							_
	Scale Eactor	-		Replace "P	No Elevatio	n'' With : [L	J.UUUU	
	Latitude	- -		Replace	"No Featur	e'' With : 🔽	DEFAULT	
	Longitude	TI	Line GPK R	Doint Ctatio	n voluo ete	rod with Roi		
	Elev(Z)	-		-uni otatu	n value stu	rea with For	<u>n</u>	
	Geoid Height	_	Chain to me	asure Stati	on and Off:	set from :		7
	None	-		lse Duplica	ate Filter To	lerance : [ſ	010000	
				500 B apilo.	3.0111.01110	ioranioo . _T e		
Select F	^p oints for Tab	le or Export	:					
Point#	North(Y)	East(X)	Elev(Z)	Station	Offset	Feature	Desc 🔺	
101	1102185	3373988	284.6210	0+00.00	Off Chain	DEFAULT		Dog 1
102	1102414	3373993	280.9930	0+00.00	Ulf Chain	DEFAULT		<u></u>
103	1102941	3374350	278.3020	0+00.00	Uff Chain	DEFAULT		© ‡
104	1103073	3374429	275.8890	0+00.00	Off Chain	DEFAULT		同
105	1114134	3370866	346.1440	0+00.00	Off Chain	DEFAULT		
106	1106546	3371909	304.4390	0+00.00	Off Chain	DEFAULT		<u>_</u> ₩3
1101	1102328	3374426	284.6210	0+00.00	Off Chain	No Feat	-	
							_	
🔽 Head	er: 🗾 🚱	mple	Table Text :	[Samp]	e 🔽	Horz. Line	ISI	
	-					Vert Line	p.	_
	lex	t Spacing (% o	r Text Size) :	175.0000C		YOR, LING.		
Point:	Convergence	Scale Factor:	Latitude:	Lonaitude:	Elevation	n: Geoid	HeiahtNone:	
Point	Convergen	Scale Fact	Latitude	Longitude	Elevatio	on Geoid	I Heig	
						ĺ.	- /	
			<u>P</u> la	ice				

- **3**. Highlight the points 101-106.
- 4. Click the *Place* button.
- 5. Open and review the text file *coord.txt*.

웅 Text Ec	litor: C:\60843\coord_conversion\a	coord.txt					_ 🗆 ×
<u>F</u> ile <u>E</u> dit	<u>C</u> riteria						
🗋 🖻							
Point	Convergence Angle	Scale Factor	Latitude	Longitude	Elevation	Geoid Height	
101 102 103 104 105 106	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	0.99994765 0.99994758 0.99994754 0.99994737 0.99994737 0.99994543 0.99994644	37 14 44.13 N 37 14 51.58 N 37 15 8.84 N 37 15 8.84 N 37 15 13.14 N 37 21 10.18 N 37 17 4.55 N	79 55 13.38 W 79 55 13.33 W 79 54 59.14 W 79 54 56.03 W 79 57 27.55 W 79 56 40.43 W	284.6210 280.9930 278.3020 275.8890 346.1440 304.4390	-32.4190 -32.4206 -32.4260 -32.4270 -32.3737 -32.3737 -32.4242	
						Line: 1	Col: 1

6. Exit MicroStation.



Least Squares Adjustments

OBJECTIVE

This session will focus on adjusting traverse data using the Network Least Squares Adjustment in GEOPAK Survey. Also covered will be how to export various geometrical components to Carlson.

INTRODUCTION

The tools used for adjust traverses are located within GEOPAK Survey. A survey project will retain all settings made regarding adjustment options.

NETWORK LEAST SQUARES

Least Squares allows the computation of coordinate standard errors and error ellipses. While this information can be of use, for many applications they are not required. If the **Compute coordinate standard errors or error ellipses** option is off, the Least Squares reduction process operates faster as less computations are necessary.

Robustness is a re-weighting technique used in least squares in an attempt to identify blunders. It is simple strategy, which uses the residuals (amount of adjustment), in making the weaker data have less effect on the adjustment by giving the weaker data larger error estimates.

In the process of reducing data, the error estimates can be automatically derived from repetition error or defined by user input. Pressing the Error Estimates button opens the dialog depicted below.

Least Squares Error Estimates	
Error Estimates User Defined	▼
User Defined	Add On
Distance Constant 0.020	Distance Constant 0.010
Distance PPM 5.00	Distance PPM 5.00
Horz. Angle 15.0	Horz. Angle 10.0
Azimuth 0.1	Azimuth 0.1
Trig. Lev. Constant 0.050	Trig, Lev. Constant 0.030
Diff. Lev. Constant 0.010	Trig. Lev. PPM 50.00
	Diff. Lev. Constant 0.010
Setup Error 0.005	
ОК	Cancel

If the Error Estimates option is set to *User Defined*, then these error estimates are utilized instead of error estimates automatically computed from repetition error. If *From redundant measurements* + *Add Ons* is selected, then the error estimates are automatically computed from repetition error.

The entered error estimates are utilized without any influence from repetition. That is, if a particular angle was measured multiple times, a single user defined error estimate will be used instead of one being computed from repetition error.

Least Squares Error Estimates	Least Squares Error Estimates					
Error Estimates From redunda	ant measurements + Add Ons 💌					
User Defined	Add On					
Distance Constant 0.020	Distance Constant 0.010					
Distance PPM 5.00	Distance PPM 5.00					
Horz. Angle 15.0	Horz. Angle 10.0					
Azimuth 0.1	Azimuth 0.1					
Trig. Lev. Constant 0.050	Trig. Lev. Constant 0.030					
Diff. Lev. Constant 0.010	Trig. Lev. PPM 50.00					
	Diff. Lev. Constant 0.010					
Setup Error 0.005						
ОК	Cancel					

To the right of the Error Estimation group box is the Add-On group box. If the **From Redundant Measurements + Add Ons** is selected, then these values will be considered add-ons to the errors from repetition for least squares error estimation. For example, if a horizontal distance repetition error is 0.003 m and 0.003 m is specified as the Distance Constant add-on, then the error estimation for that shot will be 0.006 m. Notice that there is a separate constant for **Distance PPM** and **Trig Level PPM** since Trig Elev differences usually erode in accuracy quicker as a function of distance when compared to the horizontal distance.

Located below the User Defined group box, the **Setup Error** is added to all horizontal angle and azimuth measurement error estimates, both from repetition and user defined, and is computed by the tangent inverse of the setup error divided by the length of the line. Shorter lines get a larger error added to them whereas long lines get essentially no additional error added to them. For example, a 0.005 setup error amounts to 21 seconds in 50 ft., 2 seconds in 500 ft., and 0.2 seconds in 5000 ft. Since the **Setup Error** is always applied, set it to 0.0 to force non-application if you do not want to use it. One may think of setup error as the ability to setup over a point with the tripod and optical plummet.

LAB EXERCISE: FIELD TRAVERSE

> LEAST SQUARES ADJUSTMENT

- 1. Open the MicroStation file *c:\60843\coord_conversion\s71741.dgn*.
- 2. Access the survey project 71741 via GEOPAK Survey.
- 3. From the main Survey Menu bar select *Dataset > New*.
- 4. Make the settings as shown below.

😤 Dataset New			
Name :	TRAV	Create 💌	
Description :			
Data Source :	Data File	▼ TDS	▼ 48,95,FS2 ▼
Output Directory :			
	🔽 Use datase	et name as output su	ub-directory
File Type : TD)\$ 48,95,FS2	Raw Data	
File Type : TD)\$ 48,95,FS2	Ra w Data	File(s) to Use : 📃
File Type : TC)\$ 48,95,F\$2	Ra w Data	File(s) to Use : 2
File Type : T[DS 48,95,FS2	Ra w Data	File(s) to Use :
File Type : TC	os 48,95,FS2	Raw Data	File(s) to Use :

5. Use the Add Source File icon to select the file strv71741.RW5.

궁 Dataset New 📃 🗆 🛛
Name: TRAV Create 💌
Description :
Data Source : Data File 🔻 TDS 💌 48,95,FS2 💌
Output Directory :
✓ Use dataset name as output sub-directory
File Type : TDS 48,35,F52 Haw Data
File Type : TDS 48,35,F52 Haw Data File(s) to Use :
File Type : TDS 48,95,F52 Haw Data File(s) to Use : 2 C:\D_Drive\cec\D0T_Virginia\Advanced Trainin\strv71741.RW
File Type : TDS 48,95,F52 Haw Data File(s) to Use : C:\D_Drive\cec\D0T_Virginia\Advanced Trainin\strv71741.RW X
File (s) to Use : C:\D_Drive\cec\DOT_Virginia\Advanced Trainin\strv71741.RW
File (s) to Use : Image: State S
File (s) to Use : Image: State S

6. Click OK.

7. Select from the main Survey Menu bar *Dataset > Control Editor*.

Control Editor : C:\D_E File	Drive\cec\D0T_Virginia\Advanced Training\Survey II\data\coord_conversio 💶 🗖	X
Poi De	Sint Name : 1 Feature VDOT Pre- escription : 0101 Ne: Ne:	e∀ xt
Import CTL points Into the GPK	✓ East/X : [2697762:3600 SX: [0.0000 Europicate: ✓ North/Y : [335296.6900 Sy: [0.0000 Latitude : ✓ Elev/Z : [934.4300 Sz: [0.0000 Scale Factor:	
Constant State Plane Zone D Horz Datum [YR] : Assume Vert Datum [YR] : Assume Units : U.S. Fo	North Azimuth Type I Grid Geodetic Assumed Degrees : 0 Minutes : 0 Seconds : 0.000 Std. Error : 0.00	
	Add Delete Modify	

- 8. Review the control points in the ctl file..
- 9. Close the *Control Editor*.
- 10. Select from the main Survey Menu bar *Dataset > Reduce*.
- 11. Verify settings below and click *Process* on the reduction dialog.

🛿 Reduce :trav2\trav2.obs
Adjustment Method : Network Least Squares 🔽
· · · · · · · · · · · · · · · · · · ·
Process
Do not show reduce dialog when processing.
Import After Reduction

12. Click *OK* on the following dialog.

Alert		
	2 Unknown Feature Codes fo Do you want to save the list i	und. nto feacode.err file.
	<u>0</u> K	Cancel

13. Review the reduction report.

2	GText Editor: C:\temp\coord_conversion\trav2\trav2.rpt	
_	<u>File Edit Criteria</u>	
		-
	COPYRIGHT 1989 - RAYMOND J. HINTZ ALL RIGHTS RESERVED VER. 3.00.05 06-27-01	
	THE ELECTRONIC FIELD BOOK PROCESSOR (EFBP) INCLUDES MODULES EFB, LEVEL, LSAQ, AND SSHOT. IT IS A COPYRIGHTED SOFTWARE PACKAGE PROVIDED IN AS-IS FORM. RAYMOND J. HINTZ WILL NOT BE LIABLE OR RESPONSIBLE FOR USE OF THE PROGRAMS, FOR INFORMATION RESULTING DIRECTLY OR INDIRECTLY FROM USE OF THE PROGRAMS, OR ANY DESTRUCTION OR OTHER DISASTERS RESULTING FROM DIRECT OR INDIRECT USE OF THE PROGRAMS.	
	1 OF 8 STATIONS ARE HORIZONTAL SIDESHOTS 1 OF 8 STATIONS IDENTIFIED AS VERTICAL SIDESHOTS LEVEL NETWORK ADJUSTMENT	
	NUMBER OF BENCHMARKS = 4 NUMBER OF STATIONS = 7 NUMBER OF MEASUREMENTS = 7 NUMBER OF REQUIRED TERMS FOR NORMAL EQUATIONS = 19	
	STANDARD ERROR OF UNIT WEIGHT IS 2.742 WITH 4 DEGREES OF FREEDOM	
	PARAMETRIC HORIZONTAL LEAST SQUARES ADJUSTMENT	
	STANDARD ERROR OF UNIT WEIGHT= 1.874	
	STANDARD ERROR OF UNIT WEIGHT= 1.363 ANALYZING EXISTING X,Y COORDINATES ANALYZING SIDESHOT DISTANCES COMPUTING HORIZONTAL SIDESHOTS	_
	Line: 1 Col: 1	

14. Close the report dialog.

15. From the main Survey Menu bar select *Geometry > Navigator* and review the points.

Name 🛆 👘	Northing	Easting	Feature	Elevation
1	335296.6900	2867782.9600	VDOT	934.4300
2	336049.7000	2867798.5100	VDOT	922.5300
3	336623.8644	2867970.6165	PI	919.3824
4	337061.9977	2868625.6987	PI	915.5843
5	337028.1942	2869310.7670	PI	935.1286
6	336622.5265	2869475.9313	PI	956.8019
7	337778.6500	2868972.2100	PI	913.7100
8	338209.9300	2869229.8600	PI	905.7900

- Survey Reports
- 16. Using the reports located at *Dataset > Review Reports*, review the horizontal and the vertical adjustment reports.

17. Close the report dialog.

LAB EXERCISE: EXPORTING DATA

- > EXPORTING GEOMETRY
- 1. Open the MicroStation file *c:\60843\su60843.dgn*.
- 2. Open the project c:\60843\60843 using GEOPAK Survey.
- 3. Use the User Name *Mary*.
- 4. From the main Survey Menu bar select *Geometry > Export > LandXML1.0 Geometry*.

😤 Export Land	XML 1.0		_ 🗆 ×
Project Name:	60843		
Description:			
LandXML File:			<u> </u>
Output Mode:	Create 💌		
English Unit:	US Survey Fer 🔻	Profile	
Element Type:	Chains 🔻	NBL	
🗖 Exp	oort All Chains	NBLDESIGN	
Chain:	<select> 💌 💦</select>	NBLOG	
🗖 Exp	port Profile(s)	NBLSPL	- -
	Export		

- 5. Provide a Project Name, Description and export File Name.
- 6. Set the Output Mode to *Create*.
- 7. Set the English Unit to Survey Feet
- 8. Set the Element Type to *Chains*

8Export Land	(ML 1.0		_ 🗆 X
Project Name:	60843		
Description:	Alignments		
LandXML File	align.xml		Q
Output Mode:	Create 🔻		
English Unit:	US Survey Fe 💌	Profile	•
Element Type:	Chains 🔻	NBL	
🗖 Expo	ort All Chains	NBLLS	
Chain: [<select> 💌 💦</select>	NBLOG	
🗖 Expo	ort Profile(s)	NBLSPL	
	Export		

- 9. Use the *Chain* pulldown and select *MAINLINE*
- 10. Click Export.
 - *Note* This *XML* file can now be downloaded into Carlson to create a CL file. This will give you access to horizontal alignment data without having to key it into Carlson.