

# Second Strain St

# **1.1 Overview**

The Export to GEOPAK Drainage tool can be utilized to leverage data collected by field surveys (i.e., pipes and structures) into a GEOPAK Drainage project. This can be extremely useful when the current system is changed or augmented with new structures, which is often the case in today's transportation and site projects.

Note: GEOPAK Drainage is not required to export to Drainage, but is needed to open the drainage project for subsequent review.

The key to leveraging survey data into drainage is GEOPAK's ability to determine the feature code within Surveys and its relationship to items within the GEOPAK Drainage Library. This association between the Survey Manager Database and the Drainage Library is a Data Dictionary file. This file (not to be confused with the data dictionary files on many data collectors and GPS equipment) is an ASCII file, which associates each Feature code, which could be used for drainage applications and the Item within the Drainage Library. This file can be set up based on the organization's SMD and DLB; therefore, one file can be utilized throughout the organization.

Survey points are utilized for the structures (referred to as nodes within GEOPAK Drainage), while survey chains define the pipes (referred to links within GEOPAK Drainage.)

GEOPAK scans the specified Coordinate Geometry (GPK) file, which contains the field data, compares each feature name (and size for pipes) to the Data Dictionary file, and then displays any item for which a match is found. In this way, nodes and pipes are displayed, while non-drainage items (such as trees and fences) are not utilized. Once the items are displayed, the user has the option to use only those items for a particular processing. In this way, any items that are outside the area on interest may be removed from consideration.

When processed, GEOPAK finds the node with the lowest invert and assumes this is an outlet. Then it finds all connected pipes and that becomes a network. Then the process is repeated until all nodes and links are part of a network.

The pipes, links, and networks are stored in the specified Drainage Project File. Using GEOPAK Drainage, the user can then review, modify or utilize the information within the design or upgrade of the drainage project.

# **1.2 Deliverables from Surveys**

The following deliverables should be received from the Survey personnel:

- GPK file
- Survey Design file
- Drainage project (gdf) file

# **1.3 Reviewing Drainage Project Information**

When the Export to Drainage process is completed, review of the drainage project is prudent. A comparison of the survey data and its subsequent location in the drainage project is detailed below.

**1.** Open a blank MicroStation 3D file and attach the 3D Surveys file. Fit so the surveys data is visible.

2. Open the drainage project supplied by Surveys. By selecting

#### a.) Applications>Drainage>Drainage.

b.) Then select **Project>Open** and select the drainage gdf from the drainage pull-down.



c.) Select **Drainage > Network > Edit**.

The Dialog below is used to build (Validation) the networks. Each network is built individually. First select the **Network ID** (top left of dialog) then Select the **Build Network** icon (bottom left of dialog).

Ketwork Configuration - [DW65300]	
Network ID: 4 DW65300 -	🐝 🏂 🏦 Apply
Details Description: Validation Validation Computations	Outlet Node: DW65300   Lock Sizes Unlock Sizes Lock Elevations Unlock Elevations

When the Network is built within Drainage, the number of Nodes and Links in the Information dialog matches the number of Nodes and Links in the Export dialog. Now build the remainder of the networks.

Informat	tion
į)	Network DW65300 Successfully Built Total Node in Network = 3 Total Links in Network = 2
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**3.** Now select **Utilities>Navigator**. The dialog below displays the Drainage Navigator in the Link mode.

Navigator			×
View Tools			
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ID	Description		
CCMP3	BC: 0 EC: 0		*
CCMP5	BC: 0 EC: 1	=	Π
CCMP7	BC: 0 EC: 0	-	V
CCMP8	BC: 0 EC: 0		
CCMP9	BC: 0 EC: 0		н <sub>а:</sub>
CRCP3	BC: 0 EC: 0		-
CRCP4	BC: 0 EC: 0	-	D
Highlight	Window Center Que	ry	

Next, review an individual entry for a Link (in this example (CCMP3) by a double-click on the link you want to review from the Navigator.

Note the **Shape**, **Material**, **Size**, **Manning's n**, and **Override Library Pay item** are populated from the Exporting process.

Link Configurati	on Definition
Link ID: 4 CCM	P3
Details	
Options	Description: BC: 0 EC: 0
Definition	From Node: DW65040 🔻 🏂 To Node: DW65050 💌 🏂
Conditions	Length: 66.2848 Use MS Element
Constraints	Configuration
Computation	Shape: Circular 🔻 Material: Steel 💌
Туре	Design Size Size: 12 in Select
Pipe	Design Barrels Number of Barrels: 1 T Boughness: 0.011
Ditch	
U Direction	V Ovemde Library Payitem: CEXDRNCMP

The **Length** in the drainage dialog can be verified by selecting **DESCRIBE SURVEY CHAIN CCMP10** in COGO as shown below.

Coordinate Geometry Job: 001 Operator: jm	
$\begin{array}{c c} \hline & \hline $	°c ₽ ≪ < > > □
<* 1 DESCRIBE SURVEY CHAIN CCMP3 Survey chain CCMP3 contains: DW65041 DW65051	···· •
Beginning survey chain CCMP3 description. Data Set: DRAIN Zone: 1 Attribute: NOTINCLUDED Feature: CCMP3 Description: Station: 0+00.00	
Point:DW65041 X 543,337.68 Y 173,471.32 Z 1.446.3090 Dataset:DRAIN Zone:1 Geometry:POINT Attribute:NOTINCLUDED \ CCMP3 \ MNDT FL ENT  Course from DW65041 to DW65051 117° 23' 10.13" Dist 66.28 Slope Dist 66.29 Elev Diff 0.74 Grade 0.01	 
Point:DW65051 X 543,396.54 Y 173,440.83 Z 1,445.5680 Dataset:DRAIN Zone:1 Geometry:POINT Attribute:NOTINCLUDED\ CCMP3\ MNDT FL ENT	
Ending survey chain CCMP3 description.	-

The elevations of the links can also be verified by reviewing the two points in COGO and the Link dialog in the Conditions option. The sample COGO dialog below has the two shots for **CCMP10**. The dialog below depicts the same pipe, the Link Configuration Dialog. Note the two-invert elevations match the two elevations in the COGO dialog above.

Link Configuration	Conditions					
Link ID: 4 CCMP3	•	) ▶ 🔲 Windov	w Center 🧚	י∕ ≯	1	Apply
Details						
Options Definition Conditions Constraints Computation	Profile Conditi Min Cover: Soffit: Invert:	ons From Node 1446.309 1447.309 1446.309	Slope 1.118 1.118	•	To Node 1445.568 1446.568 1445.568	
Type	Max Depth:	1386.309	1.118		1385.568	

## **1.4 Drawing Drainage Project Information**

**1.** If not done in 1.3.1, open a blank MicroStation 3D file and attach the 3D Surveys file. Fit so the surveys data is visible.

- 2. Open the drainage project supplied by Surveys.
- 3. Select Drainage > Project > Preferences > Project Components.

Verify that the Drainage Library Files (DLB) is S:\MndotV8Stds\DOT\_GEOPAK\dlb\hyde.dlb

Verify that the GPK Job Number is correct and the the Road Preferences are set correctly

Verify that the Drainage Cell Files is S:\MndotV8Stds\DOT\_MICRO\cell\hydro.cel

Verify that the GEOPAK DDB is S:\MndotV8Stds\DOT\_GEOPAK\db\english.ddb

4. Select **Drainage > Utilities > Navigator** and review the networks.

5. To draw the pipes, highlight all links in the Navigator, and select **Tools > Update Pay Items**. This will draw the flow arrows (using the linestyle **SEW(R)**)

🐂 Nav	igator					×
View	Tools					
$\chi_{k}$	Update Update	Graphics Pay Items	ର୍ଷ 🖊	<sup>•</sup> 🖽 4	⁄≻ ¥	
ID		Desci	iption			
CCM	23	BC: (	) EC: 0			*
CCMF	°5	BC: (	) EC: 1		=	머
CCMF	77	BC: 0	) EC: 0		-	$\overline{}$
CCMF	°8	BC: 0	) EC: 0			$\sim$
CCMF	9	BC: 0	) EC: 0			17
CRCF	3	BC: 0	) EC: 0			-
CRCF	4	BC: 0	) EC: 0		-	TD.
🔳 Hi	ghlight [	Window (	Center	Quen	/	2

6. To draw the structures, highlight all nodes in the Navigator, and select **Tools >** Update Pay Items.

🐂 Nav	vigator					×
View	Tools	_				
X,	Update	e Graphics	<b>X</b> /	bas 🍌	¥	
	Update	e Pay Items 🎽	2		*	
ID		Descrip	otion			
DW6	5000	CAPR				ਣ
DW6	5010	CAPR				P
DW6	5020	CAPR				~
DW6	5030	CAPR				$\sim$
DW6	5040	CEND				17
DW6	5050	CEND				-
DW6	5070	CEOS/	A		Ŧ	Tu
📄 Hi	ghlight [	Window Ce	enter	Query		2

### **1.5 Set to Project Chain and Offset**

- **1.** Select the GPK file with the chain you are assigning has been set in the Preferences.
- 2. Select Project>Preferences>Project Components

Project	Component	Network	Reports	Utilities	Tool Boxe
<u>N</u> ew	8				
Open.					
<u>S</u> ave					
Save §	<u>4</u> s				
Prefer	ences				
<u>D</u> raina	ige Library				
Import				E.	
<u>E</u> xport	1			ы	
E <u>xi</u> t					
\Sel	fTrain\mohr1je	on\Survey\(	6916.gdf		
pw:\Se	elfTrain\mohr1	jon\Survey	\99.gdf		

Eile			
Options	Drainage Library File (DLB):	pw:\CADDStandards\MnDOTStand	9
Units Project Components	GPK Job Number:	99 Q User Preferer	nces
Rainfall Parameters	Drainage Cell Library:	pw:\CADDStandards\MnDOTStand	٩
Land Use Options Frequency Options	Criteria Directory:		۹
Intensity Option	DDB:	pw:\CADDStandards\MnDOTStand	Q
Junction Losses Inlet Options	Water and Sewer Project:		۹
Node Options	Superelevation Shapes File:		۹
Profile Options Plan Sumbologu	Site Project:		٩
Updates Save Options		]	٩
	Design Surface		
	TIN File 💌		Q

- 2. Open the Drainage Navigator (Drainage > Utilities > Navigator).
- **3.** Set the Active Component Type to Node. Select all the Nodes that you wish to assign the alignment to. Load Global Editor (View/Global Editor).

iew Tools		
Navigator	9 😼 🙍 🦯 🛤	14
ID	Description	~
DW65000	CAPR	
DW65010	CAPR	
DW65020	CAPR	
DW65030	CAPR	
DW65040	CEND	
DW65050	CEND	
DV//CE070	CEOSA	V

**4.** Choose variable to edit: Node - Reference Chain. Turn on button Overwrite Text, and type in Chain name. Left-click **Apply Edit No Confirm** button (at this point, if you look at one of the nodes, the alignment should have been assigned, but the station won't have been updated yet).

🔛 Global Ed	itor				
View Tools					
Xy X	④ ₩ 🗹 🖊 🛤	14	Current Value:		
ID	Description	~	Variable to Edit		
DW65000	CAPR		Node - ID	~	Overwrite Text:
DW65010	CAPR		Node - Description		Now Tout
DW65020	CAPR		Node - Reference Chain		inew resci
DW65030	CAPR		Node - Reference PGL		Find and Beplace:
DW65040	CEND		Node - Reference TIN		
DW65050	CEND		Node - Elevation		rinu rext.
DW65070	CEOSA	$\sim$	Node - Reference Elevation	Y	Replace Text:
Highlight	Window Center	uery App	bly Edit With Confirm Apply Edit No	Confirm	

- 5. Back in Navigator, select all of the nodes (or all for which alignment assigned).
- 6. Tools/Update Graphics now station/offset should be updated for each of these nodes.

**7.** To Verify the chain, station, and offset Select **Drainage > Component > Node > Location**. For each of the nodes you changed.

## **1.6 Create Existing Tabulation Sheet**

- 1. Select MnDOTMenu > VBA > Drainage > Drainage Tabulation from MicroStation Tool Bar.
- 2. Select the Drainage Database (gdf) you want to tabulate.

Drainage Ta	bulations	
Drainage Data	abase:	-
c:\projectwise	e\pw_working\mohr1jon\c	9
Sheet:		H
Table Type:	Inplace Drainage Table	•
Place Tab	Profile Table Erosion Control Table Casting Assembly Table Profile Table (Metro)	
	Inplace Drainage Table	

3. Select Inplace Drainage Table for Table Type



Note: This vba creates a table for all of the nodes and links within the gdf.

4. Save the Microsoft Excel file.

older			400		Save
<u>a</u>			Selec	:t	Cancel
ocument					
Name:	s2726_test_hyd	d.xlsx			
Description:	s2726_test_hyd				
File Name:	s2726_test_hyd				
Format:	XLSX		Format	5	
2.2.2				_	

5. Wait until the Table Complete dialog displays, select **OK** 

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6. Open the Excel file you just created.

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STRUCT NO.	FLOWS TO	STRUCTURE LOCATION					DRAINAGE STRUCTURES						PIPE SEWER			
		ALIGN	CASTING		BOT	TOM			<u>ە</u> ك	35 28		A STATE OF STATE	2 1968			
			STATION	OFFSET	STATION	OFFSET	TYPE		CASTIN ASSEMBI TYPE	STEPS REQ'D	CONE	TOP OF CASTING ELEV	OUTLET	INLET BLEV DOWN STREAL STRUCT	18" CPP	10" PVC
DH61810	DH61820	S.	114+05.61	24	0	· · · · · ·	CB	4.5	Existing Grate			847.28	842.78	843.29	75	-
DH61810	DH61860	8	114+05.61	24	8 F 5	s	CB	4.6	Existing Grate	- 84 - 64		847.28	842.68	842.31	51	
DH61060	DH61090	8	135+24.19	-21		1	CB	2.4	Existing Grate			836.22	833.82	831.69		44
DH61070	DH61080	9	134+31.85	-25	10 1	2	CB	2.5	Existing Grate	32 B	2	837.27	834.77	834.34		51
DH60960	DH60970		145+44.89	34			MH	4.8	Existing Manhole		,	840.69	835.89	836.63		20
DH60970	DH69920	0	145+62.22	23			MH	3.5	Existing Manhole			840.33	836.83	836.87		11
DH60330	DH60340		169+58.79	-21			CB	2.7	Existing Grate	11 1		835.15	832.4	831.85		16
DH61260	DH61270		174+28.95	-21			CB	2.9	Existing Grate			833.54	830.64	829.08		45
DH61330	DH61320	0. 0	174+29.25	21			CB	2.8	Existing Grate			833.8	831	829.18	¢	45

- 7. There are empty columns you should hide.
- 8. Modify as needed and import tab into a dgn using Axiom Office Importer.