SCDOT

South Carolina Department of Transportation

SCDOT GEOPAK Drainage Manual for Roadway Design

Introduction

Introduction

This manual is designed for the Roadway division's usage of GEOPAK Drainage.

- Purpose

As all of us know, placing drainage onto a highway project is a time consuming process. In the past, Hydrology has provided to Road Design a red lined set of prints that has the drainage design drawn onto it. The drainage design was either labeled by hand on the red line set of prints or a computer printout providing the pipe sizes, flow line information, and box types was provided.

It was then the responsibility of the engineer in Road Design to place and label the drainage accurately on our plans. This process involves careful attention to detail when placing and labeling the drainage. It is our goal to help eliminate the potential for error when transferring the drainage design onto the plans, as well as to decrease the amount of time necessary to place and label the drainage design.

- Terminology

The following is a list of Geopak Drainage terminology.

Node – A node typically represents a drainage structure that has a point location. Examples include: catch basins, drop inlets, junction boxes, manholes, and points.

Link – A link represents a linear feature connecting two nodes, running from upstream to downstream. Examples include: pipes, ditches and channels.

Chapter 1: Data and Organization

1. Files

The following is a list of typical file types utilized by Geopak Drainage.

The GDF file is the Geopak Drainage File and contains all the hydraulic information about the drainage design. This file also references the GPK file.

File Type:	GDF
Type	Binary
Acronym	GDF = **G**eopak **D**rainage **F**ile
Use	Stores the Drainage components

The DLB file is the Drainage Library file utilized by Hydrology and contains the standards for the drainage design. It contains the nodes, links, as well as other design information necessary for Hydrology to analyze the systems contained in the design.

File Type:	DLB
Type	Binary
Acronym	DLB = **D**rainage **LiB**rary File
Use	Geopak Drainage Library file

The LSF File is the Label Style File. This file contains the layouts of commonly used labels.

File Type:	LSF
Type	Binary
Acronym	LSF = **L**abel **S**tyle **F**ile
Use	Geopak Drainage Labeling

The GPK File is the main Coordinate Geometry file.

File Type:	GPK
Type	Binary
Acronym	GPK = **G**eo**Pa**K
Use	Stationing, Profiling, Reporting, Chains, Profiles, etc.

The pp.dgn file is the plan view of the project. The pp.dgn file will usually be named *#####pp.dgn. The * is either "r", "m" or "c" and the ##### is the pin number. The .dgn is the designation for all Microstation design files.

File Type:	PP.DGN
Type	Binary
Acronym	DGN = **D**esi**GN**
Use	Plan View

The pf.dgn file is the plan and profile view of the project as it appears on the plan sheets. There will usually be more than one of these files for every project unless the project is very small.

File Type:	PF.DGN
Type	Binary
Acronym	DGN = **D**esi**GN**
Use	Plan & Profile View

The hy.dgn file is the Microstation file that is used by the Hydrology division.

File Type:	HY.DGN
Type	Binary
Acronym	DGN = **D**esi**GN**
Use	Microstation file for Geopak Drainage design

The Cell Library file is used by the Drainage division for placing Drainage Nodes into the HY.DGN file and for computing quantities.

File Type:	*.CEL
Type	Binary
Acronym	CEL = **CELL**
Use	Used for placing Node Cells

The Design & Computation Manager database file is used to compute drainage quantities.

File Type:	*.DDB
Type	Binary
Acronym	DDB = **D**esign **D**ata**B**ase
Use	Used for computing quantities

The Drainage Report File contains the variables to output to the excel CSV file.

File Type:	*.DRF
Type	Binary
Acronym	DRF = **D**rainage **R**eport **F**ile
Use	Used for automatically selecting report variables

The Comma Separated Values file contains the output variables from the drainage GDF file.

File Type:	*.CSV
Type	Binary
Acronym	CSV = **C**omma **S**eparated **V**alues
Use	Used for viewing report output in Excel

2. Exchange of Information

This section covers the transfer of information *to* and *from* Hydraulic Engineering.

- Generating Profiles

Hydrology requires profile information from Road Design before they can begin their design process. In addition to centerline profile grades, Hydrology will require top of curb profile grades and valley gutter profile grades early in our design process. Hydrology references our curb profile grades and valley gutter profile grades to design their drainage systems. In the future, Hydrology will be able to directly reference our shape files resulting in us not having to provide them curb grades and valley gutter grades.

It is important for Road Design to use a consistent naming symbology when generating curb profiles and valley gutter profiles. The following is an example of how to name these profiles to avoid confusion.

Example: TCL93FP or VGR93FP

> Section Type = TC or VG
> Location from Centerline = L or R
> Abbreviated Alignment Name = 93 (short for SC93)
> Future Profile = FP

- Info to Hydrology

Once the necessary profiles have been generated, you will then need to transfer the information to Hydrology. Hydrology requires the following information:

Hard Copy
1. Cross Sections <u>to scale</u> on half size sheets
   a. Mainline
   b. Side roads
   c. Outfall ditches
2. Plan Sheets <u>to scale</u> on half size sheets
   a. Centerline final grades for mainline
   b. Final grades for side roads
   c. All outfall ditch surveys
   d. Limits of construction line
   e. All existing survey pipe recommendations

Electronic Copy
1. Project **.GPK** file
2. Project **PP.DGN** file
3. Project **PF.DGN** file
4. Project **DX.DGN** & **FX.DGN** files
5. Project **.NEW** file
6. Excel file containing survey data, including control points
7. Centerline and top of curb pgl's.
8. Project curb grades

The excel spreadsheet is a standard form that will be made available to everyone. This file contains detailed descriptions of COGO chain names, profiles, pp.dgn file name, pf.dgn file names, the server location of project files, as well as other important information. The file should be named as follows:

Example: R21686.xls
English or Metric = R or M
Pin Number = 21686

The following page is a printout of what the excel spreadsheet looks like. The gray areas contain information to be edited for each project.

ROAD DESIGN DATA FOR HYDRAULIC DESIGN
DATE: 8/18/2008

DESIGN GROUP:	RPG 4 - UPSTATE

PIN NO.:	36298

COUNTY:	OCONEE

ROAD/ROUTE NO.:	S-402 / SHEEPFARM RD.

PROJECT DESCRIPTION:	WIDEN (SHEEPFARM RD.) EXISTING 2 LANES TO 5 LANE CURB & GUTTER WITH BIKE LANES AND SIDEWALKS ON BOTH SIDES. CONNECT SHEEPFARM ROAD TO SC 28 (BLUE RIDGE BLVD.) WITH NEW LOCATION STARTING AT S-135 (BOUNTYLAND ROAD).

ADDITIONAL NOTES:	S-135 WILL BE WIDENED TO 5 LANE CURB & GUTTER AT THE INTERSECTION WITH SHEEPFARM ROAD. IT WILL THEN TIE BACK TO THE EXISTING PAVEMENT. STONEBROOK DRIVE WILL HAVE A VALLEY GUTTER. ALL OTHER SIDE ROADS WILL HAVE DITCH SECTIONS.

FILE INFORMATION

	SERVER	DESIGN GROUP	COUNTY	PIN
FILES LOCATED:	NTS/HQ/Precon/	RPG 4	OCONEE	36298

'.GPK' FILE(S):	JOB298.GPK			

'PP' FILE(S):	R36298PP.DGN			

'PF' FILE(S)	R36298PF1.DGN			S-402 (SHTS. 6 - 13)
	R36298PF2.DGN			SIDE ROADS (SHTS. 14 - 23)
	R36298PF3.DGN			SIDE ROADS (SHTS. 24 - 26)

'.NEW' FILE(S):	36298.NEW		
	36298A.NEW		

CHAIN NAME	PROPOSED PROFILE	DESCRIPTION
S402REL	S402RFP	CENTER LINE GRADE S-402 RELOCATION
US76		CENTER LINE US 76
BROOKLANER	BROOKLANERFP	CENTER LINE GRADE BROOK LN. REL.
STONEBROOKR	STONEBROOKRFP	CENTER LINE GRADE STONEBROOK DR. REL.
S135REL	S135RFP	CENTER LINE GRADE S-135 RELOCATION
SPRINGWOOD		CENTER LINE EAST SPRINGWOOD DR.
OCONEER1	OCONEER1FP	CL GRADE OCONEE ESTATES REL. PART 1
OCONEER2	OCONEER2FP	CL GRADE OCONEE ESTATES REL. PART 2
ALBERTSR	ALBERTSRFP	CENTER LINE GRADE ALBERT'S RD. REL.
PAULGILLR	PAULGILLRFP	CENTER LINE GRADE PAUL GILLISON RD. REL.
SC28		CENTER LINE SC 28
TANGLEWOOD		CENTER LINE TANGLEWOOD DR.
STREAM1		CENTER LINE OF STREAM #1
STREAM2		CENTER LINE OF STREAM #2
STREAM3		CENTER LINE OF STREAM #3
STREAM4		CENTER LINE OF STREAM #4
STREAM5		CENTER LINE OF STREAM #5
STREAM6		CENTER LINE OF STREAM #6

CHAIN NAME	CROSS SECTIONS	DESCRIPTION
S402REL	S402REL_DX_SCALED.DGN	STA. 10+00.00 - 114+64.38
US76	US76DX.DGN	STA. 10+50.00 - 20+00.00
BROOKLANER	BROOKLANERDX_SCALED.DGN	STA. 10+35.87 - 16+27.98
STONEBROOKR	STONEBROOKRDX_SCALED.DGN	STA. 10+35.92 - 15+94.48
S135REL	S135RDX_SCALED.DGN	STA. 10+00.00 - 42+79.57
SPRINGWOOD	SPRINGWOODDX.DGN	STA. 10+12.71 - 15+57.93
OCONEER1	OCONEER1DX_SCALED.DGN	STA. 10+30.38 - 16+00.00
OCONEER2	OCONEER2DX_SCALED.DGN	STA. 36+00.00 - 41+26.31
ALBERTSR	ALBERTSRDX_SCALED.DGN	STA. 7+00.00 - 12+22.35
PAULGILLR	PAULGILLRDX_SCALED.DGN	STA. 15+02.15 - 19+01.89
SC28	SC28DX.DGN	STA. 648+00.00 - 660+00.00
TANGLEWOOD		

- Info from Hydrology

When Hydrology completes their drainage design, they will send you an excel spreadsheet containing information necessary for you to understand their drainage design. This spreadsheet will contain the server location of their files, the name of the gdf file, the name of the dlb file, as well as other important information.

The following is a printout of what the excel spreadsheet from Hydrology will look like:

HYDRAULIC DESIGN DATA FOR ROAD DESIGN							
DATE:							
HYDRO SQUAD:	VAUGHAN						
PIN NO.:	21686						
COUNTY:	ABBEVILLE						
ROAD/ROUTE NO.:	SC-72						
PROJECT DESCRIPTION:	THIS AREA WILL BE USED TO DESCRIBE THE PROJECT						
ADDITIONAL NOTES:	THIS SPACE WILL BE USED FOR ANY ADDITIONAL						
FILE INFORMATION							
	SMPSERV6	\	HYDRO SQD	\	COUNTY	\	PIN
FILES LOCATED:	SMPSERV6	\	VAUGHAN	\	ABBEVILLE	\	21686
'.GDF' FILE:	SC93.GDF						
'.DLB' FILE:							
EXCEL' FILE(S)							

In addition to receiving the spreadsheet from Hydrology, we will also receive the following information:

Hard Copy
1. Plan sheets stating which existing pipes are to be abandoned or retained.

Electronic Copy
1. Project **.GDF** file
2. Project **.DLB** Drainage Library file (if modified for project exceptions)
3. Project **HY.DGN** file
4. Proposed ditch cross sections
5. Alternate Pipe spreadsheet
6. Erosion Control Data Sheet
7. Additional erosion control BMP recommendations as appropriate

.

Chapter 2: Getting Started

1. Opening Drainage

The location and names of the files you will need for the drainage design are on the spreadsheet you received from Hydrology.

Before opening Drainage use the following steps:

1. Copy the GDF File and (if received) the DLB File to the project directory on your machine; you are now ready to begin using GEOPAK Drainage.
2. Open the pp.dgn file for the project.

2. Main Menu Bar

The Drainage Menu Bar is initiated from the Applications pull-down menu, remains open while Drainage is open, and can be docked:
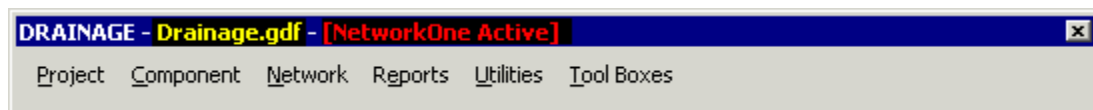
The Menu Bar always displays the **GDF file** name (shown above in **yellow**) and the **Active Network** (shown above in **red**).

To open the Drainage file:
1. Use the Drainage menu bar shown above and select **Project>Open** and select the GDF File from the project directory.
2. Ignore any Warning Messages (if any) for now.

3. Configuration & Settings Files

Geopak Drainage by default will select configuration files, but a good rule of thumb is to use the same dlb, cel library & ddb files that the hydraulic designer used in creating their systems. These are usually found in the projects hydro folder or by asking the designer for help in their location. Care should be taken to ensure that the correct workspace is utilized.

4. Setting Preferences

Select **Project>Preferences** and set the Project Components as shown below:
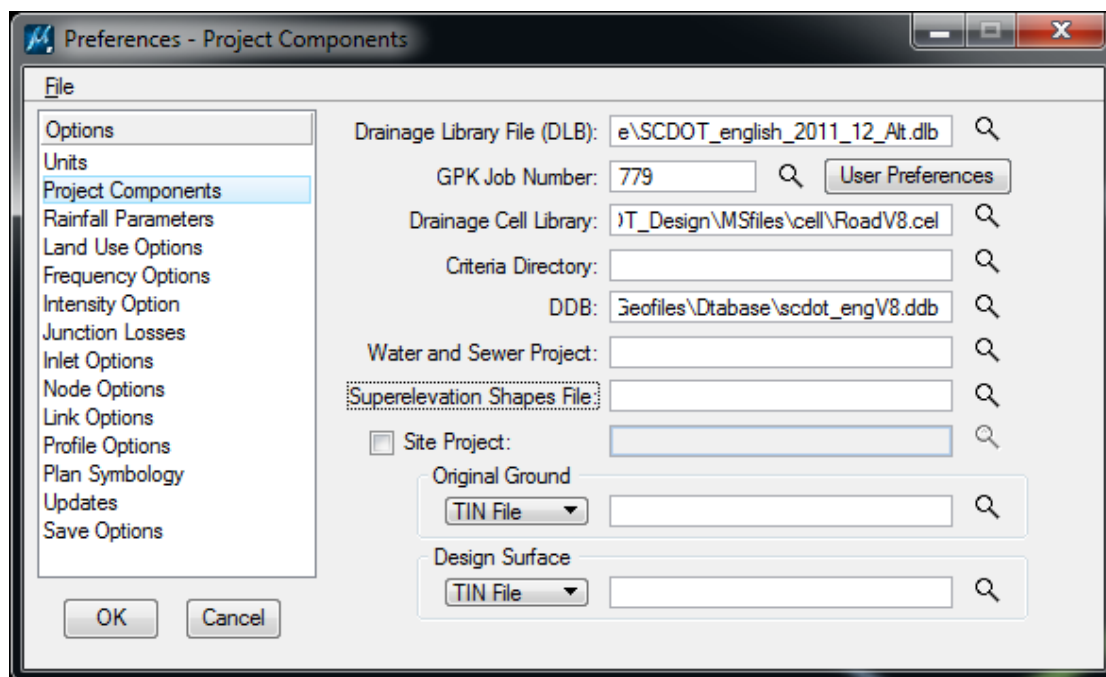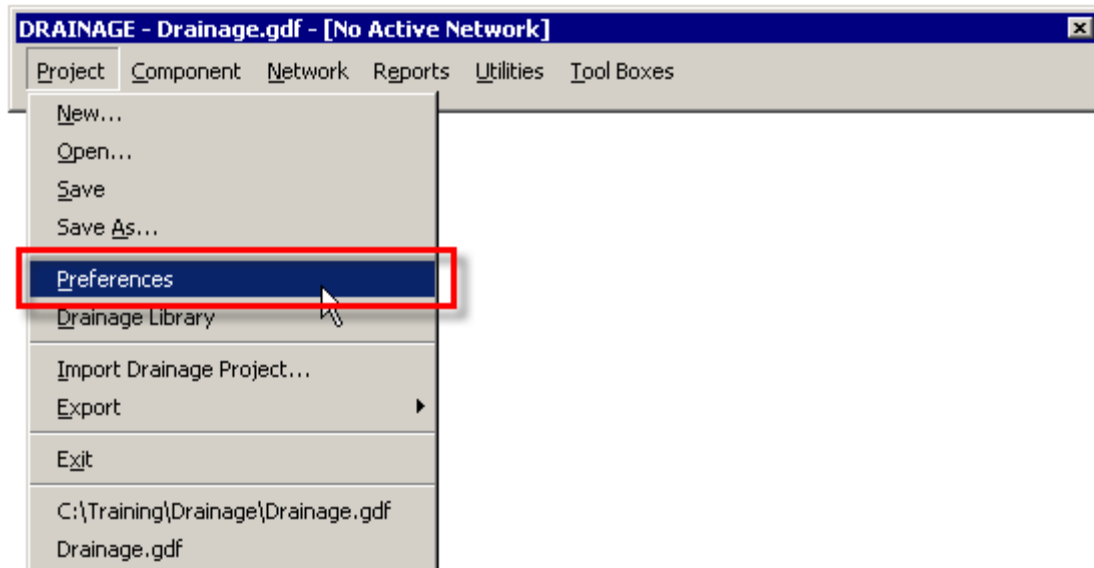
1. Select the DLB File from the project Hydro folder as used by the Hydraulic Designer
2. Select the correct GPK File.
3. Check the Road Preferences to make sure everything is properly setup
4. Select RoadV8.cel for your Drainage Cell Library
1. Select scdot_engV8.ddb as your Geopak ddb file
2. Select **OK** when finished.

Chapter 3: Drainage Navigator

The Navigator tool provides an easy way to maneuver, add, edit, delete, query and identify the drainage components of the GEOPAK Drainage Project.

It also allows us to easily draw the drainage into our pp.dgn file by means of updating graphics. After that, we can update pay items and use automated quantity computation.

To open the Navigator, select **Utilities>Navigator** from the pull-down on the main Drainage menu bar:
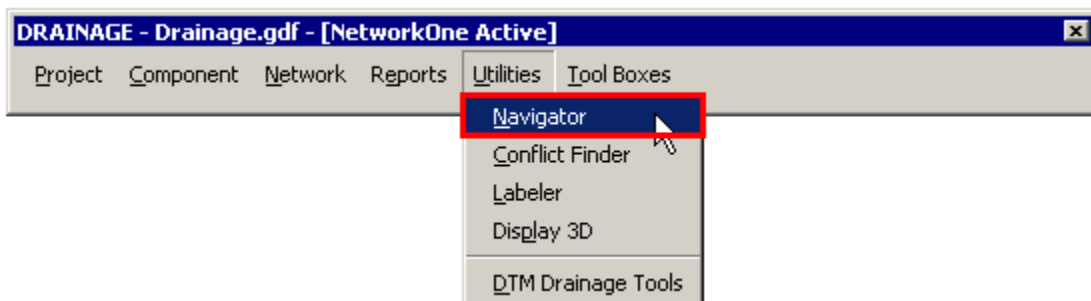
The Navigator has the following toolsets:
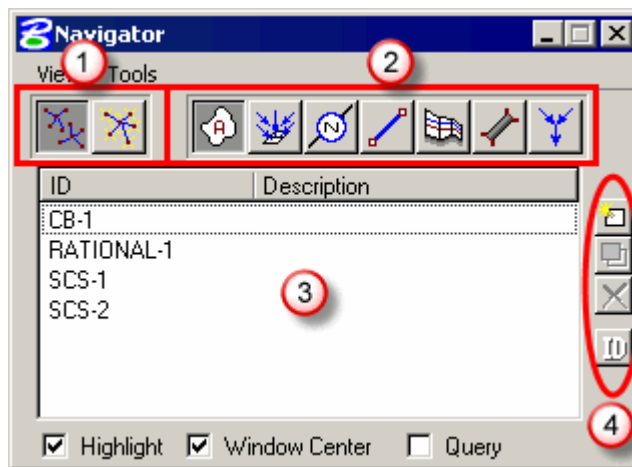
①	Networks	Choose to navigate through "All Networks" or only the "Active Network".
②	Components	Options include: Areas, Inlets, Nodes, Links, Profiles, Culverts and Routings, displayed left to right
③	ID List	The list of components available by the selection in bullet #2 above
④	Action buttons	Click to add / modify / delete / or ID any component for modifications

1. Navigating

The Navigator window allows you to click through the lists of drainage objects to identify and modify the components you are interested in.
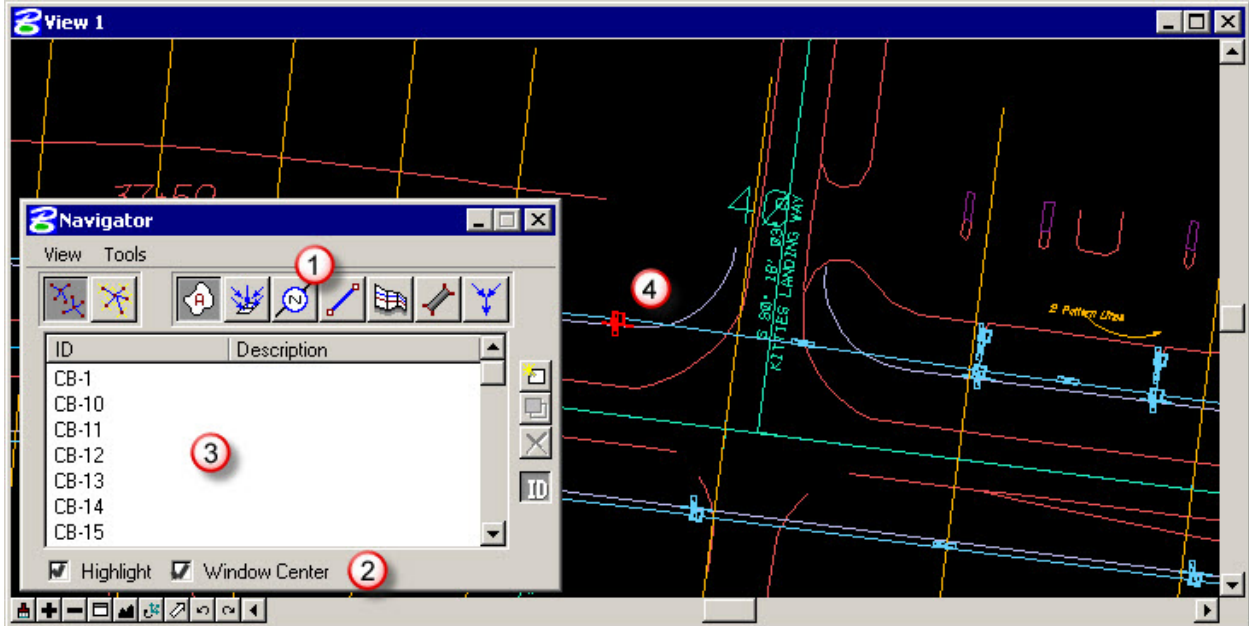
1	Type	Select the component type of interest – only that type will be shown in the components list.
2	Toggles	Toggle ON so the Microstation view will highlight and center on a drainage component when it is selected.
3	Component	Click any component in the list.
4	View	The Microstation view updates to window center and highlight the selected drainage component.
5		Repeat as necessary to navigate the components

2. Updating Graphics

To update the Drainage graphics in the PP.DGN file, follow the steps below:
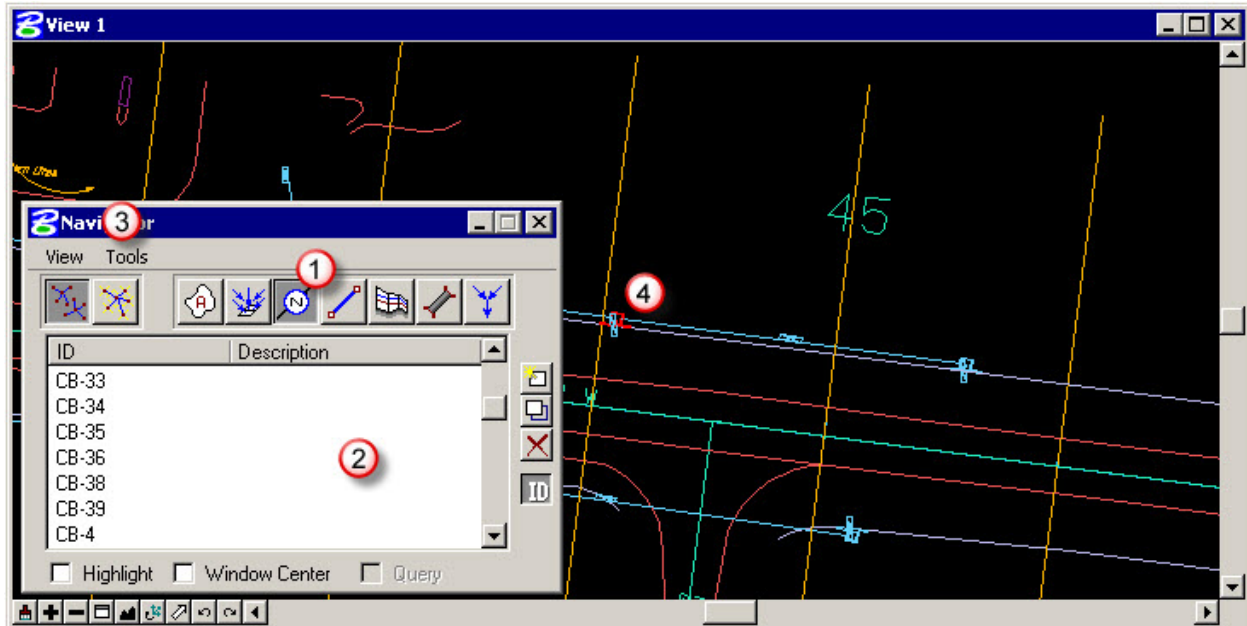
(1)	Type	Select the component type of interest
(2)	Selection	Select all (or any you wish) components in the list for graphical updating
(3)	Tools	Select Tools > Update Graphics to commence the procedure
(4)	View	The Microstation view updates with the revised graphics.
(5)		Repeat as necessary to update the graphics on the components.

3. Updating Pay Items

To update the Drainage graphics in the PP.DGN file according to the symbology in the DDB file, in order to compute quantities, follow the steps below:
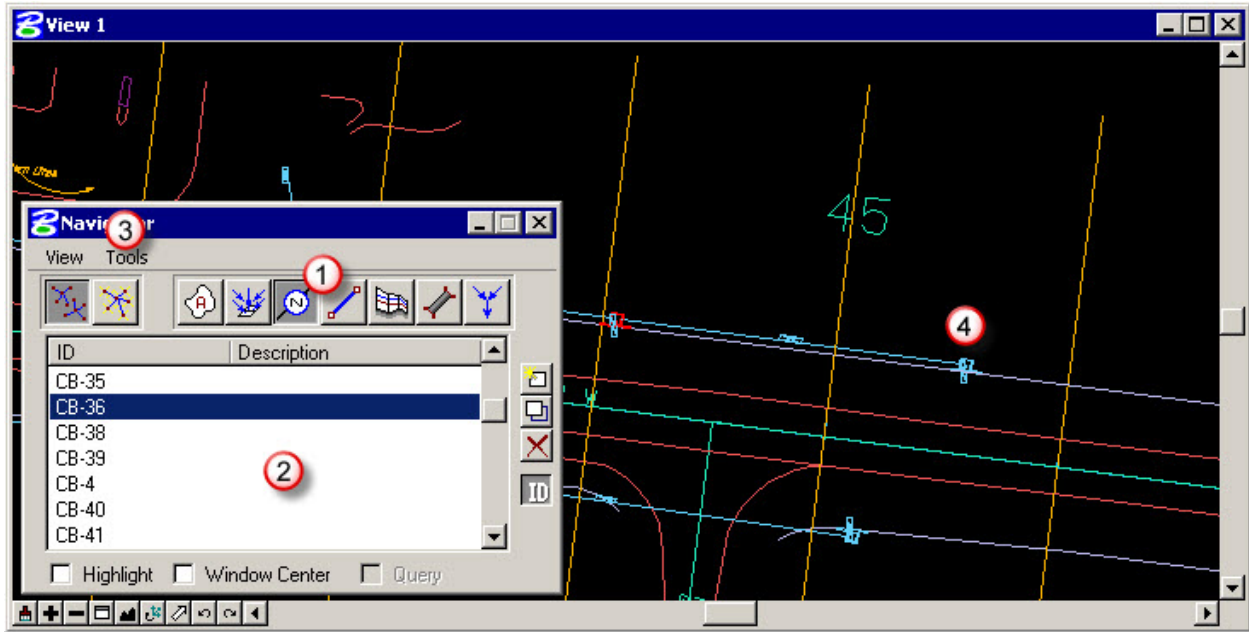
(1)	Type	Select the component type of interest
(2)	Selection	Select all (or any you wish) components in the list for Pay Item updating
(3)	Tools	Select Tools > Update Pay Items to commence the procedure
(4)	View	The Microstation view updates with the revised Pay Items
(5)		Repeat as necessary to update the Pay Items on the components

Links will be on level "RD_PD_DR_Pipe" with a custom line style of PIPE NEW1; the nodes will be on level "RD_PD_DR_Inlet" with the proper cell.

4. Identifying Items

Navigator can also be used to identify a drainage component from its graphic in the Microstation file.
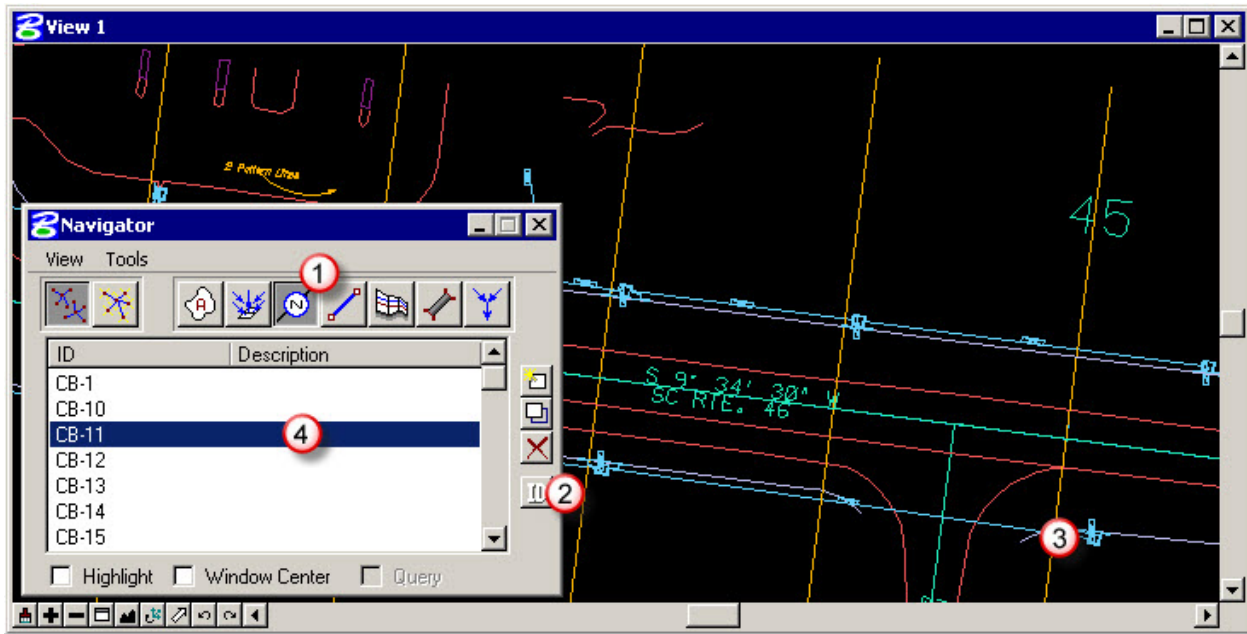
(1)	Type	Select the component type of interest.	
(2)	ID	Click the ID button	
(3)	Select	Select any Node or Link in the DGN file	
(4)	Navigator	Notice the specific Node or Link gets found and highlighted in the Navigator window	
(5)		Repeat as necessary to identify the drainage components.	

Chapter 4: Drafting

1. Driveway Pipes

The following procedures are used to draw, label, and report on drive pipes or cross pipes.

- Start a Project

To start a new Drainage Project:

1. Open the Microstation DGN file.
2. From Microstation, select Applications>GEOPAK DRAINAGE>Drainage (if GEOPAK is not activated select Applications>GEOPAK>Activate GEOPAK).
3. You should now have a new menu item by Applications titled Drainage.
4. Selecting Drainage>Project>Save As... Name the file after the driveways pipes or cross pipes being improved.

GEOPAK Drainage always starts in an untitled project; it does not remember or automatically reopen a GDF that was previously worked in. The .GDF file must be reopened manually each time you open the DGN file. Select Project > Open each time you start to edit or continue working on a project.

- Set the Preferences

Set the Preferences; from the main Drainage menu bar *Project > Preferences:*
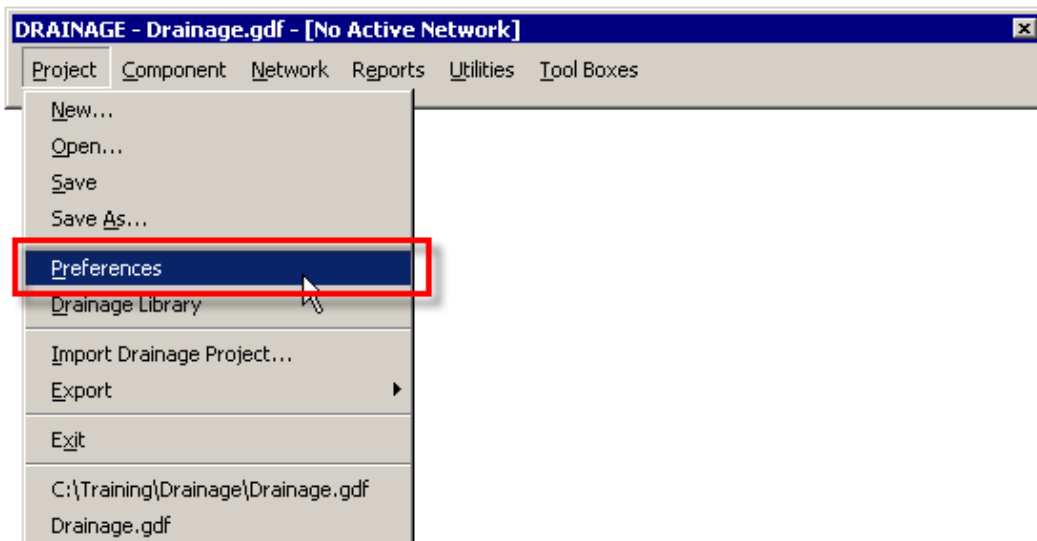
Set the **Project Components** as shown below:
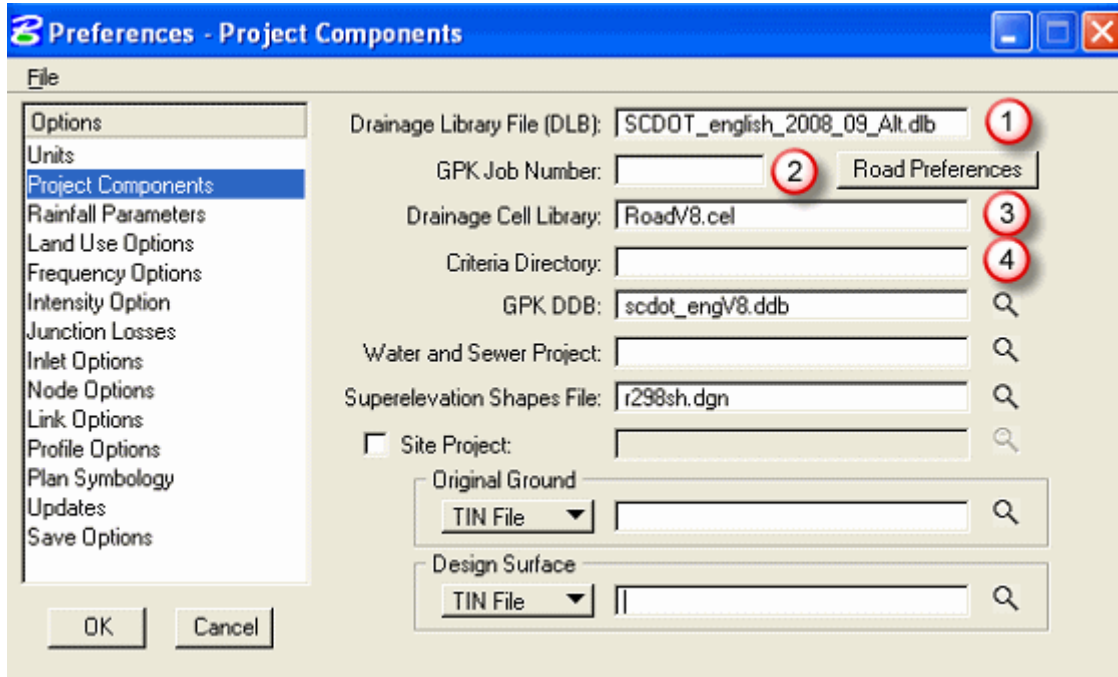
①	DLB	Click on the magnifying glass button and select the DLB file
②	GPK	Click the magnifying glass button and select the GPK Job Number. You need to select your project directory and choose the file job###.gpk; there should only be one .gpk file. When you choose OK only the 3-digit number that was in the file name appears.
③	CEL	Click the magnifying glass and select the roadv8.cel file in the workspace folder.
④	DDB	Click the magnifying glass and select the scdot_engV8.ddb file in the workspace location.

- Add Nodes

To add nodes go to **Drainage>Component>Node>Add**. The "Add a New Node" dialog will open for each Node asking for a Node name prefix and number. The number automatically increases for each node up to 10000. These instructions will place the upstream node for the pipe. Repeat them for the downstream node when you are through.
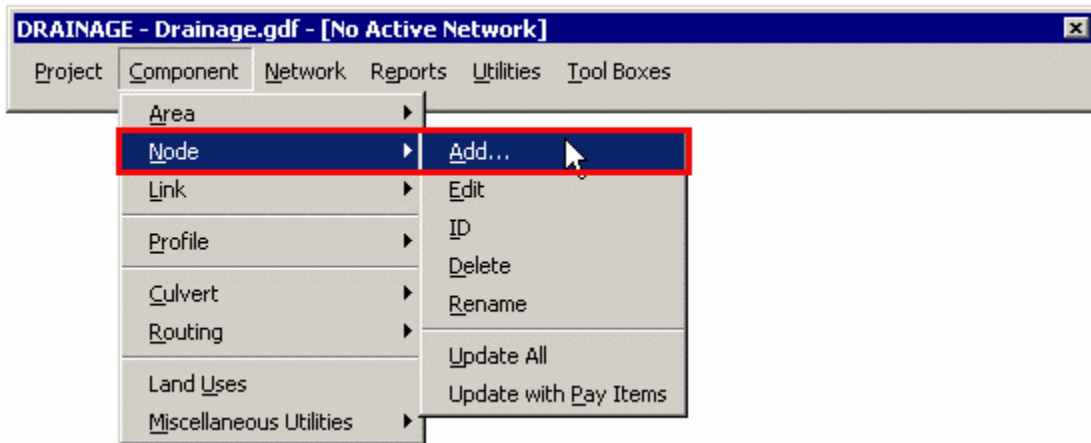
Set the Properties Options:
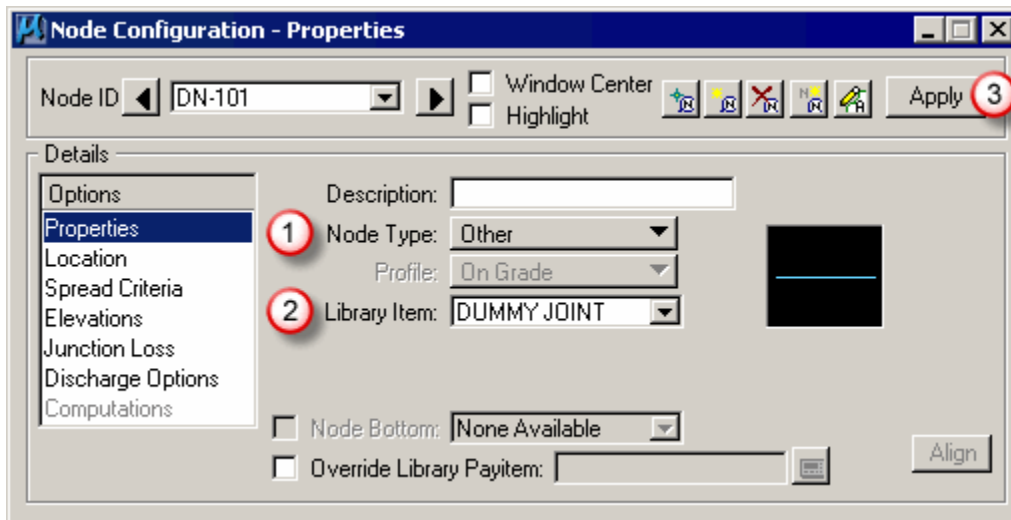
①	Node Type	Set to "Other"
②	Library Item	Set to "DUMMY JOINT"
③	Apply	Click the Apply button to accept the Properties.

Set the Location Option:
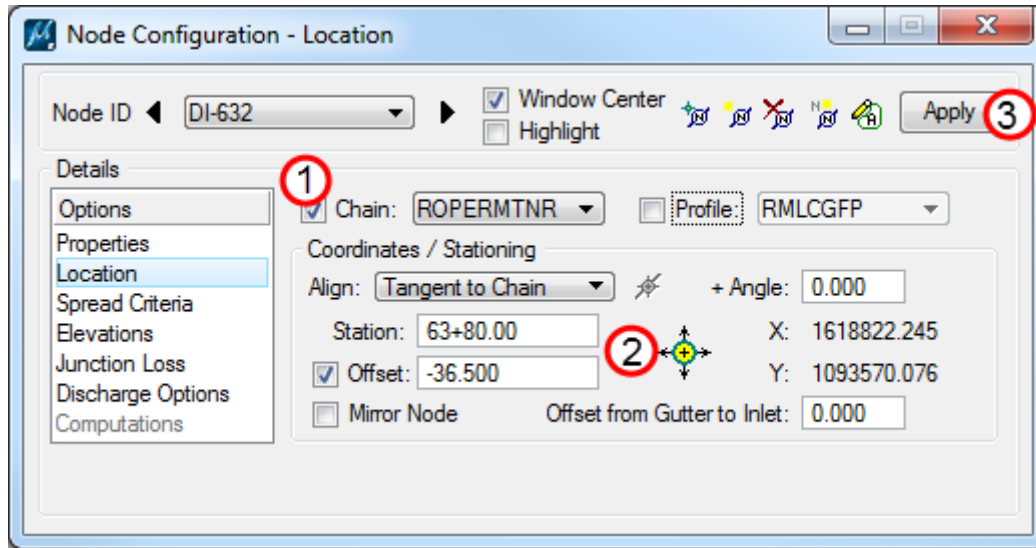
①	Chain	Use the pulldown arrow to select the correct chain name. This information comes from the GPK File. If you are placing a node on a side road make sure to use the corresponding side road chain name. Turn off the curb profile option for dummy nodes.
②	Station DP	Click the **Station DP** button, move the cursor to place the upstream dummy joint at the upstream entrance of the driveway pipe.
③	Apply	Click the Apply button to accept the Location.
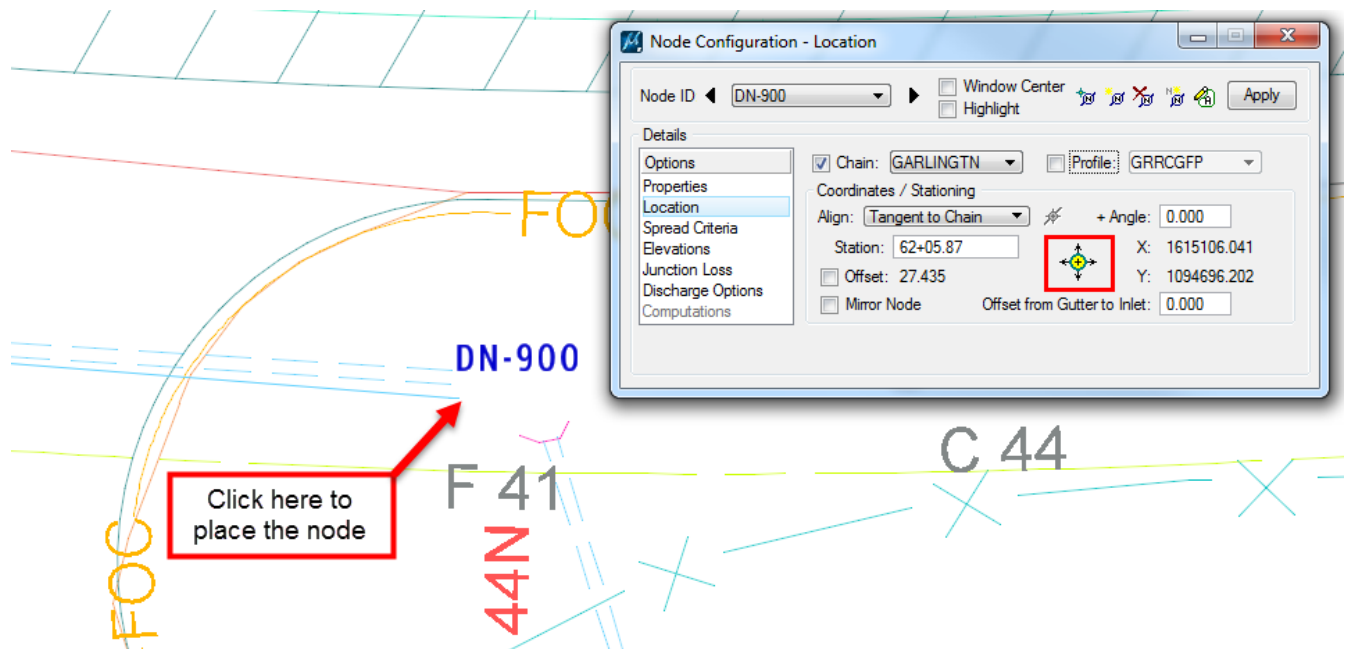
Repeat this **Node>Add** procedure for the downstream pipe location, so you'll have 2 Nodes for each **Link**.

- Add 1 Link

To add a link, select **Drainage>Component>Link>Add** and give it a name:
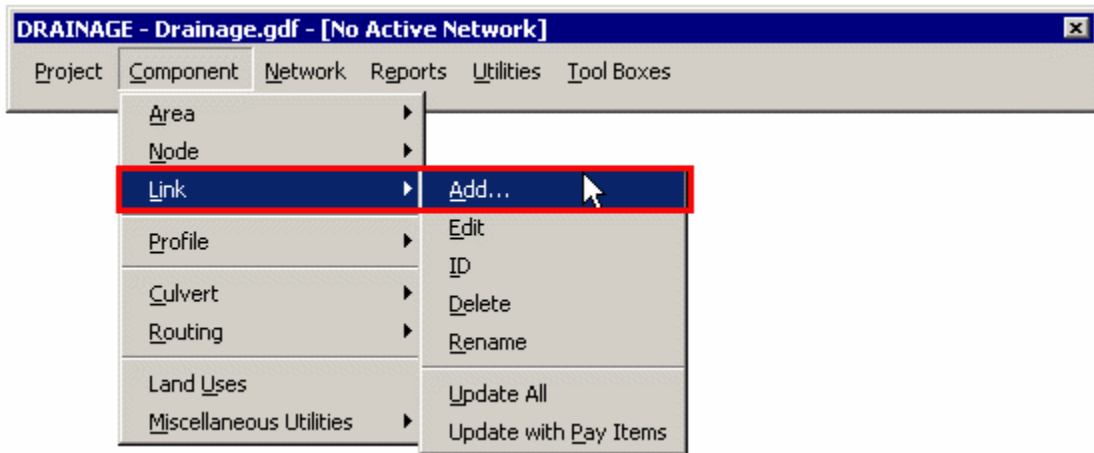
Set the Definition Option:
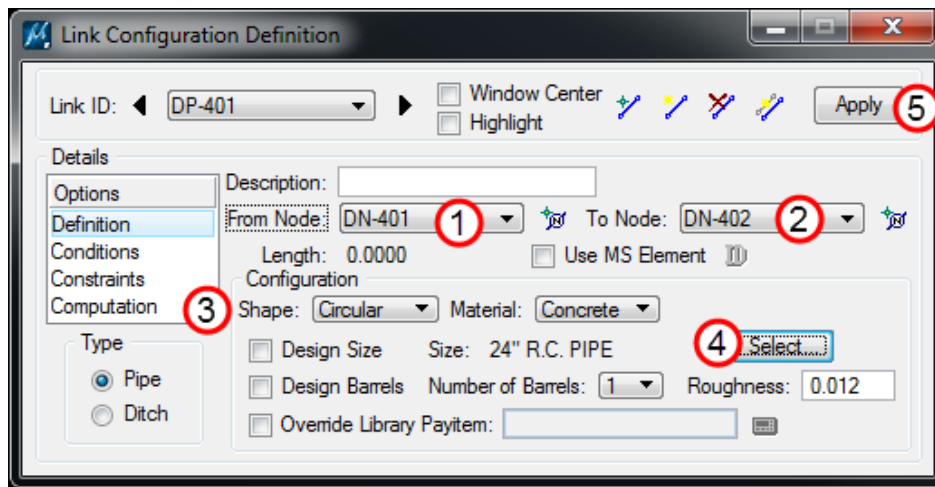
①	From Node	Select the *Up*stream Node
②	To Node	Select the *Down*stream Node

③	Shape/ Material	Set the Shape to "Circular" and the Material to the appropriate type from the Drainage Library
④	Design Size	Toggle OFF, and click Select to pick the size from the Drainage Library
⑤	Apply	Click Apply to accept the Pipe Definition.

Continue adding Nodes and Links for the rest of the driveway or cross pipes.

- Label Plans

The plans are now ready to be labeled using the Drainage Labeler.

Since only a few Node and Link variables were set, only certain label variables will be available for driveway or cross pipes.

2. Cross Section Files – Draw Side Line Pipes

Open the *dx.dgn design file and select
Applications -> GEOPAK -> ROAD -> Design & Computation Manager from the menu bar.
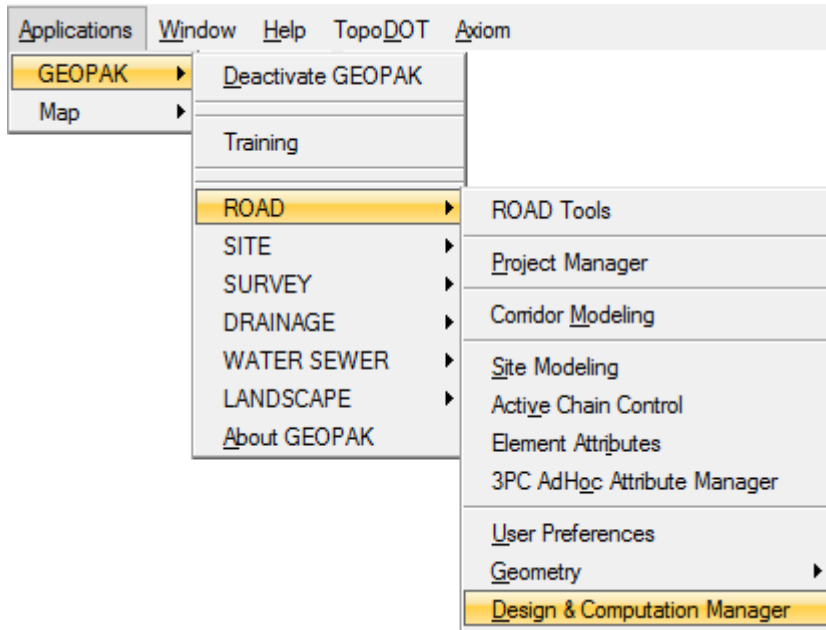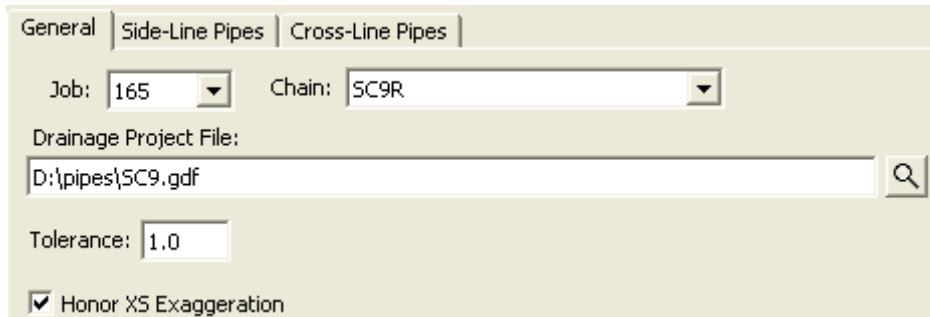
Select *English -> VBA Applications -> XS Pipes* and double click to start the macro.
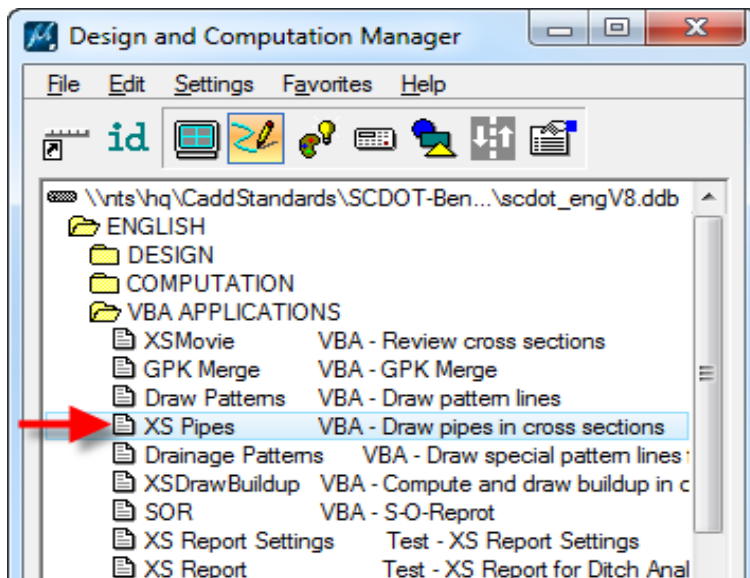
On the **General** tab, select the Job and Chain, then browse to select the *.gdf file in the project folder. Check on the Honor XS Exaggeration. (This toggle controls the size of the pipe drawn on the cross sections in case they are drawn 10:5 vs. 5:5).

On the **Side-Line Pipes** tab, accept the defaults and press the **Process Cross Sections** button. (You can change the symbology by clicking the appropriate buttons prior to processing as well.)


Press the **Begin** button and wait for the program to finish. Select **Yes** to save a *.csv pipe report file. Pipe drawings in cross sections **should be reviewed by roadway and hydraulic engineers** after processing.

3. Cross Section Files – Draw Cross Line Pipes

Open a plan view .dgn file showing the cross line pipes. Draw drainage pattern lines along each cross line pipe using Microstation "draw line" command. Pattern lines should be set to one of the RD_PD_PatLn# levels and should extend a minimum of 20 feet beyond each end of the cross line pipe or to the construction limits.
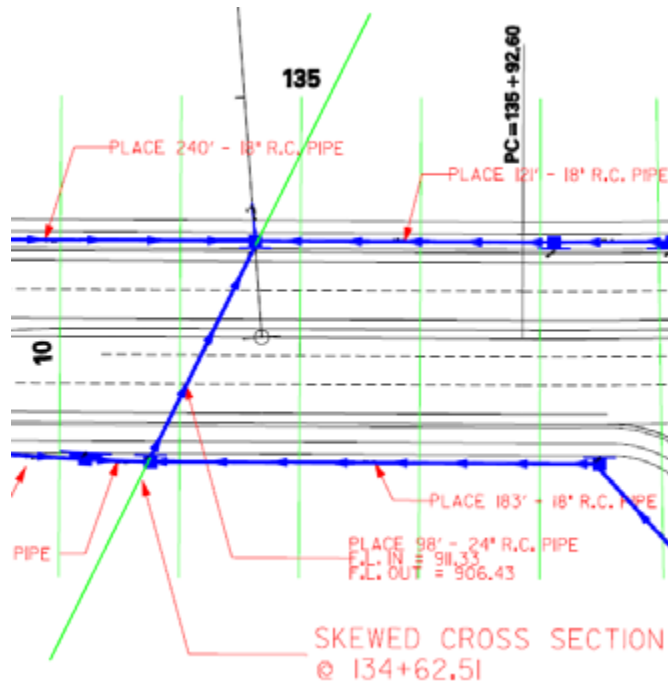

Alternatively, open the D&C Manager (*Applications -> GEOPAK -> ROAD -> Design & Computation Manager* on the menu bar), select *English -> VBA Applications -> Drainage Patterns*, and double click to start the macro.
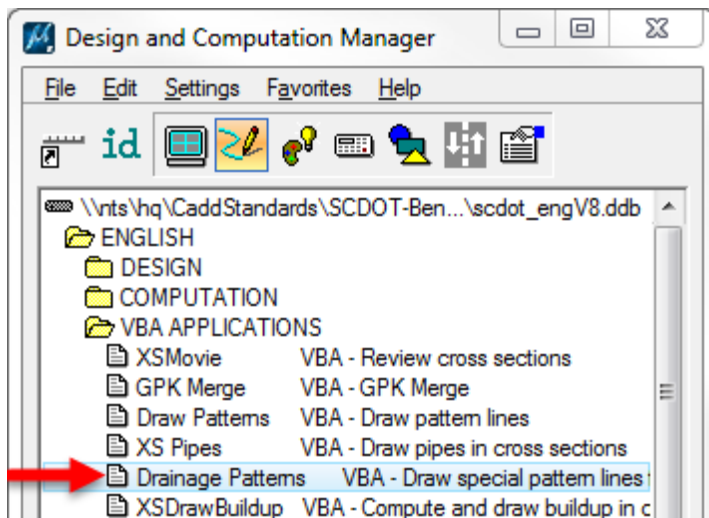
In the Culvert Pattern Lines window, enter the Job number of the project and select the chain of the road being crossed. Click the magnifying glass next to the "Drainage Project"

---

space and browse to the .GDF file for the project. Check the box marked "Pattern Lines for Cross-Line Pipes" and enter 0 for the Pattern Line Offsets
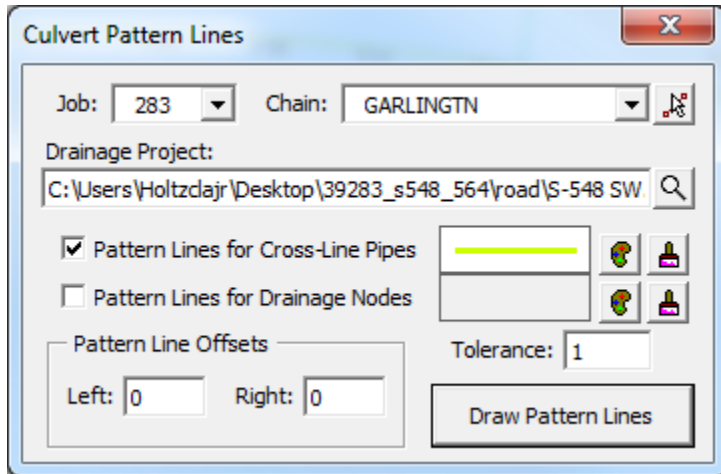

Open or create a *xp.dgn file for the project. Cut existing and proposed cross sections using the new drainage pattern lines. Cross sections will be skewed.

Open the D&C Manager, select *English -> VBA Applications -> XS Pipes* and double click to start the macro.
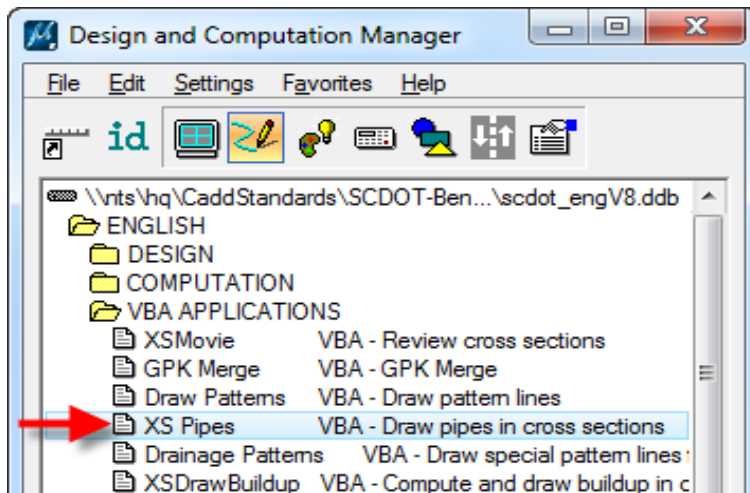
On the **General** tab, select the Job, Chain and browse to select the *.gdf file. Check on the Honor XS Exaggeration. On the Side-Line Pipes tab, turn off all of the checks.
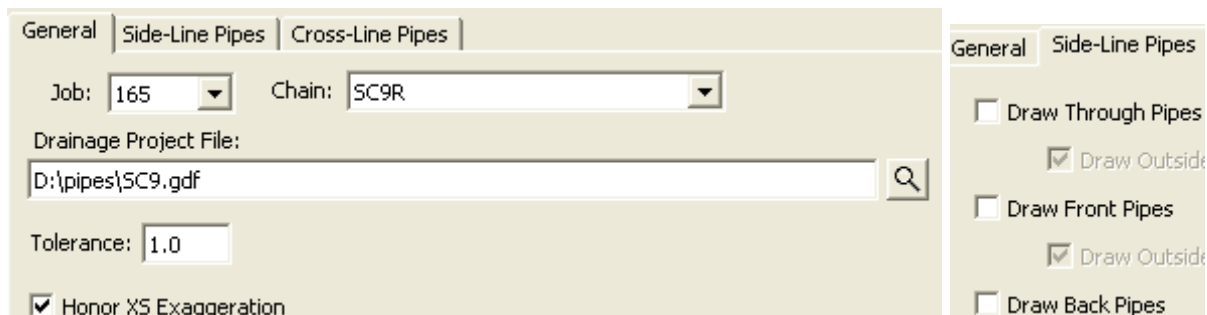
On the **Cross-Line Pipes** tab, check on all of the boxes. You can accept the defaults for symbology or click the appropriate buttons to change them.
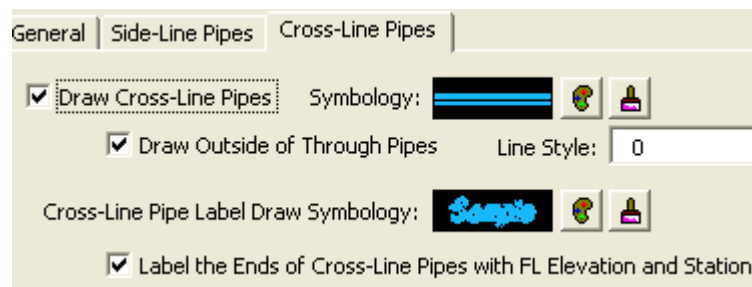
Press the **Process Cross Sections** button. Press the **Begin** button and wait for the program to finish. Select **Yes** to save a *.csv pipe report file. Pipe drawings in cross sections **should be reviewed by roadway** and hydraulic engineers after processing.


4. Drainage Structures in X-Section

In order to view Drainage structures (Nodes & Links) in Roadway cross sections, use the following procedures:

1. The **Drainage Preferences: Project Components** option must have the proper Criteria Directory set.
2. The **Drainage Preferences: Link Options** must have the correct Criteria File Name set.
3. The **Drainage Library: Nodes** must have the correct Criteria File Name.
4. The **Drainage Nodes Cells** must have Front and Back points.
5. The **Roadway Proposed Cross Sections** must be run.

5. Displaying 3-D Networks

Create a new 3-D .dgn. Start GEOPAK Drainage and open the .gdf containing the network. Open the GEOPAK Drainage Preferences menu and go to the Project Components tab. Ensure that the Drainage Cell Library being used is the most up-to-date RoadV8.cel dated 8/24/2011 or later. If not, load the *.dpf file associated with the project and check again.

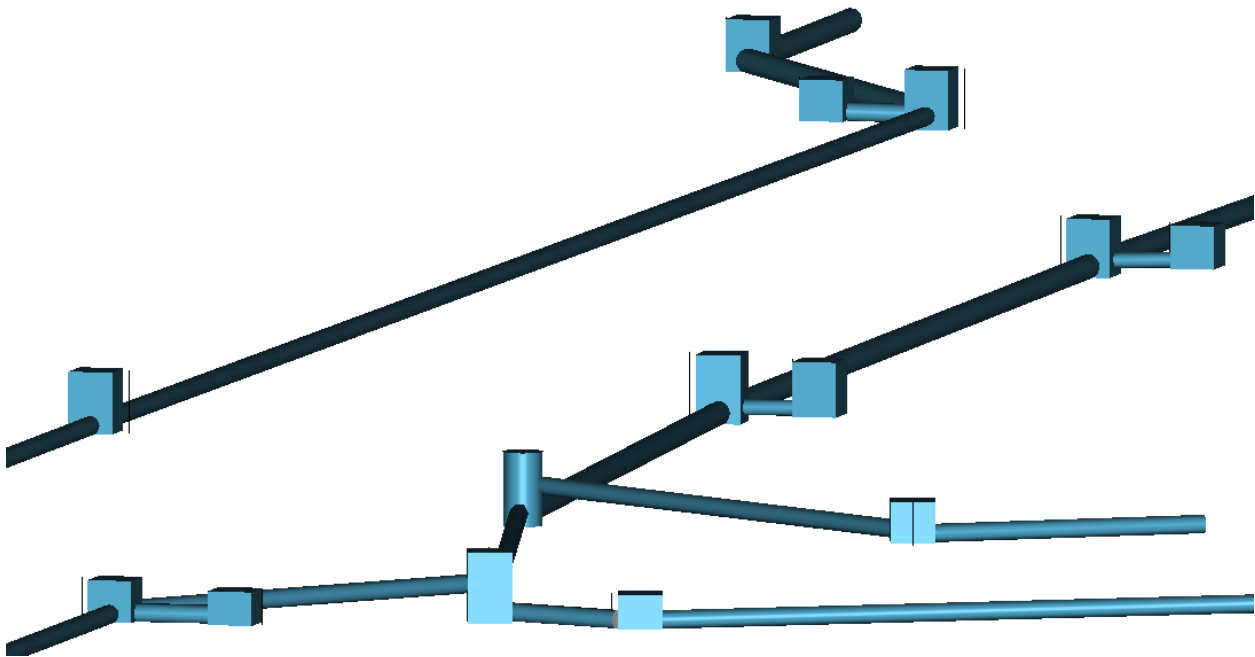Update all Nodes and Links via Navigator.
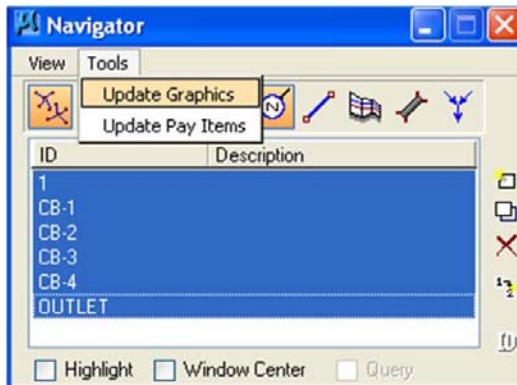
Activate the 3D display using Utilities -> Display 3D in the Drainage menu. Change the Display Style in View Attributes from "Wireframe" to "Smooth."
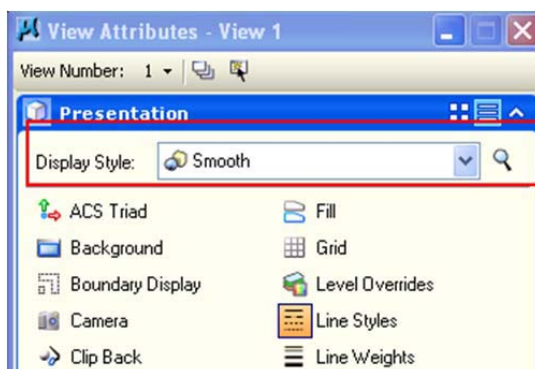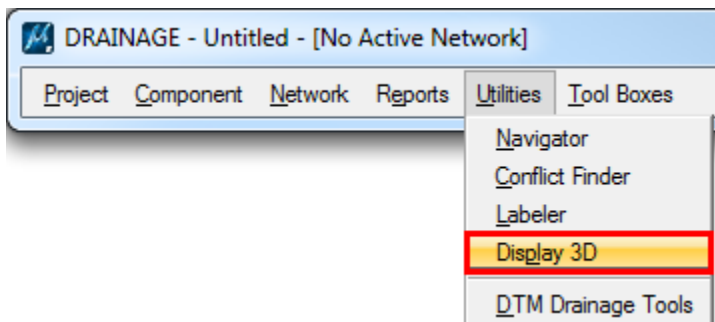
A 3-D representation of the network will be drawn above the existing 2-D version. Use the **Rotate View** tool in the View menu to observe the network from other angles.
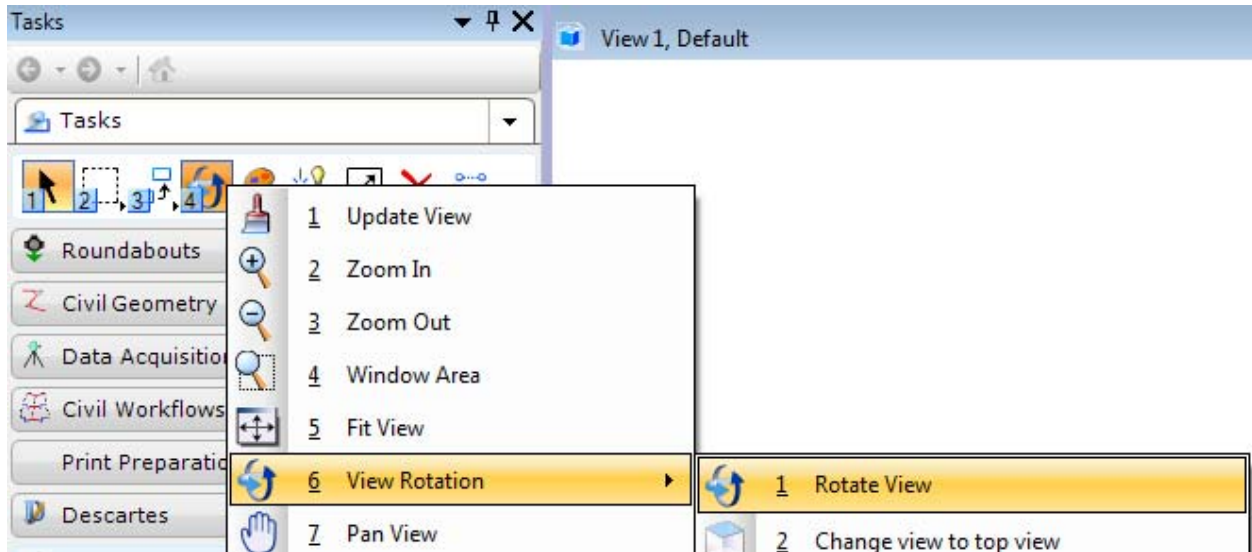
A 3-D view can reveal errors in the network design, such as incorrect structure and pipe elevations. Examining this view for pieces that appear out of place or incorrectly shaped can be much quicker than comparing the data associated with each pipe and node in text format using the Navigator tool.

# Chapter 5: Drainage Labeler

GEOPAK Drainage Labeler automates the composition and placement of drainage notes onto drawings. The label is composed of inserts that the user controls. These inserts can be customized to form labels. Several standard label styles are provided in order to label pipes and inlets.

Step 1. From the main menu bar, select _Utilities > Labeler_:
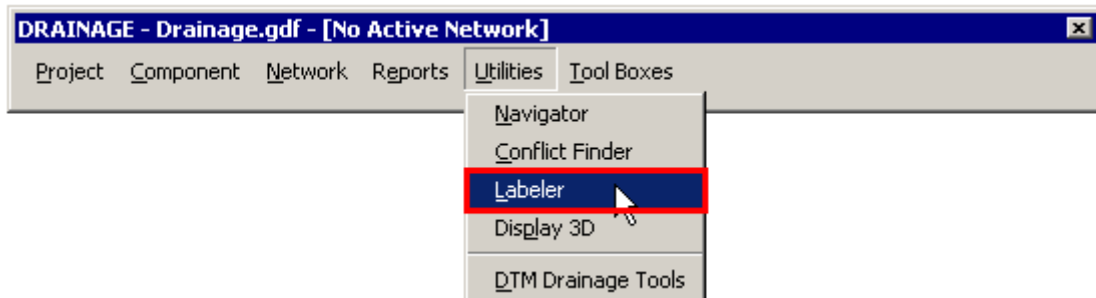
Step 2. **First** click the Styles Tab; then Select _Style Files > Open…_ and open the \\nts\hq\CaddStandards\SCDOT-Bentley\Standards\SCDOT_Design\Geofiles\Labelers\scdot.LSF.
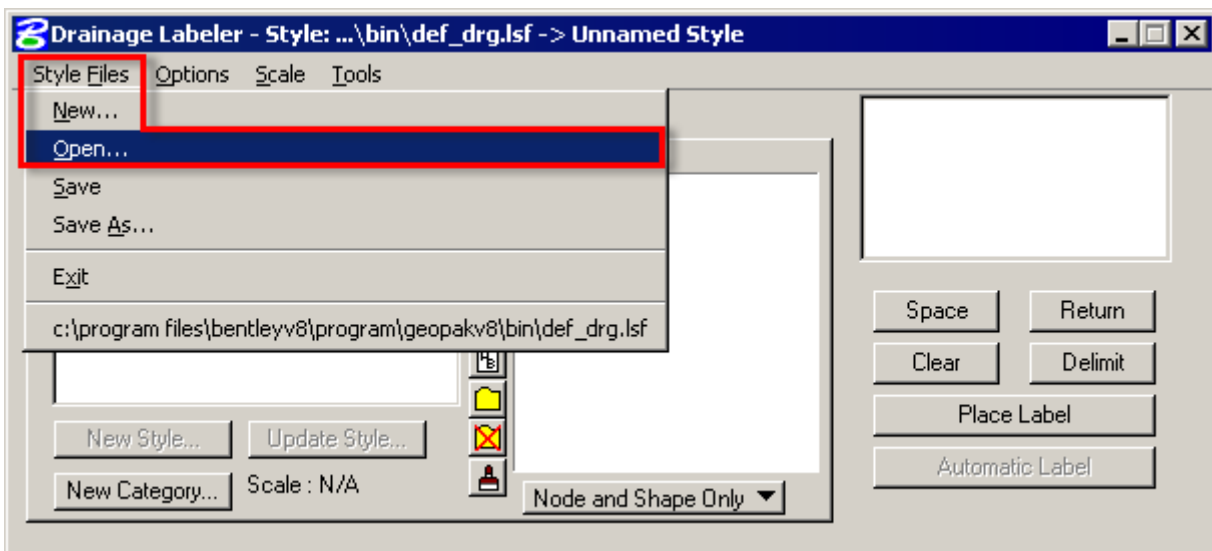
Step 3. The dialog should look similar to below:

1. Labeler Setup >

To setup the Labeler and remaining tabs:

- Text Tab: the text should be built automatically from the selected style (in step #3)
- Parameters Tab: set the text symbology
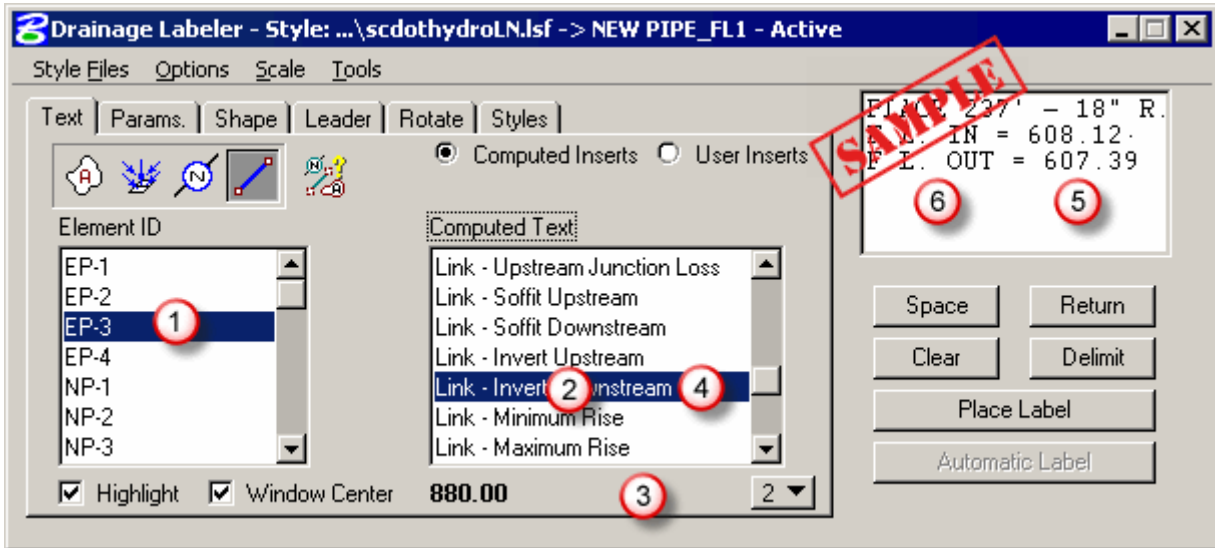- Shape Tab: set the label's shapes
- Leader Tab: set the leader specifications
- Rotate Tab: set the label's rotation
- Styles Tab: select the label's text content

- Text Tab

If the text is different from the stored style, set the label's text content as shown below:

①	Element ID	Select the **Type** of component and then the **Element ID.**
②	Computed Text	*Single-click* on the computed text of interest
③	*Read-Only*	View the *read-only* computed text readout (shown in bold), and set the # of decimals (if available)
④	Computed Text	*Double-click* on the computed text to place it (bullet #5)
⑤	Label Window	After double-clicking the computed text (bullet #4) the text is inserted into the label window at the cursor's location in the window
⑥	Prefix & Suffix	*(Optional)* Use keyboard text to add prefixes and/or suffixes to the Computed Text (bullet #5) but ***not*** inside the computed text itself (as breaking inside the computed text breaks the auto computed text)

- Params Tab

Set the Text symbology:
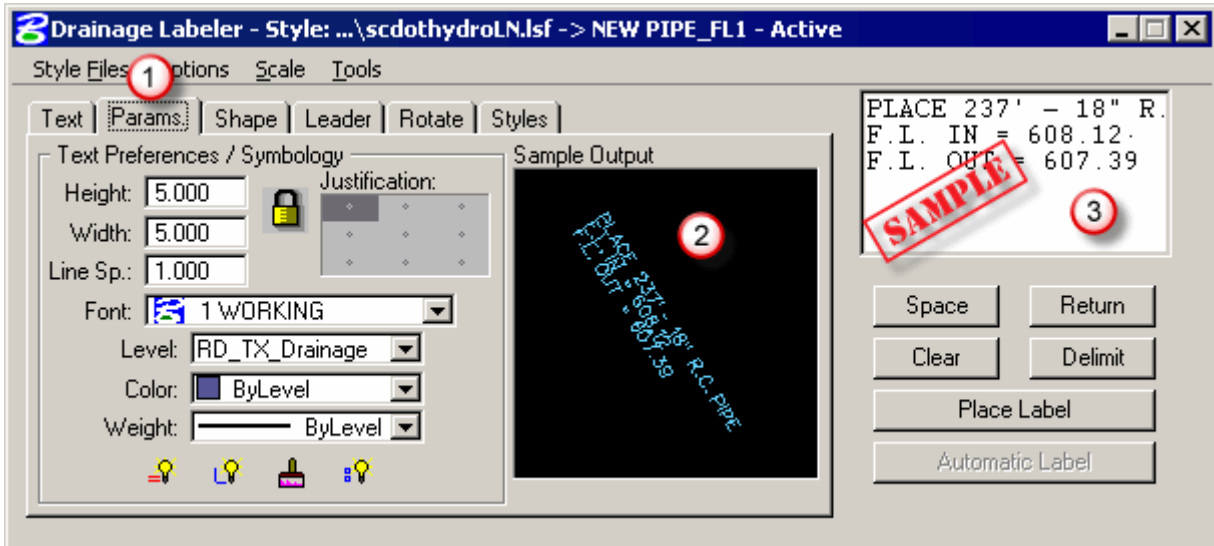
1	Text Prefs/Symb	Select the Height/Width/Line sp/font/level/color/weight/justification.
2	Sample Output	View the actual label in the Sample Output window.
3	Labeler Window	View the label text; and also allows further keyboard text commands.

- Shape Tab

Set the label's Shape:
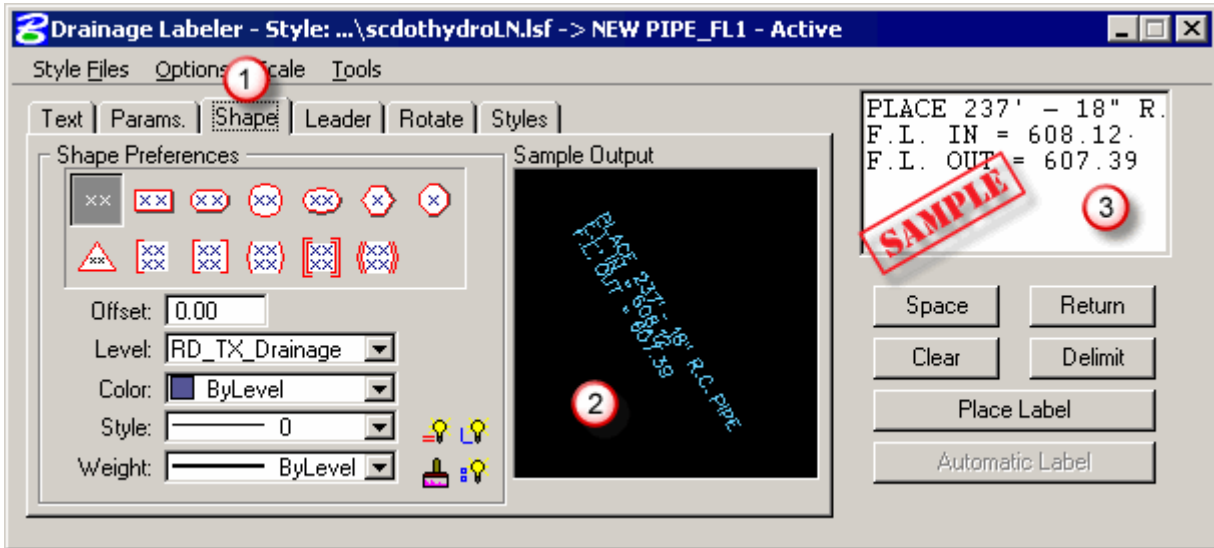
①	Shape Preferences	Set the shape of the label, or **XX** for No Shape.	
②	Sample Output	View the actual label in the Sample Output window.	
③	Labeler Window	View the label text; and also allows further keyboard text commands.	

- Leader Tab

Select the label's Leader Line:
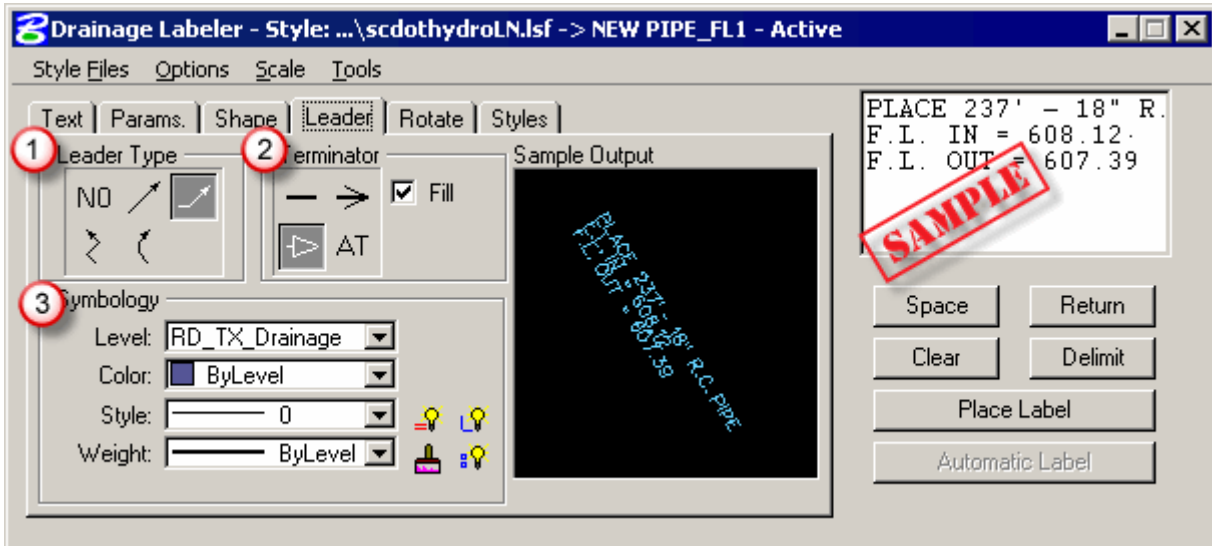
(1)	Leader Type	Set the Leader Type.
(2)	Terminator	Set the Terminator Type.
(3)	Symbology	Set the Leader symbology

Note: the Leader is **not** displayed in the Sample Output window.

- Rotate Tab

Set the label's Rotation:
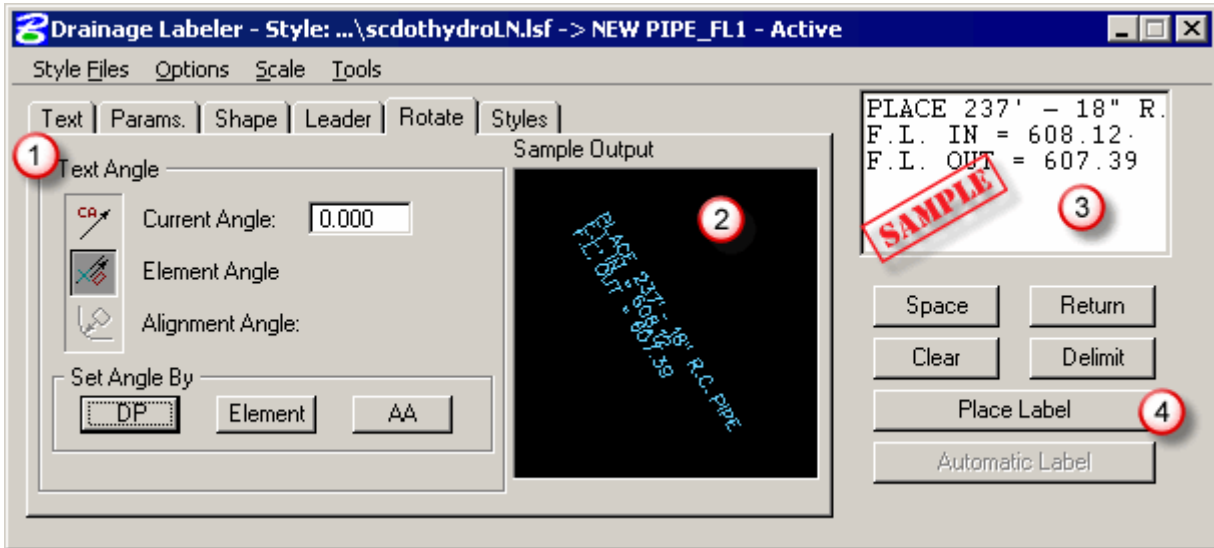
(1)	Rotate	Set the Rotation of the label by any of the methods.
(2)	Sample Output	The leader will not be shown until the **Place Label** button is pressed.
(3)	Labeler Window	View the label text; and also allows further keyboard text commands.
(4)	Place Label	Click the **Place Label** button and data-point in the DGN; you may have to data-point several times to place the leader line in the correct location.

- **Styles Tab**

The Styles Tab is where the individual Styles are stored, displayed and retrieved.

Options include:

- Style: Adding: add new styles
- Style: Updating: modify existing styles
- Style: Categories: add new styles category

You **_must_** be on the **Styles Tab** to utilize the StyleFiles pull-down menu.

To add a Style:
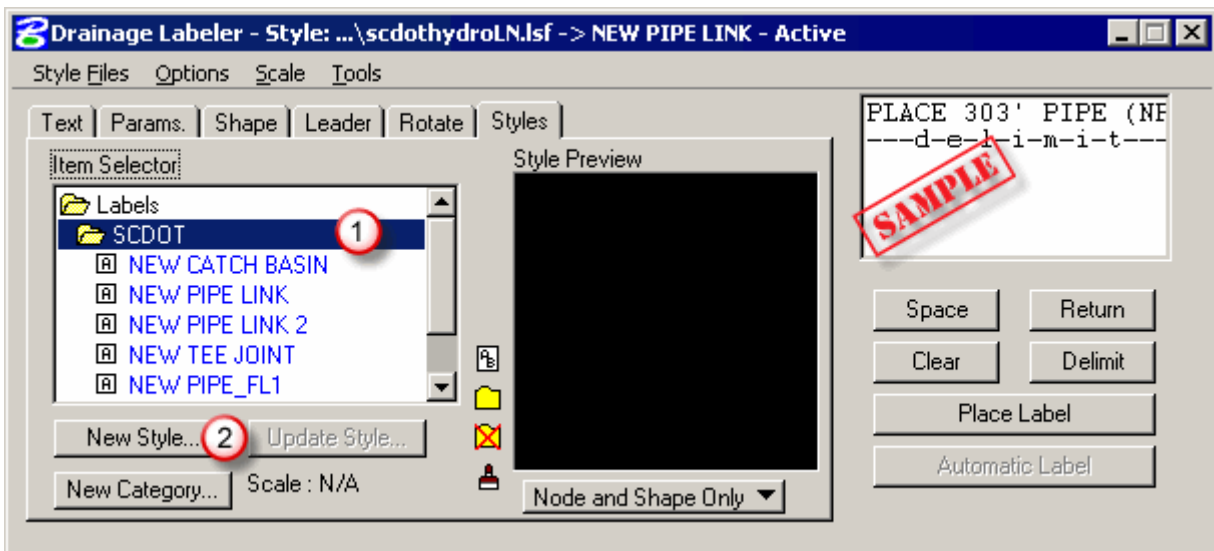
①	Item Selector	Select the Category (folder icon) in which to place the Style.
②	Save the Style	Click the **New Style** button to save the Label Style.

1. You must first use the **Place Label** button before the label can be saved as a Style.
2. Use Styles whenever possible so that the Label Updater can update the labels.

To update a Style:

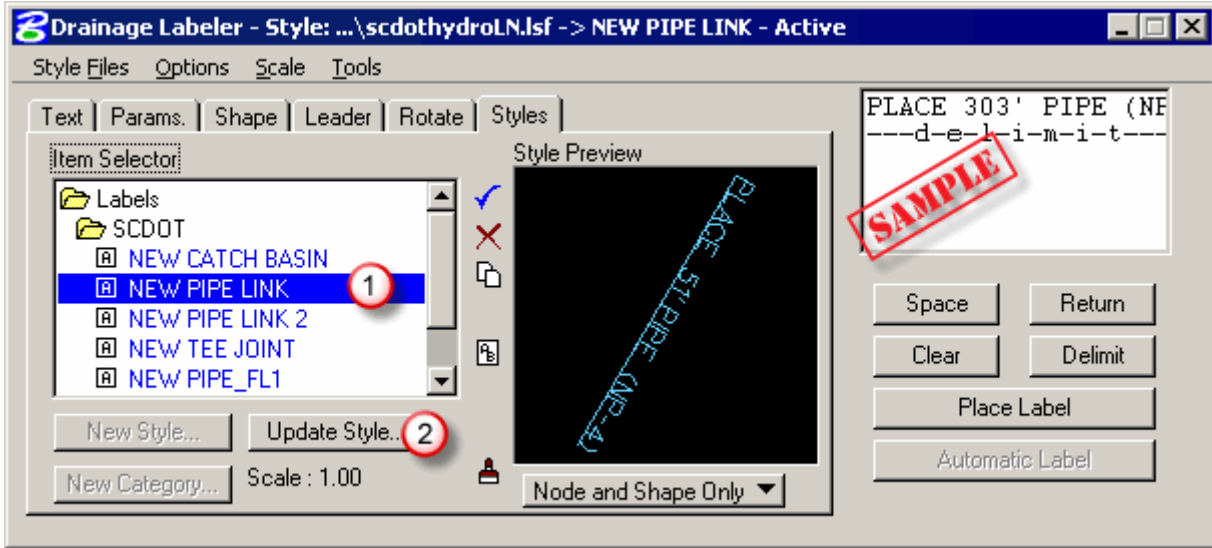|		
(1)	Item Selector	First activate a Style, then make changes to any of the Tabs (Text, Params, Shape, Leader, or Rotate); then place the New Label in the DGN File.
(2)	Update the Style	Click **Update Style** to update the Label Style.

1. You must first use the **Place Label** button before the label can be saved as a Style.
2. Use Styles whenever possible so that the Label Updater can update the labels.
3. When complete (or periodically) select *File* > *Save* from the StyleFiles pulldown menu (must be on the Styles Tab to do this).

To Add a New Style Category:
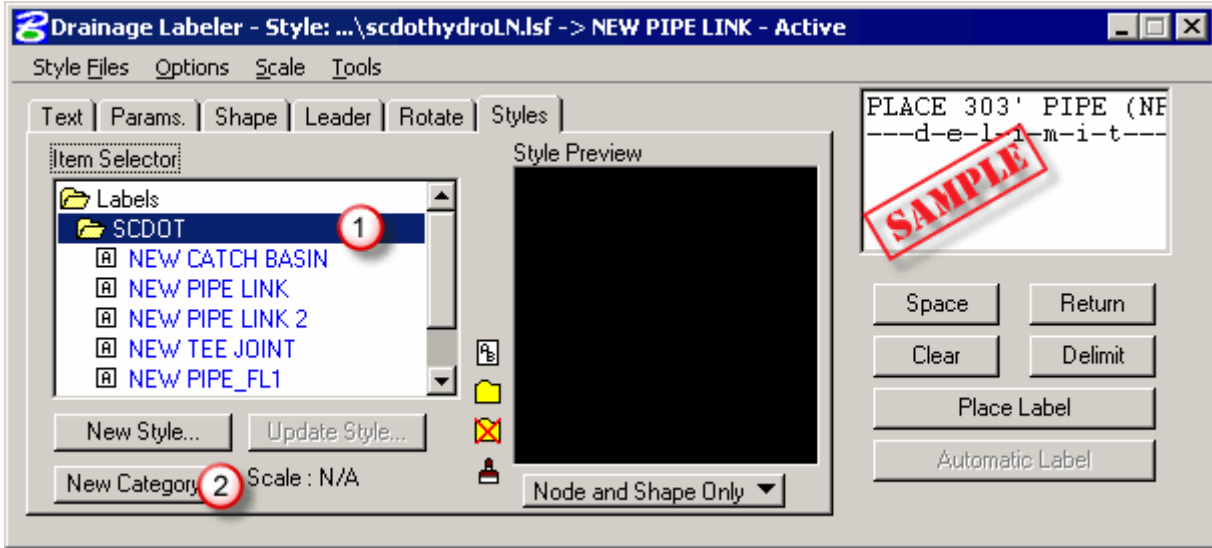
	Item Selector	Select an existing Category (folder icon)
	New Category	Click the **New Category** button to create a New Category within the existing Category.

When complete (or periodically) select *File > Save* from the *StyleFiles* pulldown menu (must be on the Styles Tab to do this).

2. Node Labeling

When labeling nodes using the following workflow:
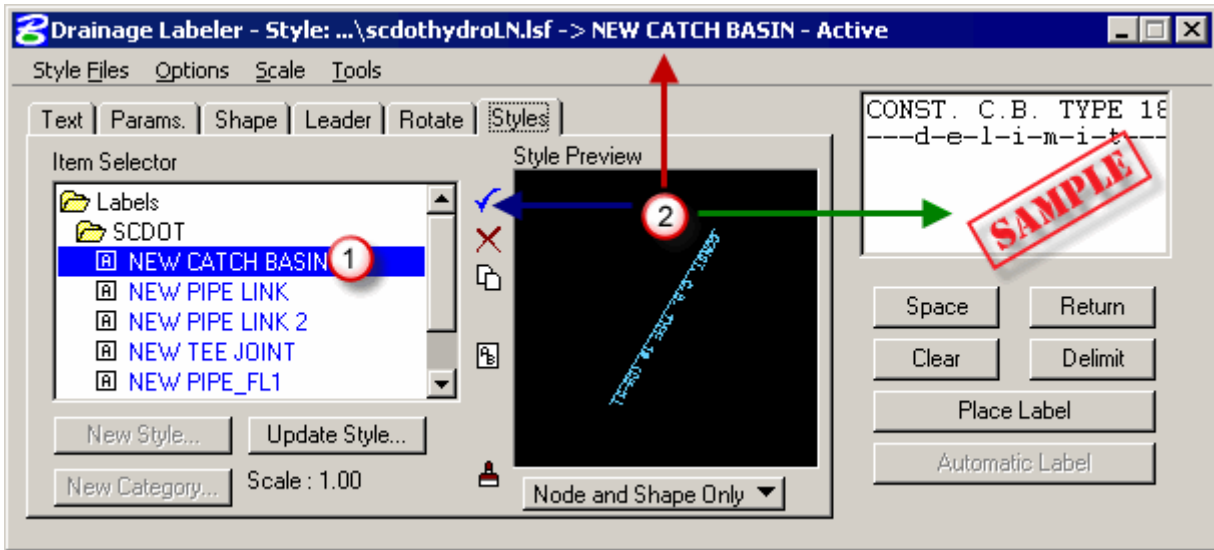
Step 1. Select and activate a label:

①	Double-click the **Item Selector** to find the Label you wish to place.
②	**Click the check mark**, **which will activate the style**, **and place it in the label window**

Step 2. Select the Text Tab and then highlight a Drainage Node to label:

(1)	Select the Element ID you wish to label.
(2)	*Ensure* the Label data is correct.
(3)	Click the **Place Label** button, and data point (multiple times if leaders are included) in the DGN File to place the label.

Step 3. Repeat as necessary to label all the Nodes.

For the remaining tabs see Labeler Setup.

3. Link Labeling

When labeling links using the following workflow:

Step 1. Select and activate a label:

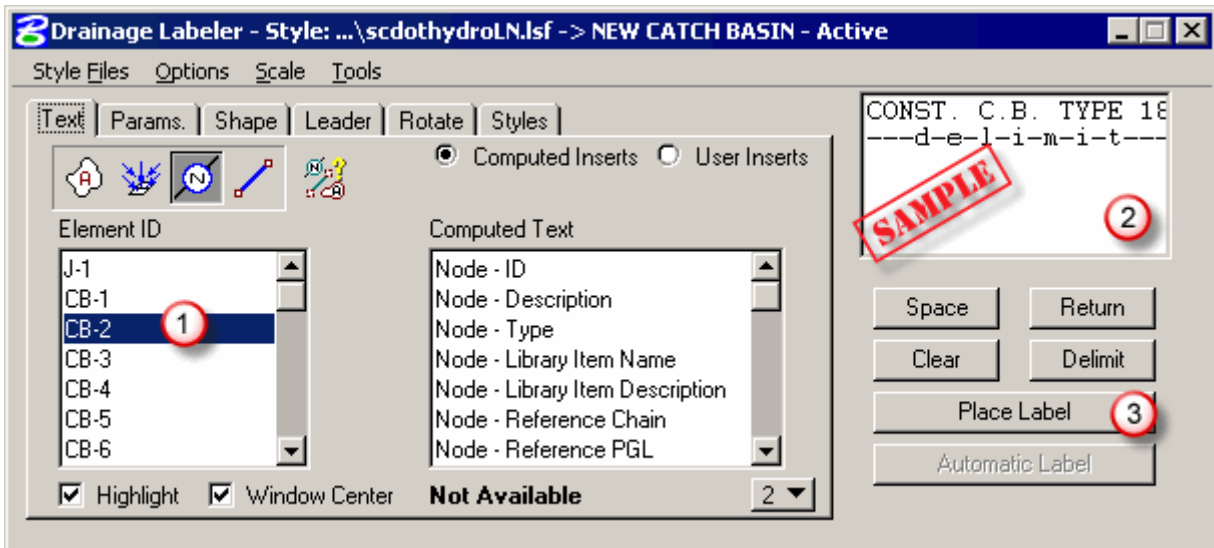|	
①	Double-click the **Item Selector** to find the Label you wish to place.
②	**Click the check mark**, **which will activate the style**, **and place it in the label window**

Step 2. Select the Text Tab and then highlight a Drainage Link to label:

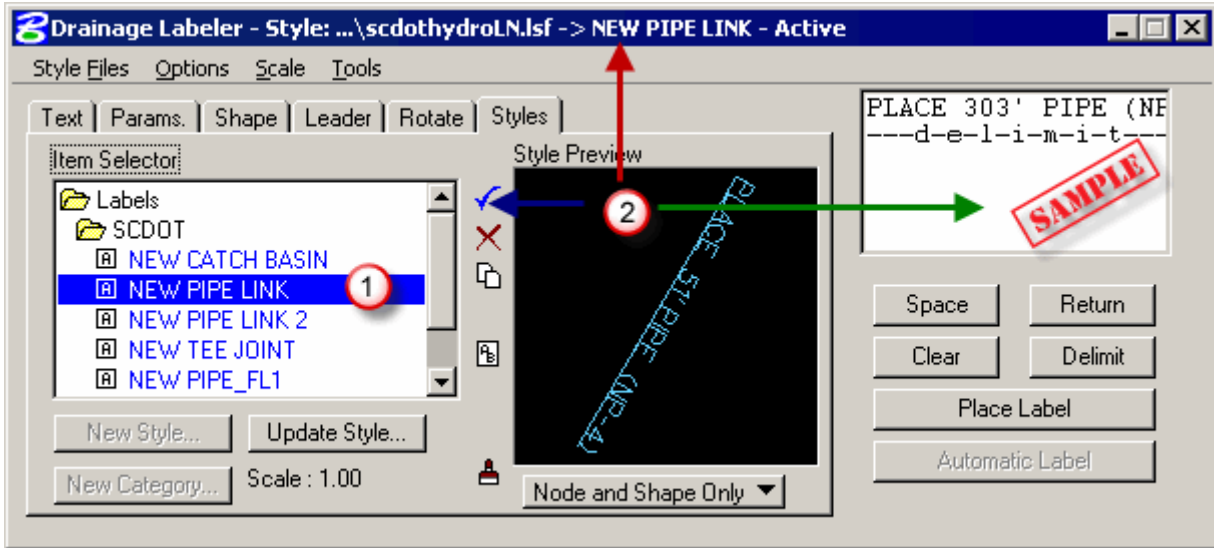|	
(1)	Select the Element ID you wish to label.
(2)	***Ensure*** the Label data is correct.
(3)	Click the **Place Label** button, and data point (*multiple times if leaders are included*) in the DGN File to place the label.

Step 3. Repeat as necessary to label all the Links.

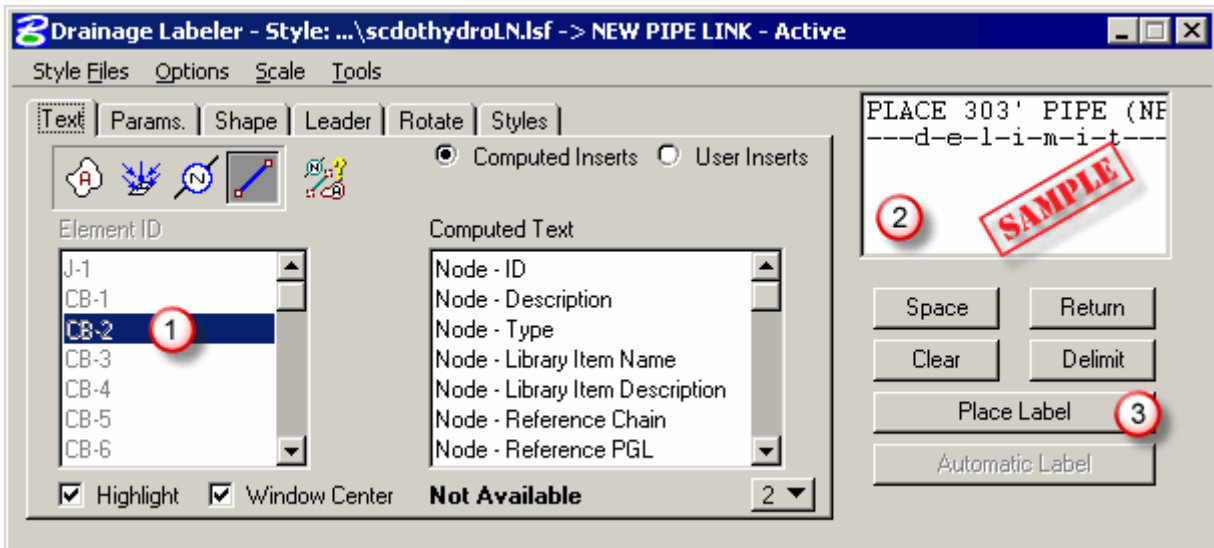For the remaining tabs see Labeler Setup.

4. Updating Labels

Auto-Computed Labels can be automatically updated. From the Labeler pull-down menu, select *Tools* > *Label Updater:*
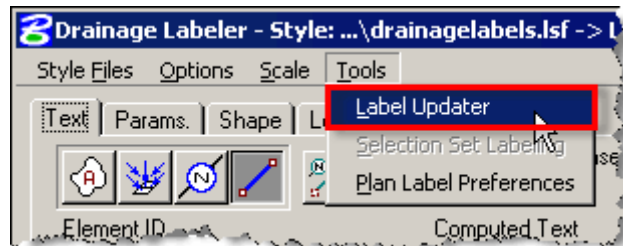
Use the workflow shown below:
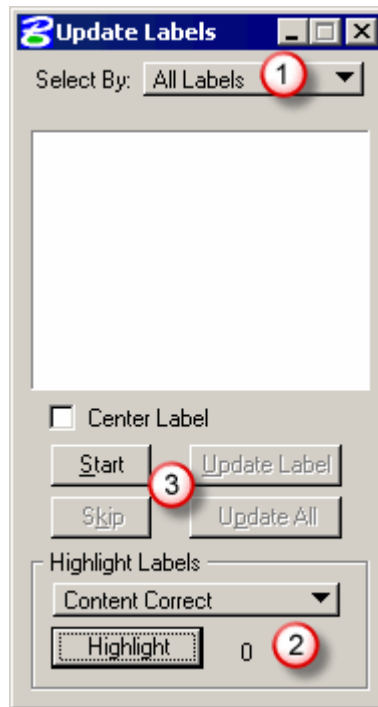
①	Click on **All Labels** (or choose individual labels, or labels within a Microstation selection set)
②	Select the constraint for which labels will Highlight, then click **Highlight**, the plan view labels matching the constraint will highlight in the DGN.
③	Click the **Start** button to initiate updating, and then use the **Skip**, **Update Label**, or **Update All** buttons to select which labels will be updated.

5. Label Tools

From the Labeler window, select Options > Label Tools:
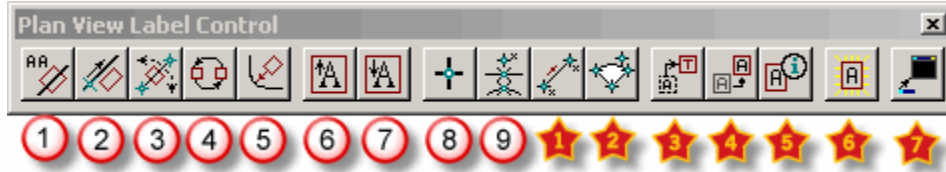
①	Active Angle	Rotates the label to the active angle
②	Element Angle	Rotates the label to the same angle as any Microstation element
③	Two Points	Rotates the label by issuing 2 data points in the design file
④	Rotate 180	Rotates the label by 180 degrees
⑤	Rotate Align	Rotates the label to a chain alignment angle
⑥	Increase Text	Increase the text size by one point
⑦	Decrease Text	Decrease the text size by one point
⑧	Data Point	Pick a point to label (must be a point style label)
⑨	Element	Pick an element to label (must be an element style label)
★1	2 GPK Line	Pick 2 COGO points to label the line in-between
★2	3 GPK Arc	Pick 3 COGO points to label the arc in-between
★3	Edit Label	Click to edit an already placed label
★4	Move Label	Click to move an already placed label
★5	Extract Label	Click to extract the settings from an already placed label
★6	Place Label	Click to place the current label
★7	Restore dialog	Click to reopen the main Labeler dialog if it has been minimized

Chapter 6: Automated Quantities

See the sections below for computing Node and Link quantities.

1. Node Quantities

Step 1. From the main menu bar, select *Component* > *Node* > *Update with Pay Items:*
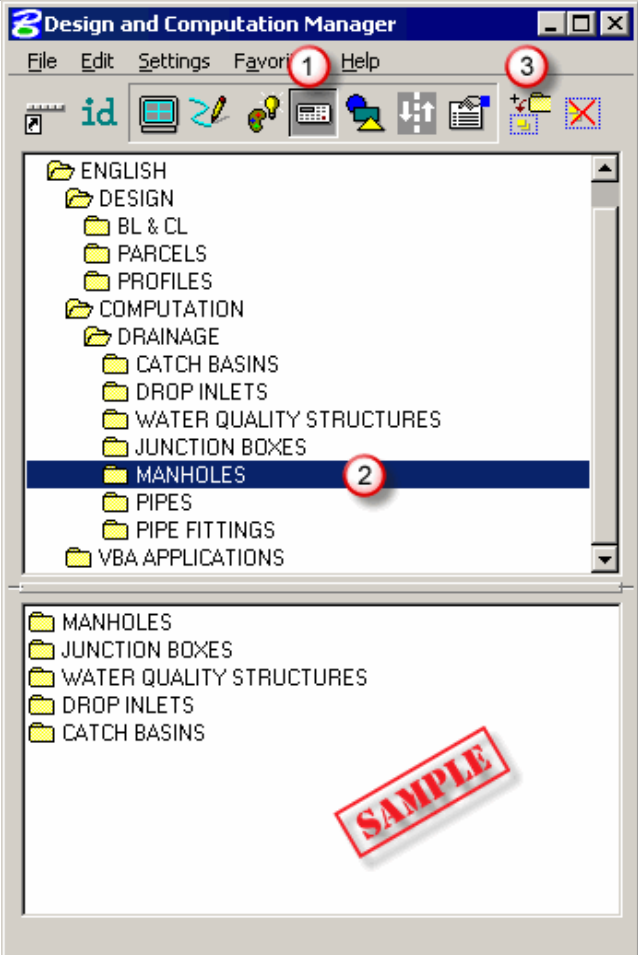
Update individual **Node** Items by selecting the individual Nodes in the Navigator, then using the Navigator's pull-down menu, select, *Tools* > *Update Pay Items*.

Step 2. Open the D&C Manager:

Step 3.   Set the dialog using the workflow shown below:

①	▦	Click **Compute**
②	Select Category	Navigate to the Drainage Structures category
③	▦	Click **Add to Selection**

Step 4. Set the Plan Quantity Computation dialog as shown below to compute within a View (or Fence, or file, or etc.):

Step 5.   Click the **Compute Quantities** button to initiate the computation.

Step 6.   A typical computation will display as follows:
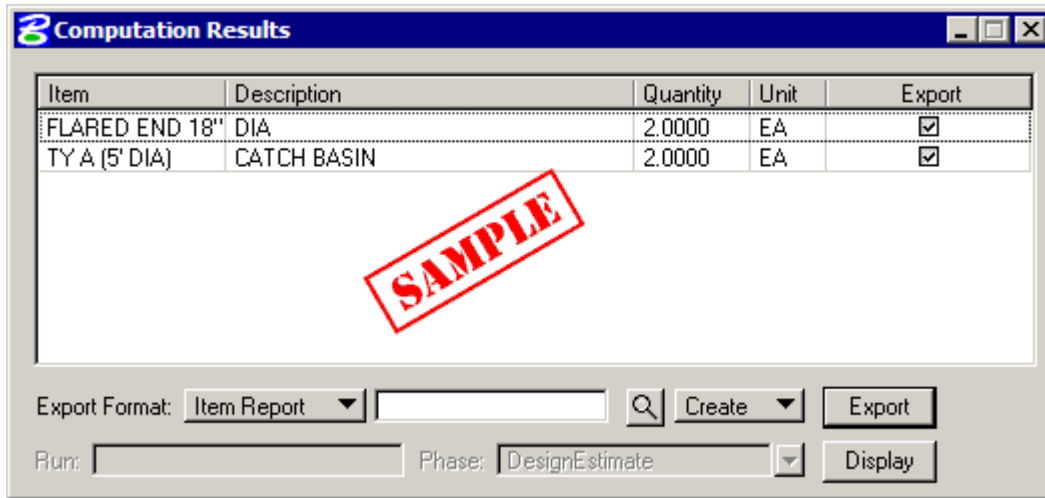
Step 7. Click **Export** to export to the preferred format.

2. Link Quantities

Step 1. From the main menu bar, select *Component > Link > Update with Pay Items:*
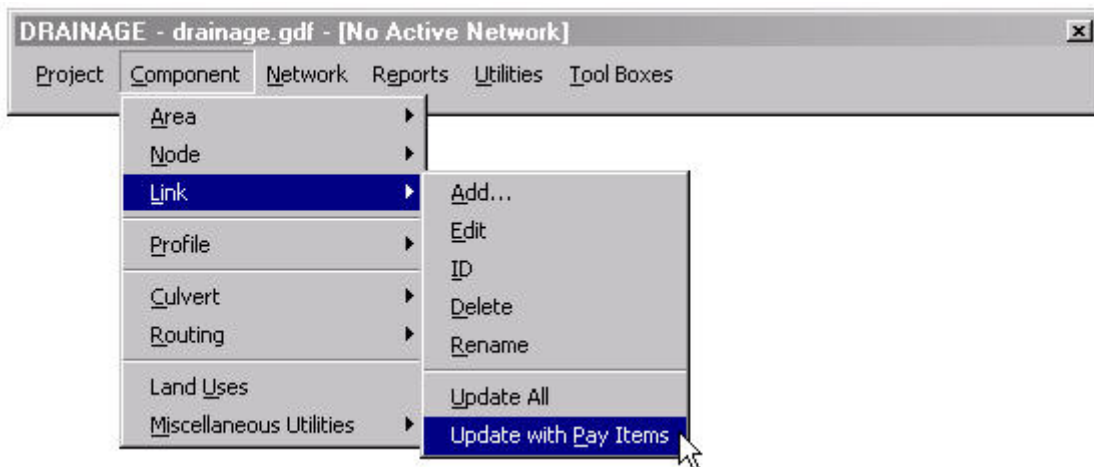
The same option is available in the Navigator.

Step 2. Open the D&C Manager:

Step 3. Set the dialog using the steps below:
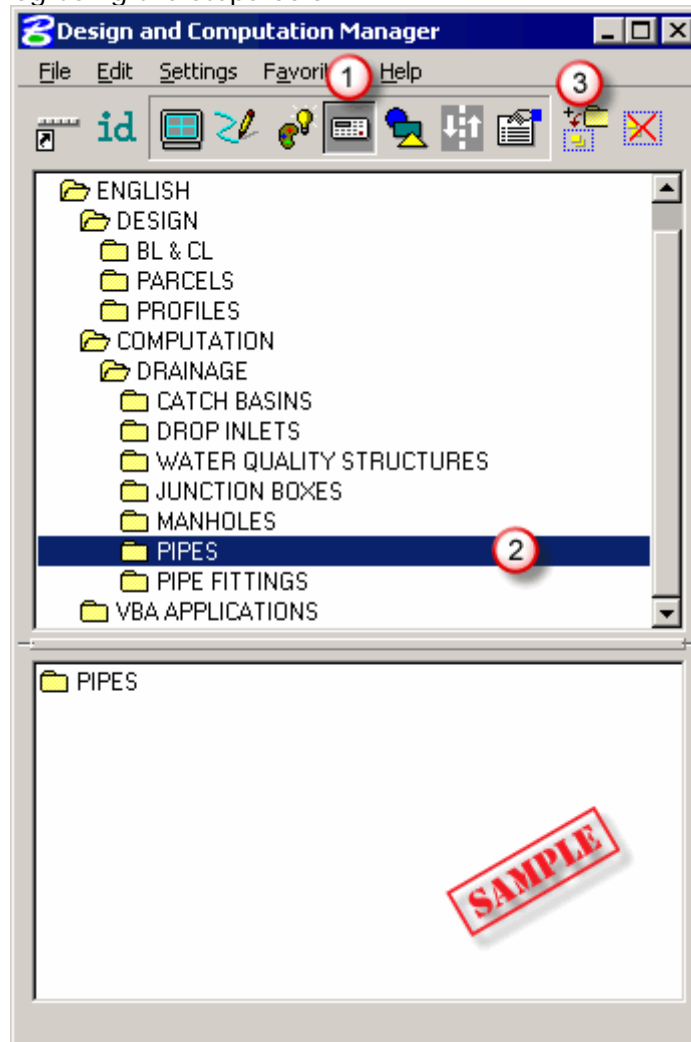
①	⌨	Click **Compute**
②	Select Category	Navigate to the Drainage Links category
③	📁	Click **Add to Selection**

Step 4. Set the Plan Quantity Computation dialog as shown below to compute within a View (or Fence, or file, or etc.):

Step 5.   Click **Compute Quantities** to initiate the computation. This will scan the view or fence in the DGN file for Drainage Library Links.

Step 6. A typical computation will display as follows:
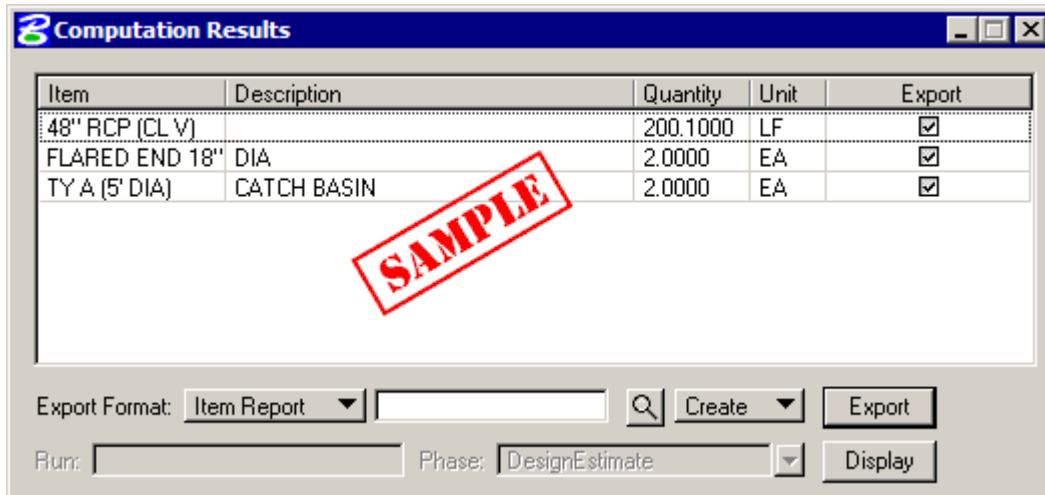
Step 7. Click **Export** to export to the preferred format.

Appendix A: Update Pay Items

When the **Update Pay Items** option is selected, GEOPAK Drainage sets the elements of the drainage design to the attributes as defined in our scdot.ddb file and the links and nodes take on their proper symbology. This is because GEOPAK Drainage associates a pay item to the design elements. D&C Manager recognizes the pay item and gives it the proper appearance and characteristics of its' corresponding item in the 'scdot.ddb' file. In doing so, D&C Manager is now ready to compute the quantity total for all the drainage as shown in the drainage design.

There will still be a need for coordination between Road Design and Hydrology concerning outfall ditches, special ditches, riprap pads, and similar drainage items that cannot be stored as a graphical element in the design file. Because these elements do not have graphics associated with them, automated quantities will not pick up "Clean Outfall Ditch" or "Place Riprap Pad" quantities. In cases that involve those types of quantities, Hydrology will provide us with information showing the necessary information.

Pipe lengths are computed using the slope distance. This gives a more accurate measurement between inlets. The following is a sample report of computed quantities generated by D&C Manager.

```
+------------------------------------------------------------------------------+
|                                                    Page No.    1             |
|      Pay Items List                                                          |
|      Date: 03/22/2000                    File Name: cmp.out                  |
+---------------+-------------------------------------------------+------+-------------+
|               |                                                 |      |             |
| Item No.      | Description                                     | Unit | Quantity    |
|               |                                                 |      |             |
+---------------+-------------------------------------------------+------+-------------+
|7141112        |  15" RC PIPE CULVERT - CLASS III                | LF   |       74.0  |
|7141113        |  18" RC PIPE CULVERT - CLASS III                | LF   |    14217.6  |
|7141114        |  24" RC PIPE CULVERT - CLASS III                | LF   |     2798.5  |
|7141115        |  30" RC PIPE CULVERT - CLASS III                | LF   |     2451.3  |
|7141116        |  36" RC PIPE CULVERT - CLASS III                | LF   |      124.5  |
|7141117        |  42" RC PIPE CULVERT - CLASS III                | LF   |      680.2  |
|7191205        |  CATCH BASIN - TYPE 9                            | EA   |        1    |
|7191605        |  CATCH BASIN - TYPE 16                           | EA   |       59    |
|7191625        |  CATCH BASIN - TYPE 17                           | EA   |       46    |
|7191650        |  CATCH BASIN - TYPE 18                           | EA   |        5    |
+---------------+-------------------------------------------------+------+-------------+
```

Appendix B: Drainage Revisions

Drainage revisions are a common occurrence on projects. When the need arrives for a revision, the person responsible for the design in Hydrology must be notified. Only Hydrology can change the location and placement of drainage items. We will be unable to manually move any drainage items because GEOPAK Drainage will lose its' ability to recognize the attributes of that item. This will cause problems when we try and label the item using GEOPAK Drainage and also when we try and perform automated quantity computations.

If a revised drainage design is received:

1. Delete the current drainage design out of the **pp.dgn** file. This will be easy because it should be the only thing on levels "RD_PD_DR_Inlet", "RD_PD_DR_Pipe", "RD_PD_DR_Inlet_TX", "RD_PD_DR_Pipe_TX", and "RD_HY_Gpkprofile". You can check for objects placed on other levels by activating the Level Display window and sorting by whether levels are Used - check the RD_PD_DR group as well as the Default level in particular.
2. Perform another Update Graphics and then Update Pay Items as described in the Navigator.
3. Use the Label Updater to update all the labels.

Appendix C: Error Messages

Below are some common error messages & resolutions listed alphabetically:

If your problem is not listed then call your coordinator for help.

Check Rainfall in Preferences

Probable Cause:
The DLB stored in the Preferences: Project Components could not be found and the resulting Rainfall could not be located

Possible Solutions:
1. Open the Preferences: Project Components and select the correct DLB.
2. Click OK to the Preferences, the message should no longer appear.

Error Opening Drainage Library File

Probable Cause:
The DLB File cannot be found in the specified directory, or has version issues.

Possible Solution:
1. Copy the file to the project directory on your machine and try opening there.
2. Ensure the file works in the previous version, is a supported file type, not corrupt, exists, etc.

Error Opening Drainage Project

Probable Cause:
The File>Open command couldn't complete.

Possible Solution:
1. Use File>Open to open the correct GDF file.

Error Opening GPK File

Probable Cause:
The GPK File cannot be found in the specified directory.

Possible Solution:
1. Open the Preferences: Project Components option, Road Preferences button, and ensure the working directory is set correctly.
2. In the Preferences: Project Components option, ensure the GPK Job Number is selected.

Error Retrieving Cell

Probable Cause:
The Microstation cell library is not attached to the DGN file.

Possible Solutions:
1. Use Microstation to attach the correct cell library.

Failed to open the database

Probable Cause:
The D&C Manager file stored in the Preferences: Project Components could not be found.

Possible Solutions:
1. Open the D&C Manager file manually from the Applications pull-down menu (which may default to the ../Geopak/bin/default.ddb) then use the D&C File>Open command to open the correct DDB file.

Rainfall Item Specified in Preferences not found…

Probable Cause:
The DLB stored in the Preferences: Project Components could not be found and the resulting Rainfall could not be located

Possible Solutions:
1. Open the Preferences: Project Components and select the correct DLB.
2. Click OK to the Preferences, the message should no longer appear.

Unable to find library in Preferences: DLB

Probable Cause:
The DLB stored in the Preferences: Project Components could not be found.

Possible Solutions:
1. Open the Preferences: Project Components and select the correct DLB.

Unable to find cell library in Preferences: CEL

Probable Cause:
The CEL stored in the Preferences: Project Components could not be found.

Possible Solutions:
1. Open the Preferences: Project Components and select the correct CEL.