

TRAINING OUTLINE

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 - 1.2.1 Description of Typical ASAD Project
 - 1.2.2 Program Features
 - 1.2.3 Program Limitations and Assumptions
- 1.3 File Structure – Files Used by ASAD
 - 1.3.1 Executable program file (ASAD3.EXE)
 - 1.3.2 Database Files (*.MDB and SEEDv3.MDB)
 - 1.3.3 CAD files
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 - 1.3.3.2 Level Name Libraries (*.DGNLIB)
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- 2.3 Projects Settings

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 - 2.4.1.2 Importing from another ASAD Database
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 - 2.4.2.1 Importing from GEOPAK
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 - 2.4.2.3 Manually Entered Data
- 2.4.3 Cross Slopes (typical section)
- 2.4.2 Cross Widths

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- Utilities*

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	3.2.2.	User Defined Time-Intensity Tables
	3.3	Defining the Storm Sewer System Header Information
	3.3.1	Outfall
	3.3.2.	Tailwater Conditions
	3.3.3	Selecting a Storm Event
	3.3.4	Setting Report Heading Labels (designer/checker)
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		. Inlet/Top/Grate Elevation
		. Drainage Areas
	5.2	Computing Pipe Sizes
	5.3	Computing Flow Line (Invert) Elevations
	5.4	Computing Hydraulics (Storm Tabs)
	5.4.1	Setting Options
	5.4.2	Verifying Data
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<i>French Drains</i>	5.6.2	Data Setup in Nodes & Reaches
<i><u>& Deep Wells</u></i>	5.6.3	Treatment Volume (Dade County Methodology)
	5.6.4	Reduction of Flow through French Drain
	5.6.5	Fine Tuning a French Drain/Deep Well System
<i>Lab #12</i>	5.7	Cost Analysis
<i>Computing</i>	5.8	Profile Elevation Inquiry
<i><u>Other</u></i>	5.9	Utility Conflicts
<i>Lab #13</i>	5.10	Summary of Drainage Structures
<i>Summary of</i>	5.10.1	Building SDS Data Table
<i><u>Dr. Structures</u></i>	5.10.2	Modifying SDS Data
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	5.10.3	Row Layout
	5.10.4	Grid Layout
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	5.10.6	Drawing SDS into CAD
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	6.1	CAD Window
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<i>Draw Plan</i>	6.4	Levels
<i><u>& Profile</u></i>	6.4.1	Levels Display
	6.4.2	Level/Layer Manager
	6.4.3	ASAD Master Level List
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	6.5.1	Drawing Templates and Setting Defaults
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<i><u>Structures</u></i>	6.6.2	Multiple Structures Using GEOPAK Cross Section Cells
	6.6.3	Multiple Structures Drawn in Plan View
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	7.3	Tools
	7.3.1	Options
	7.3.2	PCS Dialog Windows
	7.4	Editing TOP Files

CHAPTER I: INTRODUCTION

1.1 Technical Support

- Phone: (352) 383-4191 Fax: (352) 383-4650
- eMail: tim@hiteshew.com <http://www.hiteshew.com>
- Program updates: <http://www.hiteshew.com/download.htm>
- Frequently asked questions: <http://www.hiteshew.com/faq.htm>

1.2 Overview – General Facts about ASAD

- 1.2.1 Description of Typical ASAD Project
- 1.2.2 Program Features
- 1.2.3 Program Limitations and Assumptions

1.3 File Structure – Files Used by ASAD

- 1.3.1 Executable program file (ASAD3.EXE)
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- 1.3.3 CAD Cell Libraries (*.CEL)
- 1.3.4 Cross Section Top Drawing Files (*.TOP)
- 1.3.5 Report Generation Files (*.RPT)
- 1.3.6 CAD files
 - 1.3.6.1 Drawing Files (*.DGN)
 - 1.3.6.2 Level Name Libraries (*.DGNLIB)

1.4 ASAD Master Level List (table within the project database (MDB))

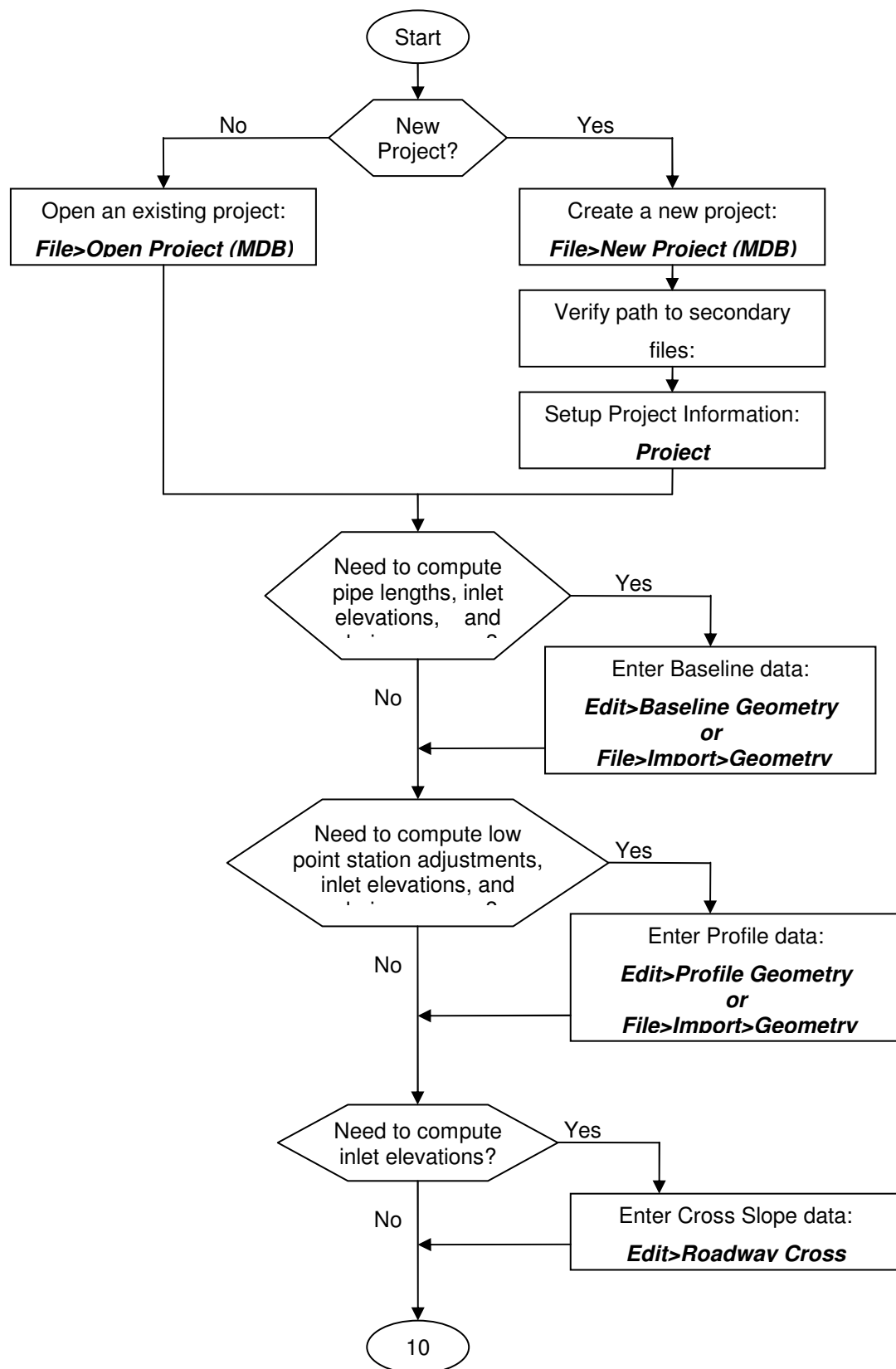
CAD> Levels> ASAD Master Level List

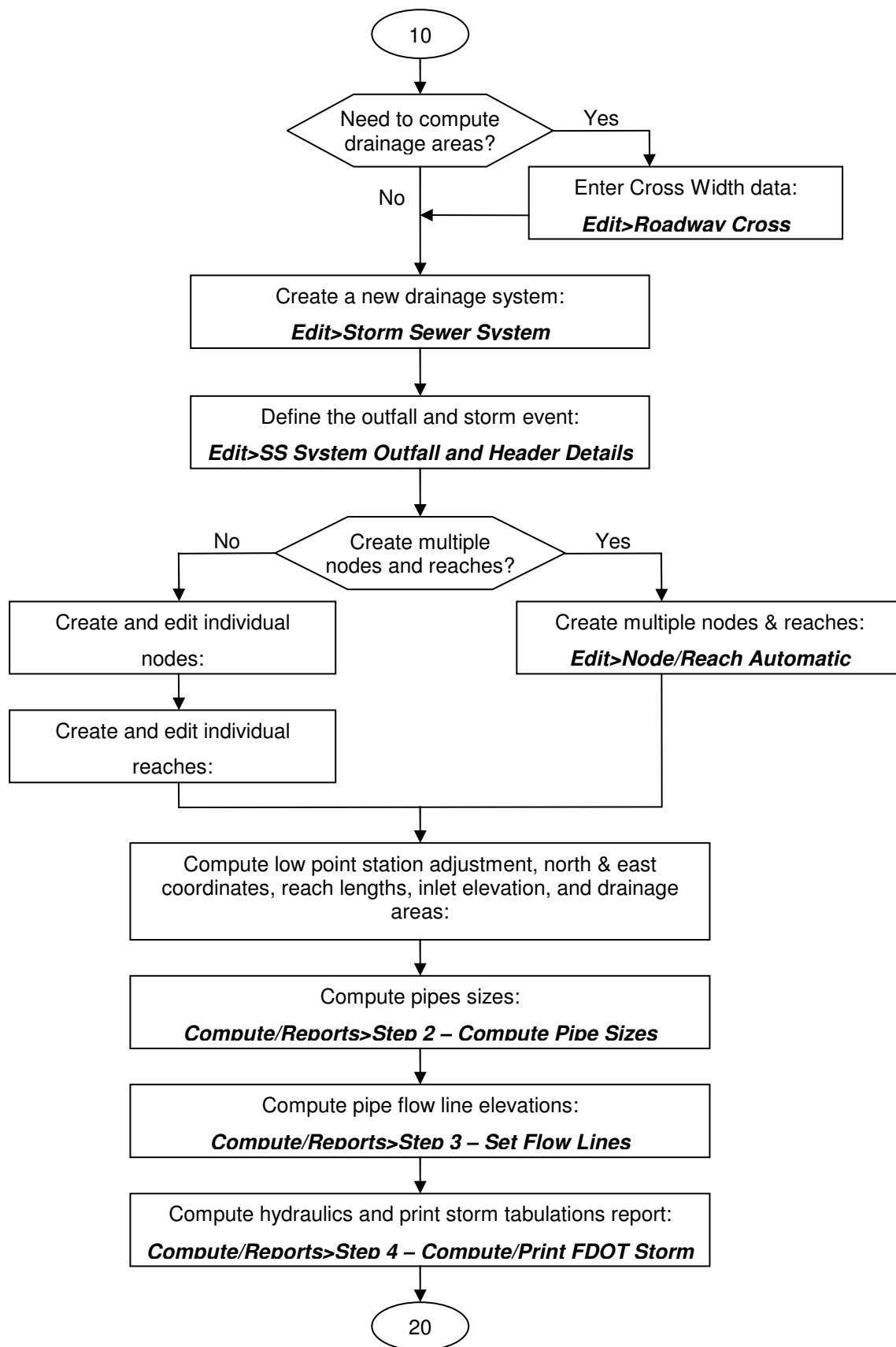
Name	Active	Description	Number	Color	Weight	Style
DitchPavt	<input type="radio"/> Yes <input checked="" type="radio"/> No	Ditch Pavement Including Quantity Shapes	220	3	1	0
DitchPavt_px	<input type="radio"/> Yes <input checked="" type="radio"/> No	Ditch Pavement for Cross Sections	313	3	3	0
DitchProfLt_er	<input checked="" type="radio"/> Yes <input type="radio"/> No	Ditch Profile Left (Existing)	413	8	1	3
DitchProfLt_pr	<input checked="" type="radio"/> Yes <input type="radio"/> No	Ditch Profile Left	414	8	1	3
DitchProfMdn_er	<input checked="" type="radio"/> Yes <input type="radio"/> No	Ditch Profile Median (Existing)	415	10	1	3
DitchProfMdn_pr	<input checked="" type="radio"/> Yes <input type="radio"/> No	Ditch Profile Median	416	10	1	3
DitchProfRt_er	<input checked="" type="radio"/> Yes <input type="radio"/> No	Ditch Profile Right (Existing)	417	9	1	3
DitchProfRt_pr	<input checked="" type="radio"/> Yes <input type="radio"/> No	Ditch Profile Right	418	9	1	3
DrainDivideArw	<input checked="" type="radio"/> Yes <input type="radio"/> No	Drainage Divide Arrow	419	0	1	0
DrainDivides	<input checked="" type="radio"/> Yes <input type="radio"/> No	Drainage Divide	420	10	4	2
DrainMisc	<input checked="" type="radio"/> Yes <input type="radio"/> No	Miscellaneous Drainage Items	421	10	2	0
DrainMisc_ex	<input checked="" type="radio"/> Yes <input type="radio"/> No	All types of miscellaneous existing drainage eler	386	10	1	3
DrainStruct_ex	<input checked="" type="radio"/> Yes <input type="radio"/> No	All Drainage Structures and Elements for Cross S	314	10	1	3
DrainStruct_pr	<input checked="" type="radio"/> Yes <input type="radio"/> No	Drainage Structures (All Types)	422	10	2	0
DrainStruct_px	<input checked="" type="radio"/> Yes <input type="radio"/> No	Miscellaneous Drainage Structures and Element	315	10	2	0
DripSystem	<input type="radio"/> Yes <input checked="" type="radio"/> No	Irrigation Drip System	853	1	2	0
Driveway	<input type="radio"/> Yes <input checked="" type="radio"/> No	Driveway (Drive, Lane, Turnouts)	221	7	2	0
Driveway_px	<input type="radio"/> Yes <input checked="" type="radio"/> No	Driveway Lines on Cross Sections	316	7	2	0
Drum	<input type="radio"/> Yes <input checked="" type="radio"/> No	Drum	111	6	1	0
DTM	<input type="radio"/> Yes <input checked="" type="radio"/> No	Digital Terrain Model, TIN Model Elements	222	1	2	0
DTM_ep	<input type="radio"/> Yes <input checked="" type="radio"/> No	Digital Terrain Model, TIN Model Elements (Exis	223	2	1	0
DTMTriangles	<input type="radio"/> Yes <input checked="" type="radio"/> No	DTM Triangles	224	1	2	0

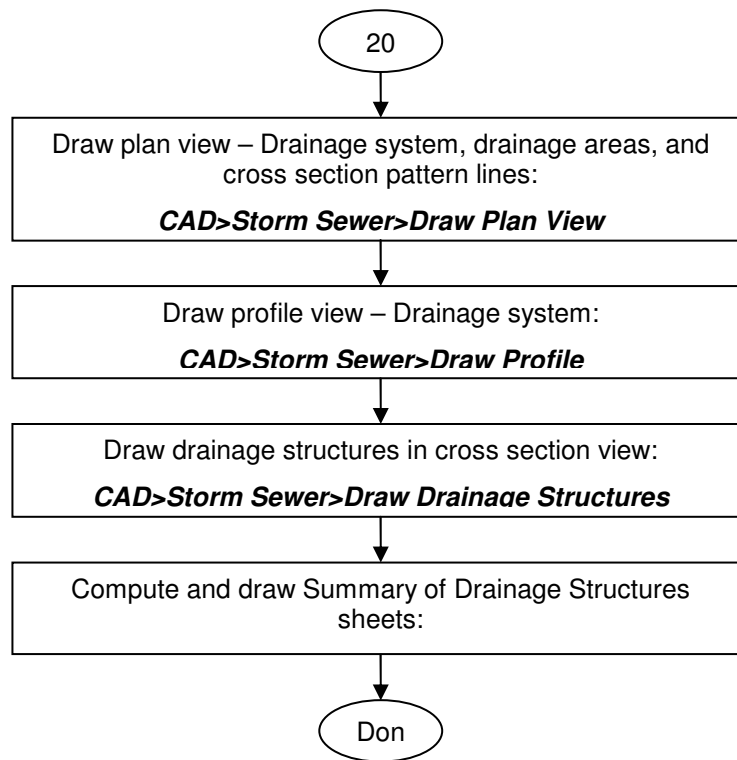
Levels: 698 Make All Levels: Make Levels Typical to ASAD Projects Active, All Others Inactive.

Figure 1

User Flowchart







CHAPTER II: STARTING A PROJECT

2.1 Creating/Opening a Project Database

2.2 Setting the Path/File Names Files

2.3 Projects Settings

Lab #1 New Project

File>New Project (MDB)

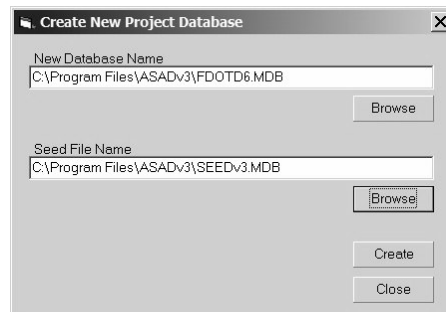


Figure 2

File>Open Project (MDB)

File> Top Files/Report Files/Cell Libraries/Level Name Library



Figure 3

PROJECT

PROJECT SETUP

Project Units <unused>

Financial Project ID: 2007-1000 (20 char)

State Road: SR 5 (20 char)

Description: State Road 5 (30 char)

County: Lake (20 char)

OK

Figure 4

PROJECT SETUP

Project Units

☒ English Units

☐ Metric Units

Figure 5

2.4 Defining the Geometry

2.4.1 Baseline Geometry

2.4.1.1 Importing from GEOPAK

2.4.1.2 Importing from another ASAD Database

2.4.1.3 Manually Entered Data

2.4.2 Profile Geometry

2.4.2.1 Importing from GEOPAK

2.4.2.2 Importing from another ASAD Database

2.4.2.3 Manually Entered Data

2.4.3 Cross Slopes (typical section)

2.4.2 Cross Widths

Lab #2 Geometry

File>Import> Geometry from GEOPAK Input Text File

IMPORT

GEOPAK Chains GEOPAK Profiles Cross Widths

Geopak Input File

Name: C:\Program Files\ASADv3\baseline.inp

Selection: CLSR5

Options:

- ☐ Overwrite existing
- ☐ List detailed curve data

Figure 6

File>Import> All Data from ASAD Created Text File

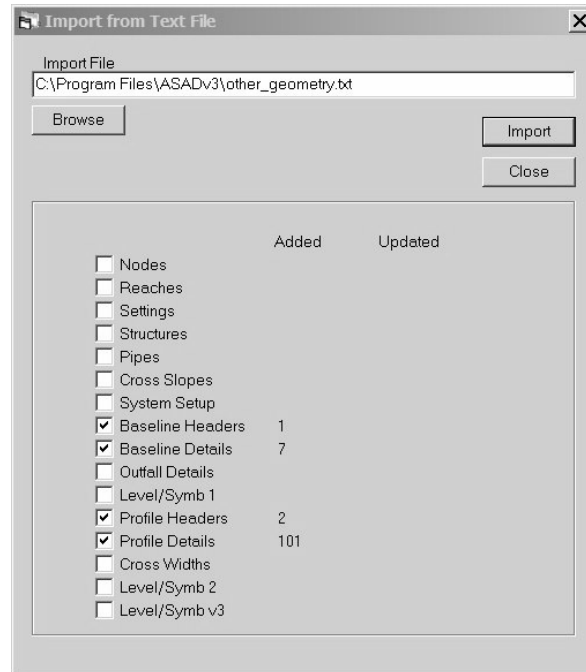


Figure 7

Re-Start ASAD
Edit>Baseline Geometry

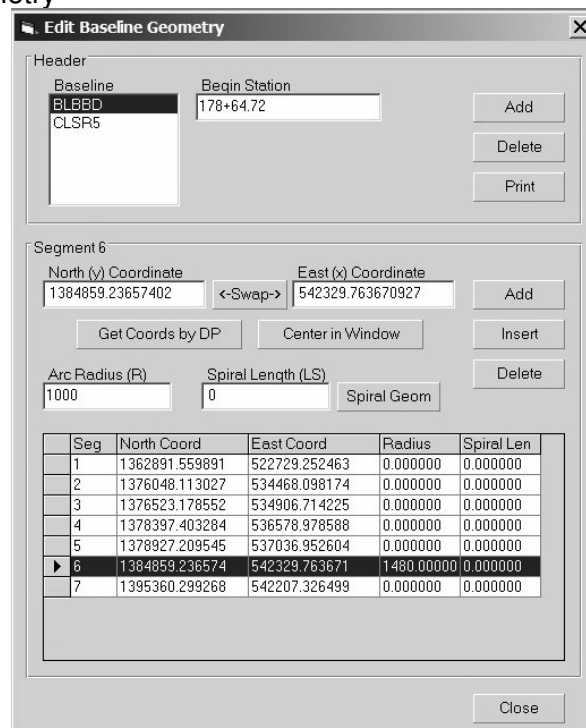


Figure 8

File>Import> Geometry from GEOPAK Input Text File

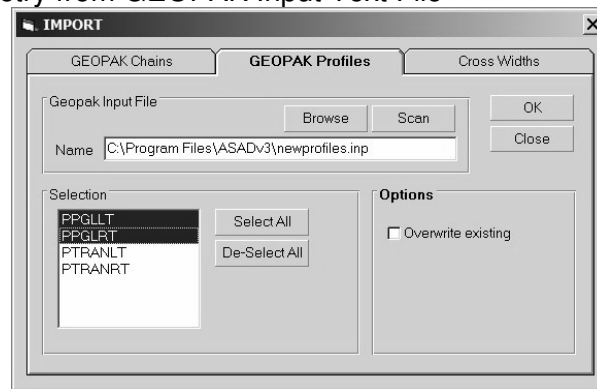


Figure 9

Edit>Profile Geometry

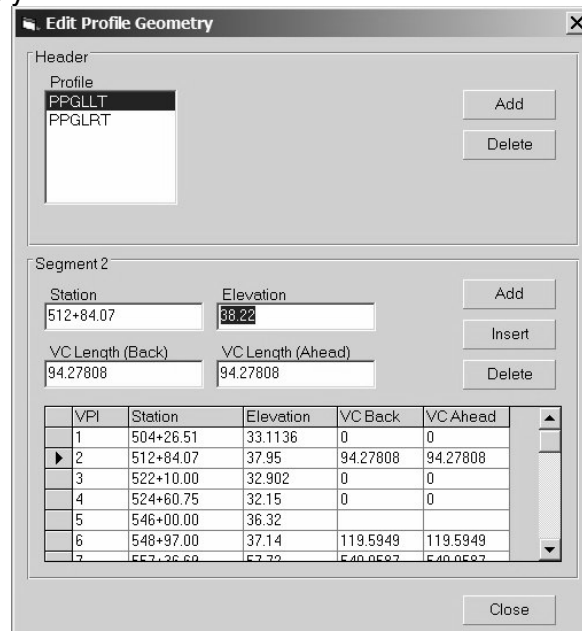


Figure 10

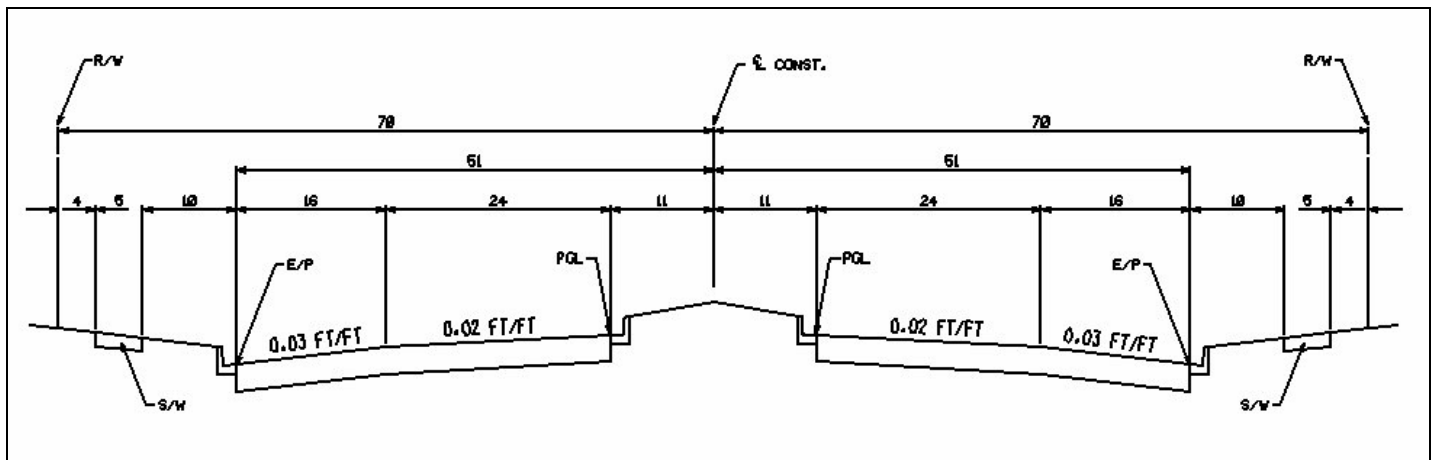


Figure 11

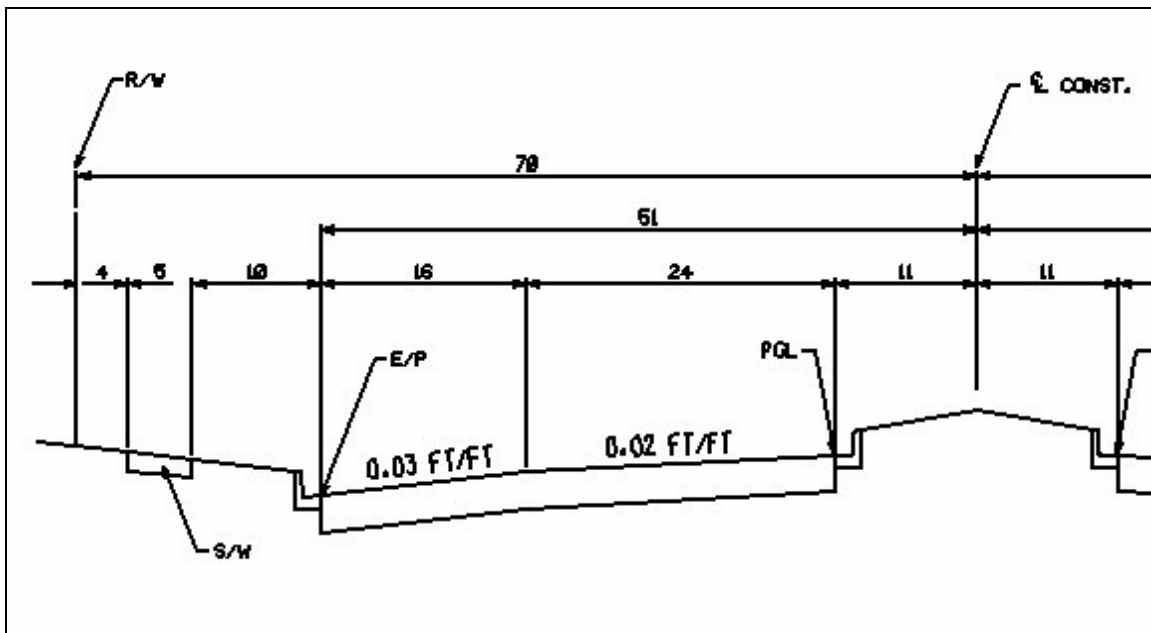


Figure 12

Edit>Roadway Cross Slopes

Figure 13

Figure 14

2.5 Defining Structures

2.5.1 Editing Structure Definitions File

2.5.2 Updating Structure Definitions from a Seed

2.6 Defining Pipes

Lab #3 Structures & Pipes

Edit> Structure Definitions

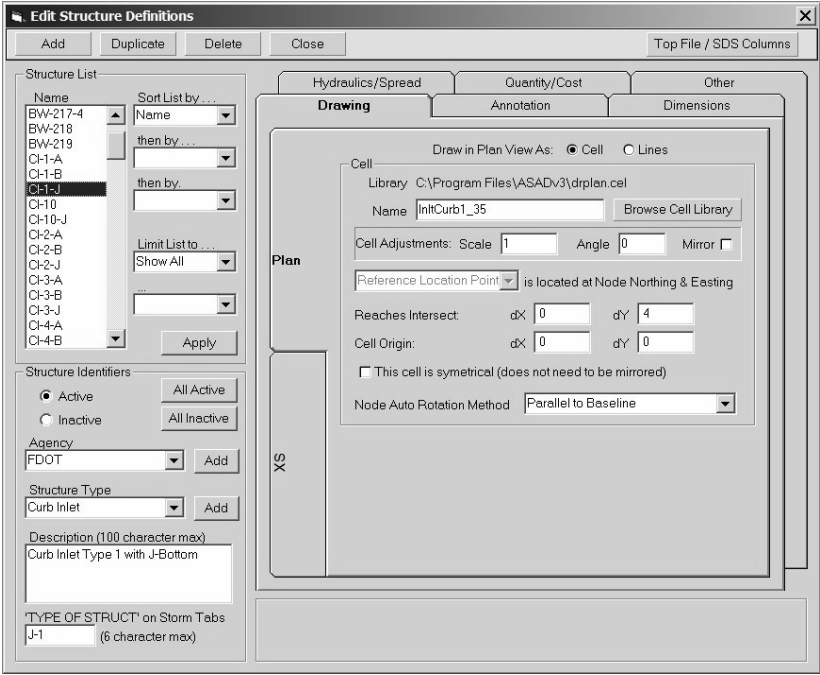


Figure 15

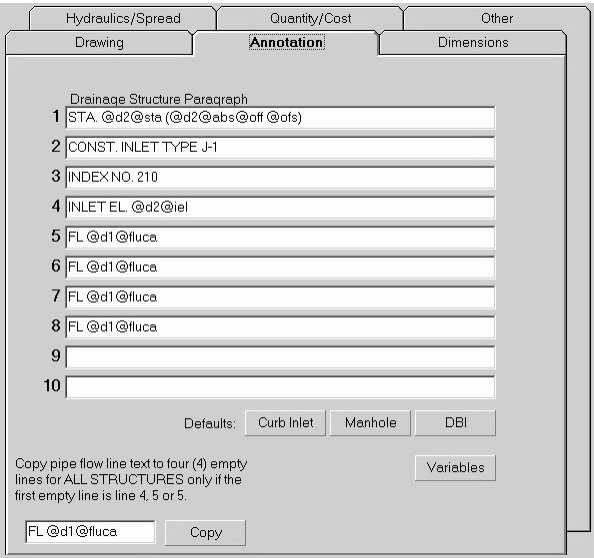


Figure 16

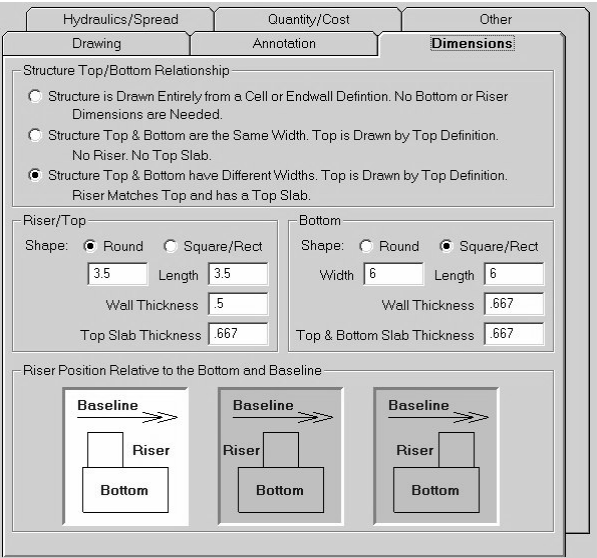


Figure 17

Drawing	Annotation	Dimensions
Hydraulics/Spread		
Hydraulic Warnings		
Hydraulic Intake Capacity		4.1
HGL Clearance		1
Gutter Spread & Intercept		
Is this structure used in HEC-12 calculations? <input checked="" type="radio"/> Yes <input type="radio"/> No		
Gutter Width	1.5	Gutter Cross Slope
<input type="radio"/> NO THROAT opening <input checked="" type="radio"/> NO GRATE opening		
<input checked="" type="radio"/> Vertical THROAT OPENING <input type="radio"/> Horizontal GRATE OPENING		
Throat Length	13	Throat Height
Grate Width	0	Grate Length
Grate Type	7	

Figure 18

Drawing	Annotation	Dimensions
Quantity/Cost		
Cost		
Depth Less than 10'		1.00
Depth 10' or Greater		1.00
Quantities		
DOT Index Number(s)		200, 201, 210
Column: Identifier		J-1
Order Number		1020110
SDS Header 1		
SDS Header 2		
SDS Header 3		
SDS Header 4		
<input checked="" type="checkbox"/> Use second Column Identifier based on structure depth.		
For structures deeper than 10 (feet)		
2nd Column: Identifier		J-1(x10)
Order Number		1020115
SDS Header 1		
SDS Header 2		
SDS Header 3		
SDS Header 4		

Figure 19

Drawing	Annotation	Dimensions
Other		
Pipe Length Adjustment		
Offset Adjustment		-1.5
Minimum Cover		2.79
Inlet/Grate/Top Elevation		
Inlet Elevation Adjustment		0
<input checked="" type="checkbox"/> Computing Hydraulics Profile View: <input checked="" type="checkbox"/> Drawing & Labeling		
<input checked="" type="checkbox"/> Plan View, Labeling Drainage Structures: <input type="checkbox"/> Drawing <input checked="" type="checkbox"/> Labeling		
<input checked="" type="checkbox"/> Structure Depth in Summary of Drainage Structures		
Sump Bottom		
Does this structure have a sump bottom? <input checked="" type="radio"/> Yes <input type="radio"/> No		
Distance below the lowest invert elevation		4
Weep Hole Diameter		.5

Figure 20

File>Update Structures from Seed File

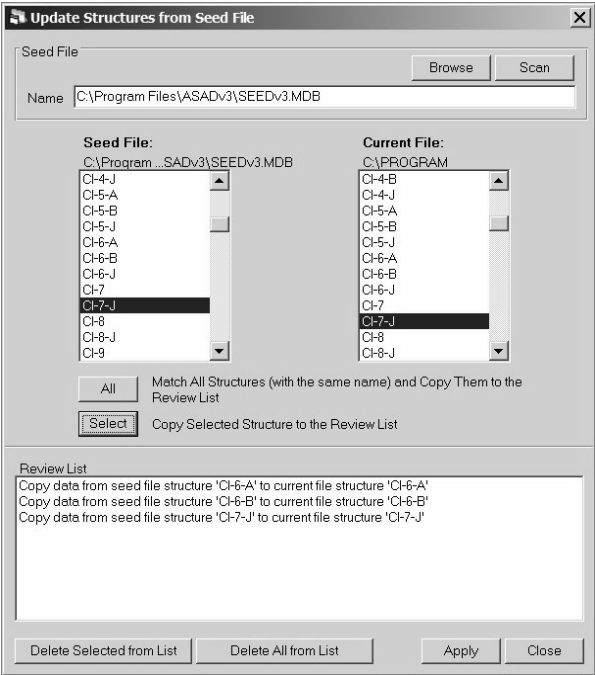


Figure 21

Edit>Pipe Definitions

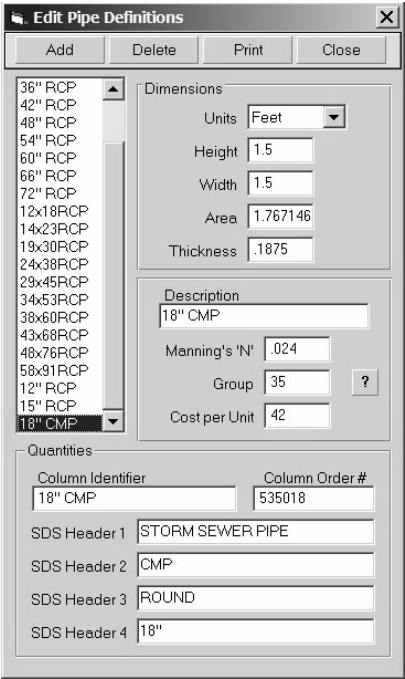


Figure 22

2.7 Defining Utilities

Lab #4 Utilities

Edit> Underground Utilities

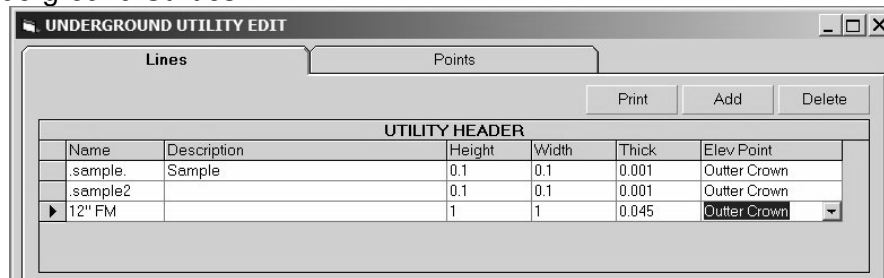


Figure 23 shows the 'UNDERGROUND UTILITY EDIT' dialog box with the 'Lines' tab selected. The 'UTILITY HEADER' table contains the following data:

Name	Description	Height	Width	Thick	Elev Point
.sample	Sample	0.1	0.1	0.001	Outer Crown
.sample2		0.1	0.1	0.001	Outer Crown
▶ 12" FM		1	1	0.045	Outer Crown

Figure 23

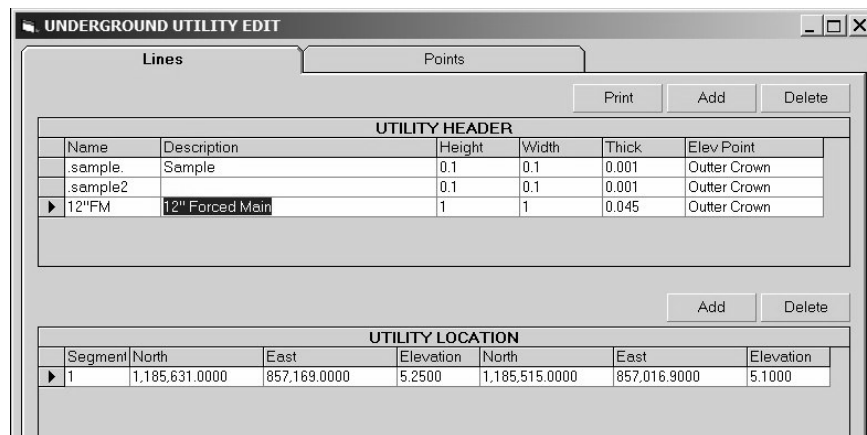


Figure 24 shows the 'UNDERGROUND UTILITY EDIT' dialog box with the 'Lines' tab selected. The 'UTILITY HEADER' table contains the following data:

Name	Description	Height	Width	Thick	Elev Point
.sample	Sample	0.1	0.1	0.001	Outer Crown
.sample2		0.1	0.1	0.001	Outer Crown
▶ 12" FM	12" Forced Main	1	1	0.045	Outer Crown

The 'UTILITY LOCATION' table contains the following data:

Segment	North	East	Elevation	North	East	Elevation
▶ 1	1,185,631.0000	857,169.0000	5.2500	1,185,515.0000	857,016.9000	5.1000

Figure 24

CHAPTER III: HYDRAULIC SETUP

- 3.1 Creating/Deleting/Renaming a Storm Sewer System**
- 3.2 Defining Storm Events**
 - 3.2.1 FDOT Intensity-Duration-Frequency (IDF) Curves
 - 3.2.2 User Defined Time-Intensity Tables
- 3.3 Defining the Storm Sewer System Header Information**
 - 3.3.1 Outfall
 - 3.3.2 Tailwater Conditions
 - 3.3.3 Selecting a Storm Event
 - 3.3.4 Setting Report Heading Labels (designer/checker)

Lab #5 Storm Sewer Setup

Edit> Storm Sewer System Add/Delete/Rename

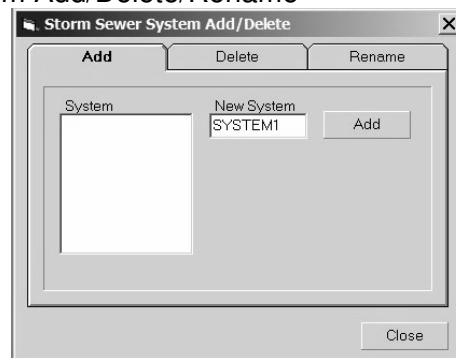


Figure 25

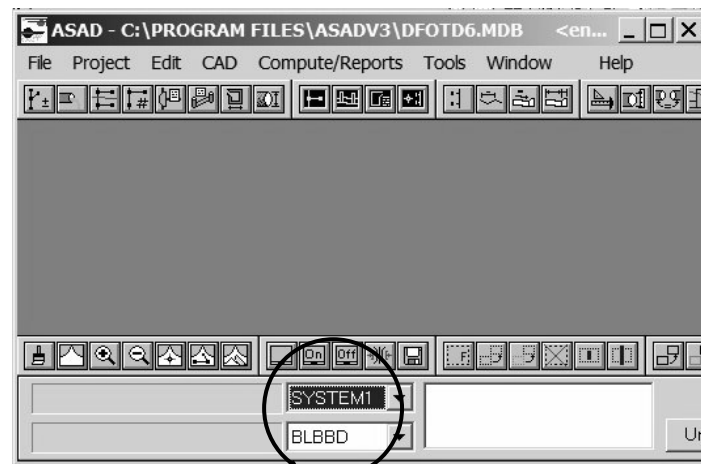
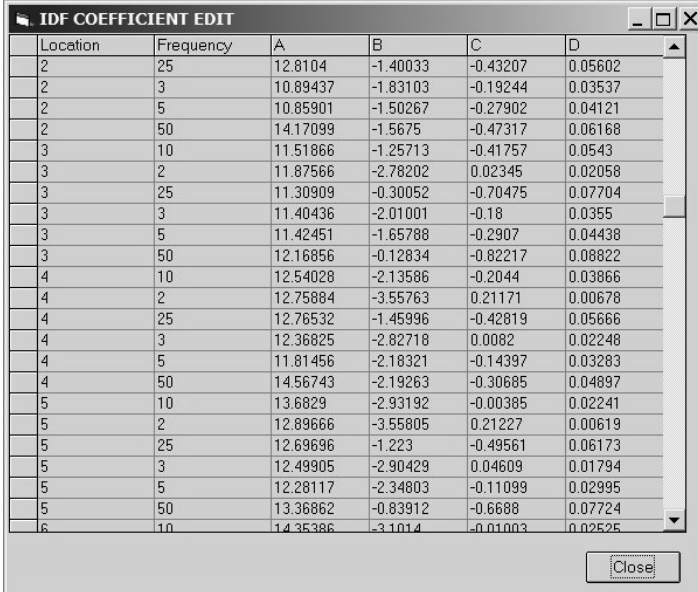


Figure 26

Current Active System

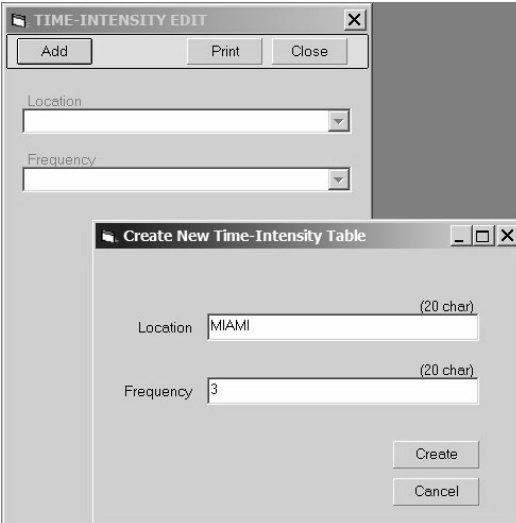
Edit>IDF Coefficients



Location	Frequency	A	B	C	D
2	25	12.8104	-1.40033	-0.43207	0.05602
2	3	10.89437	-1.83103	-0.19244	0.03537
2	5	10.85901	-1.50267	-0.27902	0.04121
2	50	14.17099	-1.5675	-0.47317	0.06168
3	10	11.51866	-1.25713	-0.41757	0.0543
3	2	11.87566	-2.78202	0.02345	0.02058
3	25	11.30909	-0.30052	-0.70475	0.07704
3	3	11.40436	-2.01001	-0.18	0.0355
3	5	11.42451	-1.65788	-0.2907	0.04438
3	50	12.16856	-0.12834	-0.82217	0.08822
4	10	12.54028	-2.13586	-0.2044	0.03866
4	2	12.75884	-3.55763	0.21171	0.00678
4	25	12.76532	-1.45996	-0.42819	0.05666
4	3	12.36825	-2.82718	0.0082	0.02248
4	5	11.81456	-2.18321	-0.14397	0.03283
4	50	14.56743	-2.19263	-0.30685	0.04897
5	10	13.6829	-2.93192	-0.00385	0.02241
5	2	12.89666	-3.55805	0.21227	0.00619
5	25	12.69696	-1.223	-0.49561	0.06173
5	3	12.49905	-2.90429	0.04609	0.01794
5	5	12.28117	-2.34803	-0.11099	0.02995
5	50	13.36862	-0.83912	-0.6688	0.07724
6	10	14.35386	-3.1014	-0.01003	0.02525

Figure 27

Edit>Storm Time-Intensity Tables (user defined)



TIME-INTENSITY EDIT

Add Print Close

Location:

Frequency:

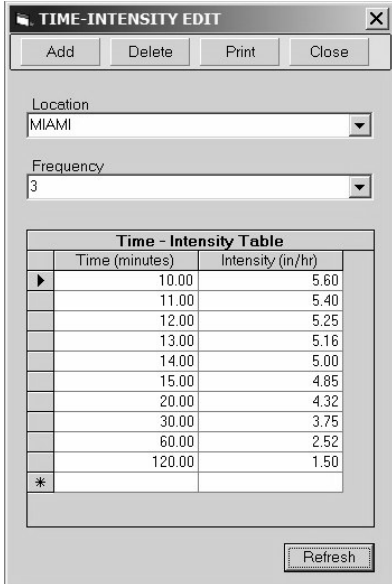
Create New Time-Intensity Table

Location: (20 char)

Frequency: (20 char)

Create Cancel

Figure 28



TIME-INTENSITY EDIT

Add Delete Print Close

Location:

Frequency:

Time - Intensity Table	
Time (minutes)	Intensity (in/hr)
10.00	5.60
11.00	5.40
12.00	5.25
13.00	5.16
14.00	5.00
15.00	4.85
20.00	4.32
30.00	3.75
60.00	2.52
120.00	1.50
*	

Refresh

Figure 29

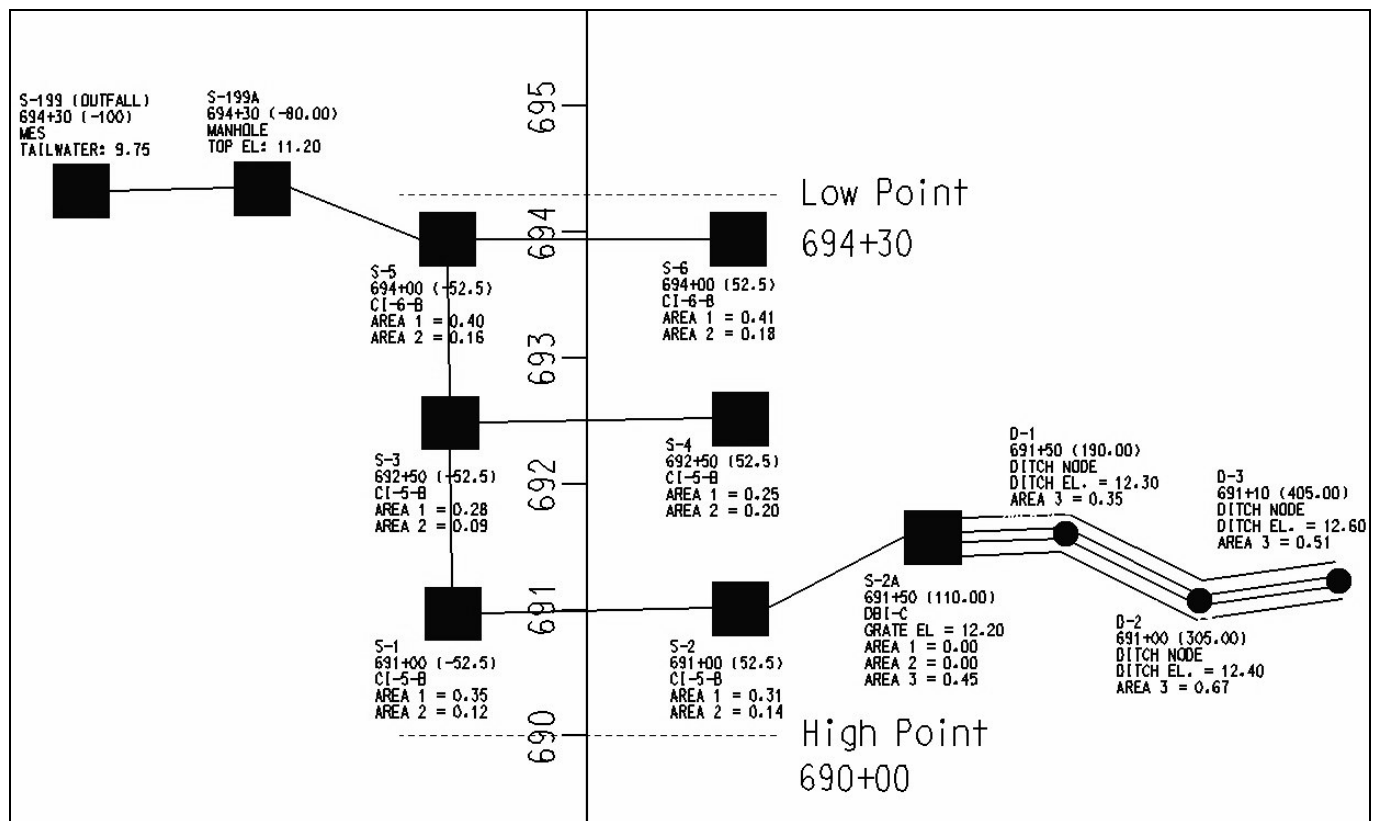


Figure 30

Edit> SS System Outfall and Header Details

Figure 31

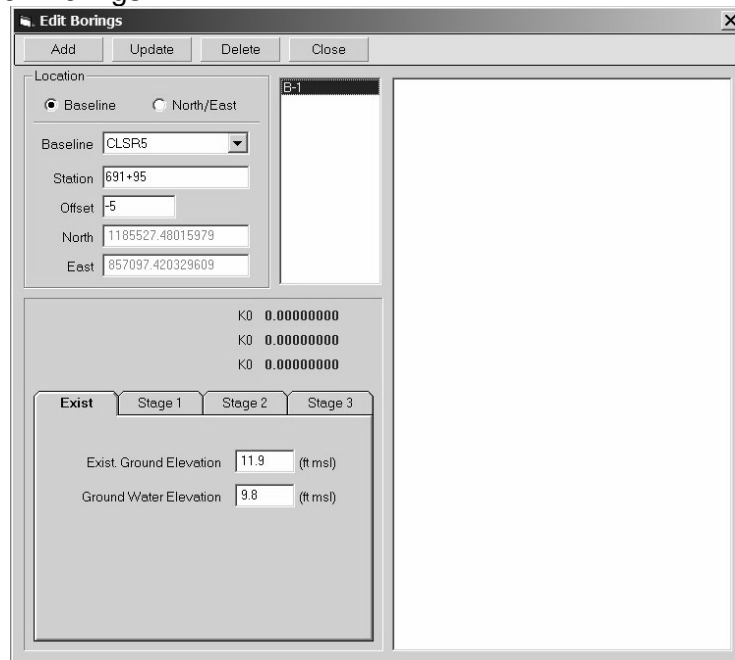
Figure 32

Figure 33

3.4 Defining Percolation Borings

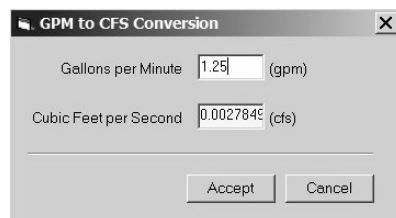
Lab #6 Borings

Edit> Percolation Borings



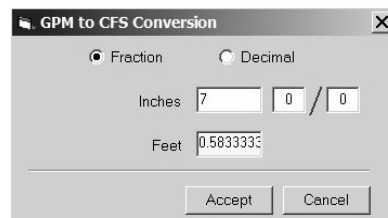
The "Edit Borings" dialog box is shown. It has a title bar with "Edit Borings" and a close button. Below the title bar are buttons for "Add", "Update", "Delete", and "Close". The "Location" section has two radio buttons: "Baseline" (selected) and "North/East". Below these are input fields for "Baseline" (CLSR5), "Station" (691+95), "Offset" (-5), "North" (1185527.48015979), and "East" (857097.420329609). To the right of these fields is a small map area labeled "B-1". Below the location fields are three "KO" labels, each followed by "0.00000000". At the bottom, there are four tabs: "Exist", "Stage 1", "Stage 2", and "Stage 3". The "Exist" tab is selected, showing "Exist. Ground Elevation" (11.9 (ft msl)) and "Ground Water Elevation" (9.8 (ft msl)).

Figure 34



The "GPM to CFS Conversion" dialog box is shown. It has a title bar with "GPM to CFS Conversion" and a close button. Below the title bar are two input fields: "Gallons per Minute" (1.25 (gpm)) and "Cubic Feet per Second" (0.0027845 (cfs)). At the bottom are "Accept" and "Cancel" buttons.

Figure 35



The "GPM to CFS Conversion" dialog box is shown. It has a title bar with "GPM to CFS Conversion" and a close button. Below the title bar are two radio buttons: "Fraction" (selected) and "Decimal". Below these are two input fields: "Inches" (7 / 0) and "Feet" (0.5833333). At the bottom are "Accept" and "Cancel" buttons.

Figure 36

Edit Borings

Add Update Delete Close

Location

☒ Baseline ☐ North/East

Baseline CLSR5

Station 691+95

Offset -5

North 1185527.48015979

East 857097.420329609

B-1

13

11

9

7

5

3

1

K10 0.00075748

K0 0.00000000

K0 0.00000000

Exist Stage 1 Stage 2 Stage 3

Boring Depth from 0 to 10 (ft)

Pump Discharge (P) 0.002784 (cfs) Gallons

Stabilized Water 10.05 (ft msl)

Boring Diameter (d) 0.583333 (ft) Inches

Du 0.25000000

Ds 7.90000000

K10 0.00075748

Figure 37

Edit Borings

Add Update Delete Close

Location

☒ Baseline ☐ North/East

Baseline CLSR5

Station 691+95

Offset -5

North 1185527.48015979

East 857097.420329609

B-1

13

11

9

7

5

3

1

-1

-3

-5

K10 0.00075748

K15 0.00148931

K0 0.00000000

Exist Stage 1 Stage 2 Stage 3

Boring Depth from 10 to 15 (ft)

Pump Discharge (P) 0.004678 (cfs) Gallons

Stabilized Water 10.2 (ft msl)

Boring Diameter (d) .5 (ft) Inches

Du 0.40000000

D2 5.00000000

K15 0.00148931

Figure 39

GPM to CFS Conversion

Gallons per Minute 2.1 (gpm)

Cubic Feet per Second 0.0046787 (cfs)

Accept Cancel

Figure 38

GPM to CFS Conversion

Gallons per Minute

1.15

(gpm)

Cubic Feet per Second

0.0025622

(cfs)

Accept

Cancel

Figure 40

Edit Borings

Add

Update

Delete

Close

Location

☒ Baseline

☐ North/East

Baseline

CLSP5

Station

691+95

Offset

-5

North

1185527.48015979

East

857097.420329609

B-1

K10

0.00075748

K15

0.00148931

K20

0.00122348

Exist

Stage 1

Stage 2

Stage 3

Boring Depth from 15 to

20

(ft)

Pump Discharge (P")

.0025622

(cfs)

Gallons

Stabilized Water

10.2

(ft msl)

Boring Diameter (d")

.3333

(ft)

Inches

Du

0.40000000

D3

5.00000000

K20

0.00122348

15

13

11

9

7

5

3

1

-1

-3

-5

-7

-9

Figure 41

Automated Storm Sewer Analysis and Design

Version 3.x.x

CHAPTER IV: STORM SEWER LAYOUT

4.1 Creating Nodes & Reaches Automatically

4.2 Nodes

- 4.2.1 Drainage Structure Nodes
- 4.2.2 Ditch Nodes
- 4.2.3 Time of Concentration (Tc) Calculation

4.3 Reaches

- 4.3.1 Solid Pipes
- 4.3.2 Perforated Pipe with Exfiltration Trench (French Drain)

4.3.3 Ditches & Swales

Lab #7 Storm Sewer Layout

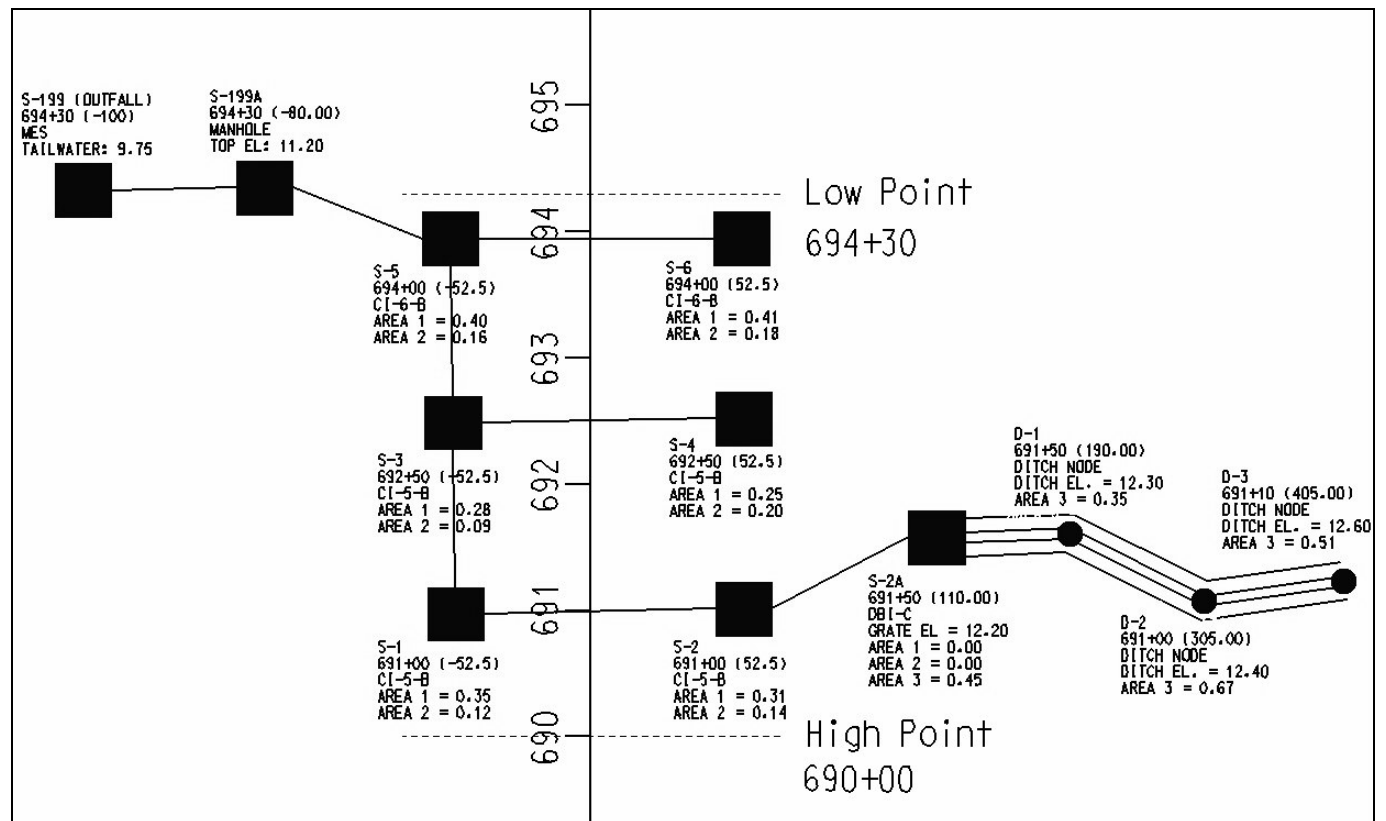


Figure 42

Edit> Node/Reach Automatic Creation



Node/Reach Automatic Creation

Quick Input Mode: **Add New Nodes and Reaches to System: SYSTEM1**

Node

Type: **Structure**

Top Status: **Proposed**

Bottom Status: **Proposed**

Geometry

Baseline: **CLSR5**

Structure Name: **CI-5-B**

Profile Name: **PPGLLT**

Cross Slope: **MAINLINE**

Initial Tc (min): **10.00**

Junct Loss Coeff: **0**

Locks

Station:

Area 1:

Inlet/Top Elev:

Area 2:

Junct Loss Coeff:

Area 3:

New Node

Prefix: **S-** Begin #: **1** Total: **6**

New Reach

Prefix: **R-** Begin #: **1** Total: **6**

Add Nodes & Reaches **Cancel**

Reach

☒ Add Reaches

Type: **Solid Pipe**

Status: **Proposed**

Pipe

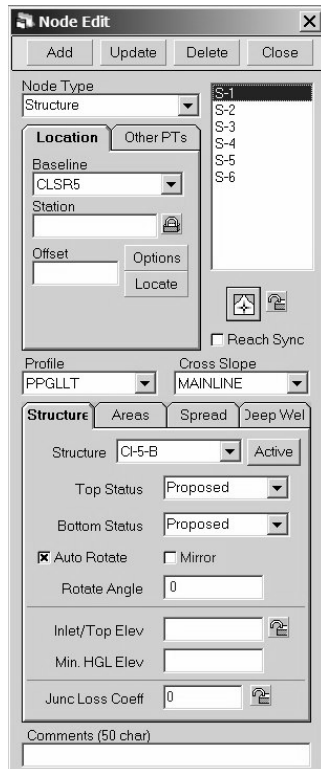
Default Pipe: **18" RCP**

Pipe Name Lock:

Pipe Length Lock:

Figure 43

Edit> Nodes



Node Edit

Add **Update** **Delete** **Close**

Node Type: **Structure**

Location **Other PTs**

Baseline: **CLSR5**

Station:

Offset:

Options

Locate

☐ Reach Sync

Profile: **PPGLLT** Cross Slope: **MAINLINE**

STRUCTURE **Areas** **Spread** **Deep Wel**

Structure: **CI-5-B** **Active**

Top Status: **Proposed**

Bottom Status: **Proposed**

☒ Auto Rotate ☐ Mirror

Rotate Angle: **0**

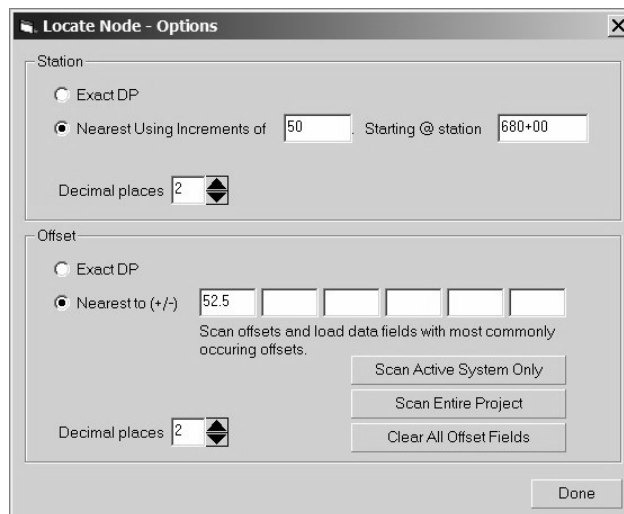
Inlet/Top Elev:

Min. HGL Elev:

Junct Loss Coeff: **0**

Comments (50 char):

Figure 44



Locate Node - Options

Station

☐ Exact DP

☒ Nearest Using Increments of **50** Starting @ station **680+00**

Decimal places: **2**

Offset

☐ Exact DP

☒ Nearest to (+/-) **52.5**

Scan offsets and load data fields with most commonly occurring offsets.

Scan Active System Only

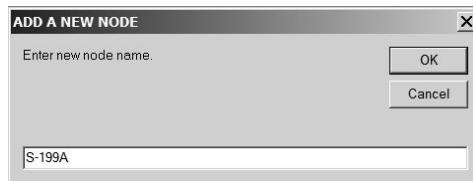
Scan Entire Project

Clear All Offset Fields

Decimal places: **2**

Done

Figure 45



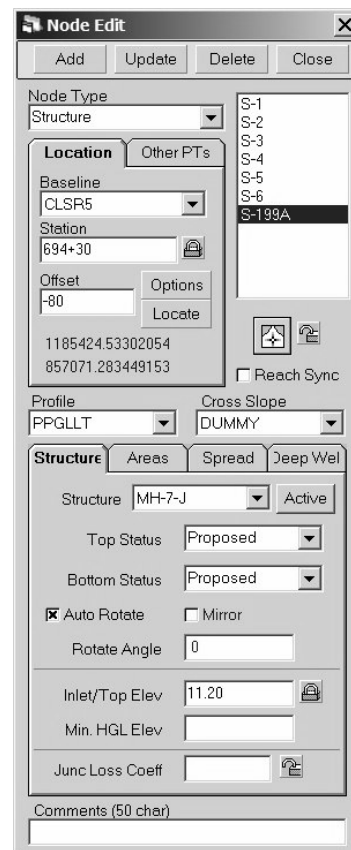
ADD A NEW NODE

Enter new node name.

OK Cancel

S-199A

Figure 46



Node Edit

Add Update Delete Close

Node Type
Structure

Location Other PTs

Baseline
CLSR5

Station
694+30

Offset
-80

Options
Locate

1185424.53302054
857071.283449153

Reach Sync

Profile
PPGLLT

Cross Slope
DUMMY

Structure Areas Spread Jeep Wel

Structure MH-7-J Active

Top Status Proposed

Bottom Status Proposed

☒ Auto Rotate ☐ Mirror

Rotate Angle 0

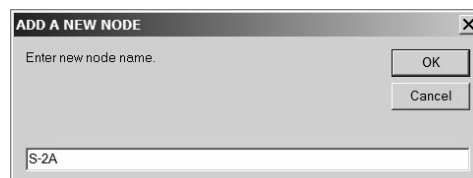
Inlet/Top Elev 11.20

Min. HGL Elev

Junc Loss Coeff

Comments (50 char)

Figure 47



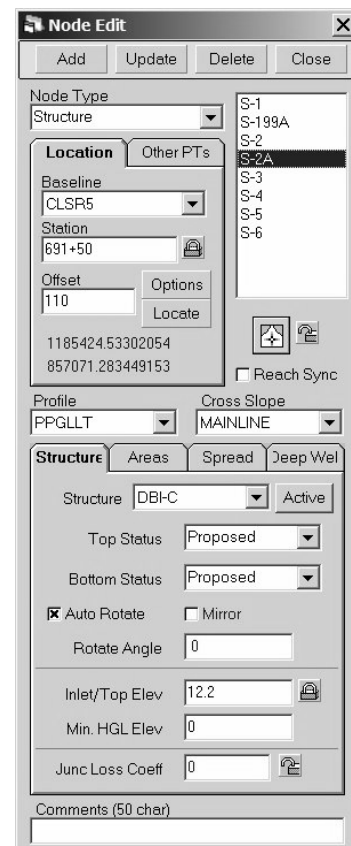
ADD A NEW NODE

Enter new node name.

OK Cancel

S-2A

Figure 48



Node Edit

Add Update Delete Close

Node Type
Structure

Location Other PTs

Baseline
CLSR5

Station
691+50

Offset
110

Options
Locate

1185424.53302054
857071.283449153

Reach Sync

Profile
PPGLLT

Cross Slope
MAINLINE

Structure Areas Spread Jeep Wel

Structure DBI-C Active

Top Status Proposed

Bottom Status Proposed

☒ Auto Rotate ☐ Mirror

Rotate Angle 0

Inlet/Top Elev 12.2

Min. HGL Elev 0

Junc Loss Coeff 0

Comments (50 char)

Figure 49

Edit> Node/Reach Automatic Creation

Node/Reach Automatic Creation

Quick Input Mode: **Add New Nodes and Reaches to System: SYSTEM1**

Node

Type: **Ditch**

Status: **Proposed**

Geometry

Baseline: **CLSR5**

Profile Name: **PPGLLT**

Cross Slope: **DUMMY**

Initial Tc (min): **10.00**

Locks

Ditch Bot Elev:

Reach

☒ Add Reaches

Type: **Ditch/Swale**

Status: **Proposed**

Ditch/Swale

☒ Warn: Velocity Exceeds **5** ft/s

☒ Warn: Normal Depth Exceeds **2** ft

☒ Warn: EGL Depth Exceeds **2.5** ft

Click on picture to select ditch shape.

Baseline → **Trapezoidal**

Baseline → **V Bottom**

Baseline → **Box**

Baseline → **Round**

Baseline → **3 Slope**

Baseline → **4 Slope**

Manning's 'N': **0.2400** ?

Slope (S1): **4**

Width (W): **5**

Slope (S2): **2**

New Node

Prefix: **D-** Begin #: **1** Total: **3**

New Reach

Prefix: **D-** Begin #: **1** Total: **3**

Add Nodes & Reaches **Cancel**

Figure 50

Edit> Nodes

Node Edit

Add **Update** **Delete** **Close**

Node Type

Ditch

Location **Other PTs**

Baseline: **CLSR5**

Station: **691+50**

Offset: **190** **Options** **Locate**

1185424.53302054
857071.283449153

☐ Reach Sync

Profile **Cross Slope**

PPGLLT **DUMMY**

Structure **Areas** **Spread** **Deep Wel**

Status: **Proposed**

Ditch Bottom El.: **12.3**

Min. HGL Elev: **0**

S-1
S-199A
S-2
S-2A
S-3
S-4
S-5
S-6
D-1
D-2
D-3

Figure 51

Time of Concentration Worksheet D-3

Sheet Flow **Shallow Concentrated**

TR55

Segment ID: **1**

Description (160 char max):
Sheet flow over parking lot.

Mannings 'n': **0.0110** ?

Flow Length (ft): **200**

Two-Yr 24-Hr Rain (in): **4**

Land Slope (ft/ft): **.0025**

Computed Tt (min): **4.33**

Figure 52

Time of Concentration Worksheet D-3

Sheet Flow **Shallow Concentrated**

1

Segment ID: **2**

Description (160 char max):
Shallow swale (grass)

Flow Length (ft): **135**

Slope (ft/ft): **.00015**

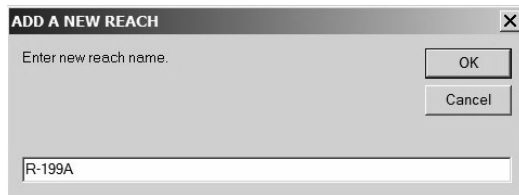
Surface: ☒ Grass ☐ Pavement

Avg Velocity (ft/s): **.1943178** ☐ Manual

Computed Tt (min): **11.58**

Figure 53

Edit> Reaches



ADD A NEW REACH

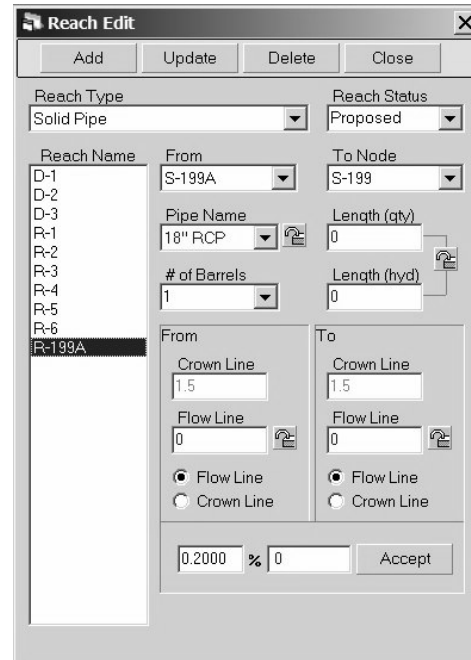
Enter new reach name.

OK

Cancel

R-199A

Figure 54



Reach Edit

Add Update Delete Close

Reach Type: Solid Pipe Reach Status: Proposed

Reach Name: D-1, D-2, D-3, R-1, R-2, R-3, R-4, R-5, R-6, R-199A

From: S-199A To Node: S-199

Pipe Name: 18" RCP Length (qty): 0

of Barrels: 1 Length (hyd): 0

From: Crown Line 1.5 Flow Line 0 To: Crown Line 1.5 Flow Line 0

Flow Line Crown Line

0.2000 % 0 Accept

Figure 55



ADD A NEW REACH

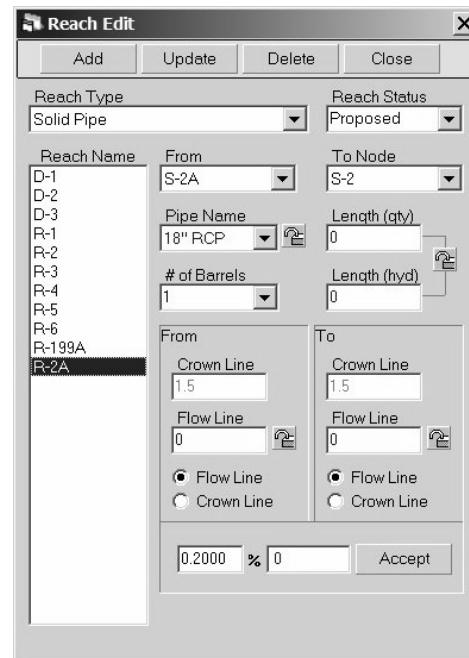
Enter new reach name.

OK

Cancel

R-2A

Figure 56



Reach Edit

Add Update Delete Close

Reach Type: Solid Pipe Reach Status: Proposed

Reach Name: D-1, D-2, D-3, R-1, R-2, R-3, R-4, R-5, R-6, R-199A, R-2A

From: S-2A To Node: S-2

Pipe Name: 18" RCP Length (qty): 0

of Barrels: 1 Length (hyd): 0

From: Crown Line 1.5 Flow Line 0 To: Crown Line 1.5 Flow Line 0

Flow Line Crown Line

0.2000 % 0 Accept

Figure 57

Reach Edit

Add Update Delete Close Copy Data to Other Reaches

Reach Type: Ditch/Swale Reach Status: Proposed

Reach Name: D-1 From: D-1 To Node: D-2

Flow Line: 12.3 Flow Line: 12.4

Length (ft): 0

Hydraulic Warnings:

- ☒ Velocity Exceeds 5 ft/s
- ☒ Normal Depth Exceeds 2 ft
- ☒ Energy Grade Line Depth Exceeds 2.5 ft

Click on picture to select ditch shape.

Baseline →

S1 S2 W

Trapezoidal

Baseline →

S1 S2

V Bottom

Baseline →

W

Box

Baseline →

R

Round

Baseline →

S1 S3 S2 H H1 H2 W

3 Slope

Baseline →

S1 S3 S4 S2 H1 H2 W

4 Slope

Manning's Coefficient 'N': .24 ?

Side Slope, n:1 (S1): 4

Bottom Width (W): 5

Side Slope, (S2): 2

Figure 58

4.4 Importing Node & Reach Data from GEOPAK

Lab #8 Import Nodes & Reaches

Import Storm Sewer System - Page 0

Name of File to be Imported

F:\PROJECTS\ASAD_TRAINING_FILES\nodebasin1.txt

Browse Load

Preview of file F:\PROJECTS\ASAD_TRAINING_FILES\nodebasin1.txt

Start import at row 1

S-118	IntCurb1_40	Curb Inlet Type 1- 4.0 Bottom	999+58.00	65.5	CLSR5	PPGLRT	746185.07	1452112.74
S-109	IntCurb1_40	Curb Inlet Type 1- 4.0 Bottom	990+56.64	65.5	CLSR5	PPGLRT	746725.78	1451391.57
S-110	IntCurb1_40	Curb Inlet Type 1- 4.0 Bottom	994+63.38	-32.5	CLSR5	PPGLLT	746403.37	1451658.21
S-117	IntCurb1_40	Curb Inlet Type 1- 4.0 Bottom	999+58.00	-32.5	CLSR5	PPGLLT	746106.66	1452053.95
S-120	IntCurb1_40	Curb Inlet Type 1- 4.0 Bottom	1002+72.00		68.75	CLSR5	PPGLRT	745999.31
S-107	PBottom35Dia	Manhole (Type P-7)	987+50.00	71	CLSR5	PPGLRT	746914.12	1451149.53
S-107C	PBottom40Dia	Manhole (Type P-8)	990+56.64	23	CLSR5	PPGLRT	746691.77	1451366.07
S-120A	PBottom40Dia	Manhole (Type P-8)	1002+72.00	23	CLSR5	PPGLRT	745962.7	1452338.47
S-122	IntCurb2_35	Curb Inlet Type 2- 3.5 Bottom	1006+03.00		73	CLSR5	PPGLRT	745804.15

Figure 59

Import Storm Sewer System - Page 1

This screen lets you see the delimiters your data contains. You can see how your text is affected on the Next screen.

Delimiters

☒ Tab (009)
 ☐ Semicolon (059)
 ☐ Other 015
 ☐ Space (032)
 ☐ Comma (044)
 ☐ Character
 ☒ ASCII value

Data preview

Node - ID	Node - Library Item Name	Node - Library Item Description	Node - Station	Node - Offset	Node - Reference Cha
S-116	MESC54RCP2S	CD MES 54 RCP 1.2 1-pipe	1000+62.54	-743.94	CLSR5 PPGLLT 745474.73 1451710.82
S-115	PBottom40Dia	Manhole (Type P-8)	999+73.19	-617.67	CLSR5 PPGLLT 745629.36 1451715.08
S-114	PBottom40Dia	Manhole (Type P-8)	997+22.60	-263.5	CLSR5 PPGLLT 746063.05 1451727.04
BB-1	JunctionBox	Junction Box (All Types)	997+22.60	-180	CLSR5 PPGLLT 746129.86 1451777.13
S-112	IntCurb1_40	Curb Inlet Type 1- 4.0 Bottom	997+22.60	-32.5	CLSR5 PPGLLT 746247.87 1451865.61
S-113A	PBottom40Dia	Manhole (Type P-8)	997+22.60	23	CLSR5 PPGLRT 746292.28 1451898.9
S-113	IntCurb1_40	Curb Inlet Type 1- 4.0 Bottom	997+22.60	65.5	CLSR5 PPGLRT 746326.28 1451924.4
S-113B	IntCurb1_40	Curb Inlet Type 1- 4.0 Bottom	998+25.77	17.5	CLSR5 PPGLRT 746225.99 1451978.15
S-111	IntCurb1_40	Curb Inlet Type 1- 4.0 Bottom	994+63.38	65.5	CLSR5 PPGLRT 746481.78 1451717.180

Figure 60

Import Storm Sewer System - Page 2

Enter the 'Row' number(s), from the table below, of the Storm Sewer data to be imported. If importing Inlet and Manhole data, do not import a row that contains the Outfall data. The Outfall data should be imported separately. (example: 1-23,25-68)

Row to exclude (typically an outfall node) 1

Rows to import 2-36

Select ALL rows except the 'excluded' row

Row	Node - ID	Node - Library Item Name	Node - Library Item	Node - Station	Node - Offset
1	S-116	MESC54RCP2S	CD MES 54 RCP 1.2 1-pipe	1000+62.54	-743.94
2	S-115	PBottom40Dia	Manhole (Type P-8)	999+73.19	-617.67
3	S-114	PBottom40Dia	Manhole (Type P-8)	997+22.60	-263.5
4	BB-1	JunctionBox	Junction Box (All Types)	997+22.60	-180
5	S-112	IntCurb1_40	Curb Inlet Type 1- 4.0 Bottom	997+22.60	-32.5
6	S-113A	PBottom40Dia	Manhole (Type P-8)	997+22.60	23

Figure 61

Import Storm Sewer System - Page 3

The Column - Destination setup controls where the imported data will be placed in the ASAD database. Using the pulldown list you can select an existing setup or 'Add' or 'Delete' setups. Note: You must 'Add' a setup record before assigning the Destination Fields (below).

Column - Destination Setup: **NODES** [Add] [Delete]

Assign each 'Import Column' to a 'Destination Field' in the ASAD database. Select <none> to not import a field. The 'Link' button will appear beside destinations 'Node Structure' and 'Reach Pipe'. Use the 'Link' button to select the Structure or Pipe that is most like the 'Imported' structure or pipe description.

Import Columns	Destination Field
Node - ID	Node: Name
Node - Library Item	Node: Structure
Node - Library Item	<none>
Node - Station	<none>
Node - Offset	<none>

[Save setup in 'NODES'] [Link]

Figure 62

Link Import Structures to ASAD Structures

Import Structure Name/Desc	ASAD Structure Name
DBIDNoPvt	DBI-D
IntCurb1_40	P-1
IntCurb2_35	P-2
JunctionBox	MHJ-7T
MESC54RCP2S	MES2:1
PBottom35Dia	MHJ-7T
PBottom40Dia	MHJ-7T

Double click on a cell to select an ASAD structure to link to. [Done]

Figure 63

Import Storm Sewer System - Page 3

The Column - Destination setup controls where the imported data will be placed in the ASAD database. Using the pulldown list you can select an existing setup or 'Add' or 'Delete' setups. Note: You must 'Add' a setup record before assigning the Destination Fields (below).

Column - Destination Setup: **NODES** [Add] [Delete]

Assign each 'Import Column' to a 'Destination Field' in the ASAD database. Select <none> to not import a field. The 'Link' button will appear beside destinations 'Node Structure' and 'Reach Pipe'. Use the 'Link' button to select the Structure or Pipe that is most like the 'Imported' structure or pipe description.

Import Columns	Destination Field
Node - ID	Node: Name
Node - Library Item	Node: Structure
Node - Library Item	<none>
Node - Station	Node: Station
Node - Offset	Node: Offset
Node - Reference Chain	Node: Baseline Name
Node - Reference PGL	Node: Profile Name
Node - Location X	Node: East(X) Coord.
Node - Location Y	Node: North(Y) Coord.
Node - Rotation	Node: Structure Rotation
Node - Elevation	Node: Inlet Elevation
Node - Cumulative Area	Node: Area 1
Node - Cumulative C	Node: Area 1 C value
Node - Cumulative	Node: Initial Tc

[Save setup in 'NODES'] [Link]

[Cancel] [Back] [Next] [Finish]

Figure 64

Import Storm Sewer System - Page 4

Destination System
Select the system where the nodes and/or reaches are to be created and/or updated.

SYSTEM2

Default Structure & Pipe
Select a default ASAD Structure and Pipe to be used if the Import Structure or Import Pipe description has not been linked.

Structure: P-1

Pipe: 18" RCP

Node Settings

Cross Slope: PPGLT ☒ No Change

Auto Rotate: ☒ On ☐ Off ☐ No Change

Inlet Elevation: ☒ Locked ☐ Unlocked ☐ No Change

Initial Tc: 10 ☒ No Change

Objects to be Imported

☒ Nodes: Inlets & Manholes

☒ Overwrite existing nodes

☐ Reaches

☒ Overwrite existing reaches

Results

Node: S-115 - New node created in System: SYSTEM2
Node: S-115 - Node data updated.
Node: S-114 - New node created in System: SYSTEM2
Node: S-114 - Node data updated.
Node: BB-1 - New node created in System: SYSTEM2
Node: BB-1 - Node data updated.
Node: S-112 - New node created in System: SYSTEM2
Node: S-112 - Node data updated.
Node: S-113A - New node created in System: SYSTEM2
Node: S-113A - Node data updated.
Node: S-113 - New node created in System: SYSTEM2
Node: S-113 - Node data updated.
Node: S-113B - New node created in System: SYSTEM2
Node: S-113B - Node data updated.
Node: S-111 - New node created in System: SYSTEM2
Node: S-111 - Node data updated.
Node: S-118 - New node created in System: SYSTEM2
Node: S-118 - Node data updated.
Node: S-109 - New node created in System: SYSTEM2
Node: S-109 - Node data updated.
Node: S-110 - New node created in System: SYSTEM2
Node: S-110 - Node data updated.

Cancel < Back Next > Finish

Figure 65

Import Storm Sewer System - Page 2

Enter the 'Row' number(s), from the table below, of the Storm Sewer data to be imported. If importing Inlet and Manhole data, do not import a row that contains the Outfall data. The Outfall data should be imported separately. (example: 1-23,25-68)

Row to exclude (typically an outfall node):

Rows to import: 1-35

Row	Link-ID	Link - Library Item	Link - Upstream Node	Link - Invert Upstream	Link - Downstream
1	pipe-26	54	S-115	3.6	S-116
2	pipe-25	54	S-114	10	S-115
3	pipe-24	48	BB-1	10.3	S-114
4	pipe-24	48	S-112	10.8	BB-1
5	pipe-28	42	S-113A	16	S-112
6	pipe-27	42	S-113	16.3	S-113A
7	pipe-29	18	S-113B	16.3	S-113A
8	pipe-21	30	S-111	17	S-113
9	pipe-30	42	S-118	12.21	S-113
10	pipe-19	30	S-109	17.3	S-111

Figure 66

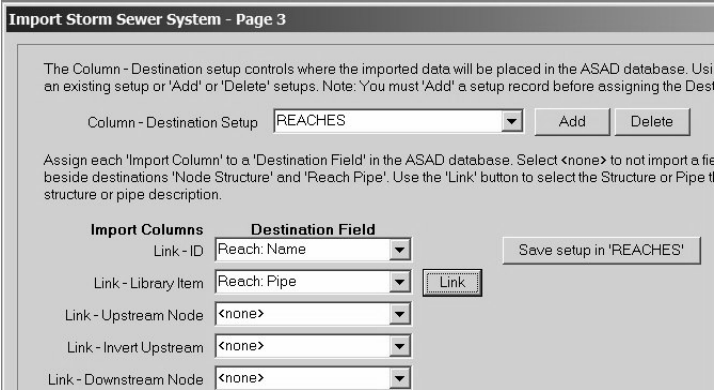


Figure 67

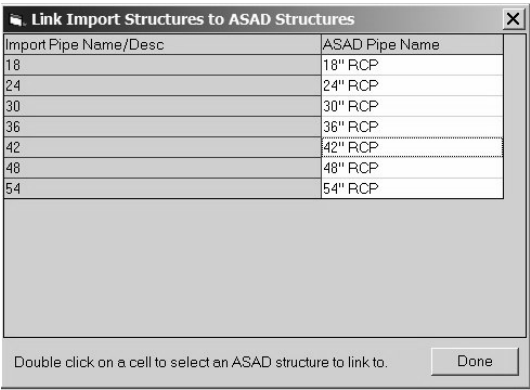


Figure 68

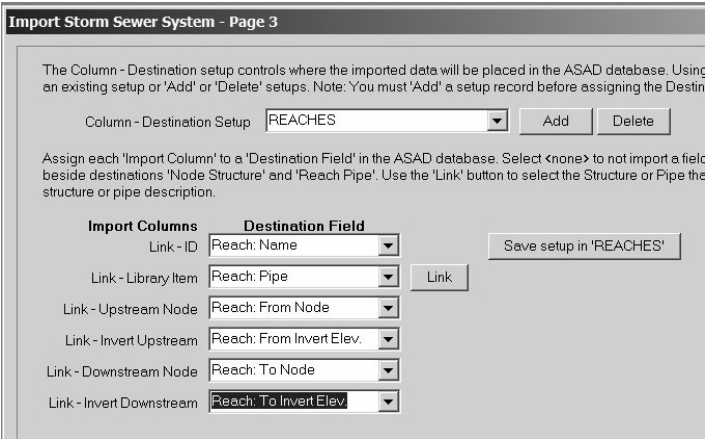


Figure 69

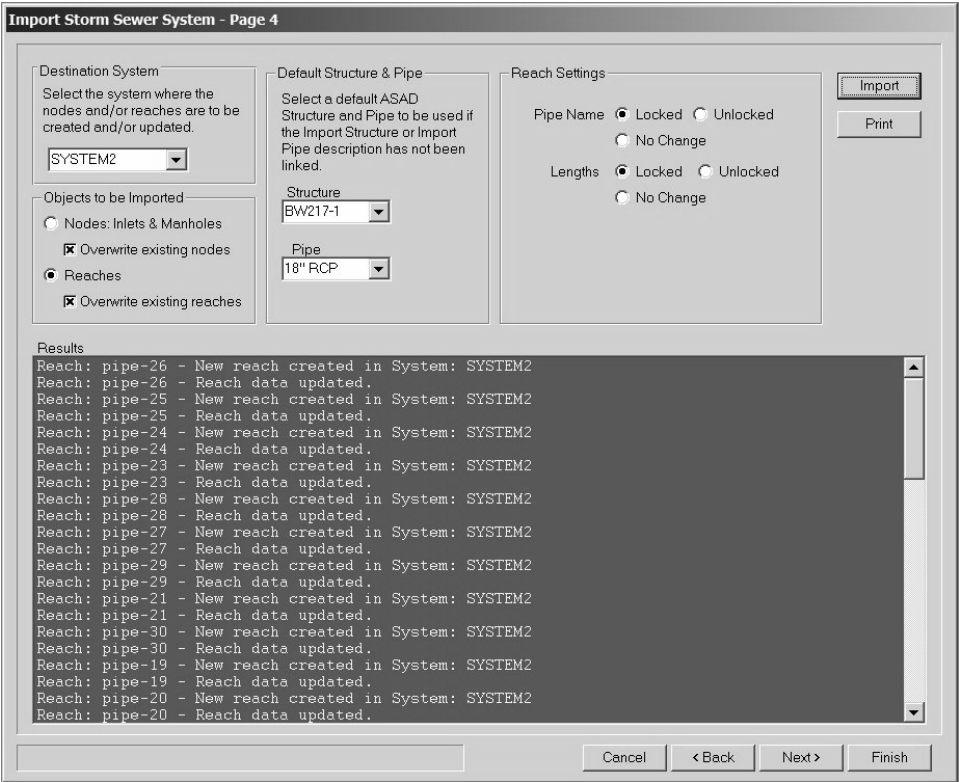


Figure 70

4.5 Dividing & Combining Systems

4.6 Renumbering Nodes & Reaches

Lab #9 Storm Sewer Manipulation (not included)

CHAPTER V: CALCULATIONS & REPORTS

5.1 Computing Storm Sewer Geometry

- . Low Point Station Adjustment
- . North & East Coordinates from Baseline/Station/Offset
- . Reaches Lengths
- . Inlet/Top/Grate Elevation
- . Drainage Areas

5.2 Computing Pipe Sizes

5.3 Computing Flow Line (Invert) Elevations

5.4 Computing Hydraulics (Storm Tabs)

- 5.4.1 Setting Options
- 5.4.2 Verifying Data
- 5.4.3 Printing Reports
- 5.4.4 Changing the Node Printing Order on Storm Tabs

5.5 Computing Roadway Spread & Inlet Intercept/Bypass (HEC-22)

Lab #10 Hydraulics

Compute/Reports> Step 1 - S.S. Geometry & Drainage Areas

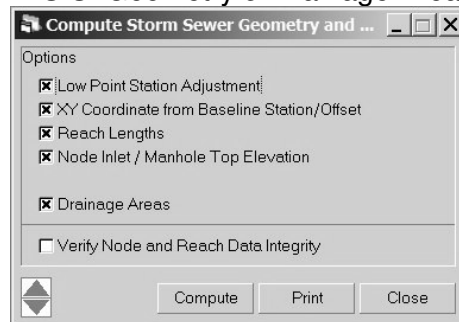


Figure 71

Compute/Reports> Step 2 - Compute Pipe Sizes

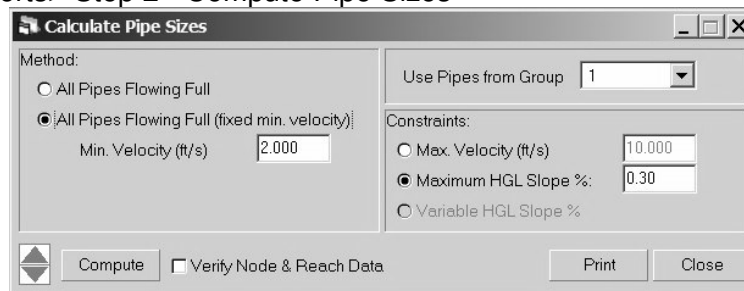


Figure 72

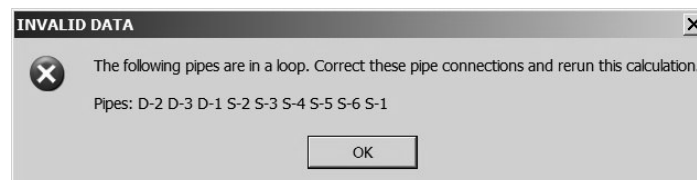
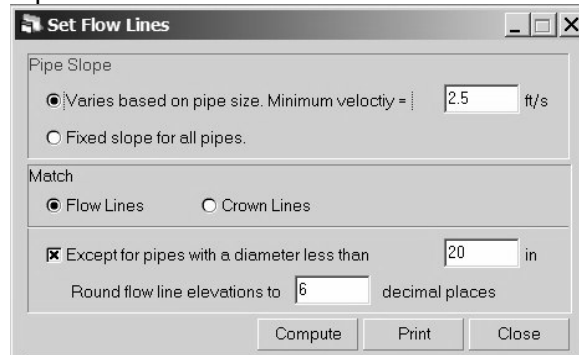


Figure 73

Compute/Reports> Step 3 - Set Flow Lines



Set Flow Lines

Pipe Slope

☒ Varies based on pipe size. Minimum velocity = ft/s

☐ Fixed slope for all pipes.

Match

☒ Flow Lines ☐ Crown Lines

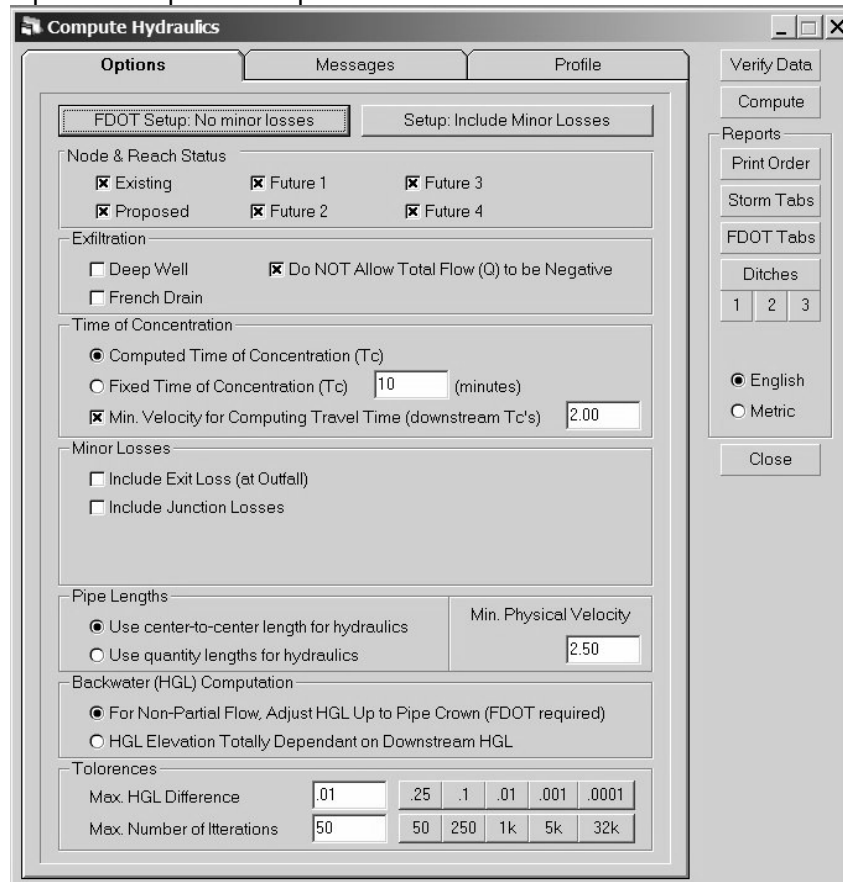
☒ Except for pipes with a diameter less than in

Round flow line elevations to decimal places

Compute Print Close

Figure 74

Compute/Reports> Step 4 - Compute\Print FDOT Storm Tabs



Compute Hydraulics

Options Messages Profile

FDOT Setup: No minor losses Setup: Include Minor Losses

Node & Reach Status

☒ Existing ☒ Future 1 ☒ Future 3

☒ Proposed ☒ Future 2 ☒ Future 4

Exfiltration

☐ Deep Well ☒ Do NOT Allow Total Flow (Q) to be Negative

☐ French Drain

Time of Concentration

☒ Computed Time of Concentration (Tc)

☐ Fixed Time of Concentration (Tc) (minutes)

☒ Min. Velocity for Computing Travel Time (downstream Tc's)

Minor Losses

☐ Include Exit Loss (at Outfall)

☐ Include Junction Losses

Pipe Lengths

☒ Use center-to-center length for hydraulics ☐ Use quantity lengths for hydraulics

Min. Physical Velocity

Backwater (HGL) Computation

☒ For Non-Partial Flow, Adjust HGL Up to Pipe Crown (FDOT required)

☐ HGL Elevation Totally Dependant on Downstream HGL

Tolerances

Max. HGL Difference .25 .1 .01 .001 .0001

Max. Number of Iterations 50 250 1k 5k 32k

Verify Data Compute

Reports

Print Order Storm Tabs FDOT Tabs

Ditches 1 2 3

☒ English ☐ Metric

Close

Figure 75

Compute/Reports> Step 4 - Verify Node & Reach Data or Verify Data (button)

Storm Tab Print Order						
Sequence	From Node	To Node	Station	Offset	Structure	
10	D-3	D-2	691+10	405	DITCH	
20	D-2	D-1	691+00	305	DITCH	
30	D-1	S-2A	691+50	190	DITCH	
40	S-2A	S-2	691+50	110	DBHC	
50	S-2	S-1	691+00.00	52.5	CI-5-B	
60	S-1	S-3	691+00.00	-52.5	CI-5-B	
70	S-4	S-3	692+50.00	52.5	CI-5-B	
80	S-3	S-5	692+50.00	-52.5	CI-5-B	
90	S-6	S-5	694+30.00	52.5	CI-5-B	
100	S-5	S-199A	694+30.00	-52.5	CI-5-B	
110	S-199A	S-199	694+30	-80	MH-7-J	

Sort by: Sequence From Node Close

Figure 76

5.6 Computing French Drains & Deep Wells

- 5.6.1 Concepts & Assumptions
- 5.6.2 Data Setup in Nodes & Reaches
- 5.6.3 Treatment Volume (Dade County Methodology)
- 5.6.4 Reduction of Flow through French Drain
- 5.6.5 Fine Tuning a French Drain/Deep Well System

Lab #11 Computing French Drains & Deep Wells

SS System Outfall & Header Details	
<div> <div>Outfall</div> <div>Hydro</div> <div>Designer</div> </div>	
<div> <div>Node</div> <div> <div>Number</div> <div>S-199</div> </div> <div> <div>Type</div> <div>Structure</div> </div> <div> <div>Baseline</div> <div>CLSR5</div> </div> <div> <div>Station</div> <div>694+30</div> </div> <div> <div>Offset</div> <div>-250</div> </div> <div> <div>Inlet/Top El.</div> <div>0</div> </div> <div> <div>North Coord (y)</div> <div>1185736.7995</div> </div> <div> <div>East Coord (x)</div> <div>856954.4679</div> </div> </div>	
<div> <div>Structure</div> <div> <div>Structure Name</div> <div>MESC2-24</div> </div> <div> <div>Top Status</div> <div>Proposed</div> </div> <div> <div>Bottom Status</div> <div>Proposed</div> </div> <div> <div><input checked="" type="checkbox"/> Auto Rotate</div> <div><input type="checkbox"/> Mirror</div> </div> <div> <div>Rotate Angle</div> <div>192.3194</div> </div> <div> <div>Tailwater/Weir El.</div> <div>9.75</div> </div> <div> <div>Exit Loss Coeff.</div> <div>0.0000</div> </div> </div>	
<div> <div>Update</div> <div>Close</div> </div>	

Figure 77

Get Reach Data from Borings

Boring	Distance to Reach (ft)	Stage1 K	Stage2 K	Stage3 K
B-1	264.44	.00075748	.00148931	.00122348

B-1

Ground El. **11.9**
Gnd. Water El. **9.8**

	to Depth	'K' Value
K10	10	0.000757
K15	15	0.001489
K20	20	0.001223

Average
Ground El.
Gnd. Water El.

to Depth 'K' Value

Copy B-1 to Reach

Cancel

Figure 78

Reach Edit

Add Update Delete Close Copy Data to Other Reaches

Reach Type: Perforated Pipe w/Exfiltration Trench Reach Status: Proposed

Reach Name: R-1 R-199A R-2 R-2A R-3 R-4 **R-5** R-6

From: S-5 To Node: S-199A

Pipe Name: 24" RCP Length (qty): 143.5 Length (hyd): 147.5

of Barrels: 1

From: Crown Line 10 Flow Line 8 To: Crown Line 10 Flow Line 8

Flow Line Crown Line

0.2000 % 7.713 Accept

Slope % = 0.0000

Get Data from Borings

Trench Length & End Slope

Qty Length less 16 Trench End Slope 25 (n:1)

Fixed = 0

Percent of Qty 0 %

Ground El. (ft) 11.9

Trench Top Width (ft) 10

Trench Top El. (ft) 11

Design GW El. (ft) 9.85

Boring GW El. (ft) 9.8

Trench Bottom El. (ft) -9

Trench Bottom Width (ft) 6

Hydraulic Conductivity (k)

	to Depth	Elevation*	'K' Value
K10	10	1.9	.000757
K15	15	-3.1	.001489
K20	20	-8.1	.001223

* - Elevation computed from 'Ground El.' minus 'to Depth'

Figure 79



Copy Reach Data

Source Reach: **R-5**

Destination Reach(s):

- R-1
- R-199A
- R-2
- R-2A
- R-3
- R-4
- R-6**

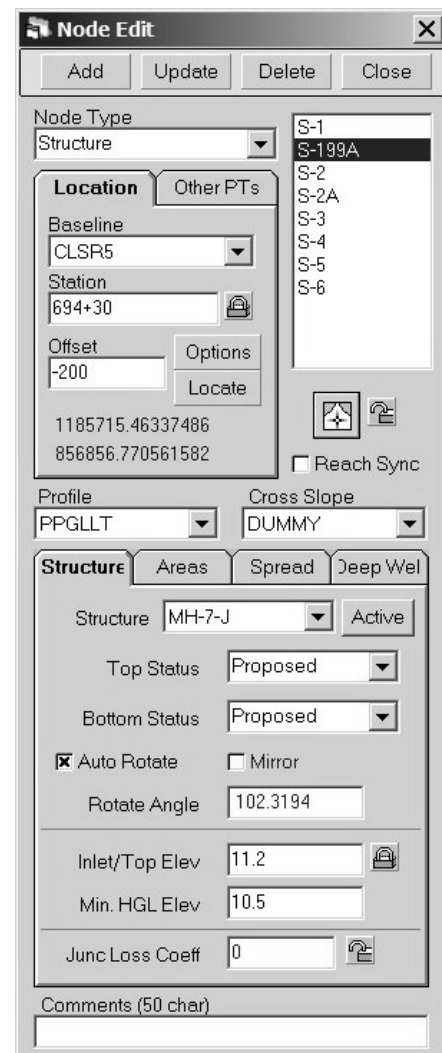
Buttons: Copy, Close

Items to Copy:

- ☒ Pipe Name
- ☒ Flow Line Elevation (To & From)
- ☒ FD Length Option
- ☒ Trench End Slope
- ☒ Ground Elevation
- ☒ Ground Water Elevation (Boring & Design)
- ☒ Trench Width (Top & Bottom)
- ☒ Trench Elevations (Top & Bottom)
- ☒ Hydraulic Conductivity (K values)

Buttons: Select All, De-Select All

Figure 80



Node Edit

Buttons: Add, Update, Delete, Close

Node Type: Structure

Location: CLSR5

Station: 694+30

Offset: -200

Options: Locate

Coordinates: 1185715.46337486, 856856.770561582

Reach Sync: ☐

Profile: PPGLT

Cross Slope: DUMMY

Structure: MH-7-J

Top Status: Proposed

Bottom Status: Proposed

☒ Auto Rotate

Rotate Angle: 102.3194

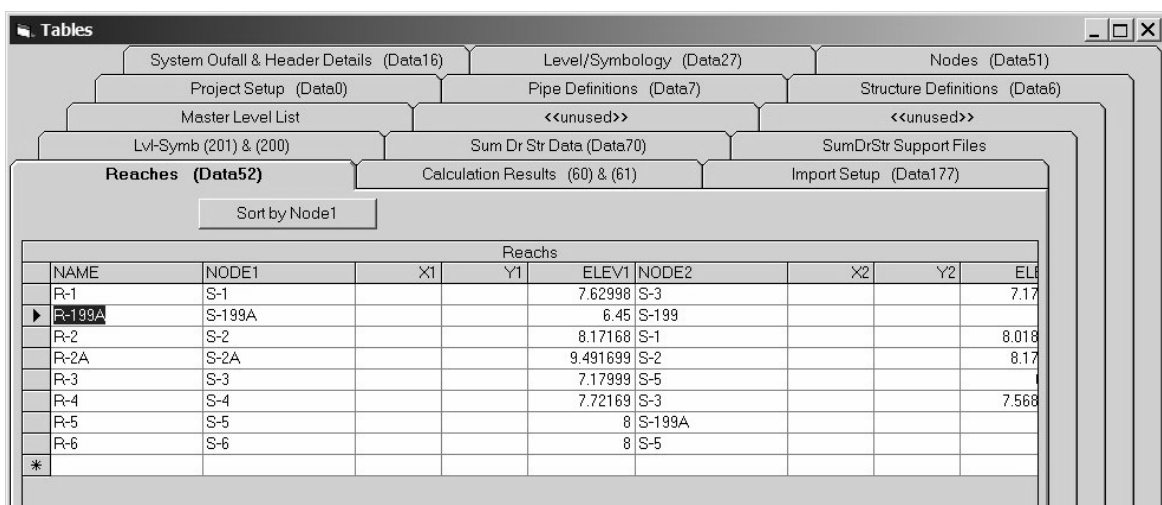
Inlet/Top Elev: 11.2

Min. HGL Elev: 10.5

Junc Loss Coeff: 0

Comments (50 char):

Figure 81



Tables

System Outfall & Header Details (Data16) | Level/Symbology (Data27) | Nodes (Data51)

Project Setup (Data0) | Pipe Definitions (Data7) | Structure Definitions (Data6)

Master Level List | <<unused>> | <<unused>>

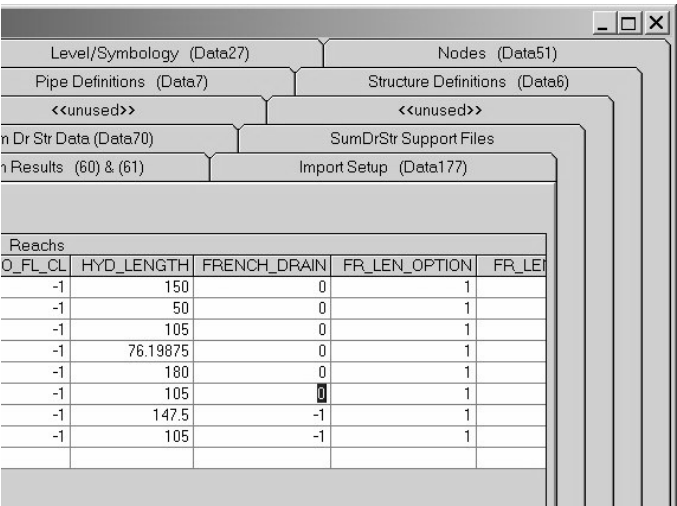
Lvl-Symb (201) & (200) | Sum Dr Str Data (Data70) | SumDrStr Support Files

Reaches (Data52) | Calculation Results (60) & (61) | Import Setup (Data177)

Sort by Node1

NAME	NODE1	X1	Y1	ELEV1	NODE2	X2	Y2	ELEV2
R-1	S-1			7.62998	S-3			7.17
R-199A	S-199A			6.45	S-199			
R-2	S-2			8.17168	S-1			8.018
R-2A	S-2A			9.491699	S-2			8.17
R-3	S-3			7.17999	S-5			
R-4	S-4			7.72169	S-3			7.568
R-5	S-5			8	S-199A			
R-6	S-6			8	S-5			
*								

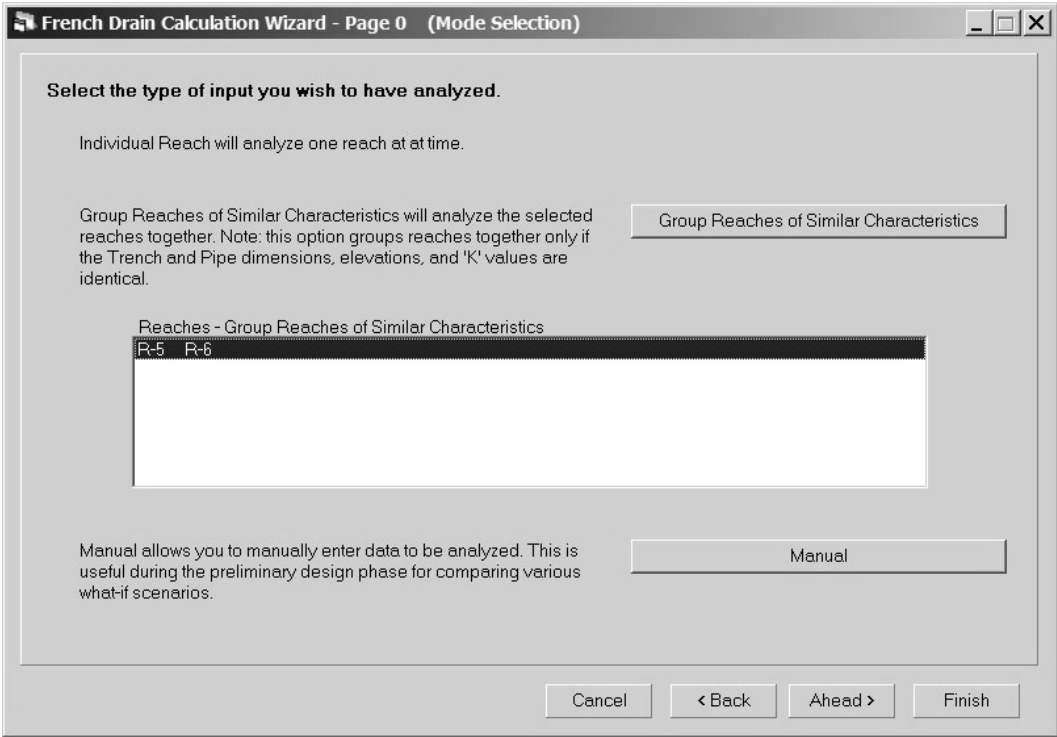
Figure 82



The screenshot shows a software window with a list of data files at the top and a table of reach data below. The data files include Level/Symbology (Data27), Nodes (Data51), Pipe Definitions (Data7), Structure Definitions (Data6), <<unused>>, n Dr Str Data (Data70), SumDrStr Support Files, n Results (60) & (61), and Import Setup (Data177). The table below has columns: O_FL_CL, HYD_LENGTH, FRENCH_DRAIN, FR_LEN_OPTION, and FR_LE.

O_FL_CL	HYD_LENGTH	FRENCH_DRAIN	FR_LEN_OPTION	FR_LE
-1	150	0	1	
-1	50	0	1	
-1	105	0	1	
-1	76.19875	0	1	
-1	180	0	1	
-1	105	0	1	
-1	147.5	-1	1	
-1	105	-1	1	

Figure 83



The screenshot shows the 'French Drain Calculation Wizard - Page 0 (Mode Selection)' dialog box. It contains instructions for selecting input types and buttons for 'Group Reaches of Similar Characteristics', 'Manual', 'Cancel', '< Back', 'Ahead >', and 'Finish'.

Select the type of input you wish to have analyzed.

Individual Reach will analyze one reach at a time.

Group Reaches of Similar Characteristics will analyze the selected reaches together. Note: this option groups reaches together only if the Trench and Pipe dimensions, elevations, and 'K' values are identical.

Reaches - Group Reaches of Similar Characteristics

R-5 R-6

Manual allows you to manually enter data to be analyzed. This is useful during the preliminary design phase for comparing various what-if scenarios.

Buttons: Cancel, < Back, Ahead >, Finish

Figure 84

French Drain Calculation Wizard - Page 1 (Storm Event)

Enter the Storm Event Data. Use the Scan buttons (not available in Manual Mode) to accumulate the associated data from the Reaches and Nodes. The output data is displayed at the bottom of this window.

Frequency (F)	5	hrs		
Time of Concentration (Tc)	16	min		
Area (A)	2.8900	acres	Total Selected Nodes	Total All Nodes
Weighted Runoff Coeff (C)	0.7344		Total Selected Nodes	Total All Nodes

Time to Generate 1 inch of Runoff (T1)	14.4611	min		
Storm Duration (Tt)	30.4611	min		
Intensity (I)	4.4688659935	in/hr		
Flow Rate (Q)	9.4847926865	cfs		
Treatment Volume (V)	17335.033110	cf		

Cancel < Back Ahead > Finish

Figure 85

French Drain Calculation Wizard - Page 2 (Hydraulic Conductivity)

The existing soil conditions (below) have been retrieved from the selected Reach(es) data.

Existing Ground Elevation (GND)	11.9	ft msl		
Ground Water Elevation (GW)	9.8	ft msl		

Stage 1

Boring Depth 0 to 10 (Z1)	10	ft		
Hydraulic Conductivity (K10)	.000757	cfs/sf-ft of head		

Stage 2

Boring Depth 10 to 15 (Z2)	15	ft		
Hydraulic Conductivity (K15)	.001489	cfs/sf-ft of head		

Stage 3

Boring Depth 15 to 20 (Z3)	20	ft		
Hydraulic Conductivity (K20)	.001223	cfs/sf-ft of head		

Cancel < Back Ahead > Finish

Figure 86

French Drain Calculation Wizard - Page 3 (Trench Dimensions)

The French Drain trench and pipe dimensions (below) have been retrieved from the selected Reach(es) data.

Trench

Top Width (W1) ft

Bottom Width (W2) ft

Top Elevation (E1) ft msl

Bottom Elevation (E2) ft msl

Total FD Length (L) ft

Pipe

Pipe Diameter (D) ft Pipe XS Area sq ft

Flow Line Elevation (FL) ft msl

Design GW

Design Water Surface Elevation (DGWE) ft msl

Cancel < Back Ahead > Finish

Figure 87

Weir & Control Elevations

Select Elevation from list and press 'Accept' or press 'Cancel' to exit.

Elevation, Node	
10.5	S-199A
9.75	S-199

Accept Cancel

Figure 88

French Drain Calculation Wizard - Page 4 (Hydraulic Head Elevation)

Enter hydraulic grade elevation information. Use the Scan button (not available in manual mode) to retrieve the system outfall tailwater elevation.

Weir/Control Elevation (WE) ft msl

Additional Stage over Weir/Control Elevation (A) ft

☒ Maximum Allowable Total Exfiltration Rate (Et) cfs/Lf

Show All Minimum HGL & Outfall Elevations

Cancel < Back Ahead > Finish

Figure 89

French Drain Calculation Wizard - Page 5 (Results: Summary)

Enter the safety factor to finish the calculations. Continue ahead to page 6 to print the results.

Exfiltration		French Drain Storage (S)	
Exfiltration Rate (E10)	0.00814343 cfs/Lf	French Drain Storage (S)	4.1708 c/Lf
Exfiltration Rate (E15)	0.02903550 cfs/Lf	French Drain Capacity	27805.72 cf
Exfiltration Rate (E20)	0.03179800 cfs/Lf		
Total Exfiltration Rate (Et)	0.06897693 cfs/Lf	Volume to be Retained (V)	17335.03 cf
Maximum Allowable Et = 0.150000		Safety Factor	1

	Length (L)	Volume (cf)	Volume (ac-ft)
Required (w/ safety)	133.1031	17335.03	0.3980
Provided	213.5000	27805.72	0.6383
Over/Shortage	80.3969	10470.69	0.2404

Cancel < Back Ahead > Finish

Figure 90

Compute Hydraulics

Options Messages Profile

FDOT Setup: No minor losses Setup: Include Minor Losses

Node & Reach Status

☒ Existing ☒ Future 1 ☒ Future 3
☒ Proposed ☒ Future 2 ☒ Future 4

Exfiltration

☐ Deep Well ☒ Do NOT Allow Total Flow (Q) to be Negative
☒ French Drain

Time of Concentration

☒ Computed Time of Concentration (Tc)
☐ Fixed Time of Concentration (Tc) 10 (minutes)
☒ Min. Velocity for Computing Travel Time (downstream Tc's) 2.00

Minor Losses

☐ Include Exit Loss (at Outfall)
☐ Include Junction Losses

Pipe Lengths

☒ Use center-to-center length for hydraulics ☐ Use quantity lengths for hydraulics
 Min. Physical Velocity 2.50

Backwater (HGL) Computation

☒ For Non-Partial Flow, Adjust HGL Up to Pipe Crown (FDOT required)
☐ HGL Elevation Totally Dependant on Downstream HGL

Tolerances

Max. HGL Difference .01 .25 .1 .01 .001 .0001
 Max. Number of Iterations 50 50 250 1k 5k 32k

Verify Data Compute

Reports

Print Order Storm Tabs FDOT Tabs

Ditches 1 2 3

☒ English ☐ Metric

Close

Figure 91

Node Edit

Add Update Delete Close

Node Type
Structure

Location Other PTs

Baseline
CLSR5

Station
692+50.00

Offset
-52.5

Options
Locate

1185571.07901567
857039.279210202

S-1
S-199A
S-2
S-2A
S-3
S-4
S-5
S-6

Reach Sync

Profile
PPGLLT

Cross Slope
MAINLINE

Structure Areas Spread **Keep We**

		Elevation (ft)	Discharge (cfs)
Highest Elevation	8	12.5	1.95
	7	12.0	1.45
	6	11.5	1.1
	5	11	.89
Clear All	4	10.5	.35
	3	10.0	.15
	2	9.5	0.0000
	1	9.0	0.0000
Lowest Elevation			

Comments (50 char)

Figure 92

- 5.7 Cost Analysis
- 5.8 Profile Elevation Inquiry
- 5.9 Utility Conflicts

Lab #12 Computing Other

Compute/Reports> Storm Sewer Cost Analysis

COMPUTE SYSTEM COST

☒ Node\Reach Details
☒ Node\Reach Sub-Totals
☒ Grand Totals

Buttons: Compute, Close, Print

Node	Inlet	Cost	Pipe	Length	Unit Cst	Cost	Total
D-1	..	0.00	18" RCP	79.00 @	1.00	79.00	79.00
D-2	..	0.00	18" RCP	125.40 @	1.00	125.40	125.40
D-3	..	0.00	18" RCP	100.50 @	1.00	100.50	100.50
S-1	CI-5-B	1.00	24" RCP	147.00 @	1.00	147.00	148.00
S-199A	MH-7-J	1.00	24" RCP	17.50 @	1.00	17.50	18.50
S-2	CI-5-B	1.00	18" RCP	102.00 @	1.00	102.00	103.00
S-2A	DBI-C	1.00	18" RCP	73.70 @	1.00	73.70	74.70
S-3	CI-5-B	1.00	24" RCP	177.00 @	1.00	177.00	178.00
S-4	CI-5-B	1.00	18" RCP	102.00 @	1.00	102.00	103.00
S-5	CI-5-B	1.00	24" RCP	23.50 @	1.00	23.50	24.50
S-6	CI-5-B	1.00	18" RCP	102.00 @	1.00	102.00	103.00

SUB TOTALS

PIPES:
 18" RCP 684.60 @ \$1.00 = \$684.60
 24" RCP 365.00 @ \$1.00 = \$365.00

INLETS/MANHOLES:
 .. Qty: 3 = \$0.00
 CI-5-B Qty: 6 = \$6.00
 DBI-C Qty: 1 = \$1.00
 MH-7-J Qty: 1 = \$1.00

TOTALS

Total Cost of Pipes: \$1,049.60
 Total Cost of Inlets/Manholes: \$8.00
 GRAND TOTAL FOR SYSTEM: \$1,057.60

Figure 93

Compute/Reports> Profile Elevation Inquiry

PROFILE ELEVATION INQUIRY

Buttons: Compute, Print, Close

Elevations High/Low

Buttons: Compute, Print, Close

Begin Station: 691+00
 End Station: 768+30.95
 Increment: 100
 Decimals: 4

STATION	ELEVATION	SLOPE	Tangent
691+00.0000	12.8400	-0.3000%	Tangent (1)
692+00.0000	12.5400	-0.3000%	Tangent (1)
693+00.0000	12.2400	-0.3000%	Tangent (1)
694+00.0000	11.9400	-0.3000%	Tangent (1)
695+00.0000	12.0600	0.3000%	Tangent (1)
696+00.0000	12.3600	0.3000%	Tangent (1)
697+00.0000	12.6600	0.3000%	Tangent (1)
698+00.0000	12.5400	-0.3000%	Tangent (1)
699+00.0000	12.2400	-0.3000%	Tangent (1)
700+00.0000	11.9400	-0.3000%	Tangent (1)
701+00.0000	12.0600	0.3000%	Tangent (1)
702+00.0000	12.3600	0.3000%	Tangent (1)
703+00.0000	12.6600	0.3000%	Tangent (1)

Figure 94

Compute/Reports> Utility Conflicts

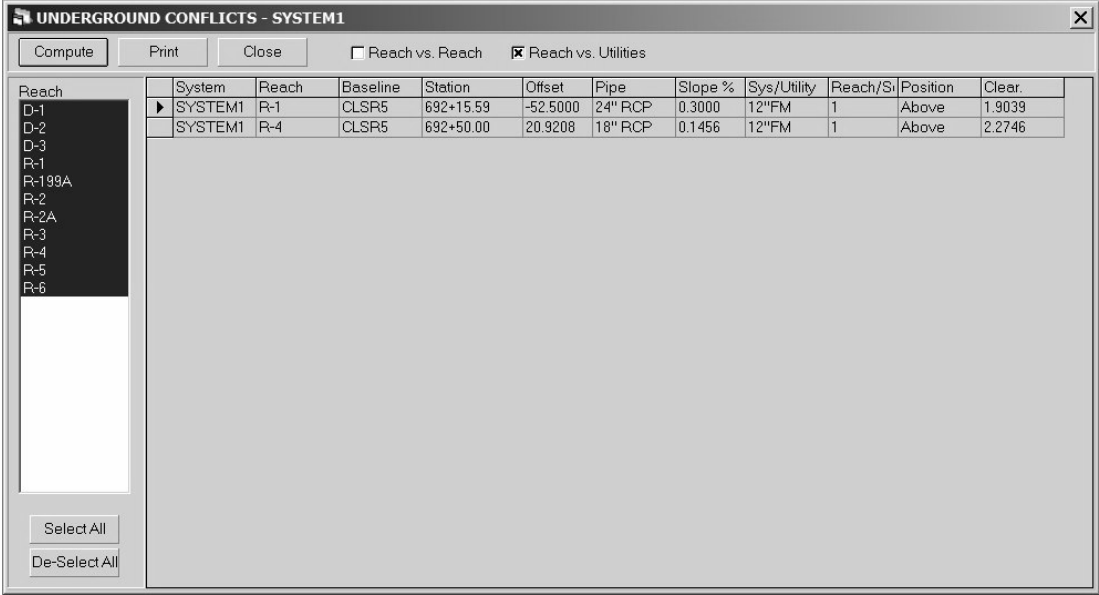


Figure 95

5.10 Summary of Drainage Structures

- 5.10.1 Building SDS Data Table
- 5.10.2 Modifying SDS Data
- 5.10.2 Text Size/Line Spacing Worksheet
- 5.10.3 Row Layout
- 5.10.4 Grid Layout
- 5.10.5 Symbology & Font Size (Headings, Details and Totals)
- 5.10.6 Drawing SDS into CAD
- 5.10.7 Exporting SDS Data to Excel (Tab-Delimited Text)

Lab #13 Summary of Drainage Structures

Compute/Reports> Summary of Drainage Structures

00 <P/F> 5	01 <Structure #> 10	02 <Station> 15	03 <Offset> 20	04 <Type> 30	05 <Pipe Size> 35	06 <Pipe Length> 40	07 <Barrels> 50	08 18RCP 510018	09 24RCP 510024	10 P-5 1020180
	D-1	691+50	RT		18"	79	1	79		
	D-2	691+00	RT		18"	125	1	125		
	D-3	691+10	RT		18"	100	1	100		
	S-1	691+00	LT	Inlet Pipe	24"	147	1		147	1
	S-199A	694+30	LT	Manhole, f	24"	18	1		18	
	S-2	691+00	RT	Inlet Pipe	18"	102	1	102		1
	S-2A	691+50	RT	DBI, Pipe	18"	74	1	74		
	S-3	692+50	LT	Inlet Pipe	24"	177	1		177	1
	S-4	692+50	RT	Inlet Pipe	18"	102	1	102		1
	S-5	694+30	LT	Inlet Pipe	24"	24	1		24	1
	S-6	694+30	RT	Inlet Pipe	18"	102	1	102		1
	S-199	694+30	LT	MES	24"	18	1			

Figure 96

Text Size & Line Spacing Worksheet (button)

Input

MaxHeight: 384

Head Row 1: 2 %
 Head Row 2: 2 %
 Head Row 3: 2 %
 Head Row 4: 1.5 %
 Sub-Total Row: 1.5 %
 Grand Total Row: 1.5 %
 # of Main Body Rows: 35

TH % of Row HT: 60 %
 TW % of TH: 75 %

Sheet Width: 616
 Columns: 13
 Column Reserve: 10 %

Results

	Row Height	Text Height	Text Width
Header 1	7.6800	4.6080	3.4560
Header 2	7.6800	4.6080	3.4560
Header 3	7.6800	4.6080	3.4560
Header 4	5.7600	3.4560	2.5920
Detail	4.7451	2.8471	2.1353
Sub-Total	5.7600	3.4560	2.5920
Grand-Total	5.7600	3.4560	2.5920

Default Column Width: 42.6462

Text Justification: 7 = CenterCenter
 Sheet Spacing: 500

☒ Automatically set column width for identifier columns

Buttons: Compute, Print, Write, Close

Figure 97

Compute/Reports> Summary of Drainage Structures – Row Layout (tab)

Summary of Drainage Structures

Scan & Build Table | **Row Layout** | Grid Layout | Heading & Symbology | Draw/Export

Row Number	00	01	02	03	04	05
300		S-2A	691+50	RT	DBL Pipe	18"
310		D-3	691+10	RT		18"
320		S-3	692+50	LT	Inlet Pipe	24"
330		S-4	692+50	RT	Inlet Pipe	18"
340		S-5	694+30	LT	Inlet Pipe	24"
350		S-6	694+30	RT	Inlet Pipe	18"
360		S-199	694+30	LT	MES	24"
370		S-199A	694+30	LT	Manhole	24"

Buttons: Refresh, Renum Rows by 10's

Node Prefix Length: 2
 Node Column Number: 01
 Sort by Node Number

Figure 98

Compute/Reports> Summary of Drainage Structures – Grid Layout (tab)

Summary of Drainage Structures

Scan & Build Table | Row Layout | **Grid Layout** | Heading & Symbology

Sympology & Dimensions

Line	Level Name	Draw
Outline	SumBoxBorder_dp	<input type="radio"/> No <input checked="" type="radio"/> YES
Head1	SumBoxLinesMin_dp	<input type="radio"/> No <input checked="" type="radio"/> YES
Head2	SumBoxLinesMin_dp	<input type="radio"/> No <input checked="" type="radio"/> YES
Head3	SumBoxLinesMin_dp	<input type="radio"/> No <input checked="" type="radio"/> YES
HeadSep	SumBoxLines_dp	<input type="radio"/> No <input checked="" type="radio"/> YES
Detail1	SumBoxLinesMin_dp	<input type="radio"/> No <input checked="" type="radio"/> YES
Detail2	SumBoxLines_dp	<input type="radio"/> No <input checked="" type="radio"/> YES

DISTANCES

Dist Name	Distance
Head1	7.68
Head2	7.68
Head3	7.68
Head4	5.76
Detail1	4.7451
Detail2	4.7451

Figure 99

Compute/Reports> Summary of Drainage Structures – Heading & Symbology (tab)

Summary of Drainage Structures

Scan & Build Table

Row Layout

Grid Layout

Heading & Symbology

Draw/Export

Headings

Details

Totals

Width

Level

Tx Ht

Tx Wd

Just

Text String

HEADING line 1

TextNotes

4.608

3.456

7

STORM SEWER I

HEADING line 2

TextNotes

4.608

3.456

7

ROUND

HEADING line 3

TextNotes

4.608

3.456

7

18"

HEADING line 4

TextNotes

3.456

2.592

7

Set to Default

Column

08

Copy level/symbology settings to ALL columns

<10

>10

Insert Column

Delete Column

<< Shift Column

Shift Column >>

☐ Shift Header Only

<10

Check for Zero Column Totals

00	01	02	03	04	05	06	07	08	09	10
<P/F>	<Structure #>	<Station>	<Offset>	<Type>	<Pipe Size>	<Pipe Length>	<Barrels>	18RCP	24RCP	P-5
5	10	15	20	30	35	40	50	510018	510024	1020180
	S-1	691+00	LT	Inlet Pipe	24"	147	1		147	1
	D-1	691+50	RT		18"	79	1	79		
	D-2	691+00	RT		18"	125	1	125		
	S-2	691+00	RT	Inlet Pipe	18"	102	1	102		1
	S-2A	691+50	RT	DBI Pipe	18"	74	1	74		
	D-3	691+10	RT		18"	100	1	100		
	S-3	692+50	LT	Inlet Pipe	24"	177	1		177	1
	S-4	692+50	RT	Inlet Pipe	18"	102	1	102		1
	S-5	694+30	LT	Inlet Pipe	24"	24			24	1
	S-6	694+30	RT	Inlet Pipe	18"	102	1	102		1
	S-199	694+30	LT	MES	24"	18	1			
	S-199A	694+30	LT	Manhole	24"	18	1		18	

Figure 100

Compute/Reports> Summary of Drainage Structures – Draw (tab)

Summary of Drainage Structures

Scan

Row

Grid

Heading

Draw

Include

TopLeft Data Point

☒ Header Text

☒ Detail Text

☒ Totals Text

☒ Outline Lines

☒ Vertical Lines

☒ Horizontal Lines

x

858196.379158029

y

1185569.9979118

DP

Draw

Export

Insert Column

Delete Column

<< Shift Column

00	01	02	03
<P/F>	<Structure #>	<Station>	<Offset>
5	10	15	20
	S-1	691+00	LT
	D-1	691+50	RT
	D-2	691+00	RT

Figure 101

CHAPTER VI: DRAWING

- 6.1 CAD Window**
- 6.2 Reference Files**
- 6.3 Drawing Cells into a Grid**
- 6.4 Levels**
 - 6.4.1 Levels Display
 - 6.4.2 Level/Layer Manager
 - 6.4.3 ASAD Master Level List
- 6.5 Drawing Plan View and Profile View Elements**
 - 6.5.1 Drawing Templates and Setting Defaults
 - 6.5.2 General Level/Symbology
 - 6.5.3 Drainage Elements in Plan View
 - 6.5.4 Pattern Lines (Plan)
 - 6.5.5 Drainage Areas (Plan)
 - 6.5.6 Drainage Elements in Profile View
 - 6.5.7 User Defined Text Labels

Lab #14 Draw Plan & Profile

CAD> Storm Sewer> Draw Plan View – Drainage (tab)

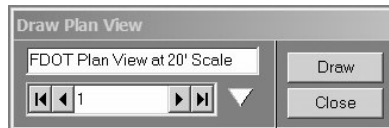


Figure 102

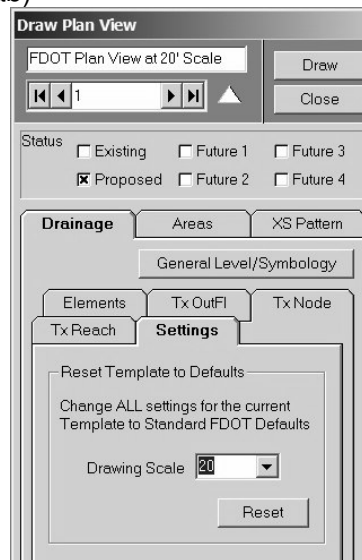


Figure 103

General Level/Symbology (button)

Figure 104 shows the 'Level Symbology' dialog box. It includes a 'Filter' section with 'Template #', 'Field Name', and 'Status' dropdowns, and a 'Fill Columns' section with 'Column' and 'Data' dropdowns. The main table is titled 'ELEMENT/TEXT IDENTIFIER' and 'LEVEL/SYMBOL/TEXT'.

Template	Field Name	Status	Level Name	Text Height	Text Width	Line Spacing	Font	Just	Angle
1	Nodes-Structures	Existing	StormSewer	2.8	2.8	1.866676	48	7	0
1	Nodes-Structures	Proposed	StormSewer	2.8	2.8	1.866676	48	7	0
1	Nodes-Structures	Future 1	StormSewer	2.8	2.8	1.866676	48	7	0
1	Nodes-Structures	Future 2	StormSewer	2.8	2.8	1.866676	48	7	0
1	Nodes-Structures	Future 3	StormSewer	2.8	2.8	1.866676	48	7	0
1	Nodes-Structures	Future 4	StormSewer	2.8	2.8	1.866676	48	7	0
1	Nodes-Ditches	Existing							
1	Nodes-Ditches	Proposed							
1	Nodes-Ditches	Future 1							
1	Nodes-Ditches	Future 2							
1	Nodes-Ditches	Future 3							
1	Nodes-Ditches	Future 4							
1	Pipes-Solid	Existing	StormSewer	2.8	2.8	1.866676	48	7	0
1	Pipes-Solid	Proposed	StormSewer	2.8	2.8	1.866676	48	7	0
1	Pipes-Solid	Future 1	StormSewer	2.8	2.8	1.866676	48	7	0
1	Pipes-Solid	Future 2	StormSewer	2.8	2.8	1.866676	48	7	0
1	Pipes-Solid	Future 3	StormSewer	2.8	2.8	1.866676	48	7	0
1	Pipes-Solid	Future 4	StormSewer	2.8	2.8	1.866676	48	7	0
1	Pipes-Perforated	Existing							
1	Pipes-Perforated	Proposed							
1	Pipes-Perforated	Future 1							
1	Pipes-Perforated	Future 2							
1	Pipes-Perforated	Future 3							

Figure 104

Figure 105 shows the 'Select a Level' dialog box. It has a list box with the following items: MenholeSW, MES, MES_px, PatternLines1_dp, PatternLines2_dp, PatternLines3_dp (selected), PipeCulvert_pr, PipeCulvert_px, PipeCulvertCD, PipeCulvertGD, and PipeCulvertSD. There are 'Accept' and 'Cancel' buttons at the bottom.

Figure 105

Figure 106 shows the 'Level Symbology' dialog box. It includes a 'Filter' section with 'Template #', 'Field Name', and 'Status' dropdowns, and a 'Fill Columns' section with 'Column' and 'Data' dropdowns. The main table is titled 'ELEMENT/TEXT IDENTIFIER' and 'LEVEL/SYMBOL/TEXT'.

Template	Field Name	Status	Level Name	Text Height	Text Width	Line Spacing	Font	Just	Ang
1	Pattern Lines	Existing	PatternLines3_dp						
1	Pattern Lines	Proposed	PatternLines3_dp						
1	Pattern Lines	Future 1	PatternLines3_dp						
1	Pattern Lines	Future 2	PatternLines3_dp						
1	Pattern Lines	Future 3	PatternLines3_dp						
1	Pattern Lines	Future 4	PatternLines3_dp						

Figure 106

CAD> Storm Sewer> Draw Plan View – Drainage (tab)

Figure 107 shows the 'Drainage' dialog box. It has tabs for 'Areas', 'XS Pattern', and 'General Level/Symbology'. The 'General Level/Symbology' tab is active, showing 'Tx Reach', 'Tx OutFI', and 'Tx Node' sections. The 'Tx Reach' section has checkboxes for 'Nodes (Structures)', 'Nodes (Ditches)', and 'Pipes (Solid)'. The 'Tx OutFI' section has checkboxes for 'Nodes (Structures)', 'Nodes (Ditches)', and 'Pipes (Solid)'. The 'Tx Node' section has checkboxes for 'Nodes (Structures)', 'Nodes (Ditches)', and 'Pipes (Solid)'.

Figure 107

Figure 108 shows the 'Tx Reach' dialog box. It has tabs for 'Elements', 'Tx OutFI', and 'Tx Node'. The 'Tx OutFI' tab is active, showing 'Node Name (w/ Oval)', 'Node Name (no Oval)', 'HGL to Inlet El. Clear.', and 'User Defined' sections. The 'Node Name (w/ Oval)' section has input fields for 'Oval Width' (17) and 'Height' (8). The 'Node Name (no Oval)' section has input fields for 'Node Name' (0) and 'Node Name' (0). The 'HGL to Inlet El. Clear.' section has input fields for 'HGL to Inlet El. Clear.' (0) and 'HGL to Inlet El. Clear.' (0). The 'User Defined' section has input fields for 'User Defined' (0) and 'User Defined' (0). There is a 'Decimal Places' dropdown set to 2.

Figure 108

Figure 109 shows the 'Tx Node' dialog box. It has tabs for 'Elements', 'Tx OutFI', and 'Tx Node'. The 'Tx Node' tab is active, showing 'Orientation', 'Pipe Name (Solid & Perf.)', 'Reach Length', 'Flow Line Elevations', 'Ditch Dimensions', and 'User Defined' sections. The 'Orientation' section has radio buttons for 'Reach Bearing' and 'Set by Symbology'. The 'Pipe Name (Solid & Perf.)' section has input fields for 'Pipe Name' (0) and 'Pipe Name' (0). The 'Reach Length' section has input fields for 'Reach Length' (0) and 'Reach Length' (0). The 'Flow Line Elevations' section has input fields for 'Flow Line Elevations' (0) and 'Flow Line Elevations' (0). The 'Ditch Dimensions' section has input fields for 'Ditch Dimensions' (0) and 'Ditch Dimensions' (0). The 'User Defined' section has input fields for 'User Defined' (2.8) and 'User Defined' (2.8). There is a 'CONST. @d0@qlen' OF @pdesc' text field and a 'Decimal Places' dropdown set to 2.

Figure 109

CAD> Storm Sewer> Draw Plan View
Pattern (tab)

Draw Plan View

Pattern Lines

Draw

Close

Status

☐ Existing ☐ Future 1 ☐ Future 3

☒ Proposed ☐ Future 2 ☐ Future 4

Drainage Areas XS Pattern

General Level/Symbology

691+00	D-2
691+00.00	S-1
691+00.00	S-2
691+10	D-3
691+50	D-1
691+50	S-2A
692+50.00	S-3
692+50.00	S-4
694+30	S-199
694+30	S-199A
694+30.00	S-5
694+30.00	S-6

Select All De-Select All

Lines Points

Pattern Line Offsets (+/-) 100

Figure 110

CAD> Storm Sewer> Draw Plan View XS
Areas (tab)

Draw Plan View

Areas

Draw

Close

Status

☐ Existing ☐ Future 1 ☐ Future 3

☒ Proposed ☐ Future 2 ☐ Future 4

Drainage Areas XS Pattern

General Level/Symbology

Elements

☐ Boundary Lines

☒ Use Level/Symbology

☐ Mixed Colors

Text

All On All Off

☒ Areas Listed Separately

☒ Total Area

☐ User Defined

Click text field to add variables or press button ... Variables

Figure 111

CAD> Storm Sewer> Draw Profile

Draw Storm Sewer Profile

FDOT Profile at 20' Scale

Draw

Close

Status

☐ Existing ☐ Future 1 ☐ Future 3

☒ Proposed ☐ Future 2 ☐ Future 4

General Level/Symbology

Text-Node Text-Reach Settings

Select Elements Grid

☒ Standard Profile (select nodes to draw)

D-1	691+50	190
D-2	691+00	305
D-3	691+10	405
S-1	691+00.0	-52.5
S-199	694+30	-100
S-199A	694+30	-80
S-2	691+00.0	52.5
S-2A	691+50	110
S-3	692+50.0	-52.5
S-4	692+50.0	52.5
S-5	694+30.0	-52.5
S-6	694+30.0	52.5

Data

Station Reference 690+00

Elevation Reference 5

DP Relative

857595.309047972 x
1185243.15834368 y

Get Data from Profile Cell

Figure 112

DbI-click on User Defined Text field in Draw Plan View or Profile

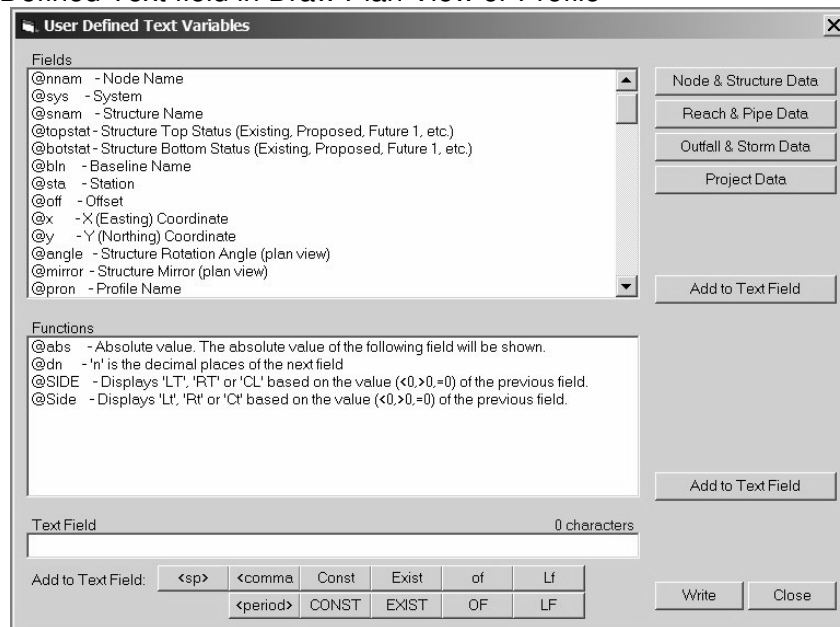


Figure 113

6.6 Drawing Drainage Structures (Cross Section View)

6.6.1 Single Structure (One at a Time)

6.6.2 Multiple Structures Using GEOPAK Cross Section Cells

6.6.3 Multiple Structures Drawn in Plan View

6.6.4 Multiple Structures Drawn into a Grid

6.7 Draw Baseline in Plan View

Lab #15 Draw Drainage Structures

CAD> Storm Sewer> Draw Drainage Structures (Single Structure mode)

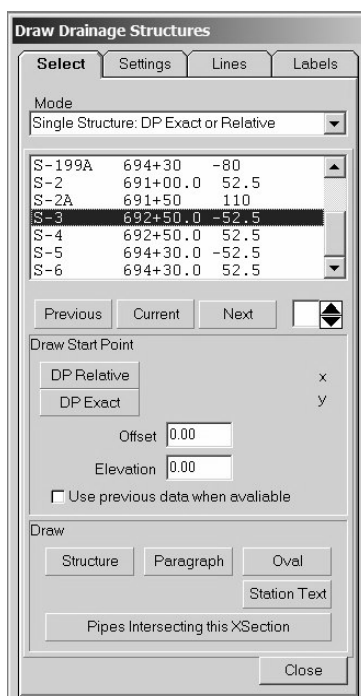


Figure 114

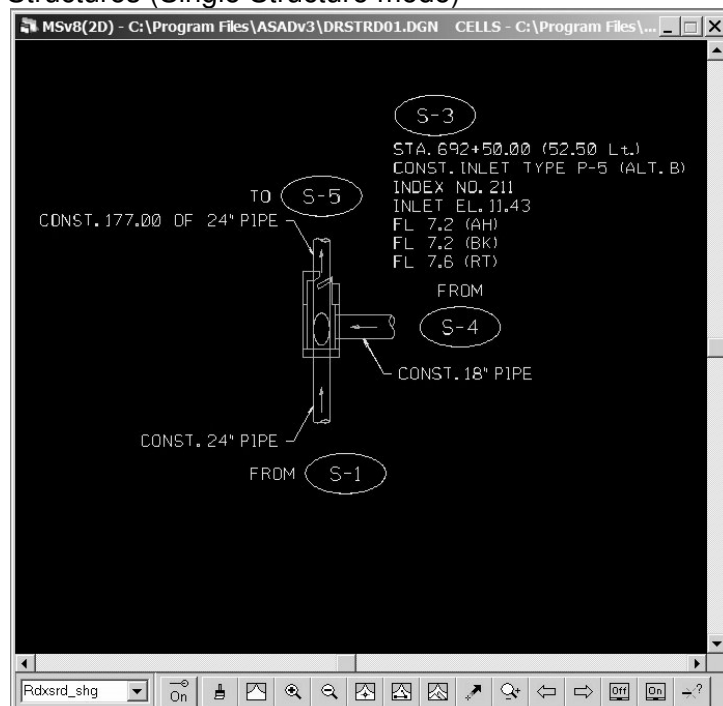


Figure 115

CAD> Storm Sewer> Draw Drainage Structures – Settings and Lines (tabs)

Figure 116

Figure 117

CAD> Storm Sewer> Draw Drainage Structures – Labels (tab), DS Paragraph (sub-tab)

Figure 118

CAD> Storm Sewer> Draw Drainage Structures – Labels (tab), Ovals (sub-tab)

Draw Drainage Structures

Select Settings Lines **Labels**

D.S. Paragraph **Ovals** Pipe Description

Level Symbology

	Height	Width	Font	Level Name
Ovals	5	10		TextNotes
Oval Text	1.75	1.75	48	TextNotes
Outer Text	1.4	1.4	48	TextNotes

Oval above D.S. Paragraph Oval at Pipe End (To/From)

Diagram

Vertical Distance from Top-Left corner of Writeup 1

Horizontal Distance from Top-Left corner of Writeup 0

Close

Figure 119

Oval above D.S. Paragraph **Oval at Pipe End (To/From)**

Diagram

	Ahead	Back	Left	Right
Vertical Distance	5.5	-6.5	0	0
Horizontal Distance	0	3	-8.5	8.5
Orientation (see Diagram)	Left	Left	Above	Above
Offset	6.5	6.5	4.5	4.5

The outer text will indicate direction of flow using 'To' or 'From' notation.

☐ Display 'To' & 'From' labels in upper and lower case.

☒ Display 'TO' & 'FROM' labels in ALL upper case.

Close

Figure 120

CAD> Storm Sewer> Draw Drainage Structures – Labels (tab), Pipe Description (sub-tab)

The screenshot shows the 'Draw Drainage Structures' dialog box with the 'Labels' tab selected. The 'Pipe Description' sub-tab is active. The dialog is divided into several sections: 'Dimensions' with input fields for Pointer Leader (1.5), Leader Extender (0.25), Pre Text Offset (0.25), and Post Text Offset (0.25); 'Line Terminator' with radio buttons for 'No Terminator' (selected), 'Draw Terminator as Lines' (with Arrowhead Length 1), and 'Use Cell' (with Name and Scale fields); 'Description Label' with fields for Cut Pipes (Incoming and Outgoing), Connected Pipes, and Pipe Length (Decimal Places 2); and 'Level/Symbology' with a table for Text, Leader Line, and Line Terminator, all set to 'TextNotes'.

Draw Drainage Structures							
Select		Settings		Lines		Labels	
D.S. Paragraph				Ovals		Pipe Description	
Dimensions				Line Terminator			
<input type="button" value="Diagram"/>				<input checked="" type="radio"/> No Terminator			
Pointer Leader 1.5				<input type="radio"/> Draw Terminator as Lines			
Leader Extender 0.25				Arrowhead Length 1			
Pre Text Offset 0.25				<input type="radio"/> Use Cell			
Post Text Offset 0.25				Name Scale 1			
Description Label							
Cut Pipes:							
Incoming (From) Pipes CONST. @desc				Pipe Length			
Outgoing (To) Pipes CONST. @length OF @desc				Decimal Places 2			
Connected Pipes:							
On Same Cross Section: CONST. @length OF @desc							
Level/Symbology							
	Height	Width	Font	Level Name			
Text	1.4	1.4	48	TextNotes			
Leader Line				TextNotes			
Line Terminator				TextNotes			
<input type="button" value="Close"/>							

Figure 121

CAD> Storm Sewer> Draw Drainage Structures (Multiple Structures: GEOPAK XS mode)

Draw Drainage Structures

Select

Settings

Lines

Labels

Mode
Multiple Structures: GEOPAK.XS Cells

50

Step 1: List
List nodes in table below.
12 nodes

Current System

All Systems

Step 2: Select
Select Nodes to be Drawn.
Click to Select (X will appear in 1st col).

All

None

Step 3: Synchronize
Scan X-Sections & Match Nodes.
Station Tolerance (+ or -) ft

Scan & Match

XS Limit
☐ List XS

Step 4: Draw
Draw Selected Structures in Cross Sections

Draw

X	System	Node	Type	Station	Offset	xsStation	xsElev	xsCoord (X)	xsCoord (Y)
X	SYSTEM1	S-199	SSout	694+30	-100		0	0.0000	0.0000
	SYSTEM1	D-1	Ditch	691+50	190		0	0.0000	0.0000
	SYSTEM1	D-2	Ditch	691+00	305		0	0.0000	0.0000
	SYSTEM1	D-3	Ditch	691+10	405		0	0.0000	0.0000
	SYSTEM1	S-1	SSnode	691+00.00	-52.5		0	0.0000	0.0000
X	SYSTEM1	S-199A	SSnode	694+30	-80	694+30.00	7	1200.0000	2500.0000
	SYSTEM1	S-2	SSnode	691+00.00	52.5		0	0.0000	0.0000
	SYSTEM1	S-2A	SSnode	691+50	110		0	0.0000	0.0000
	SYSTEM1	S-3	SSnode	692+50.00	-52.5		0	0.0000	0.0000
	SYSTEM1	S-4	SSnode	692+50.00	52.5		0	0.0000	0.0000
X	SYSTEM1	S-5	SSnode	694+30.00	-52.5	694+30.00	7	1200.0000	2500.0000
X	SYSTEM1	S-6	SSnode	694+30.00	52.5	694+30.00	7	1200.0000	2500.0000

Note: S-199 at Station: 694+30 has been updated with XS data and is ready to draw.

Note: S-199A at Station: 694+30 has been updated with XS data and is ready to draw.

Note: S-5 at Station: 694+30.00 has been updated with XS data and is ready to draw.

Note: S-6 at Station: 694+30.00 has been updated with XS data and is ready to draw.

Close

Print

Figure 122

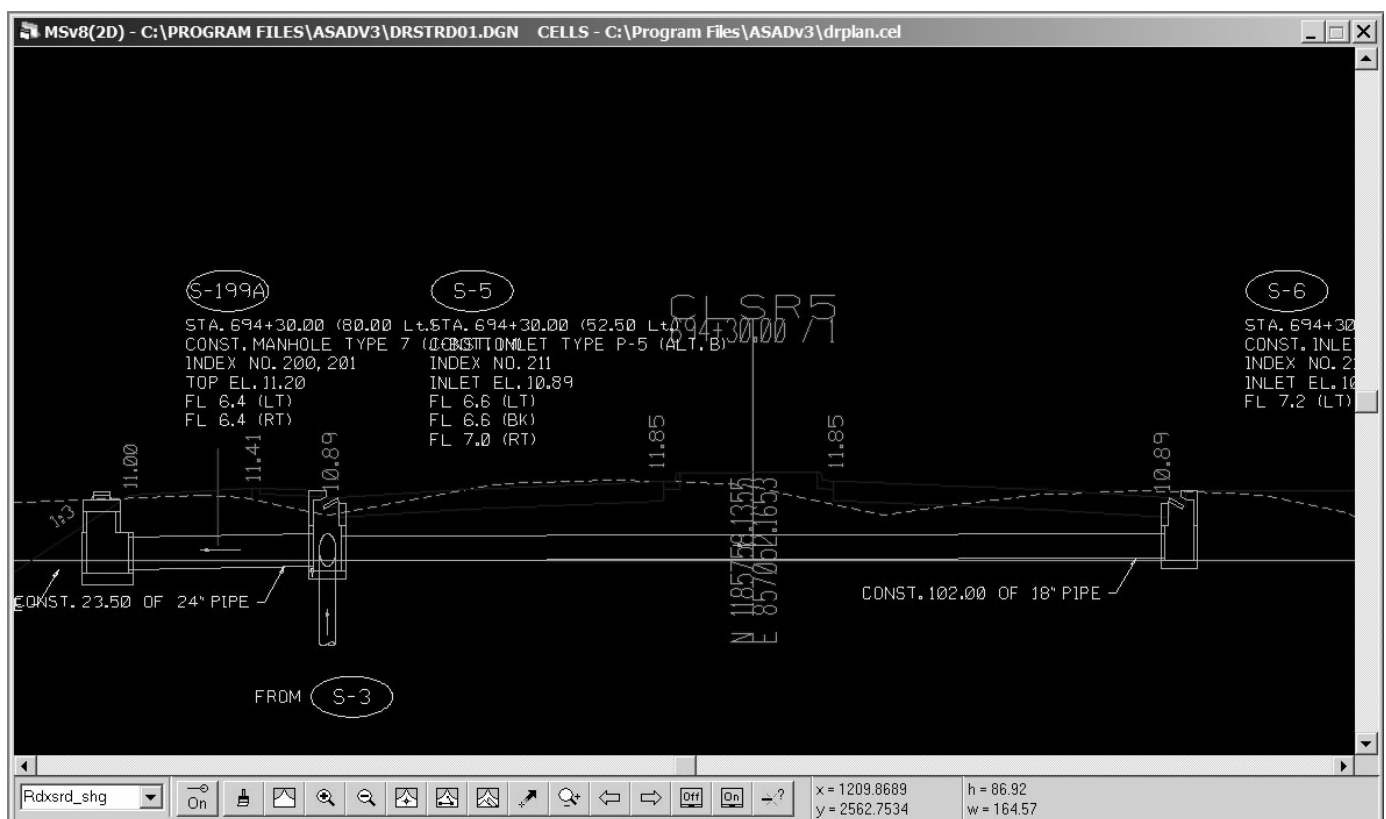


Figure 123

CAD> Storm Sewer> Draw Drainage Structures (Multiple Structures: Plan Drawing mode)

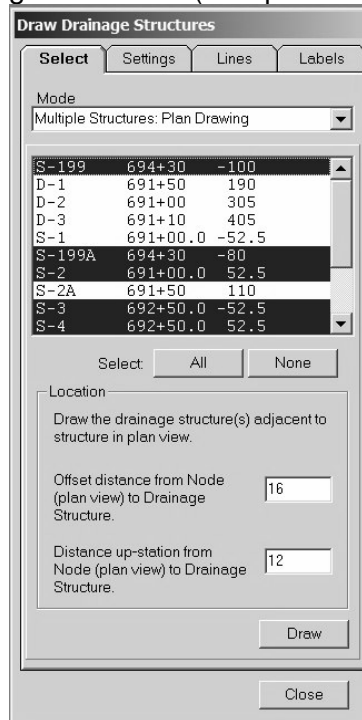


Figure 124

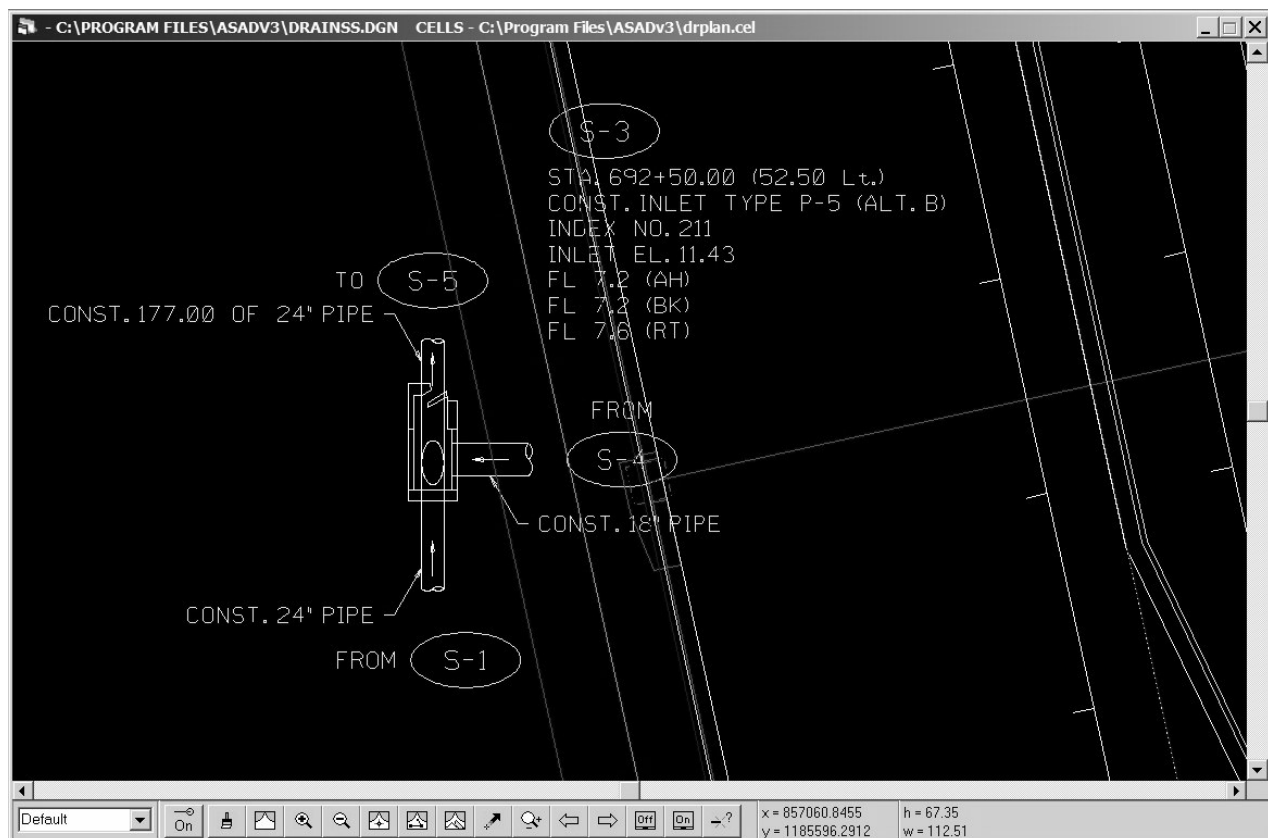


Figure 125

CAD> Storm Sewer> Draw Drainage Structures (Multiple Structures: Grid Layout mode)

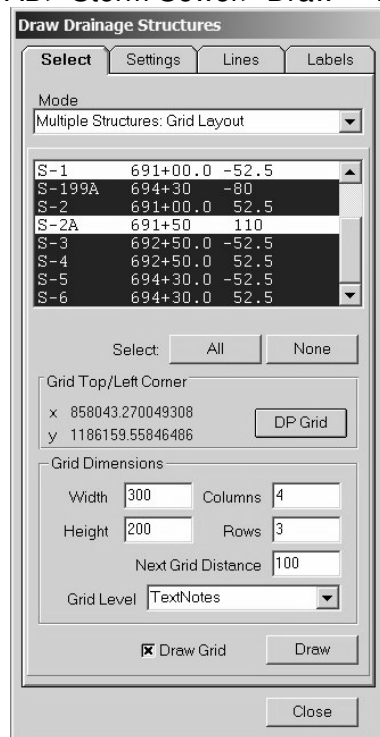


Figure 126

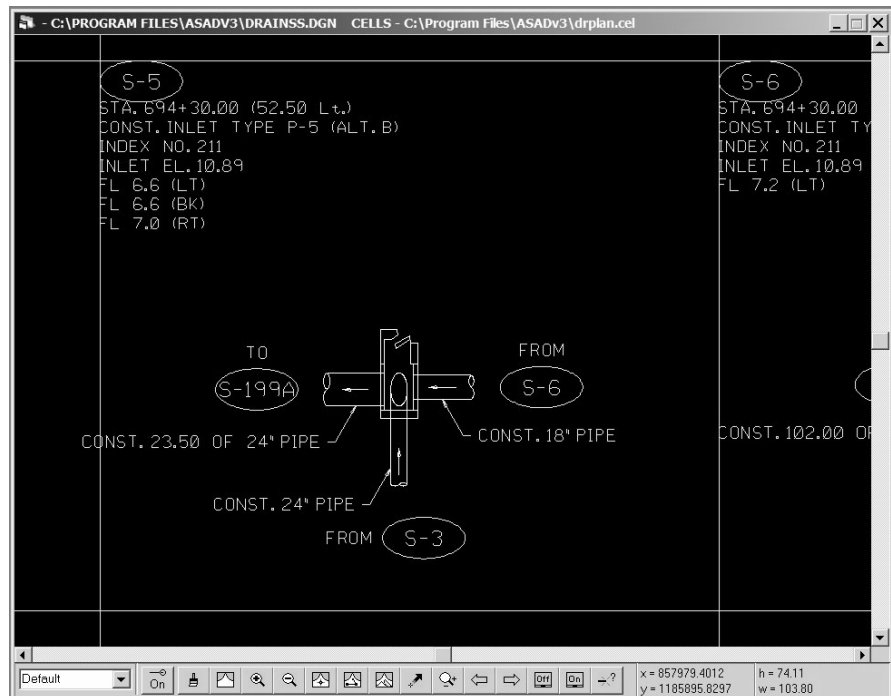


Figure 127

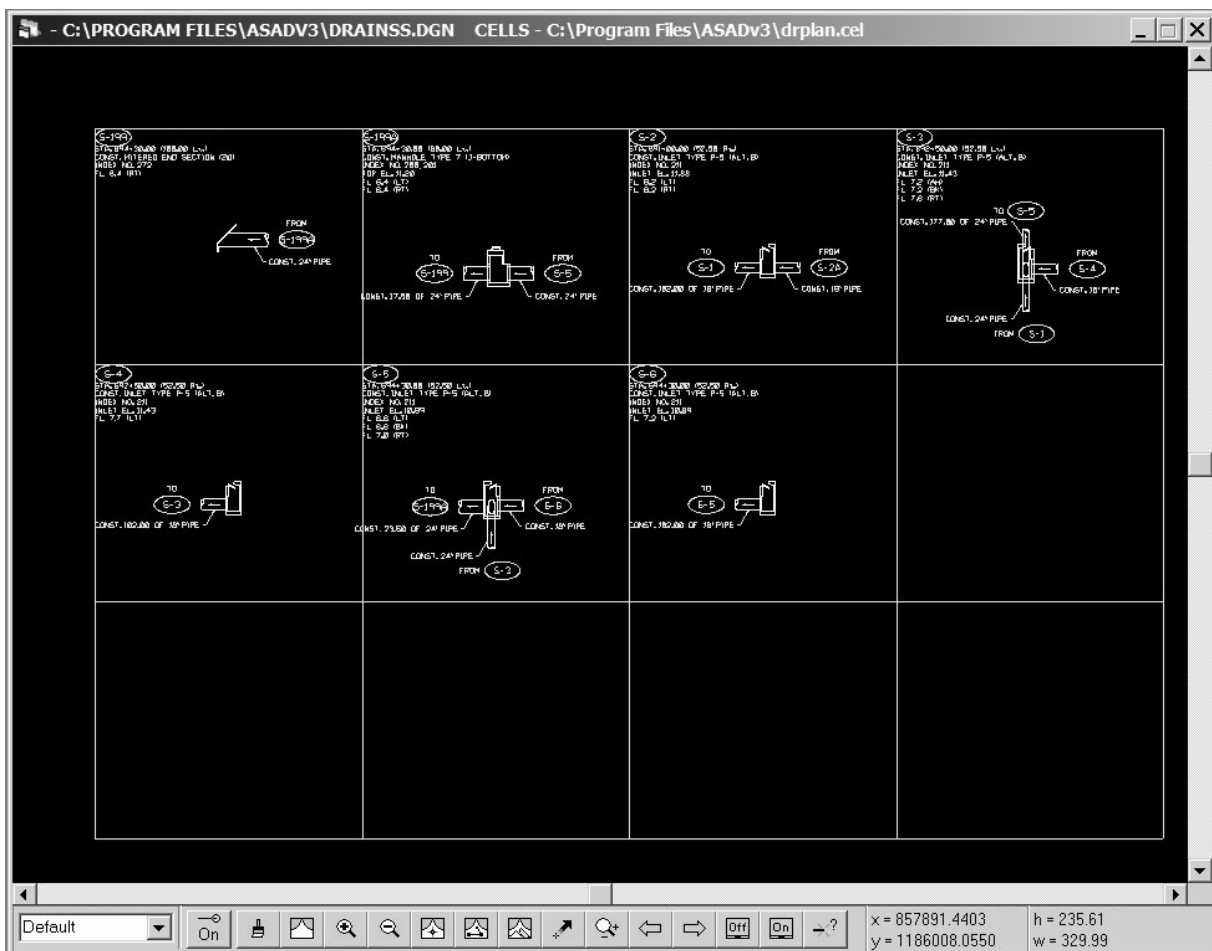


Figure 128

CHAPTER VII: MISCELLANEOUS

- 7.1 Exporting Data
- 7.2 Rebuilding (Compressing) Project Database
- 7.3 Tools
 - 7.3.1 Options
 - 7.3.2 PCS Dialog Windows
- 7.4 Editing TOP Files

Lab #16 Miscellaneous

File>Export to Text File

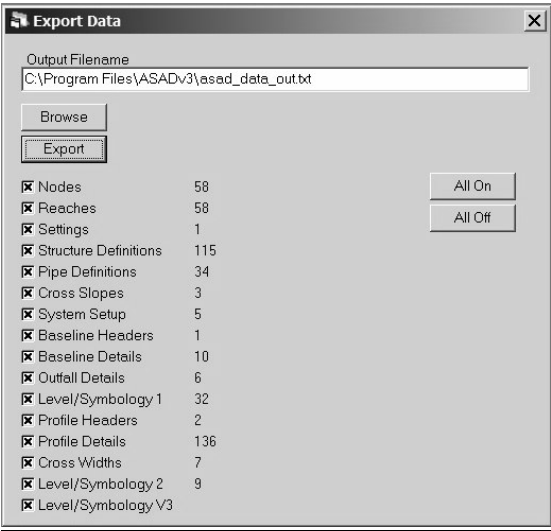


Figure 129

File>Rebuild Project Database

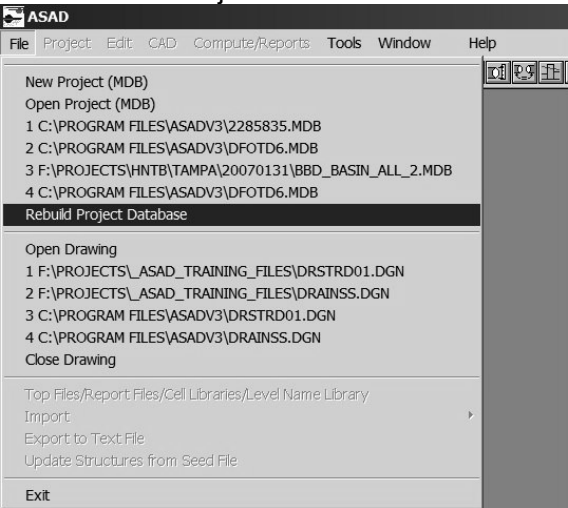


Figure 130

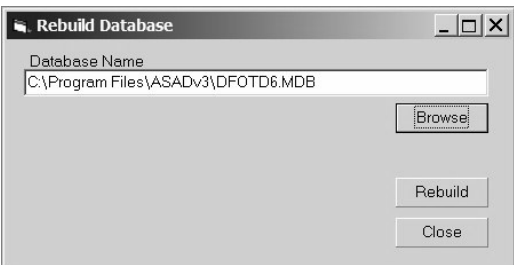


Figure 131

File>Rebuild Project Database

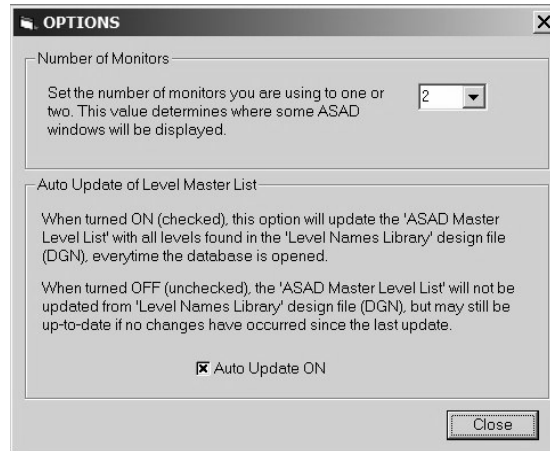


Figure 132

Use notepad to edit Drainage Structure 'TOP' files

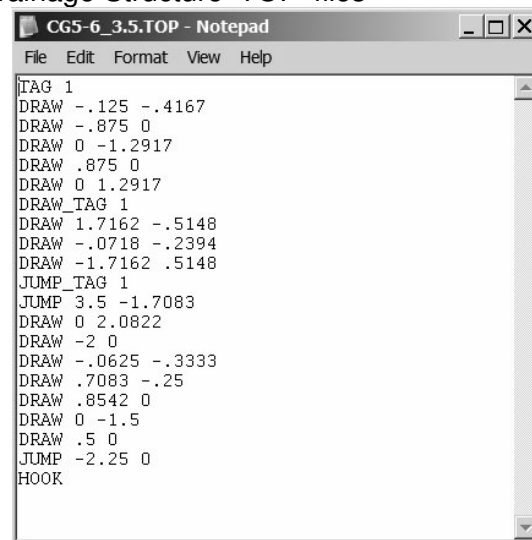


Figure 133