

## **TRAINING OUTLINE**

### **CHAPTER I – INTRODUCTION**

- 1.1 Technical Support
- 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 )
  - 1.3.2 Database Files (\*.MDB and SEEDv3.MDB)
  - 1.3.3 CAD files
    - 1.3.3.1 Drawing Files (\*.DGN)
    - 1.3.3.2 Level Name Libraries (\*.DGNLIB)
  - 1.3.4 CAD Cell Libraries (\*.CEL)
  - 1.3.5 Cross Section Top Drawing Files (\*.TOP)
  - 1.3.6 Report Generation Files (\*.RPT)
- 1.4 ASAD Master Level List
- 1.5 User Flowchart

### **CHAPTER II – STARTING A PROJECT**

- Lab #1
  - 2.1 Creating/Opening a Project Database
- New Project
  - 2.2 Setting the Path/File Names Files
  - 2.3 Projects Settings
- Lab #2
  - 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 #3
  - 2.5 Defining Structures
    - 2.5.1 Editing Structure Definitions File
    - 2.5.2 Updating Structure Definitions from a Seed
- Structures
  - 2.6 Defining Pipes
- & Pipes

### **CHAPTER III - HYDRAULIC SETUP**

- Lab #4
  - 3.1 Creating/Deleting/Renaming a Storm Sewer System
- Storm Sewer
  - 3.2 Defining Storm Events
    - 3.2.1 FDOT Intensity-Duration-Frequency (IDF) Curves
    - 3.2.2 User Defined Time-Intensity Tables
- Setup
  - 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)

## CHAPTER IV - STORM SEWER LAYOUT

- |                    |       |   |
|--------------------|-------|---|
| <u>Lab #5</u>      | 4.1   | Creating Nodes & Reaches Automatically                  |
| <u>Storm Sewer</u> | 4.2   | Nodes   |
| <u>Layout</u>      | 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  |
|                    | 4.4   | Dividing & Combining Systems                            |
|                    | 4.5   | Renumbering Nodes & Reaches                             |

## CHAPTER V – CALCULATIONS & REPORTS

- |                       |        |  |
|-----------------------|--------|--|
| <u>Lab #6</u>         | 5.1    | Computing Storm Sewer Geometry                             |
| <u>Hydraulics</u>     |        | . 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) |
| <u>Lab #7</u>         | 5.6    | Cost Analysis  |
| <u>Computing</u>      | 5.7    | Profile Elevation Inquiry                                  |
| <u>Other</u>          | 5.8    | Utility Conflicts  |
| <u>Lab #8</u>         | 5.9    | Summary of Drainage Structures                             |
| <u>Summary of</u>     | 5.10.1 | Building SDS Data Table                                    |
| <u>Dr. Structures</u> | 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)           |

**CHAPTER VI – DRAWING**

- 6.1 CAD Window
- 6.2 Reference Files
- Lab #9* 6.3 Drawing Cells into a Grid
- Draw Plan* 6.4 Levels
- & Profile* 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 #10* 6.6 Drawing Drainage Structures (Cross Section View)
- Draw Drainage* 6.6.1 Single Structure (One at a Time)
- Structures* 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

**CHAPTER VII – MISCELLANEOUS**

- Lab #11* 7.1 Exporting Data
- Misc.* 7.2 Rebuilding (Compressing) Project Database
- 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](mailto: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 )
- 1.3.2 Project Database Files (\*.MDB and SEEDv3.MDB)
- 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))**

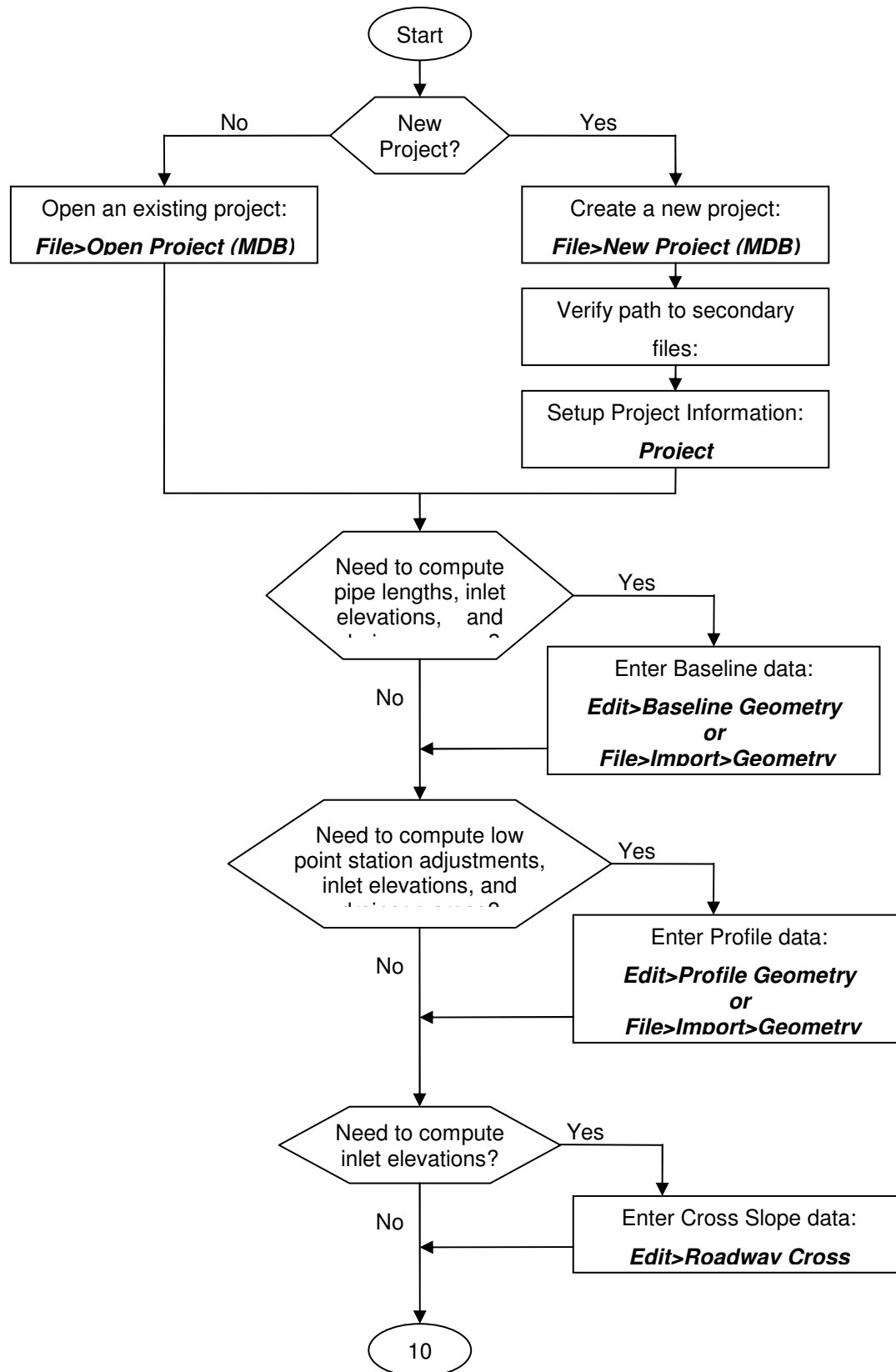
CAD> Levels> ASAD Master Level List

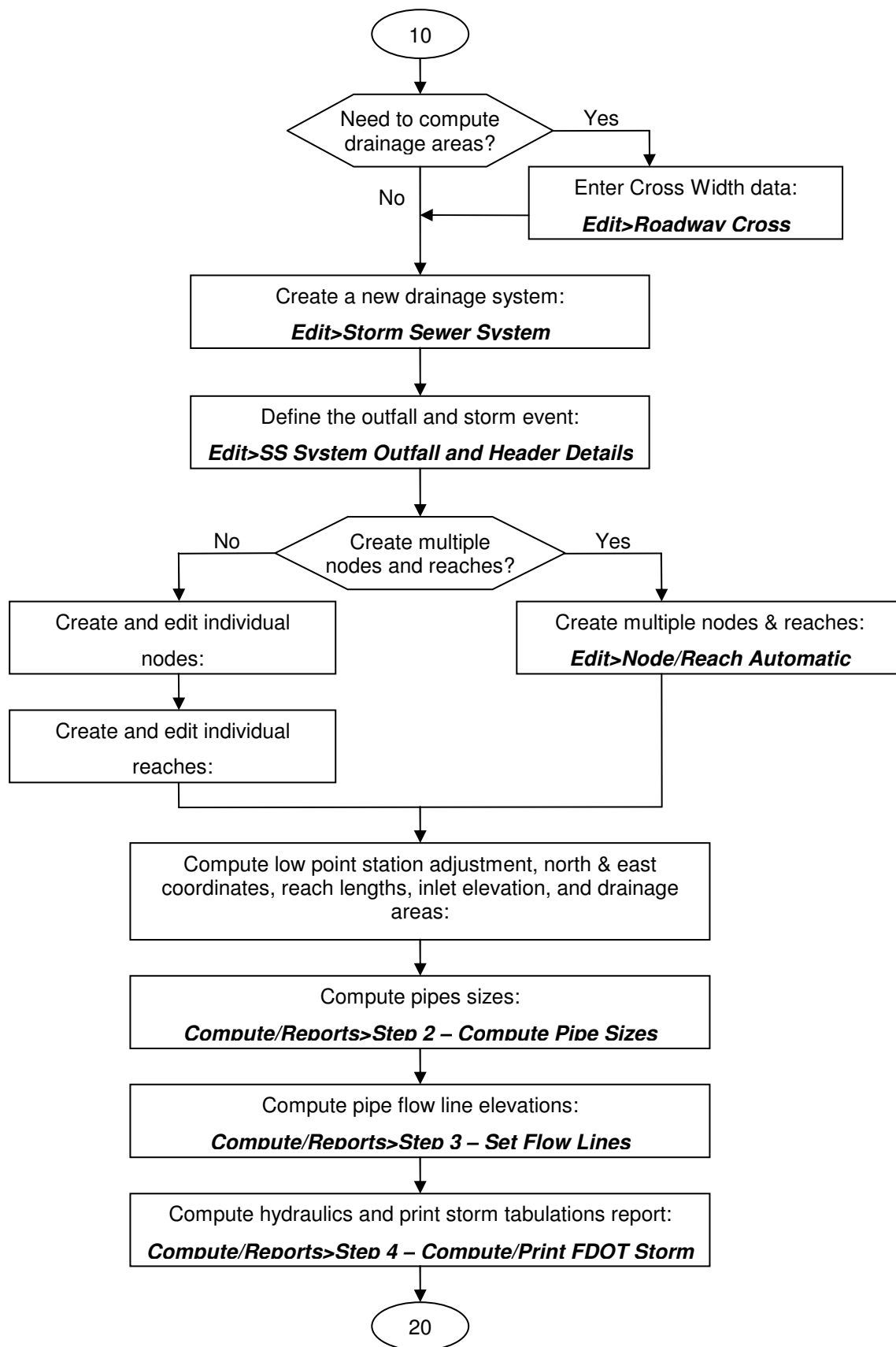
Name	Active	Description	Number	Color	Weight	Style
DitchPavt	<input type="radio"/> Yes <input checked="" type="radio"/> No	Ditch Pavement Including Quantity Shapes	220	3	1	0
DitchPavt_px	<input type="radio"/> Yes <input checked="" type="radio"/> No	Ditch Pavement for Cross Sections	313	3	3	0
DitchProfLt_er	<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

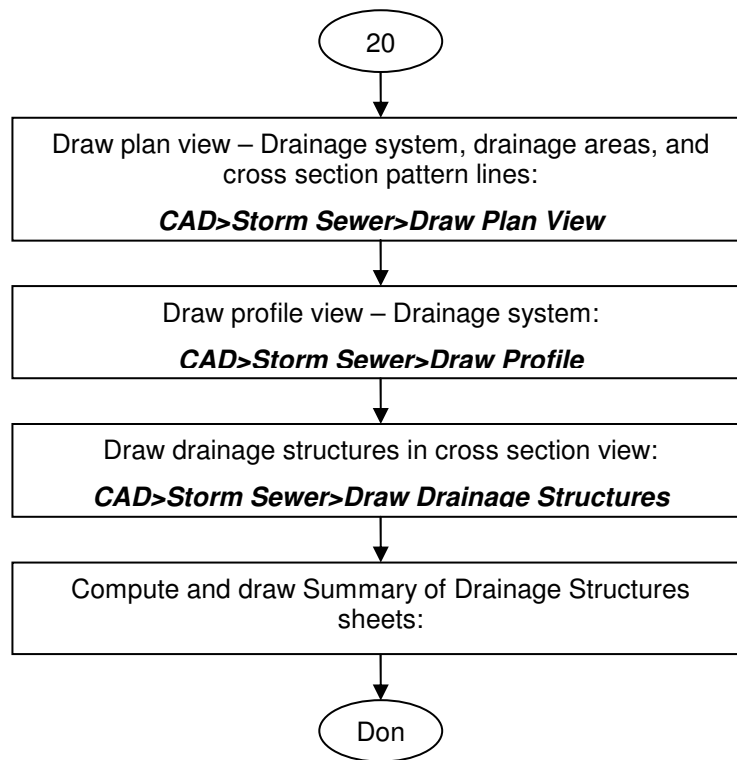
Levels: 698      Make All Levels:        Make Levels Typical to ASAD Projects Active, All Others Inactive.

Figure 1

## 1.5 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)

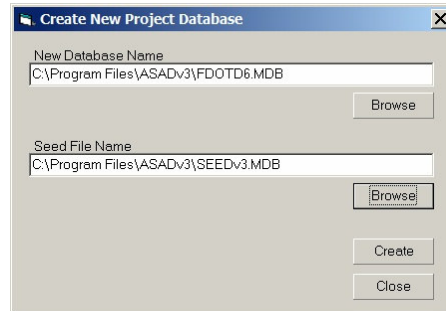


Figure 2

File>Open Project (MDB)

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

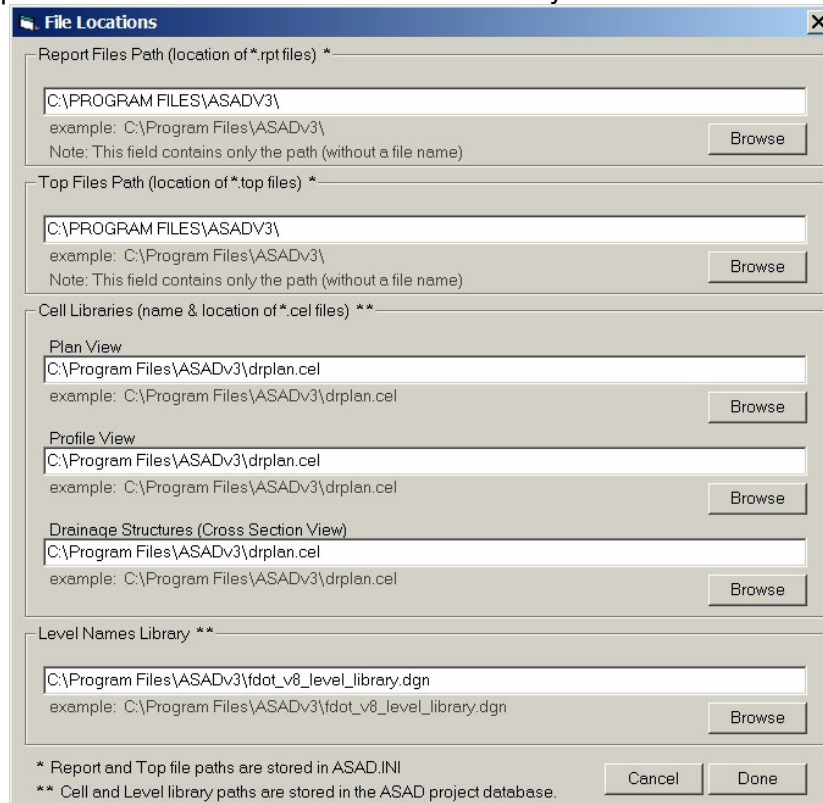


Figure 3



## 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

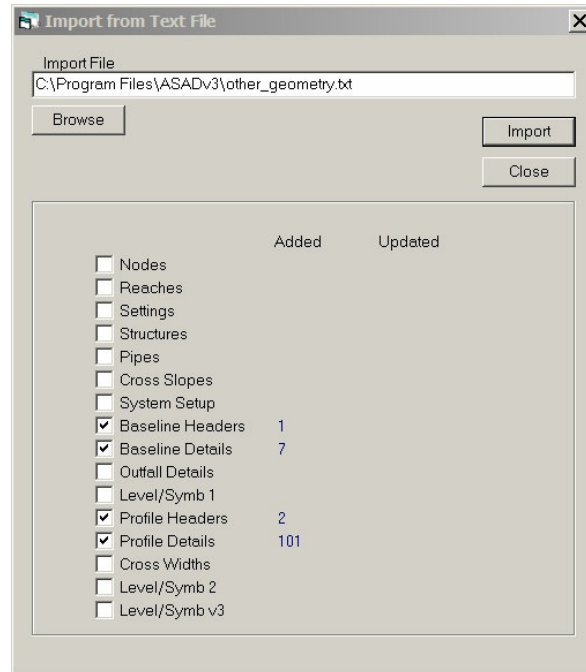


Figure 7

Re-Start ASAD  
Edit>Baseline Geometry

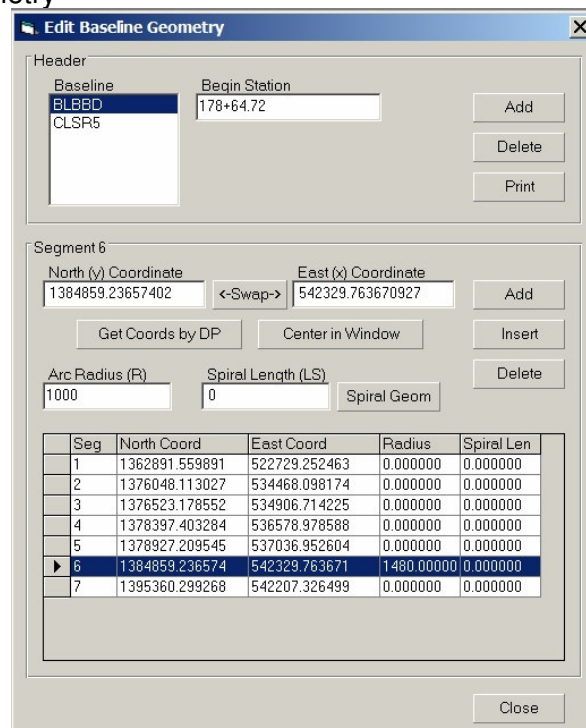


Figure 8

File>Import> Geometry from GEOPAK Input Text File

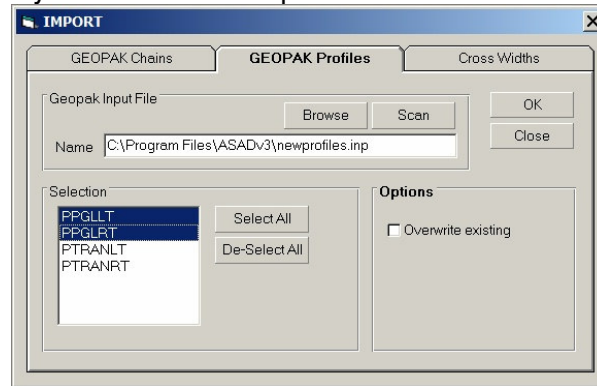


Figure 9

Edit>Profile Geometry

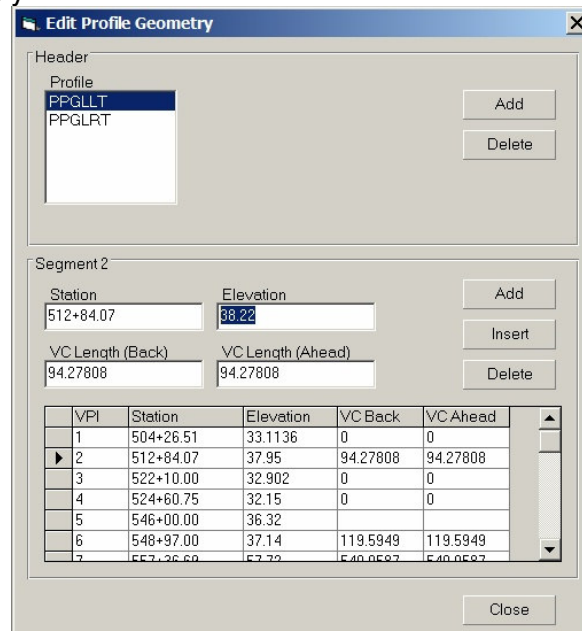


Figure 10

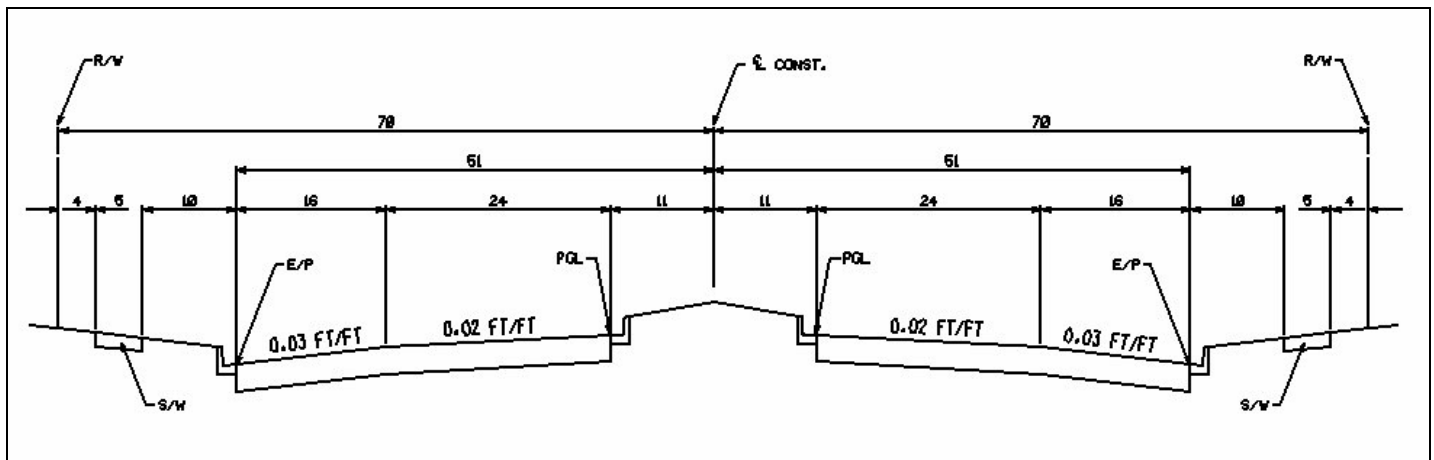


Figure 11

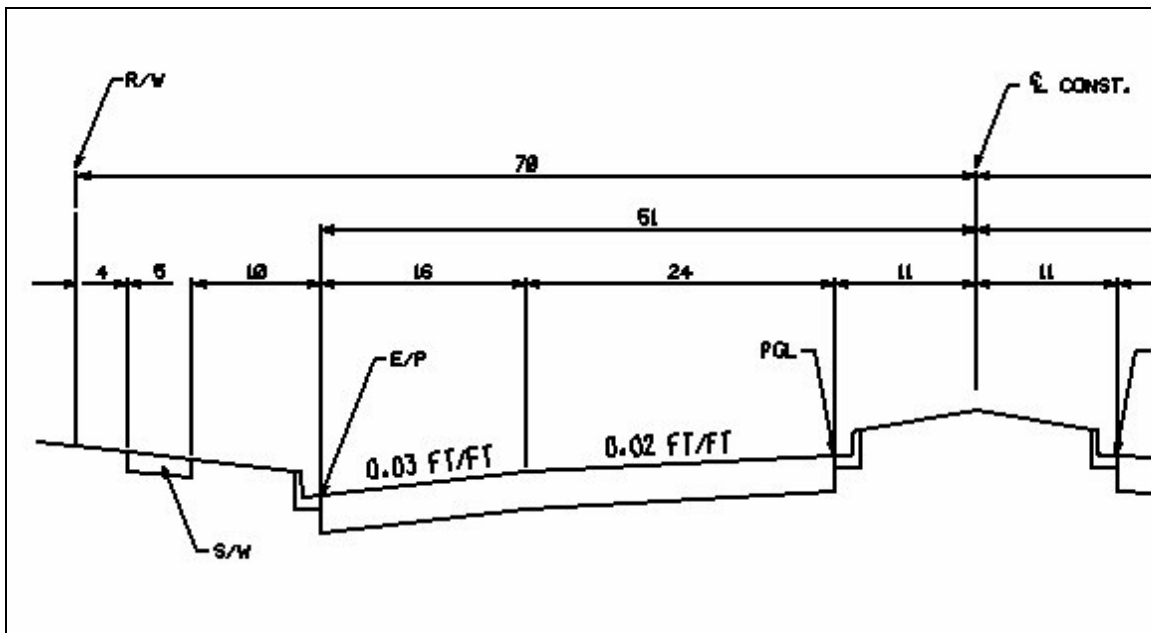


Figure 12

### 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**

**Edit Structure Definitions**

Buttons: Add, Duplicate, Delete, Close, Top File / SDS Columns

**Structure List**

Name	Sort List by...
BW-217-4	Name
BW-218	
BW-219	
CI-1-A	then by...
CI-1-B	
<b>CI-1-J</b>	then by...
CI-10	
CI-10-J	
CI-2-A	
CI-2-B	
CI-2-J	
CI-3-A	
CI-3-B	
CI-3-J	
CI-4-A	
CI-4-B	

Limit List to... Show All

Apply

**Structure Identifiers**

Active (selected), Inactive, All Active, All Inactive

Agency: FDOT (Add)

Structure Type: Curb Inlet (Add)

Description (100 character max): Curb Inlet Type 1 with J-Bottom

'TYPE OF STRUCT' on Storm Tabs: J-1 (6 character max)

**Hydraulics/Spread** | **Quantity/Cost** | **Other**

**Drawing** | **Annotation** | **Dimensions**

Draw in Plan View As: ☒ Cell ☐ Lines

Library: C:\Program Files\ASADv3\drplan.cel

Name: IntCurb1\_35 (Browse Cell Library)

Cell Adjustments: Scale: 1, Angle: 0, Mirror: ☐

Reference Location Point: is located at Node Nothing & Easting

Reaches Intersect: dX: 0, dY: 4

Cell Origin: dX: 0, dY: 0

☐ This cell is symmetrical (does not need to be mirrored)

Node Auto Rotation Method: Parallel to Baseline

**Figure 15**

**Hydraulics/Spread** | **Quantity/Cost** | **Other**

**Drawing** | **Annotation** | **Dimensions**

**Drainage Structure Paragraph**

- 1 STA @d2@sta (@d2@abs@off @ofs)
- 2 CONST. INLET TYPE J-1
- 3 INDEX NO. 210
- 4 INLET EL @d2@iel
- 5 FL @d1@fluca
- 6 FL @d1@fluca
- 7 FL @d1@fluca
- 8 FL @d1@fluca
- 9
- 10

Defaults: Curb Inlet (selected), Manhole, DBI

Copy pipe flow line text to four (4) empty lines for ALL STRUCTURES only if the first empty line is line 4, 5 or 5.

Variables: Copy

**Figure 16**

**Hydraulics/Spread** | **Quantity/Cost** | **Other**

**Drawing** | **Annotation** | **Dimensions**

**Structure Top/Bottom Relationship**

- ☐ Structure is Drawn Entirely from a Cell or Endwall Definition. No Bottom or Riser Dimensions are Needed.
- ☐ Structure Top & Bottom are the Same Width. Top is Drawn by Top Definition. No Riser. No Top Slab.
- ☒ Structure Top & Bottom have Different Widths. Top is Drawn by Top Definition. Riser Matches Top and has a Top Slab.

**Riser/Top**

Shape: ☒ Round ☐ Square/Rect

3.5 Length 3.5

Well Thickness .5

Top Slab Thickness .667

**Bottom**

Shape: ☐ Round ☒ Square/Rect

Width 6 Length 6

Wall Thickness .667

Top & Bottom Slab Thickness .667

**Riser Position Relative to the Bottom and Baseline**

Three diagrams showing the relationship between the Baseline, Riser, and Bottom.

**Figure 17**

Drawing	Annotation	Dimensions
<b>Hydraulics/Spread</b>		
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	Grate Width
Throat Height	.5	Grate Length
		Grate Type

Figure 18

Drawing	Annotation	Dimensions
<b>Quantity/Cost</b>		
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
<b>Other</b>		
Pipe Length Adjustment		
Offset Adjustment		
Minimum Cover		
Inlet/Grate/Top Elevation		
Inlet Elevation Adjustment		
<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		
Weep Hole Diameter		

Figure 20

## File&gt;Update Structures from Seed File

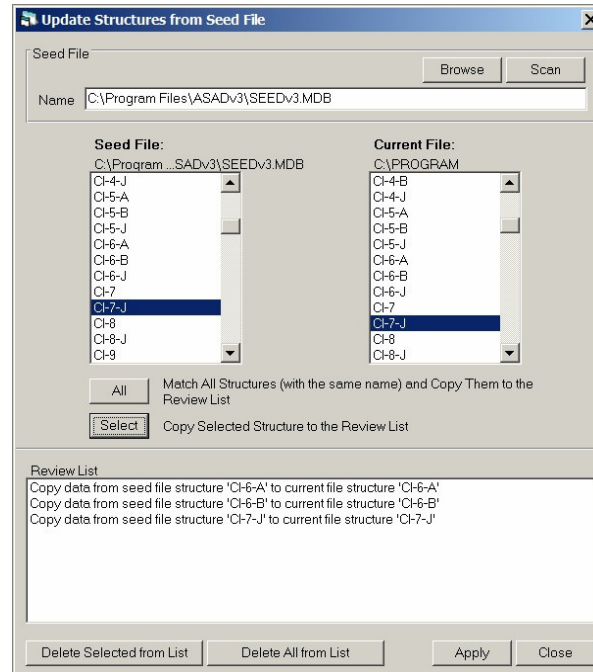


Figure 21

## Edit&gt;Pipe Definitions

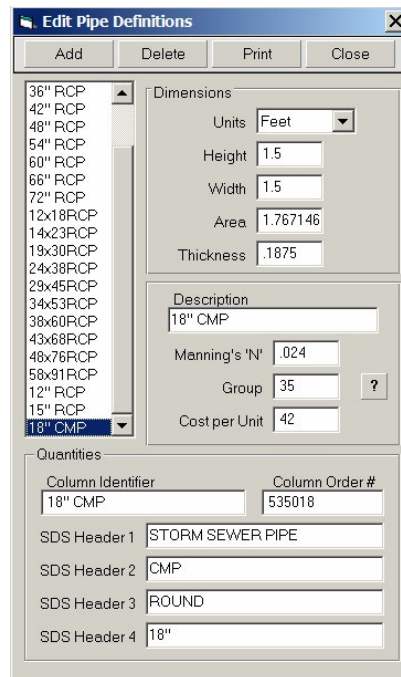


Figure 22

## **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 #4 Storm Sewer Setup**

Edit> Storm Sewer System Add/Delete/Rename

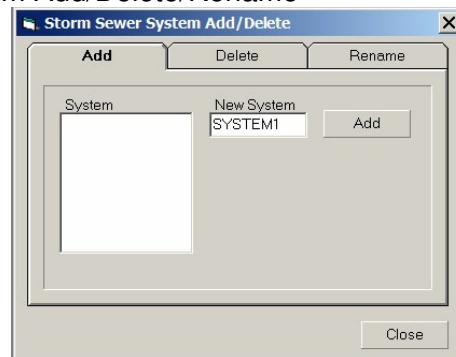


Figure 23

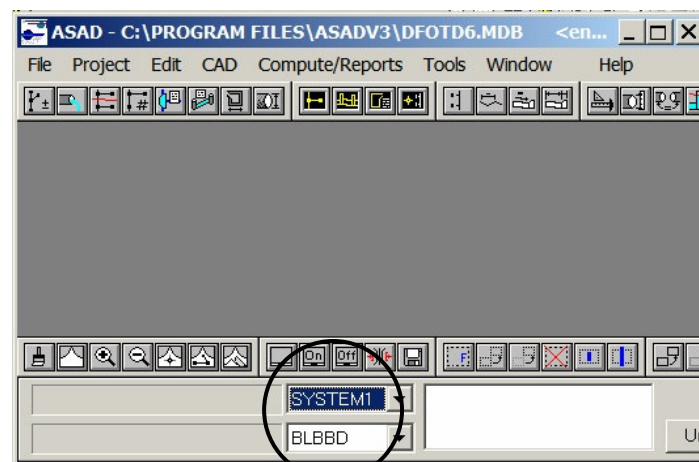
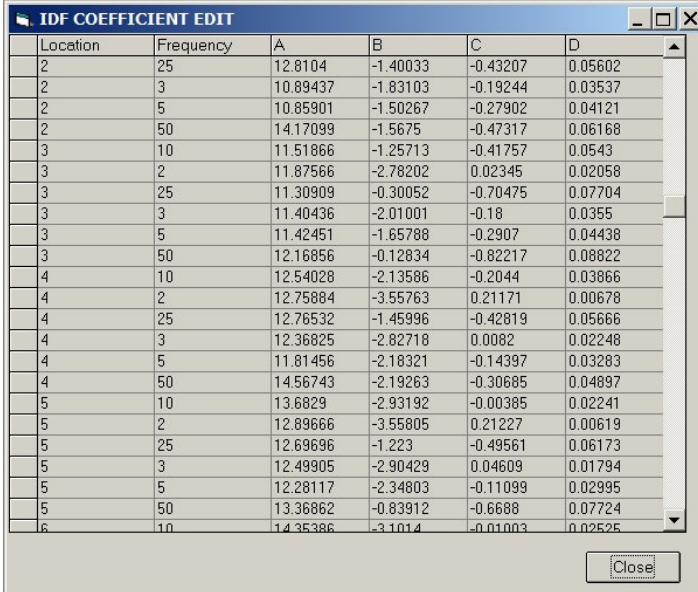


Figure 24

Current Active System



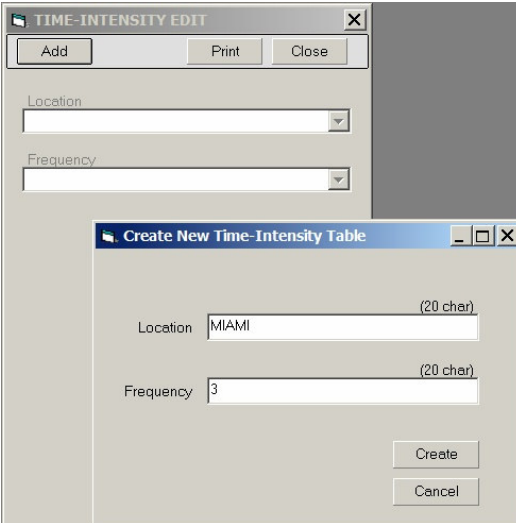
## Edit&gt;IDF Coefficients



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 25

## Edit&gt;Storm Time-Intensity Tables (user defined)



**TIME-INTENSITY EDIT**

Add Print Close

Location:

Frequency:

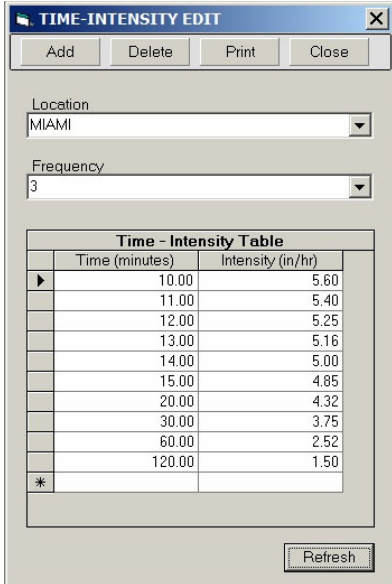
**Create New Time-Intensity Table**

Location:  (20 char)

Frequency:  (20 char)

Create Cancel

Figure 26



**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 27

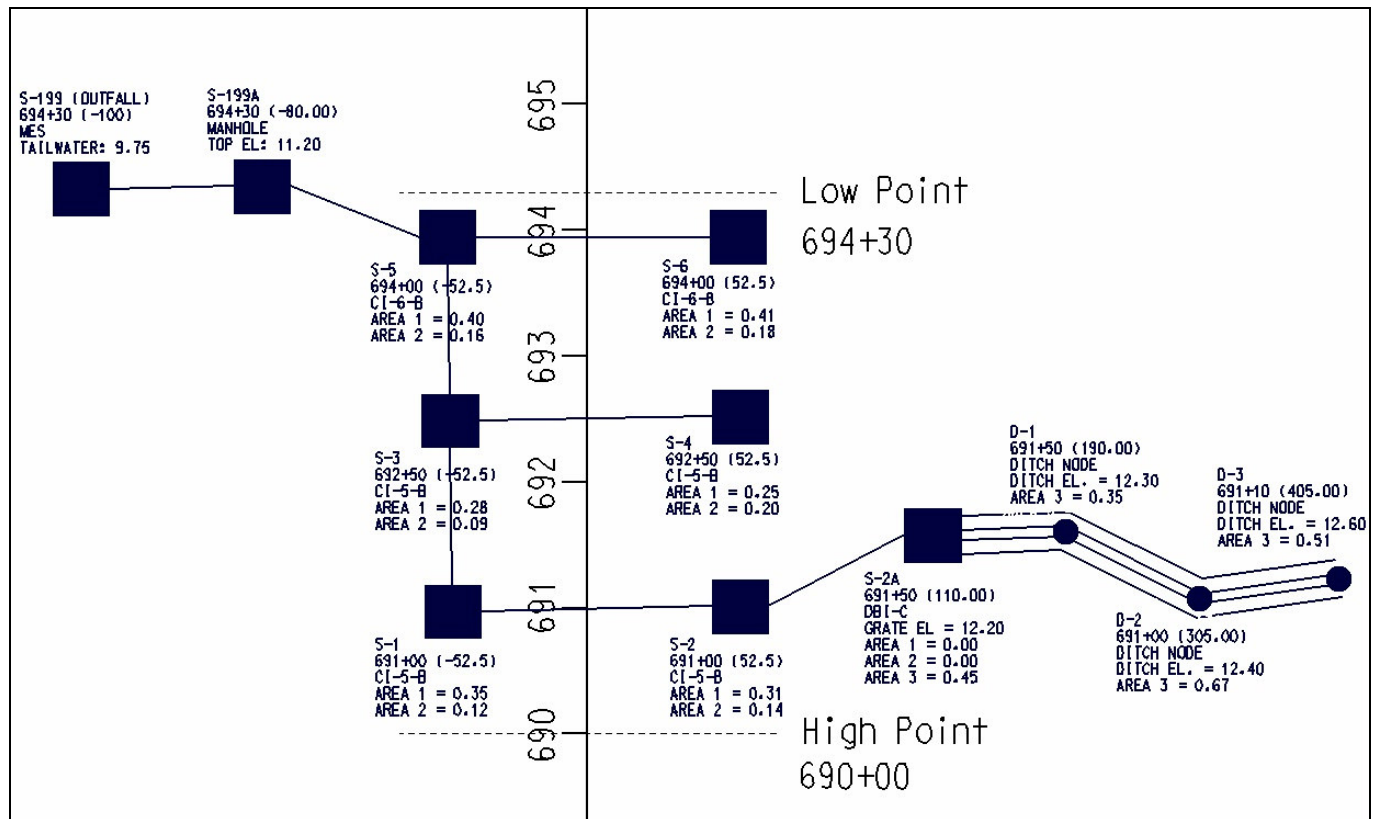


Figure 28

## Edit&gt; SS System Outfall and Header Details

Figure 29

Figure 30

Figure 31

## 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 #5 Storm Sewer Layout

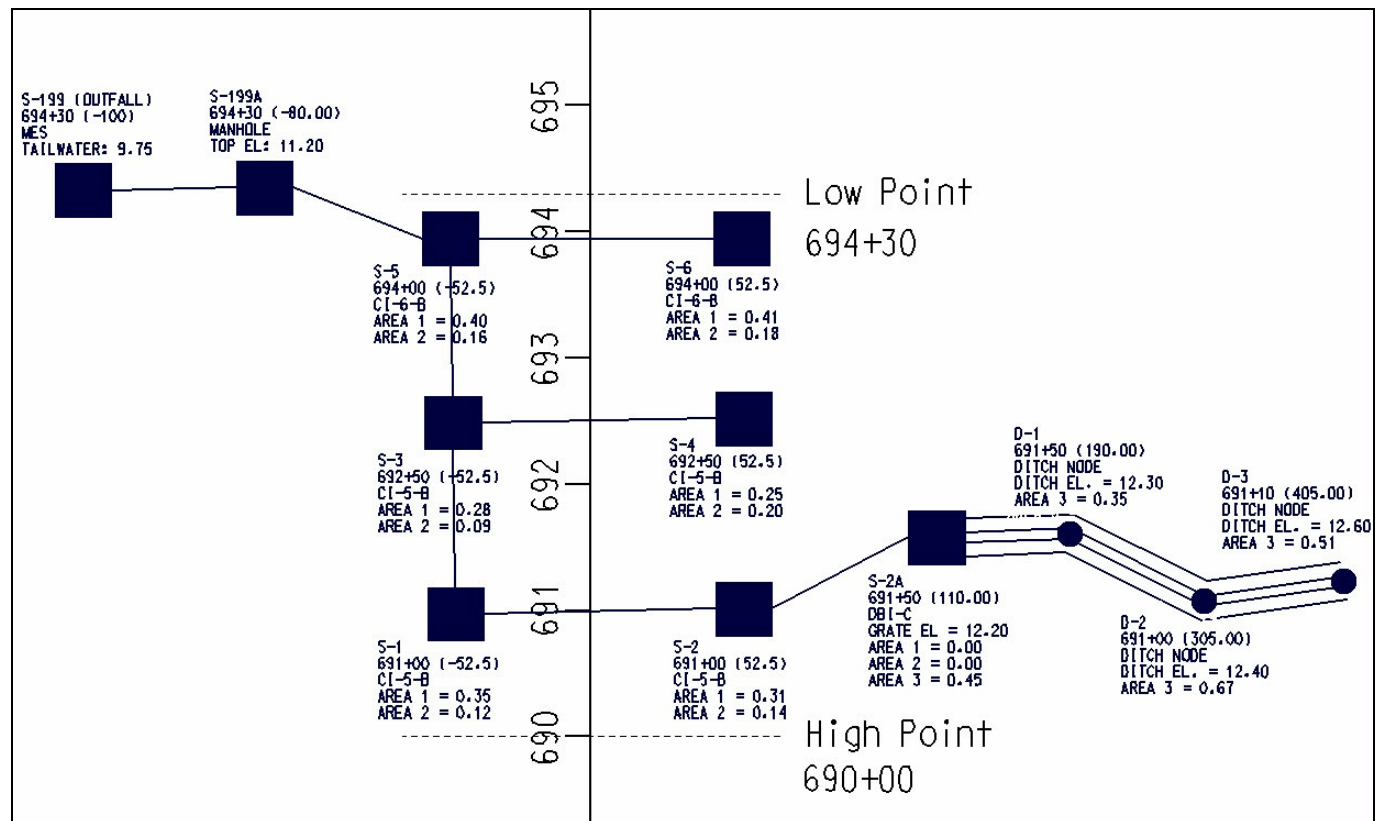
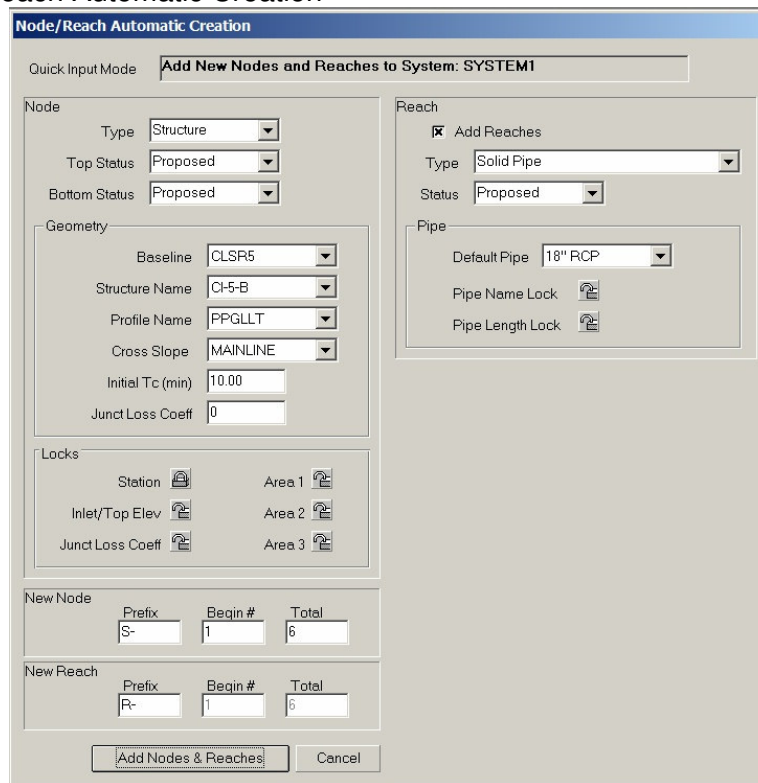


Figure 32

## Edit&gt; 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**

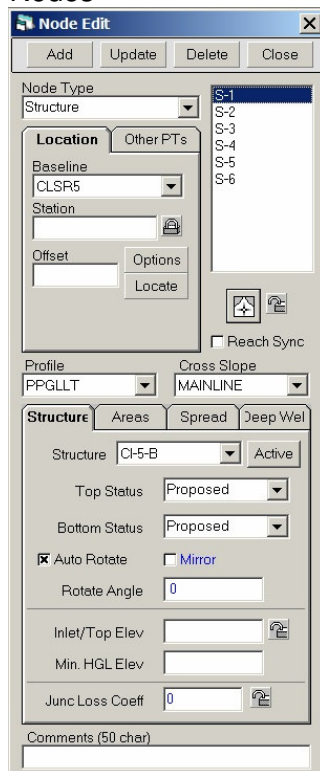
Default Pipe: **18" RCP**

Pipe Name Lock:

Pipe Length Lock:

Figure 33

## Edit&gt; 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**

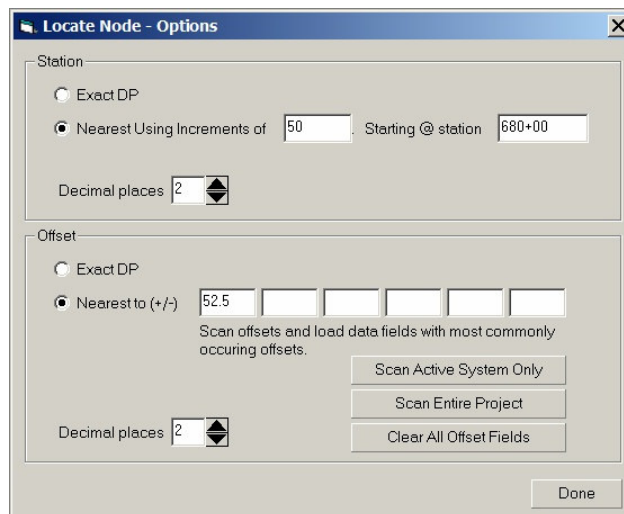
Inlet/Top Elev:

Min. HGL Elev:

Junct Loss Coeff: **0**

Comments (50 char):

Figure 34



**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 35



ADD A NEW NODE

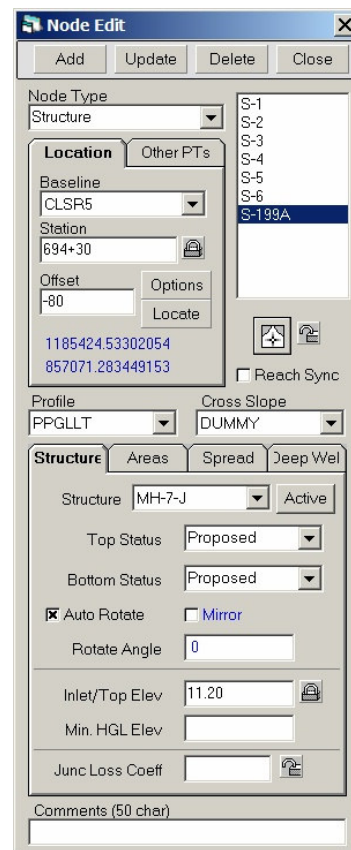
Enter new node name.

OK

Cancel

S-199A

Figure 36



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

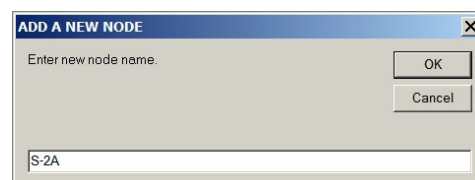
Inlet/Top Elev 11.20

Min. HGL Elev

Junc Loss Coeff

Comments (50 char)

Figure 37



ADD A NEW NODE

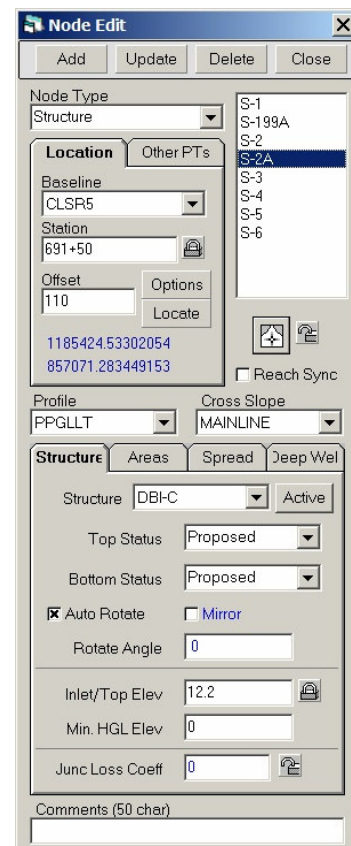
Enter new node name.

OK

Cancel

S-2A

Figure 38



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 39

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.

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 40

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: **PPGLLT** Cross Slope: **DUMMY**

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

Status: **Proposed**

Ditch Bottom El.: **12.3**

Min. HGL Elev: **0**

Figure 41

**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 42

**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 43

## Edit&gt; Reaches



ADD A NEW REACH

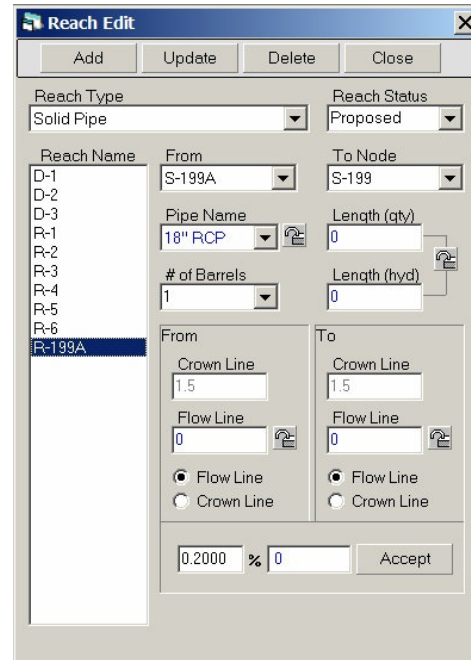
Enter new reach name.

OK

Cancel

R-199A

Figure 44



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

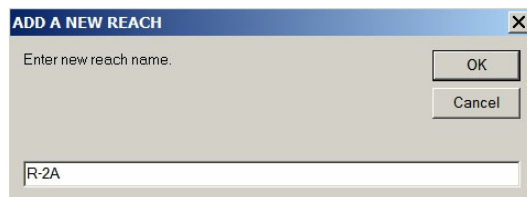
# of Barrels: 1 Length (hyd): 0

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 45



ADD A NEW REACH

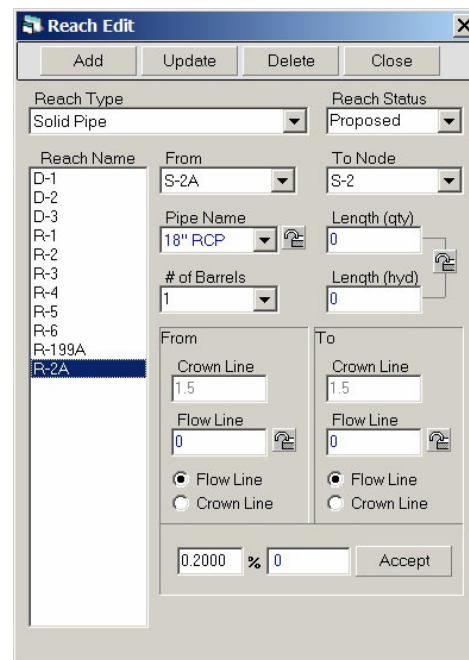
Enter new reach name.

OK

Cancel

R-2A

Figure 46



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 47



**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 48

#### 4.5 Dividing & Combining Systems

#### 4.6 Renumbering Nodes & Reaches



## 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 #6 Hydraulics

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

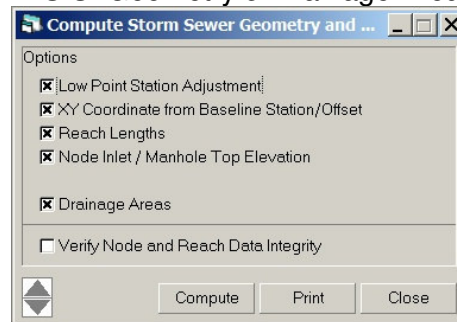


Figure 49

Compute/Reports> Step 2 - Compute Pipe Sizes

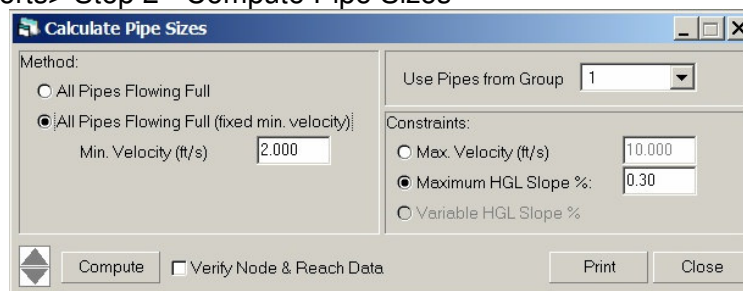


Figure 50

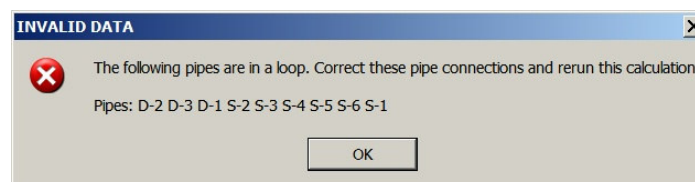
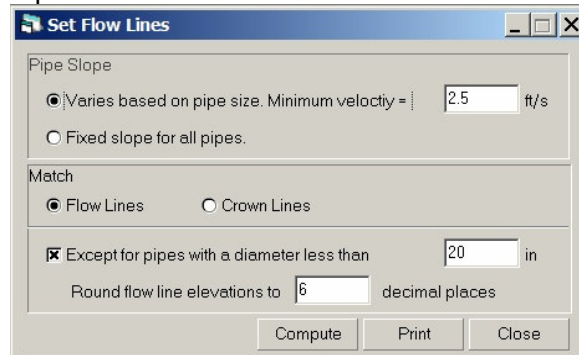


Figure 51

## Compute/Reports&gt; 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

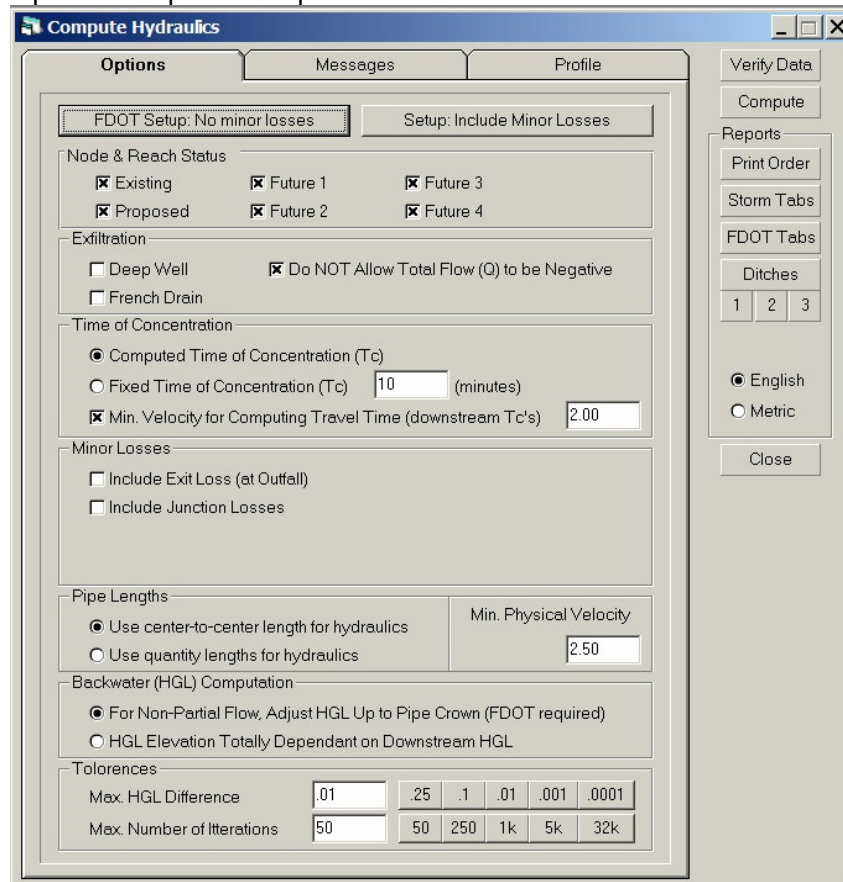
☒ Except for pipes with a diameter less than  in

Round flow line elevations to  decimal places

Compute Print Close

Figure 52

## Compute/Reports&gt; 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 53



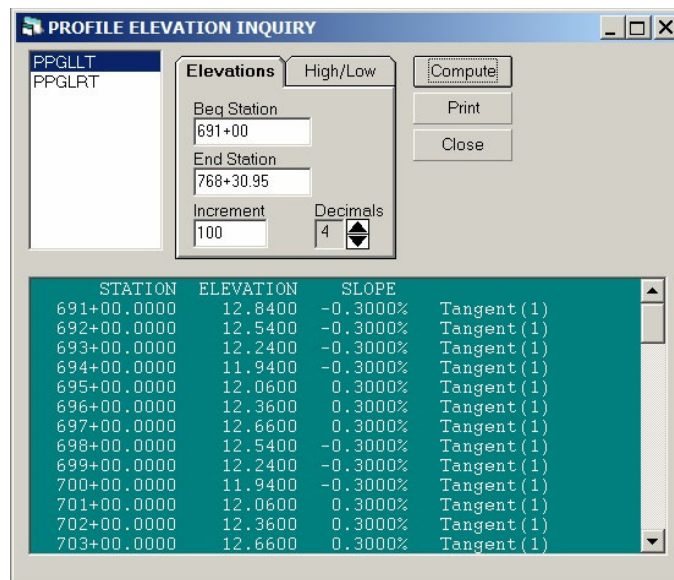


Figure 56

## Compute/Reports&gt; Utility Conflicts

The screenshot shows a software window titled "UNDERGROUND CONFLICTS - SYSTEM1". It has a menu bar with "Compute", "Print", and "Close". Below the menu bar are two checkboxes: "Reach vs. Reach" (unchecked) and "Reach vs. Utilities" (checked). The main area contains a table with the following data:

System	Reach	Baseline	Station	Offset	Pipe	Slope %	Sys/Utility	Reach/Si	Position	Clear.
SYSTEM1	R-1	CLSR5	692+15.59	-52.5000	24" RCP	0.3000	12"FM	1	Above	1.9039
SYSTEM1	R-4	CLSR5	692+50.00	20.9208	18" RCP	0.1456	12"FM	1	Above	2.2746

On the left side of the window, there is a list of reaches: D-1, D-2, D-3, R-1, R-139A, R-2, R-2A, R-3, R-4, R-5, and R-6. Below this list are two buttons: "Select All" and "De-Select All".

Figure 57

## 5.9 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 #8 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 58

## Text Size &amp; 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 59

## Compute/Reports&gt; 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"

Refresh

Renum Rows by 10's

Node Prefix Length: 2

Node Column Number: 01

Sort by Node Number

Figure 60

## Compute/Reports&gt; 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

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

**Diagram**

Figure 61



## Compute/Reports&gt; Summary of Drainage Structures – Heading &amp; 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 <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
	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	1		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, f	24"	18	1		18	

Figure 62

## Compute/Reports&gt; Summary of Drainage Structures – Draw (tab)

**Summary of Drainage Structures**

Scan | Row | Grid | Heading | **Draw**

Include:

- ☒ Header Text
- ☒ Detail Text
- ☒ Totals Text
- ☒ Outline Lines
- ☒ Vertical Lines
- ☒ Horizontal Lines

Top Left Data Point:

x: 858196.379158029

y: 1185569.9979118

DP

Draw

Export

Insert Column | Delete Column | << Shift Column

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

Figure 63

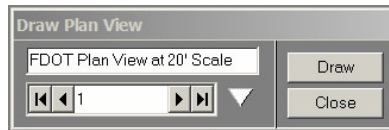


## **CHAPTER VI: DRAWING**

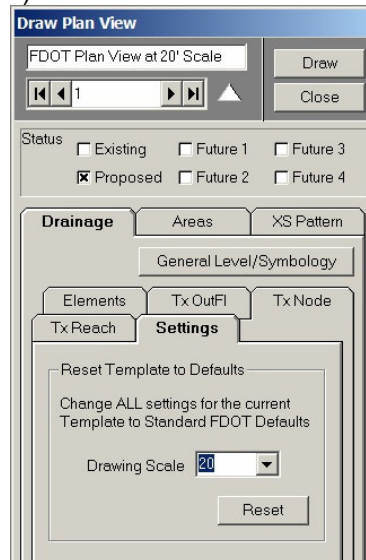
- 6.1 CAD Window**
- 6.2 Reference Files**
- 6.3 Drawing Cells into a Grid**
- 6.4 Levels**
  - 6.4.1 Levels Display
  - 6.4.2 Level/Layer Manager
  - 6.4.3 ASAD Master Level List
- 6.5 Drawing Plan View and Profile View Elements**
  - 6.5.1 Drawing Templates and Setting Defaults
  - 6.5.2 General Level/Symbology
  - 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 #9 Draw Plan & Profile**

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



**Figure 64**



**Figure 65**

## General Level/Symbology (button)

ELEMENT/TEXT IDENTIFIER			LEVEL/SYMBOLGY/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 66

Figure 67

ELEMENT/TEXT IDENTIFIER			LEVEL/SYMBOLGY/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 68

## CAD&gt; Storm Sewer&gt; Draw Plan View – Drainage (tab)

Figure 69

Figure 70

Figure 71

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 72

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

Double click text field to add variables or press button ... Variables

Figure 73

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 74

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

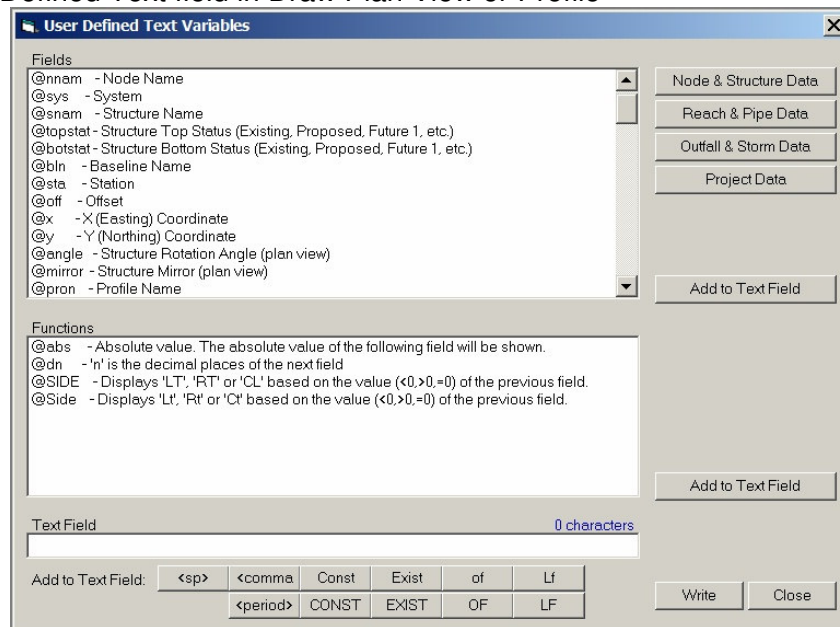


Figure 75

## 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 #10 Draw Drainage Structures

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

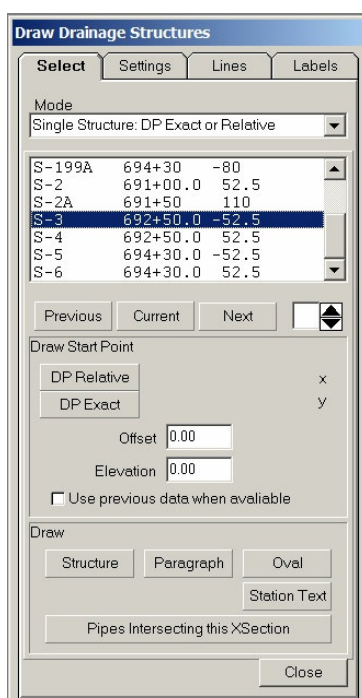


Figure 76

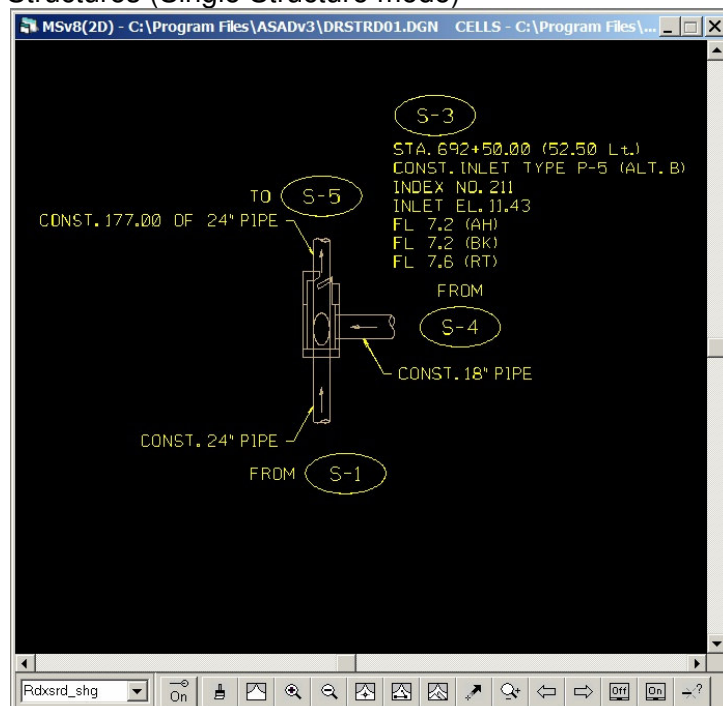


Figure 77

## CAD&gt; Storm Sewer&gt; Draw Drainage Structures – Settings and Lines (tabs)

Figure 78

Figure 79

## CAD&gt; Storm Sewer&gt; Draw Drainage Structures – Labels (tab), DS Paragraph (sub-tab)

Figure 80

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 81

**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 82

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 Incoming (From) Pipes (CONST. @desc), Outgoing (To) Pipes (CONST. @length OF @desc), and Connected Pipes (On Same Cross Section: CONST. @length OF @desc), along with a Pipe Length field (Decimal Places 2); and 'Level/Symbology' with a table for defining text styles.

	Height	Width	Font	Level Name
Text	1.4	1.4	48	TextNotes
Leader Line				TextNotes
Line Terminator				TextNotes

Figure 83



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

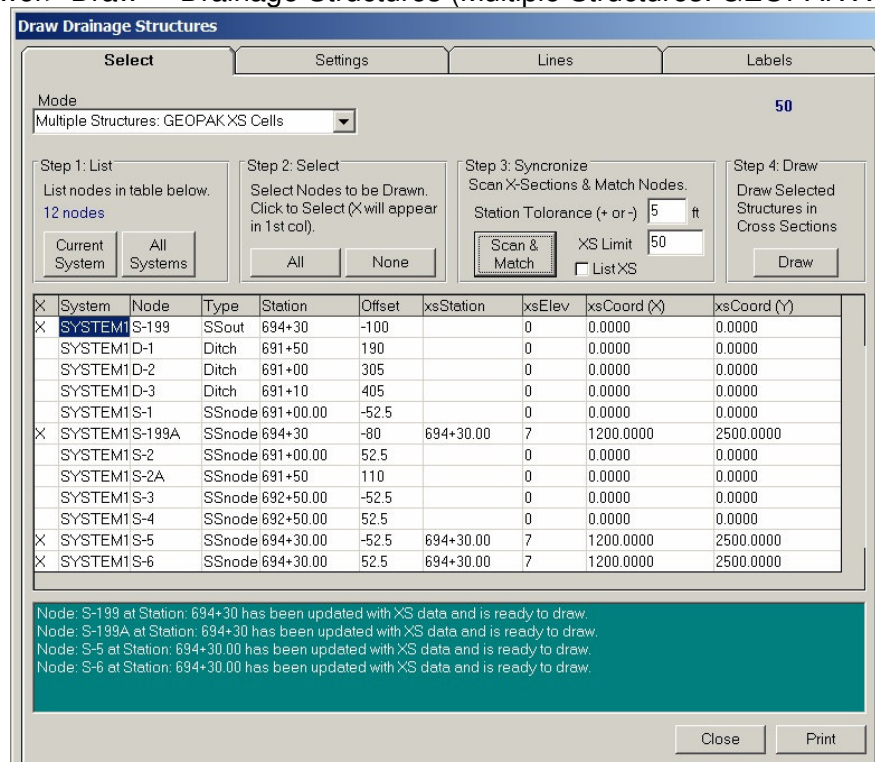
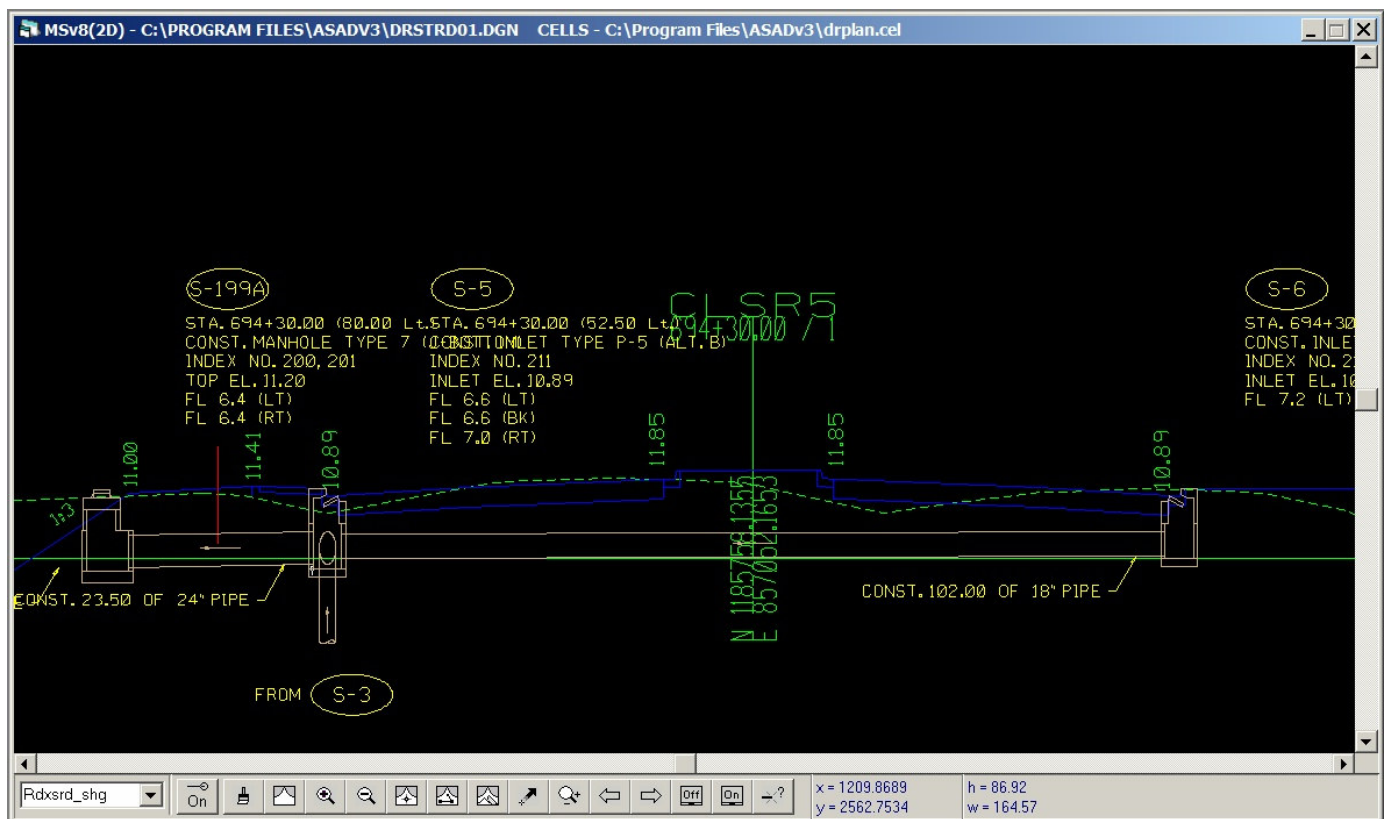


Figure 84



**Figure 85**



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

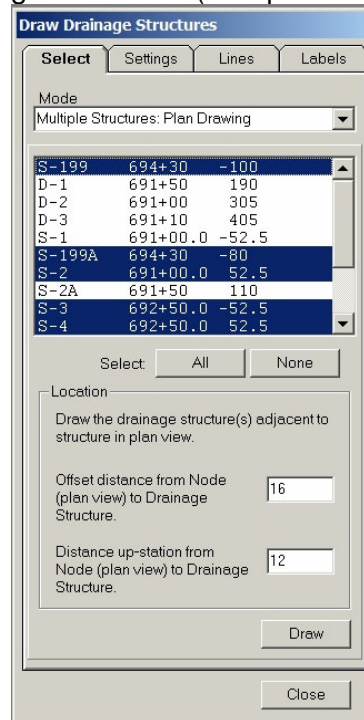


Figure 86

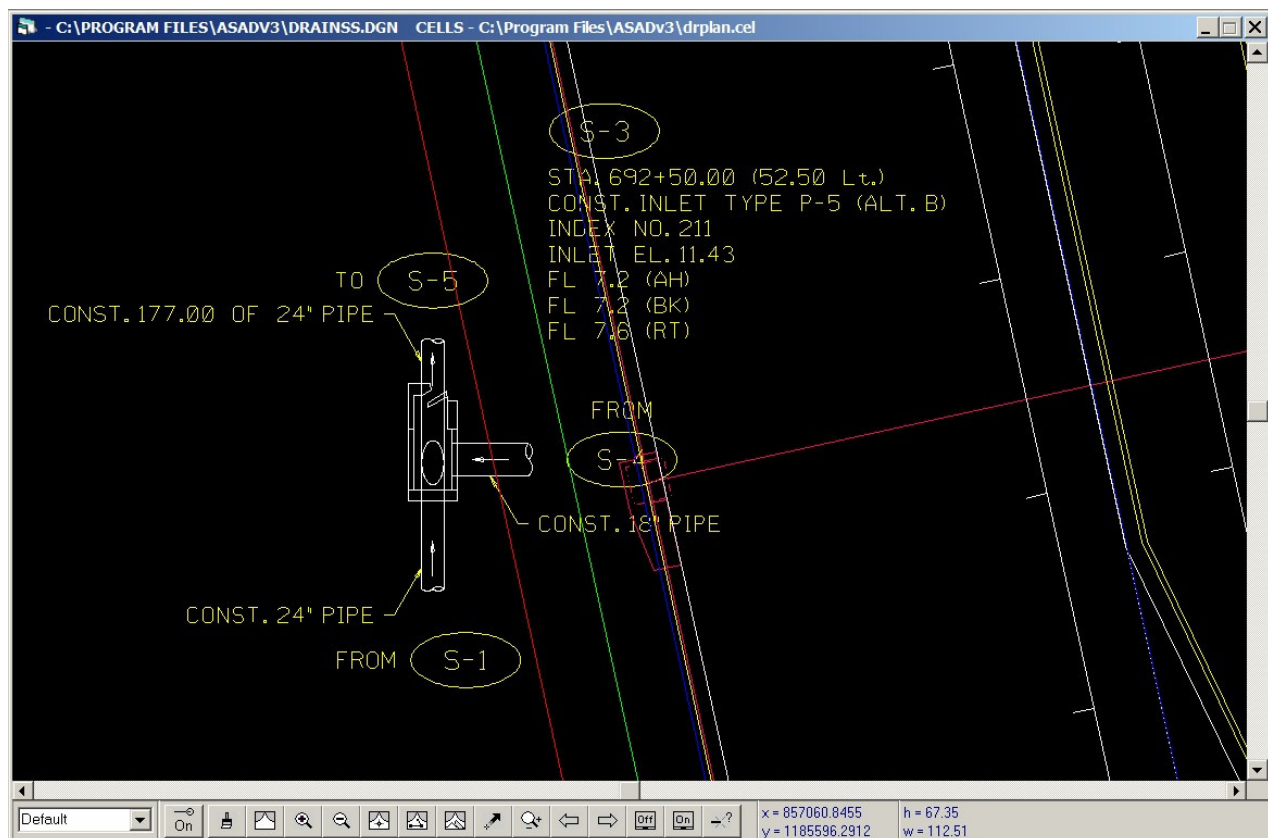


Figure 87

## CAD&gt; Storm Sewer&gt; Draw Drainage Structures (Multiple Structures: Grid Layout mode)

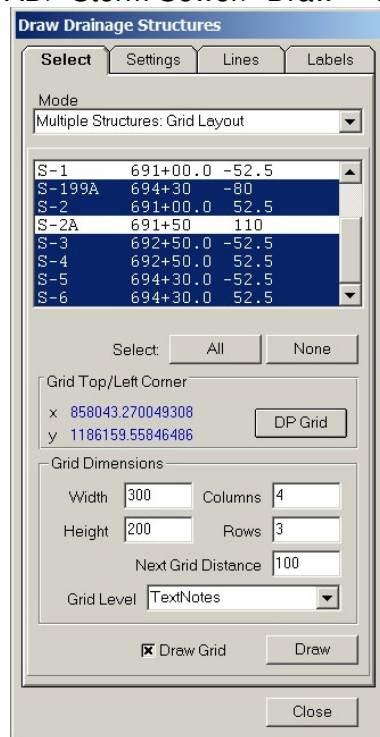


Figure 88

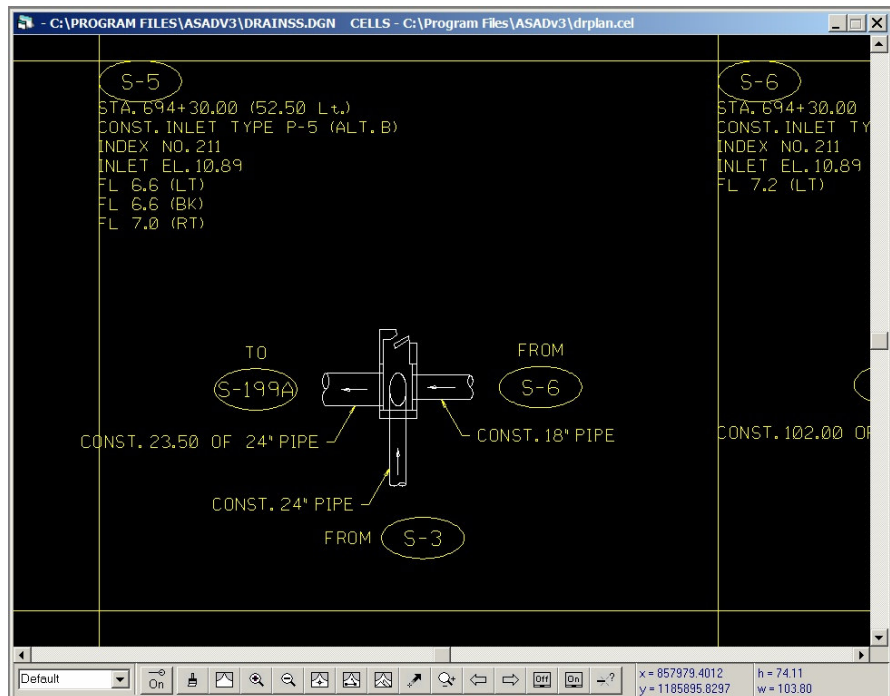


Figure 89

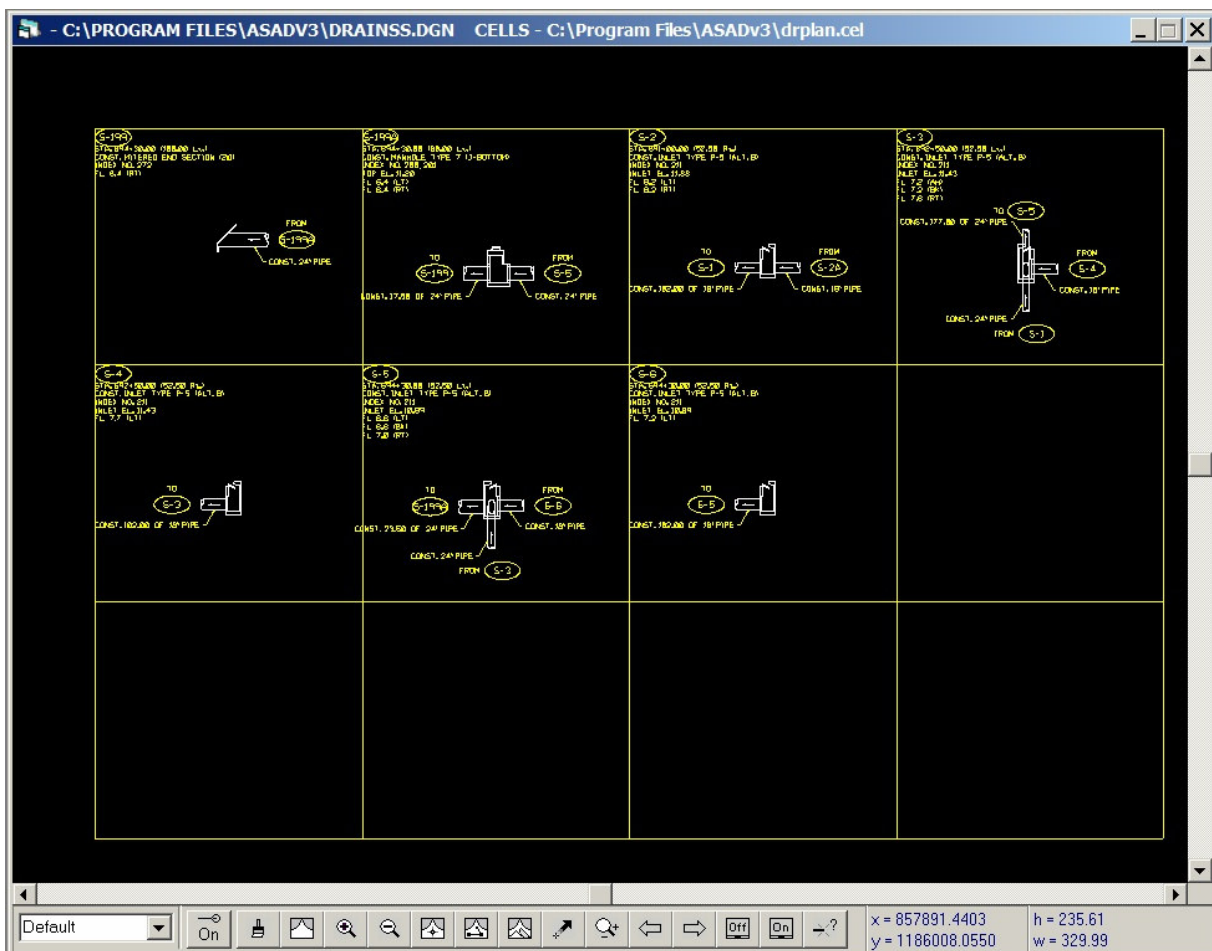


Figure 90

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 #11 Miscellaneous

File>Export to Text File

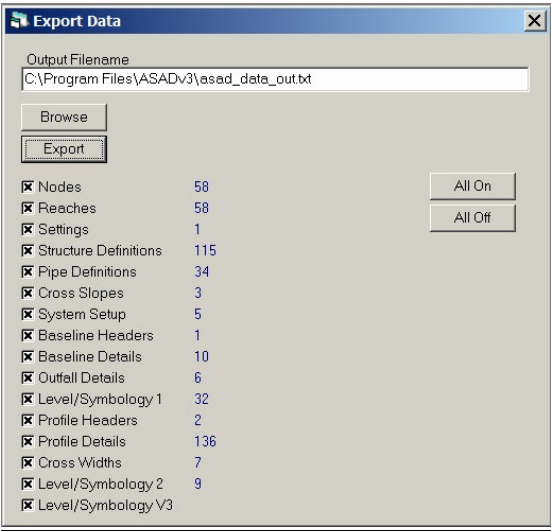


Figure 91

File>Rebuild Project Database

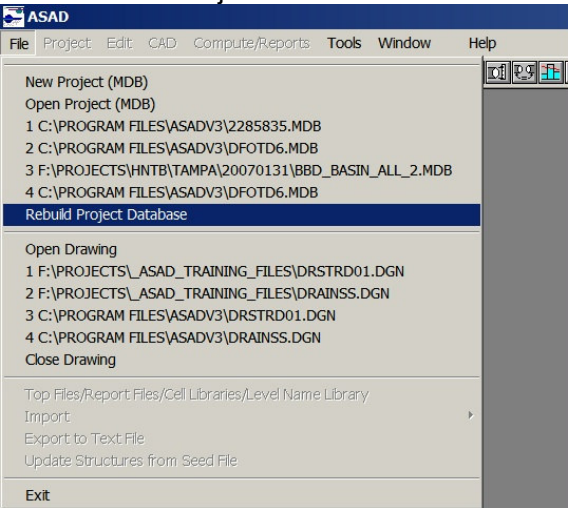


Figure 92



Figure 93

## File&gt;Rebuild Project Database

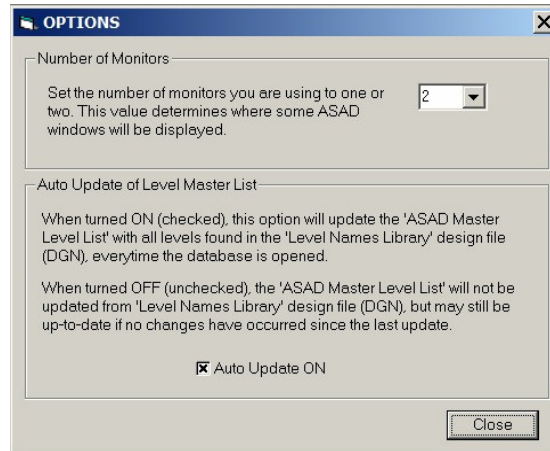


Figure 94

## Use notepad to edit Drainage Structure 'TOP' files

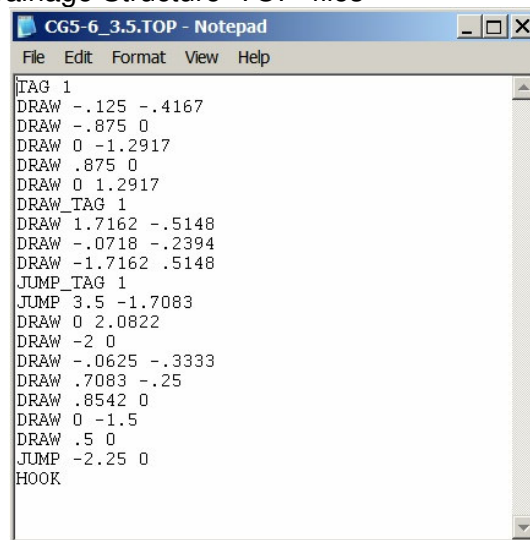


Figure 95