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E6 - Modeling Utilities and Drainage Structures

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P.E.(FL)

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Ways to Evaluate your Design

View the data

- Plan
- Profile
- Cross Section
- 3D View>Drainage as Solids

Ways to Evaluate your Design

Annotate the data

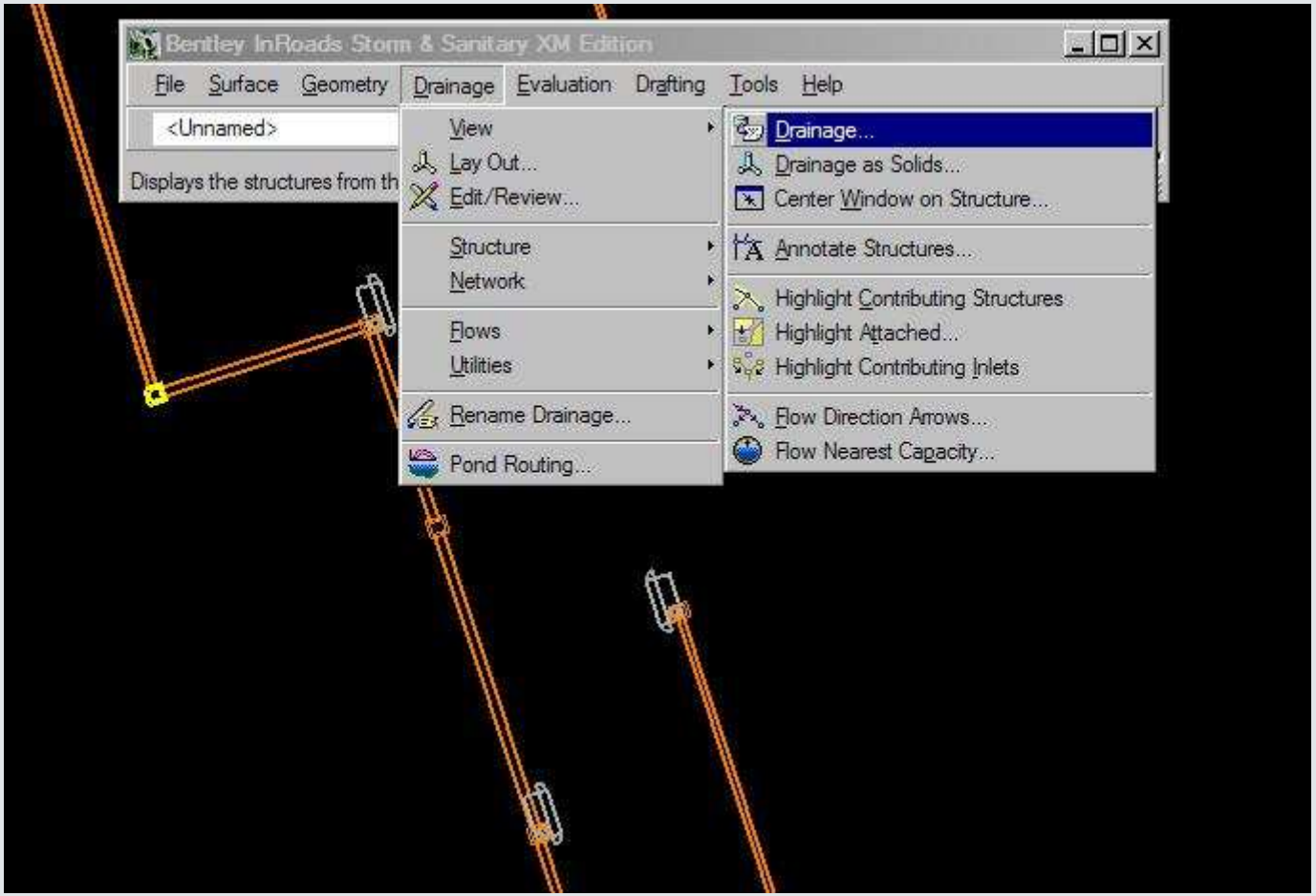
- Plan Annotation
- Profile Annotation
- Place Notes

Ways to Evaluate your Design

Evaluate the data

- Reports
- Queries
- InRoads Explorer
- Edit/Review

Plan


Bentley InRoads Storm & Sanitary XM Edition
File Surface Geometry Drainage Evaluation Drafting Tools Help
<Unnamed>
Displays the structures from th
View
Lay Out...
Edit/Review...
Structure
Network
Flows
Utilities
Rename Drainage...
Pond Routing...
Drainage...
Drainage as Solids...
Center Window on Structure...
Annotate Structures...
Highlight Contributing Structures
Highlight Attached...
Highlight Contributing Inlets
Flow Direction Arrows...
Flow Nearest Capacity...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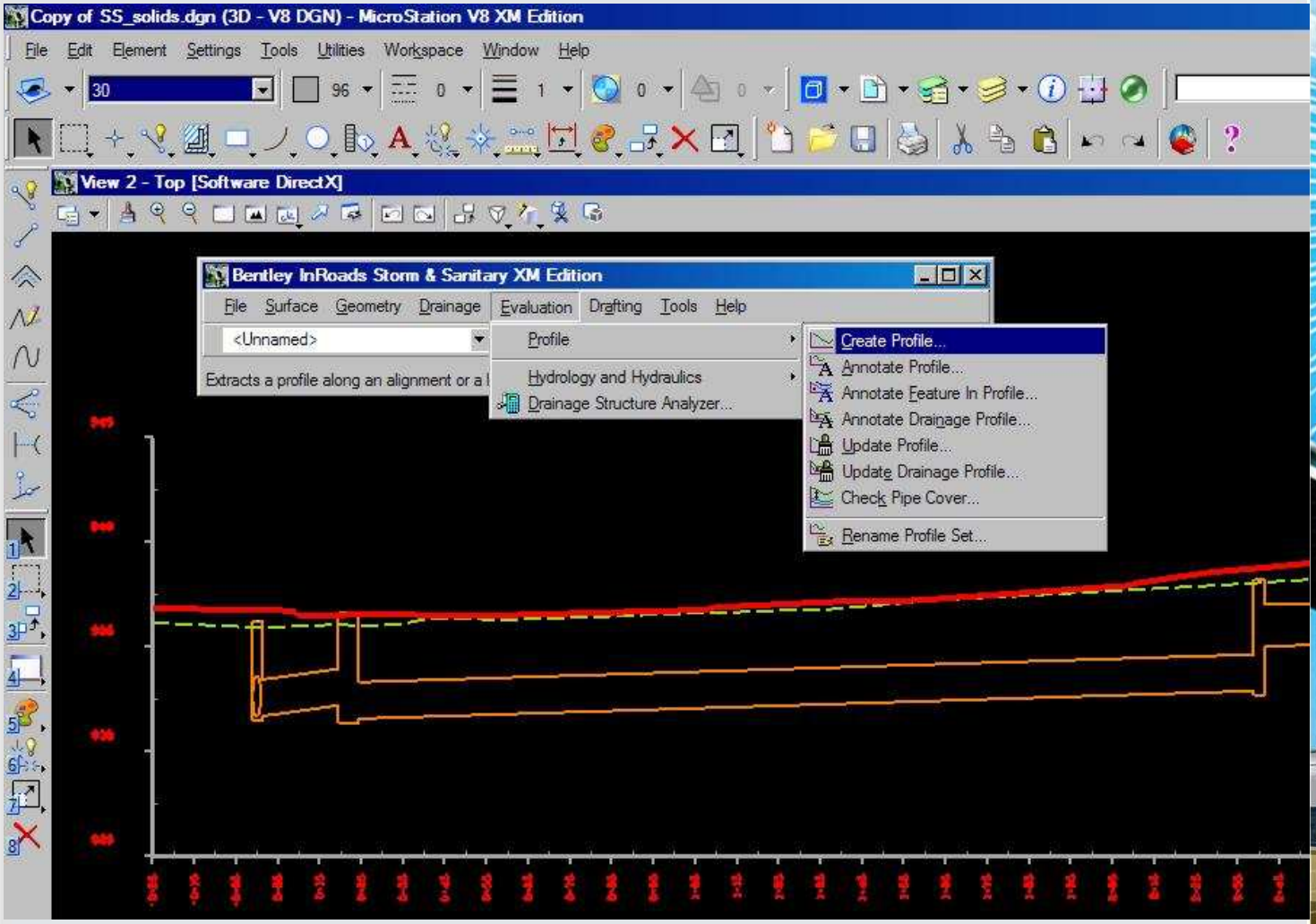
Style Lock On or Off

- Tools>Locks>Style -
  “On” = GOOD, “Off” = BAD
- When “On” each structure’s styles control their display and therefore no dialog is required.
- When “Off” the display is controlled by the command’s settings.
- Many commands, Create Cross Section, and Update Cross Section ALWAYS operate as if Style Lock is “On”

Profile


Copy of SS_solids.dgn (3D - V8 DGN) - MicroStation V8 XM Edition
File Edit Element Settings Tools Utilities Workspace Window Help
View 2 - Top [Software DirectX]
Bentley InRoads Storm & Sanitary XM Edition
File Surface Geometry Drainage Evaluation Drafting Tools Help
<Unnamed>
Extracts a profile along an alignment or a
Profile
Hydrology and Hydraulics
Drainage Structure Analyzer...
Create Profile...
Annotate Profile...
Annotate Feature In Profile...
Annotate Drainage Profile...
Update Profile...
Update Drainage Profile...
Check Pipe Cover...
Rename Profile Set...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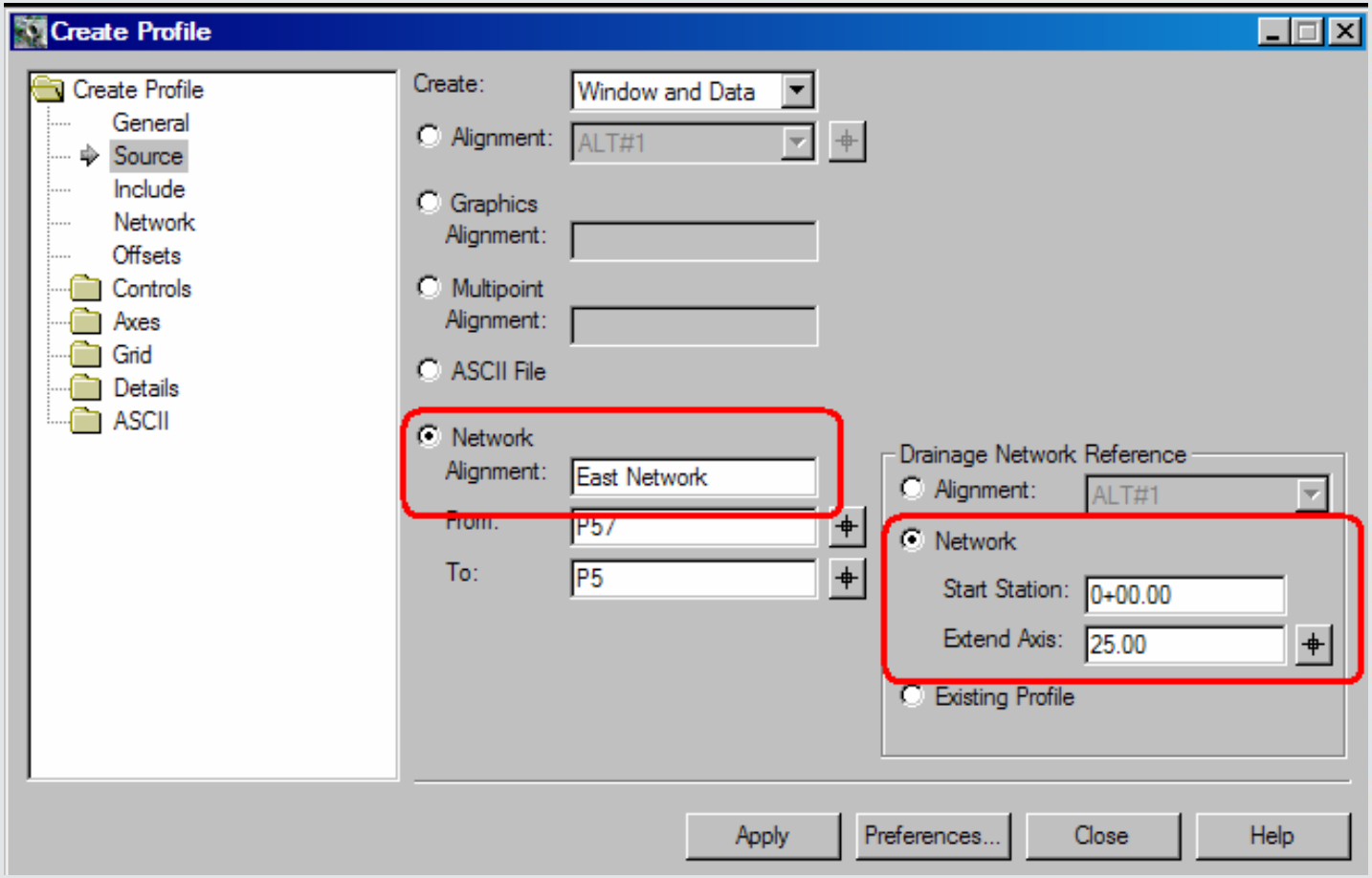
Create Profile Alignment

- Create an alignment of the Network

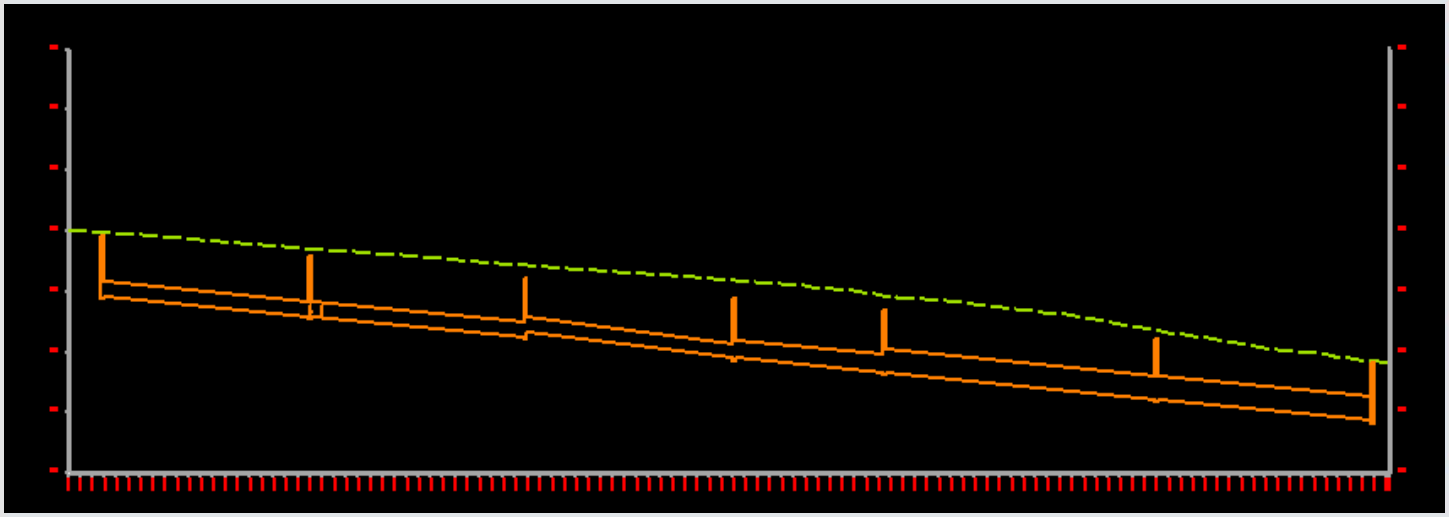


4 Types of Profiles

- Existing Alignment Profile
- Network Profile w/ Alignment Reference
- Network Profile w/ Network Reference
- Network Profile w/ Network Reference (Which Created a new Alignment)

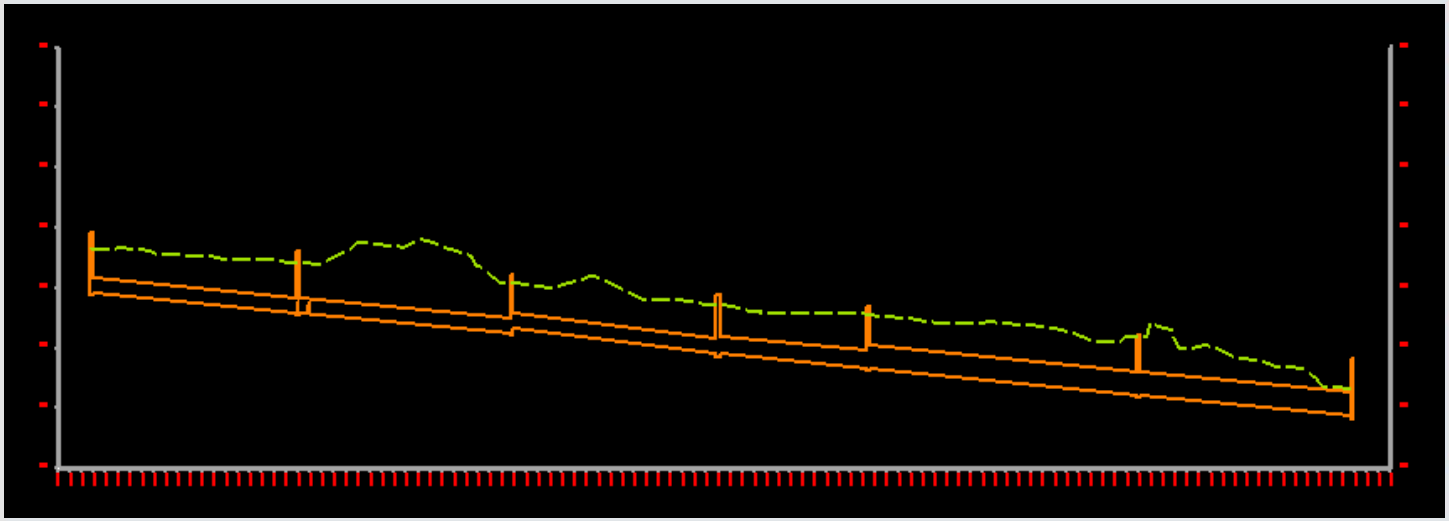
Existing Alignment Profile

- Surfaces DO NOT **Update** with "UPDATE DRAINAGE PROFILE".
- Surfaces **Update** Along the Alignment with "UPDATE PROFILE".



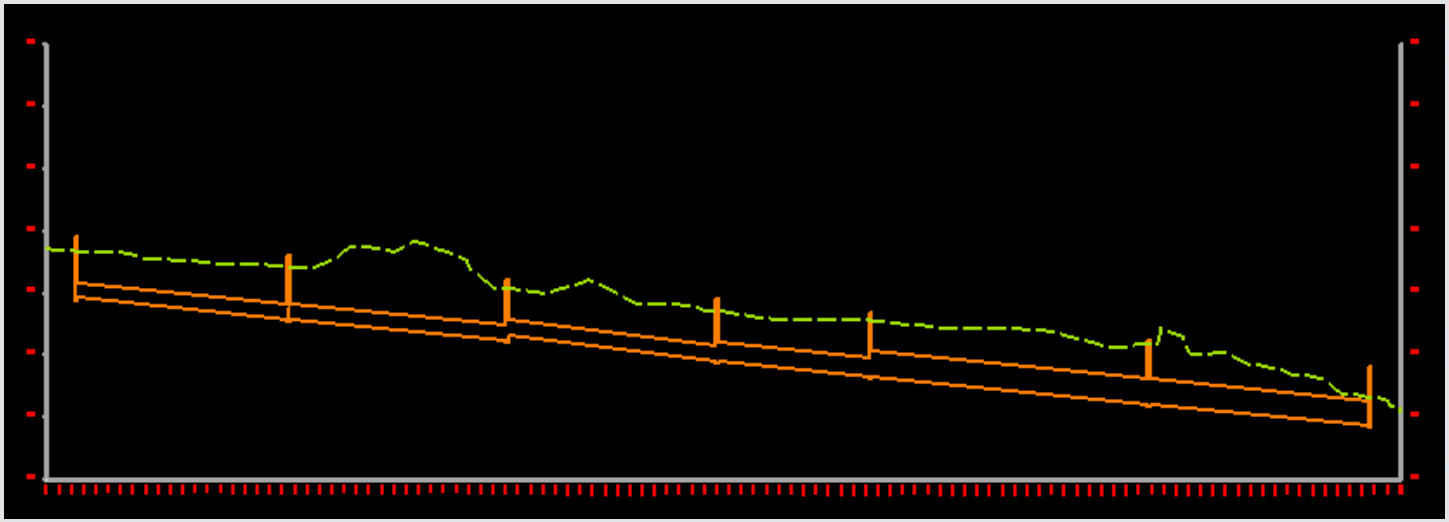
Network Profile – With *ALIGNMENT* Reference

- Surfaces **Update** Along Network with "UPDATE DRAINAGE PROFILE".
- Surfaces **Update** Along Alignment With "UPDATE PROFILE".



Network Profile – With *NETWORK* Reference

- Surfaces **Update** Along the Network with "UPDATE DRAINAGE PROFILE".
- Surfaces DO NOT **Update** with "UPDATE PROFILE".

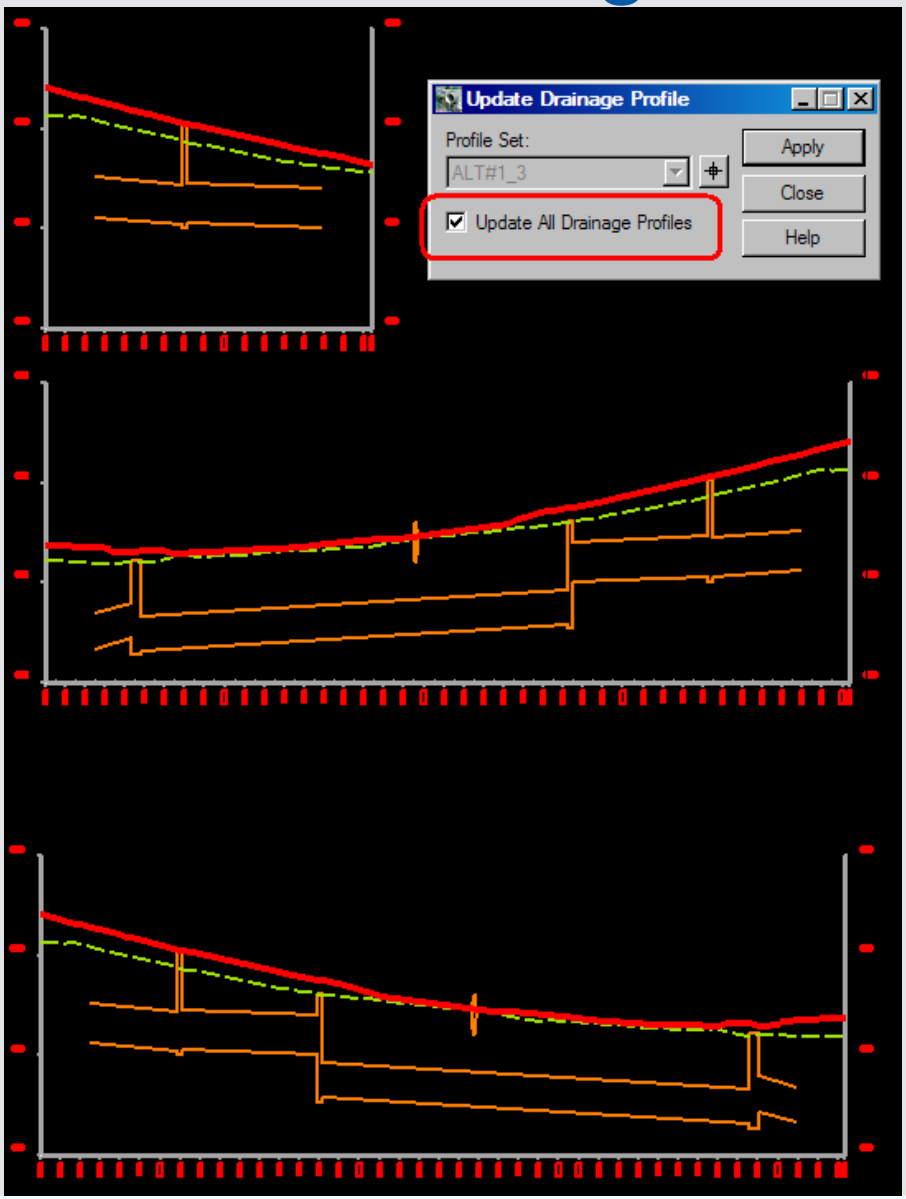


Network Profile – With Network Reference (which created a new alignment)

- Surfaces DO NOT **Update** with "UPDATE DRAINAGE PROFILE".
- Surfaces **Update** Along Alignment With "UPDATE PROFILE".

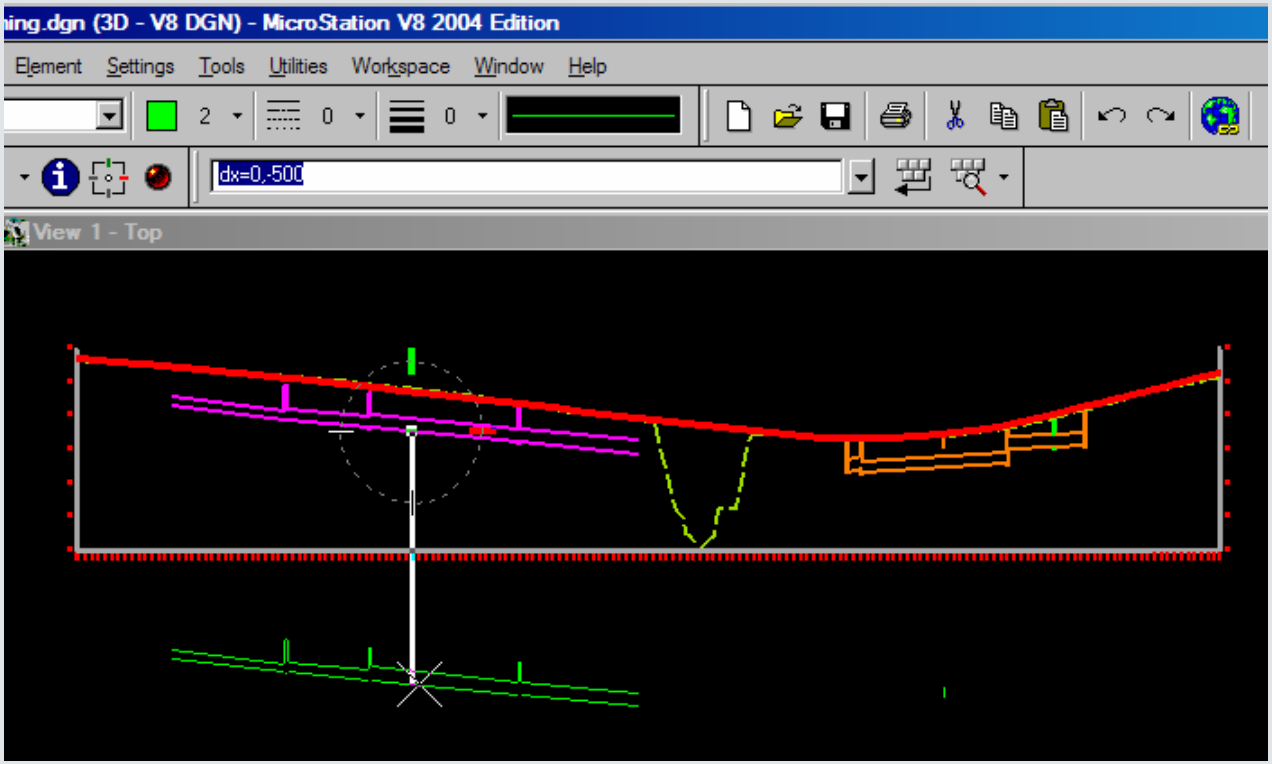
  Which is Identical to the Network Path.
- Remember to Save the Newly Created Alignment!!!

Update All Drainage Profiles



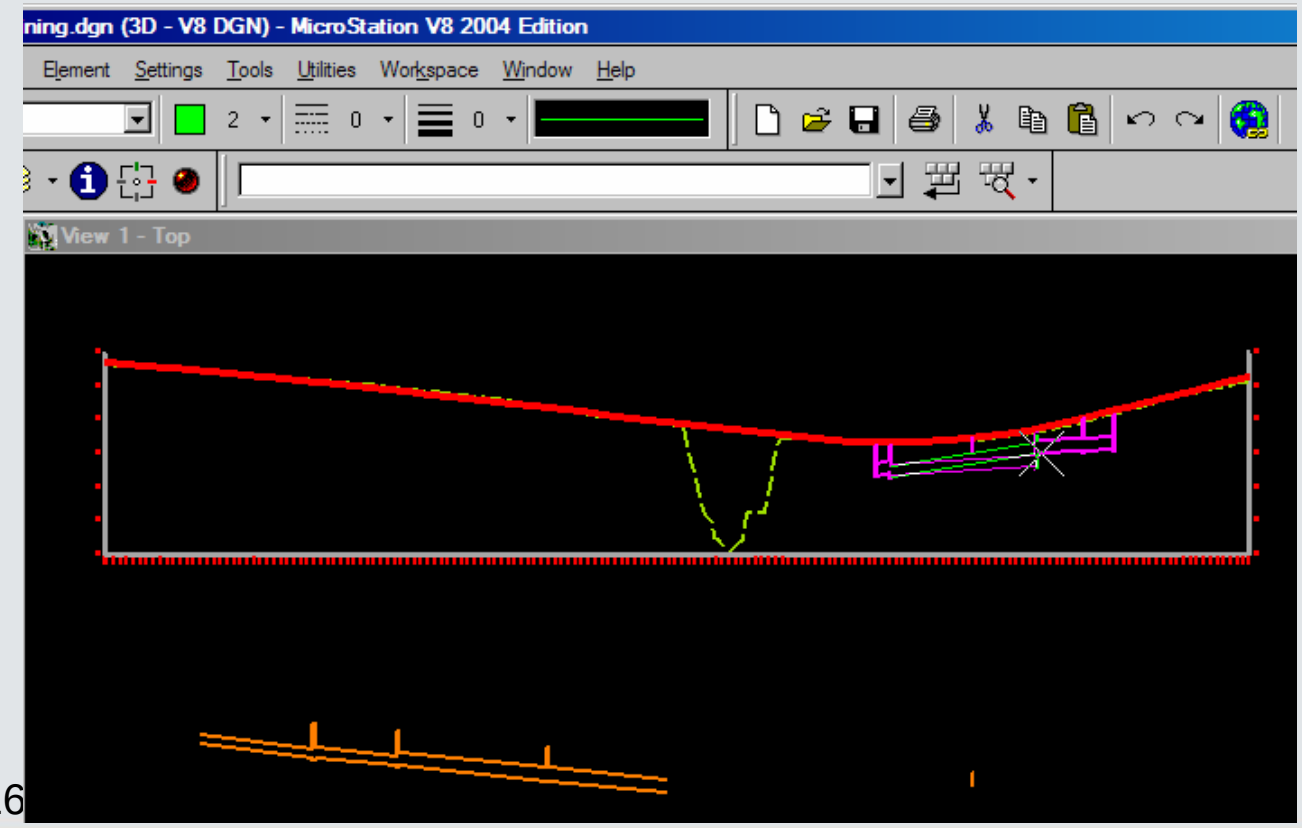
Update or Modify Multiple Networks in an Alignment Profile

- Turn on Graphic Group.
- Use Mstation to Move ALL but one Network out of the Profile Window. (dx = 0,-500)



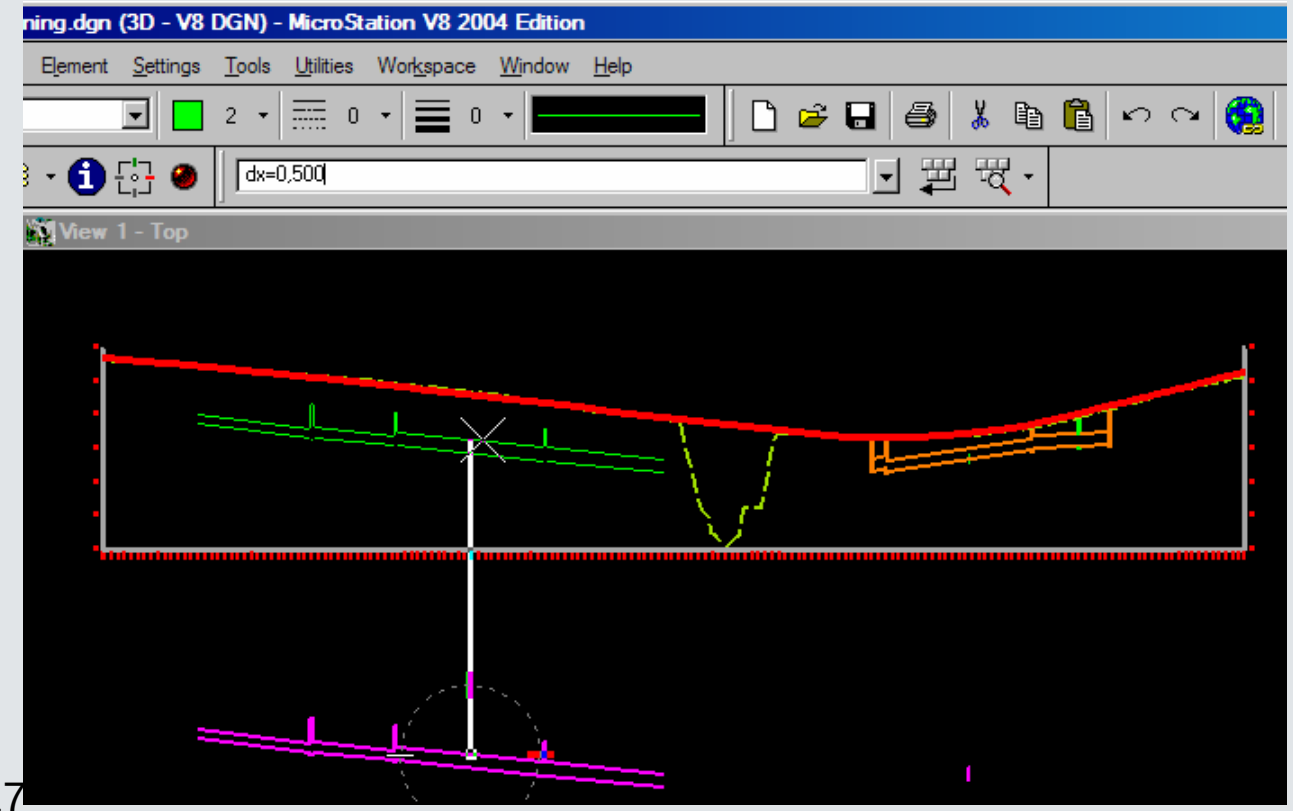
Update or Modify Multiple Networks in an Alignment Profile

- Use Move in Profile or Edit/Review to make your modifications.
- Then use Update Drainage Profile if required.

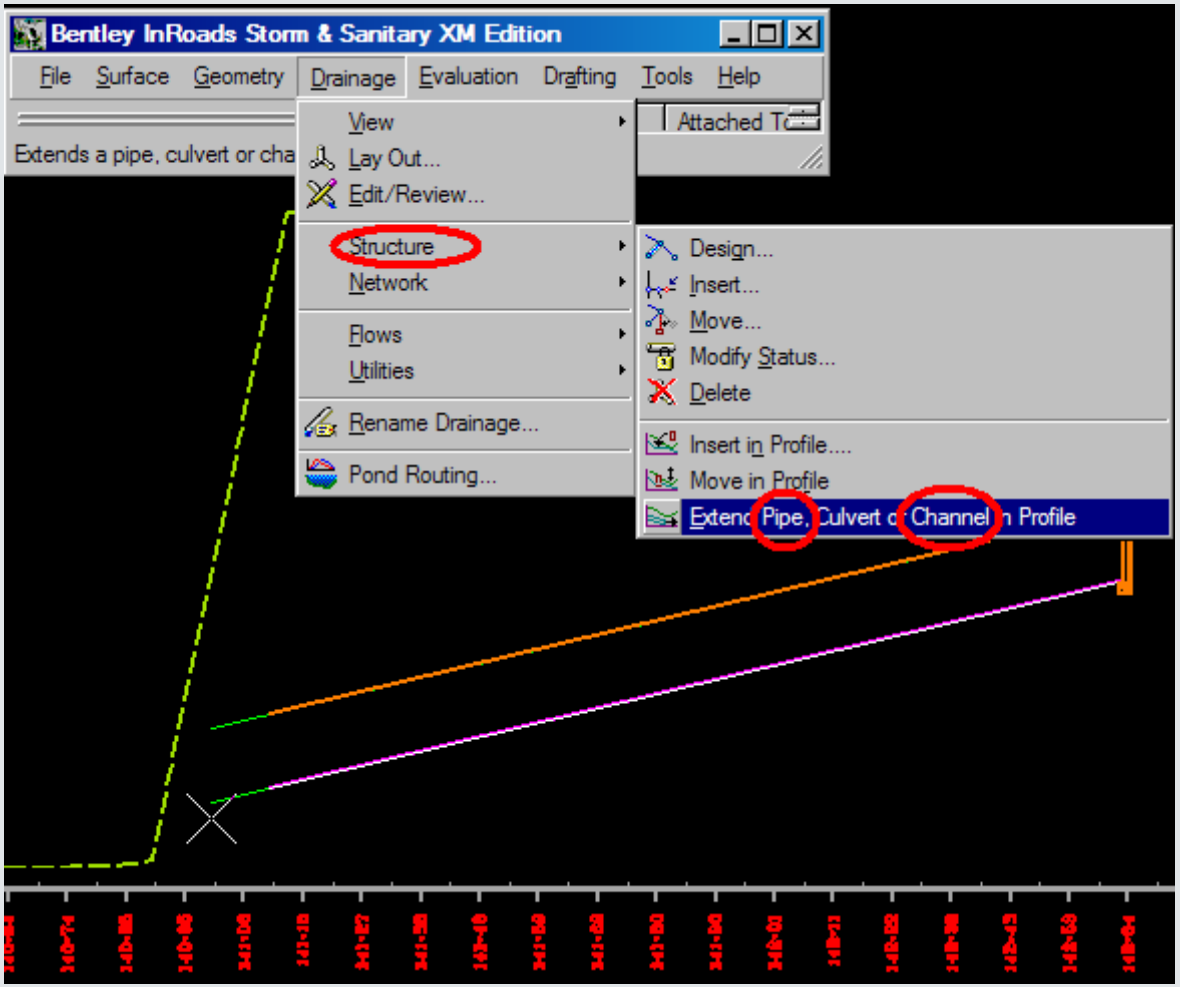


Update or Modify Multiple Networks in an Alignment Profile

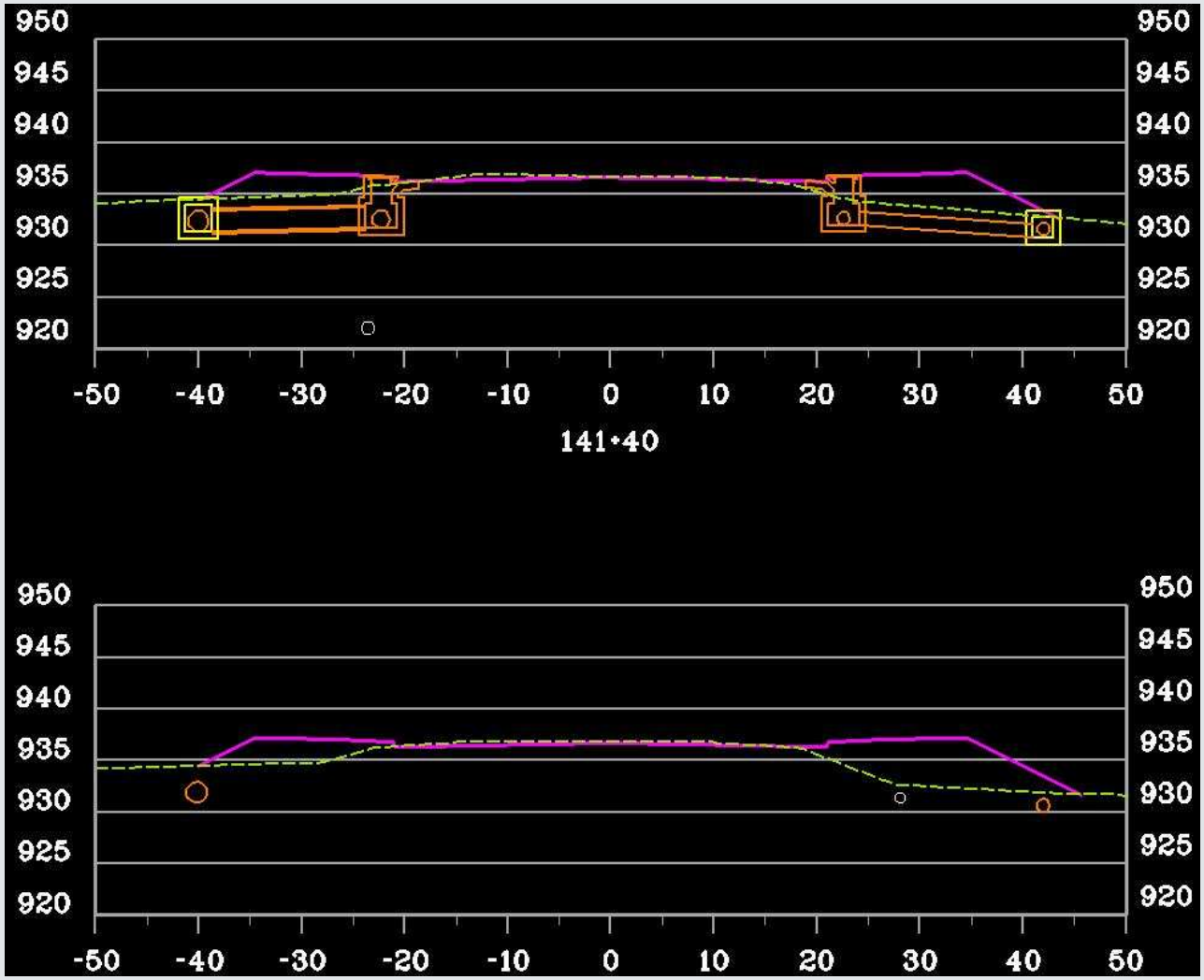
- Make sure to turn on Graphic Group.
- Use Mstation to Move the other Networks back into the Profile Window. (dx=0,500)



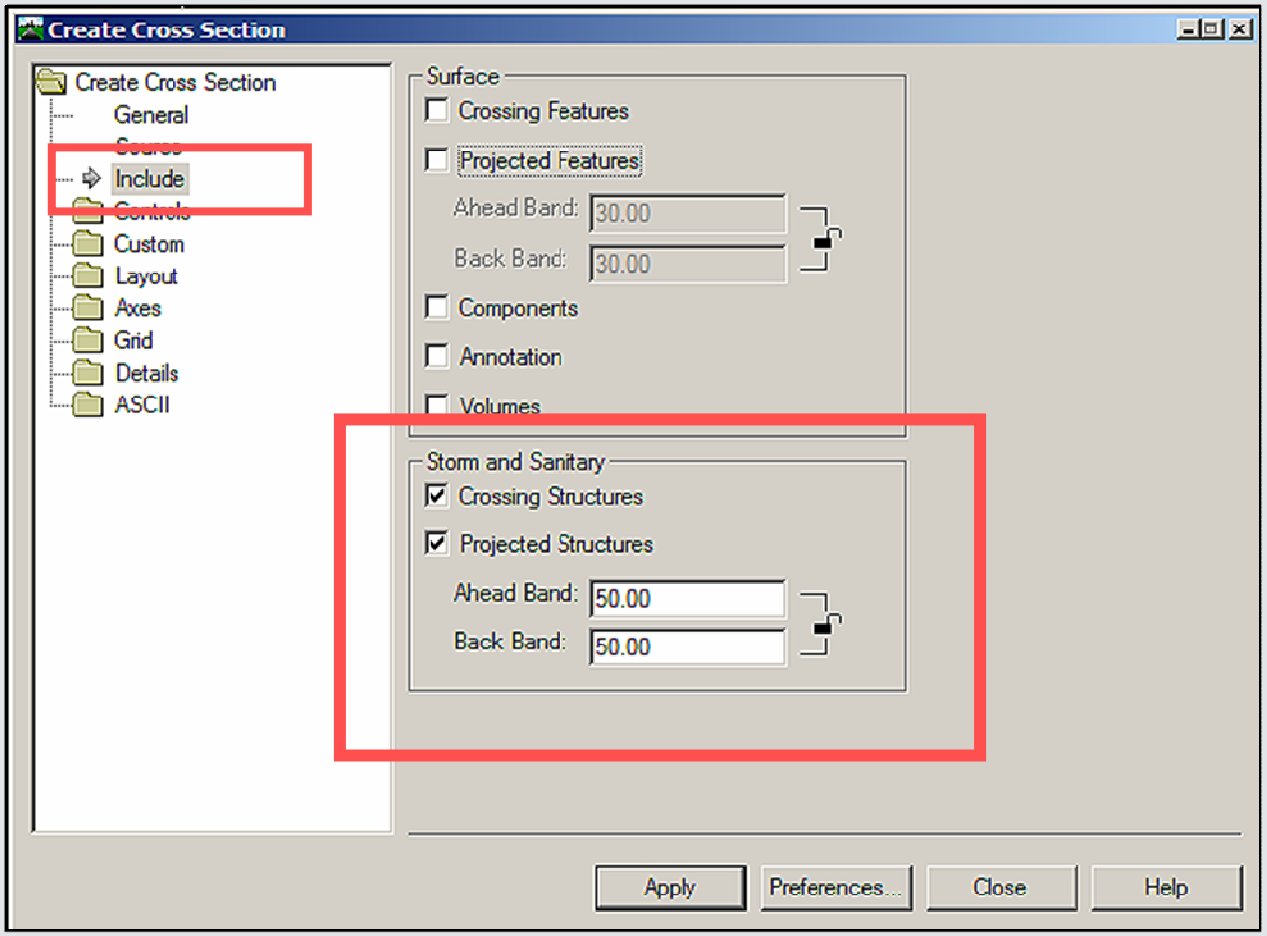
Extend Free Entrance or Free Exit Pipes and Channels(V8.9)



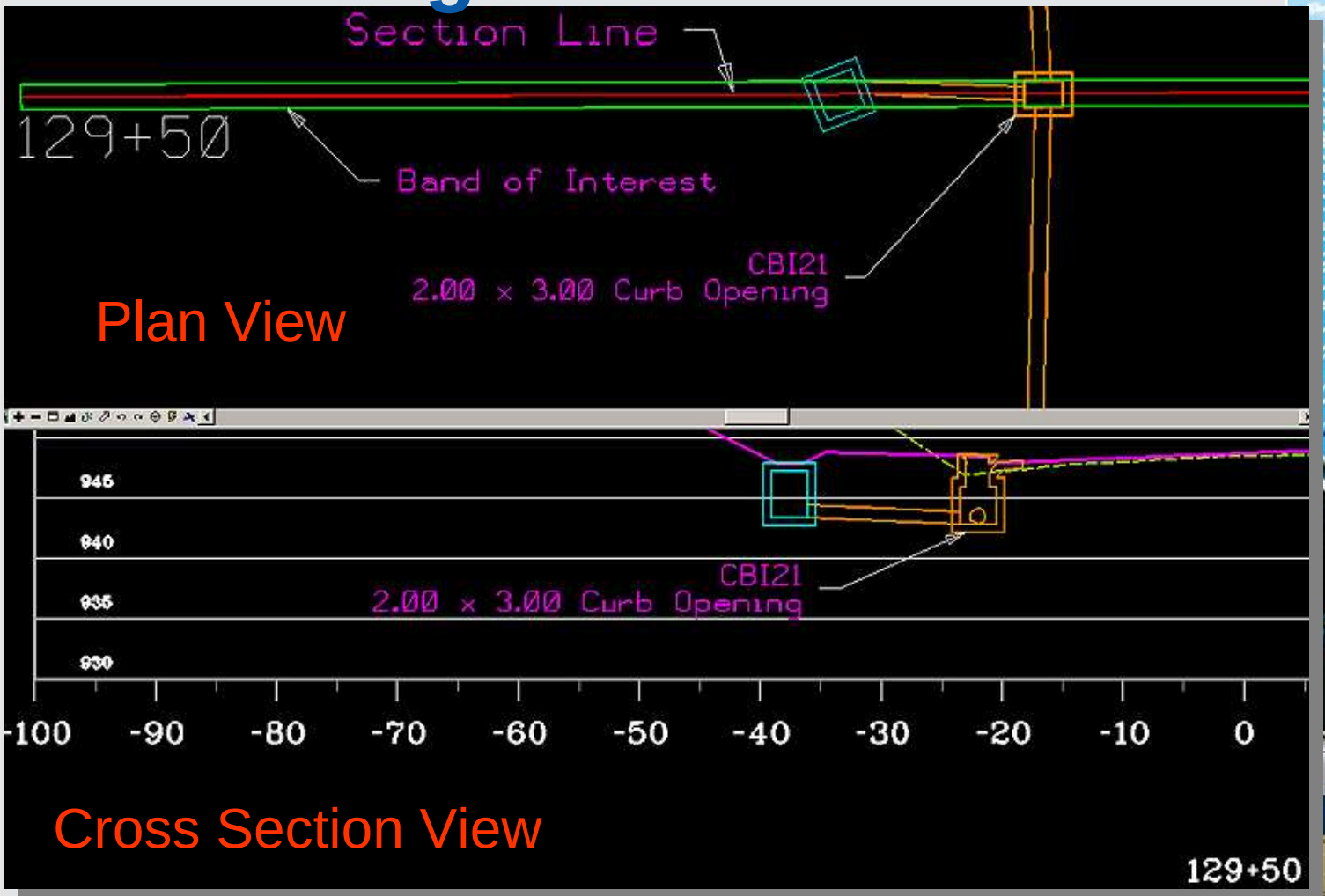
Cross Section



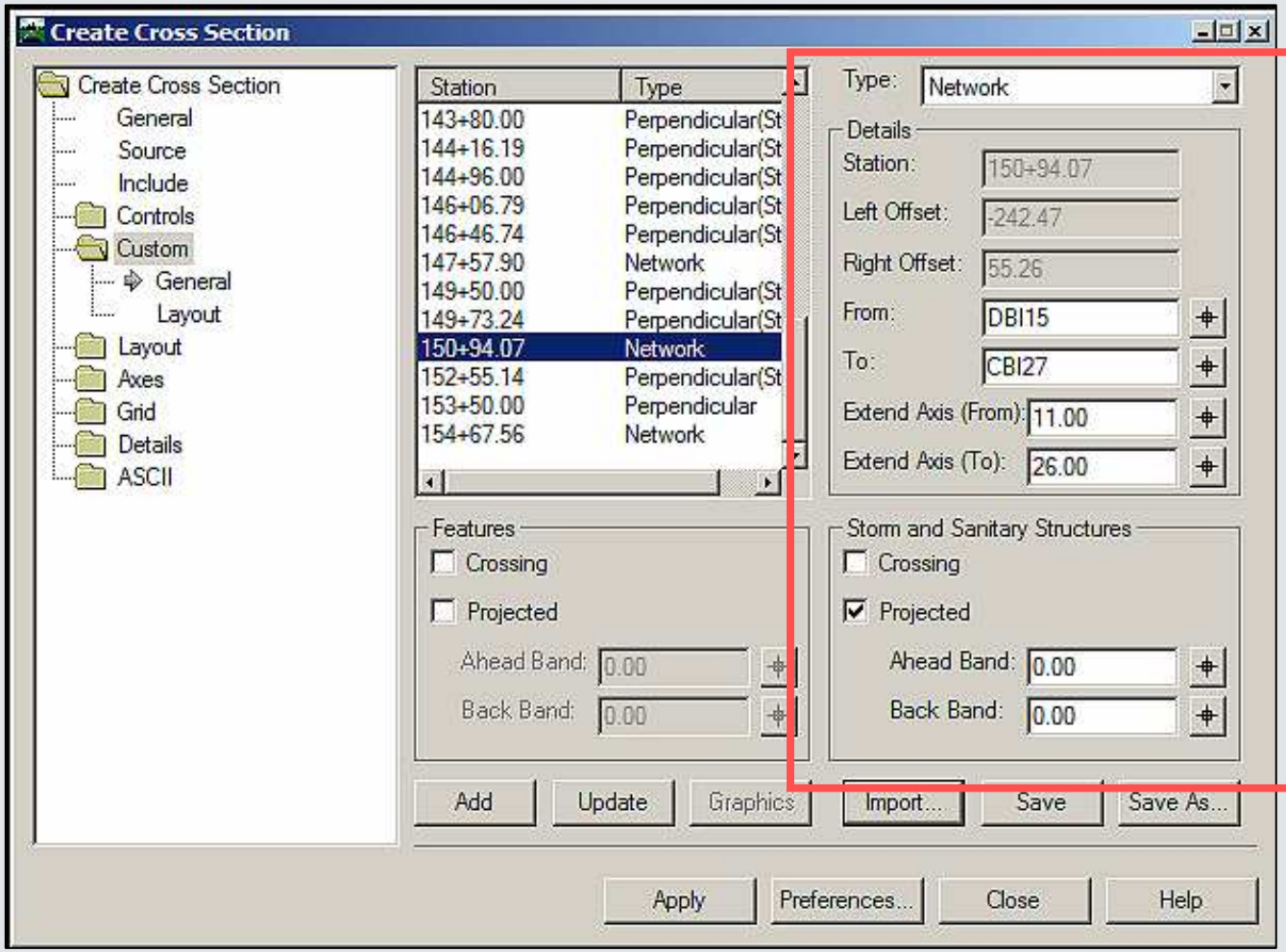
Drainage in Cross Section



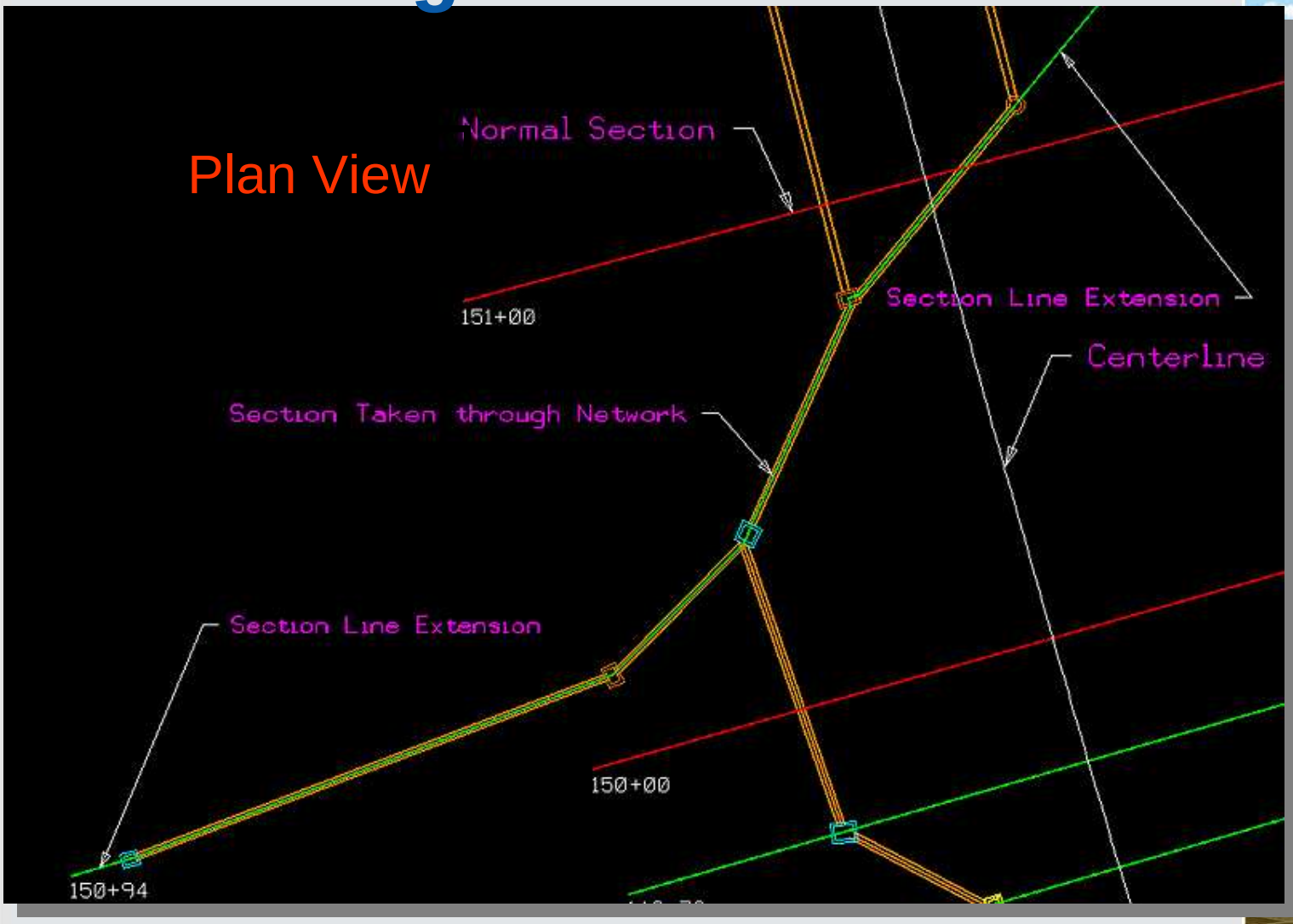
Drainage in Cross Section



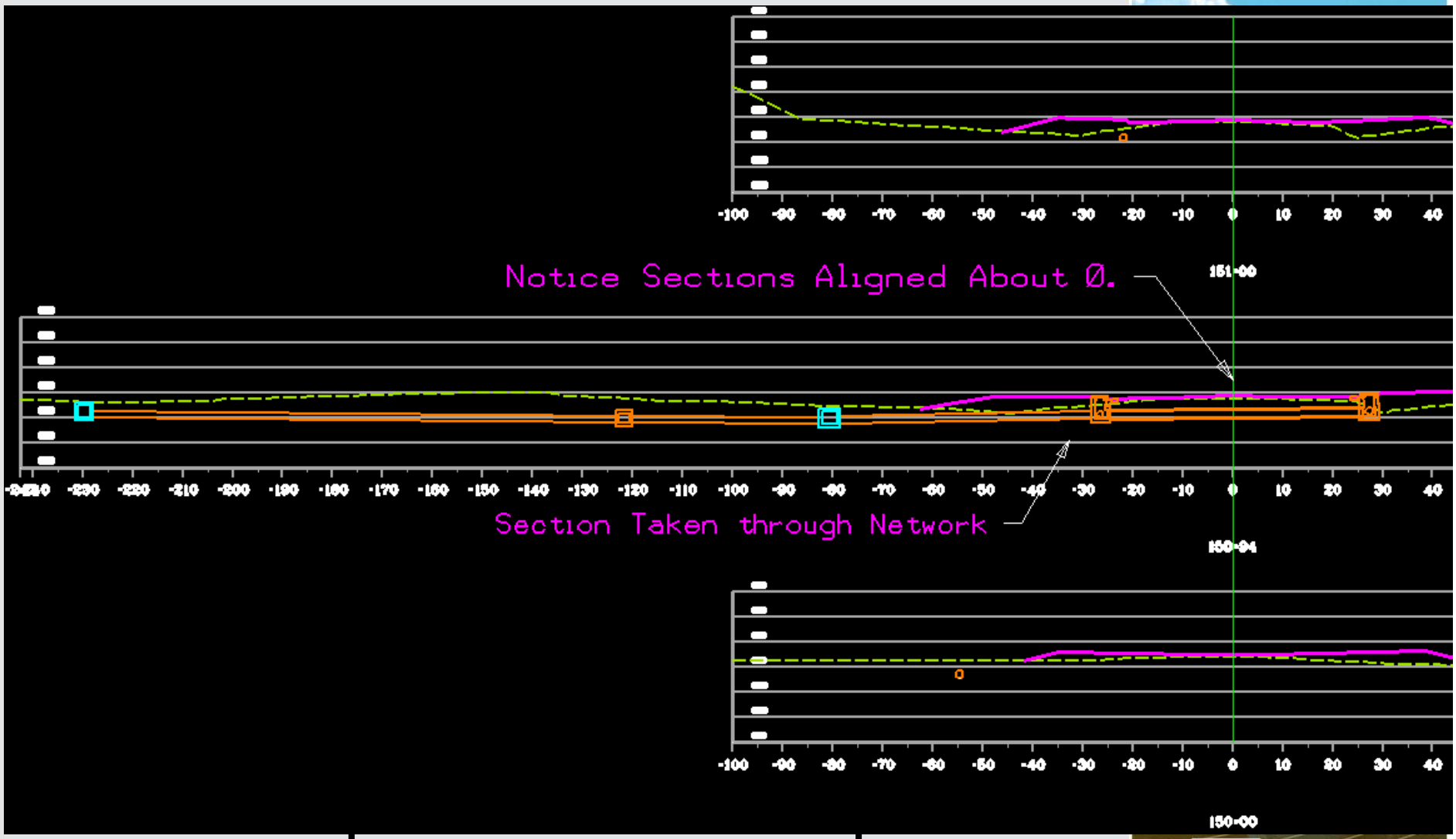
Drainage in Cross Section



Drainage in Cross Section



Drainage in Cross Section



Cross Section Views

Drainage in Cross Section

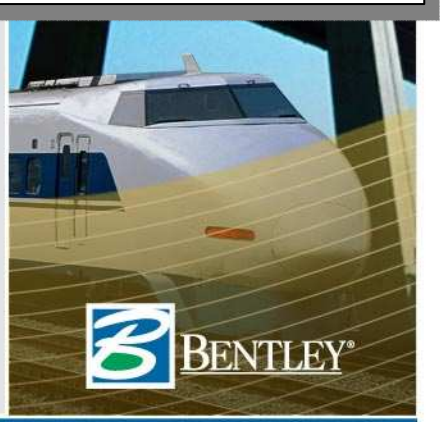
- Custom Cross Sections store the Structure IDs

- Custom file doesn't need to be re-created if structures are moved.

v87_training.xsc - Notepad

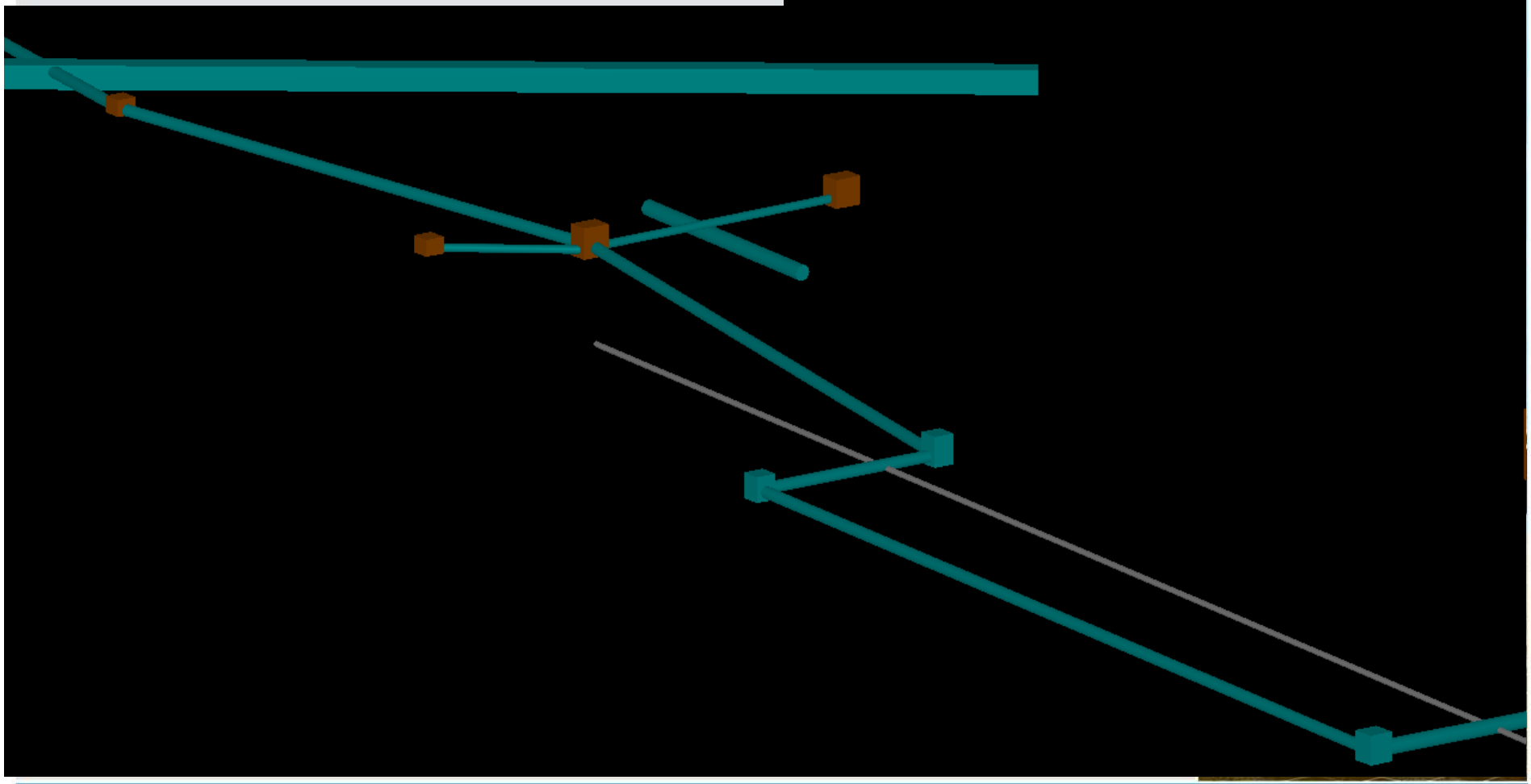
File Edit Format View Help

```
;
;Custom Cross Sections
;
;Structure ID                    Left Offset    Right Offset    Ahead Band     Back Banc
"MH1"                             | -100.0000000 | 100.0000000  | 0.0000000    | 0.00000
;Network XY Coordinates for reference only.  Actual structure names are used to create
;X                Y
;2052571.9834710 | 2027259.4098561
;2052763.7423814 | 2027316.2299257

;Cross Section Line Type  Station At Alignment
;Network                  147+57.8977005
;From                          To                              Ahead Band     Back B
"DBI TYPE 14"                  | "CBI16"                        | 0.0000000    | 0.
;Network XY Coordinates for reference only.  Actual structure names are used to create
;X                Y
;2052581.3735056 | 2027391.2544128
;2052592.4529120 | 2027394.5373510
;2052593.8911038 | 2027394.9635015
;2052612.9705852 | 2027387.6277395
;2052615.0479743 | 2027388.2432873
;2052617.1253633 | 2027388.8588352
;2052656.5431411 | 2027400.2537697
;2052657.9813330 | 2027400.6799202
;2052684.0285850 | 2027408.3979796

;Cross Section Line Type  Station At Alignment
;Perpendicular(Structure)  149+49.9999999
;Structure ID                    Left Offset    Right Offset    Ahead Band     Back Banc
"JBX11"                           | -100.0000000 | 100.0000000  | 0.0000000    | 0.00000
;Network XY Coordinates for reference only.  Actual structure names are used to create
;X                Y
;2052485.8042417 | 2027550.2599441
;2052677.6138516 | 2027606.9086296
```



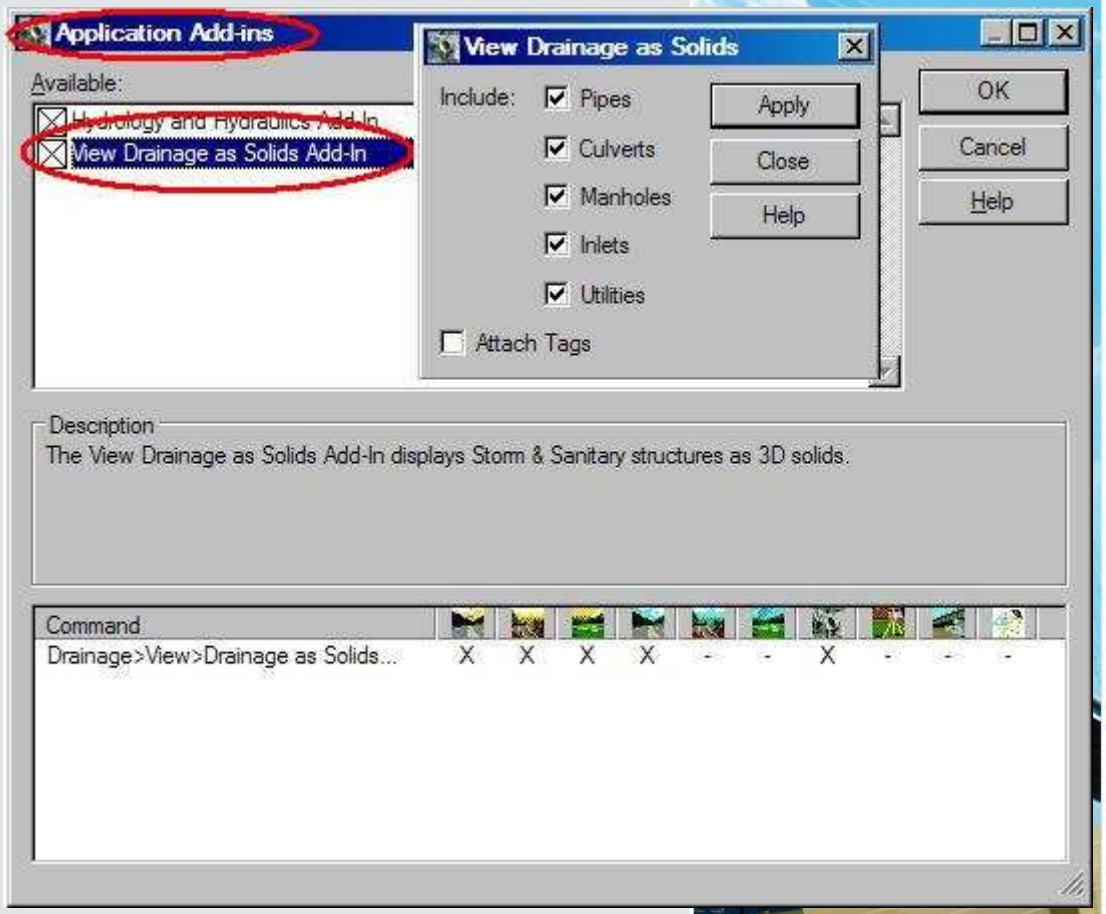
3D

- New in V 8.9 SP1

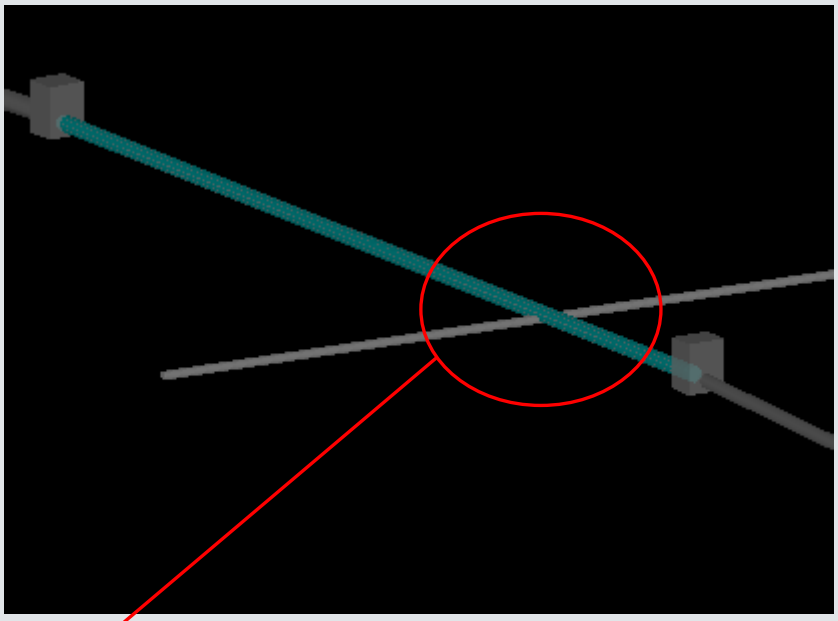


View Drainage as Solids

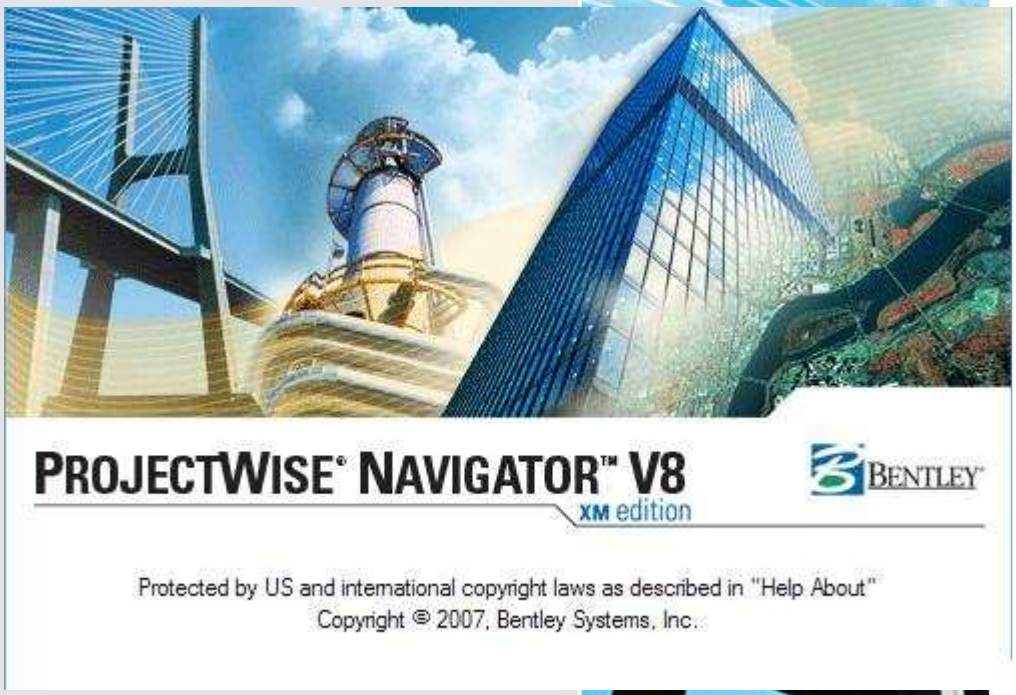
- Displays Outside Walls.
- Uses Outside Style when Style Lock is on.
- Displays Smart Solids.



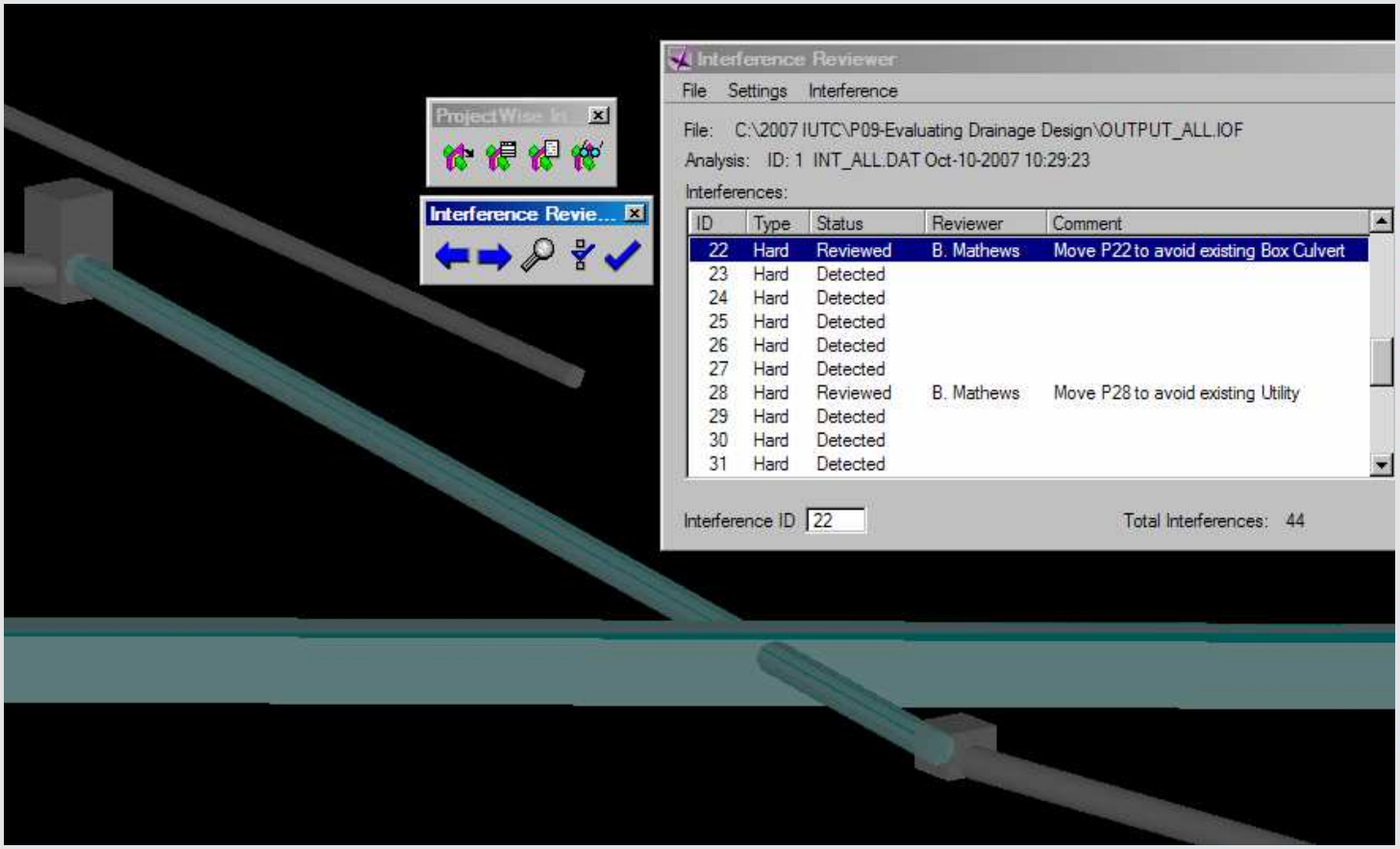
ProjectWise Navigator – Interference Manager Engine



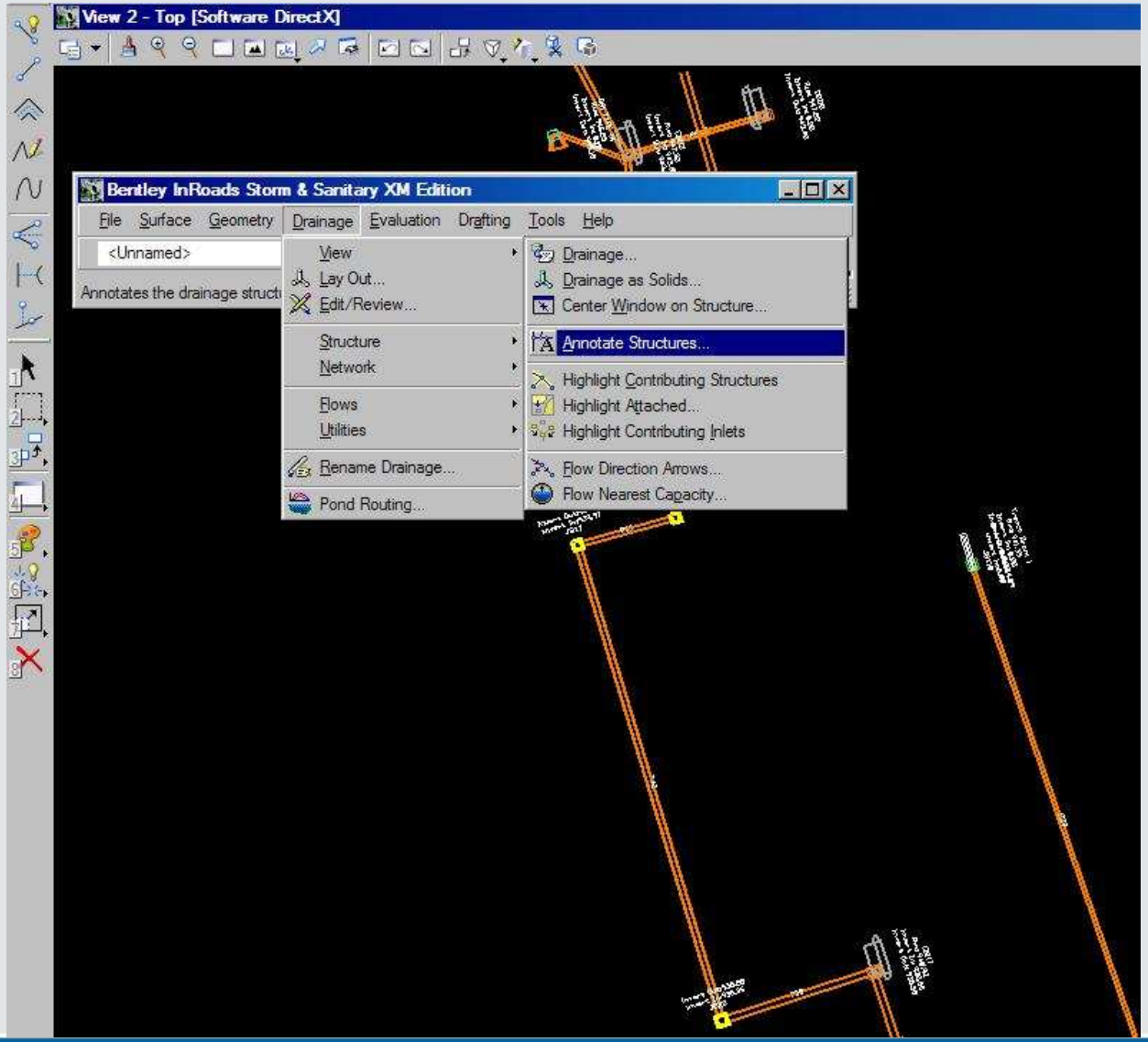
Detects Conflicts!



ProjectWise Navigator – Interference Reviewer

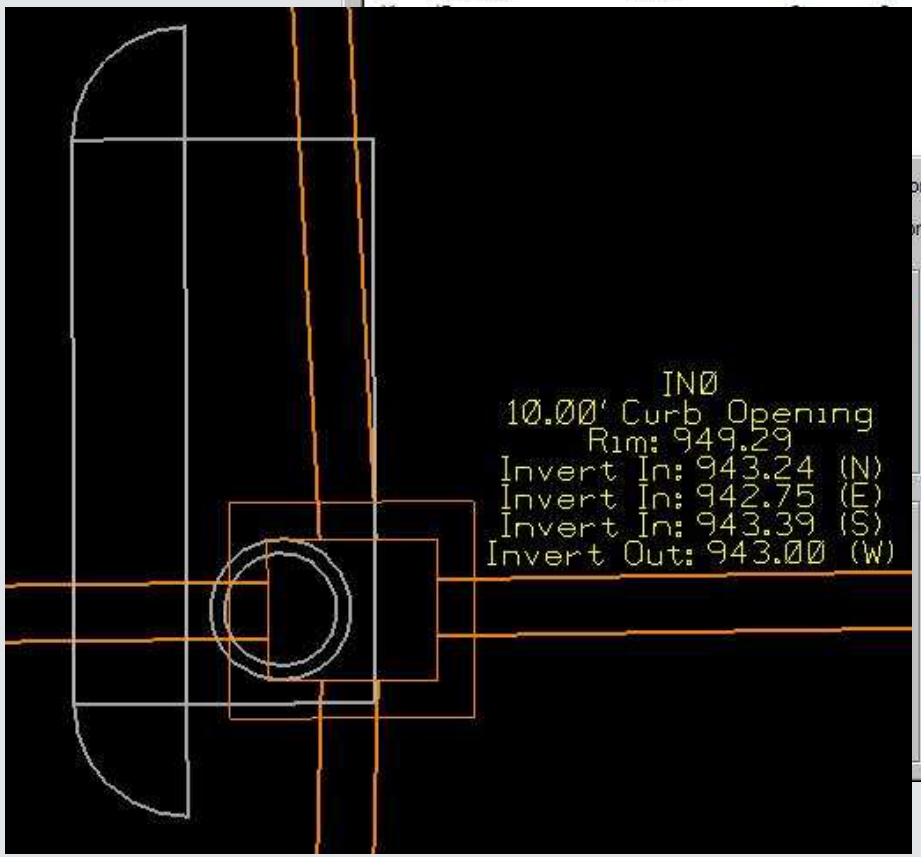


Plan Annotation

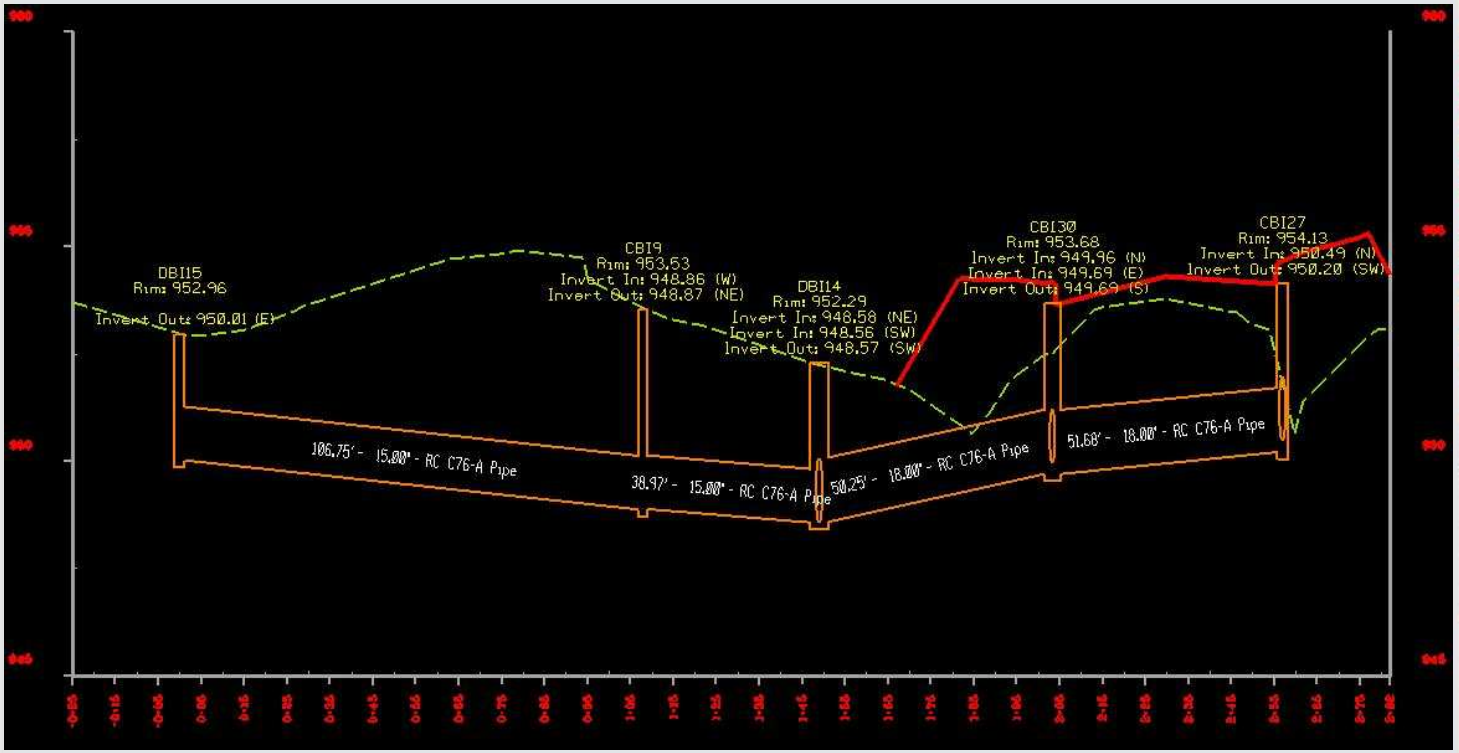


Annotate Structures

- Annotate ALL inverts at a structure.

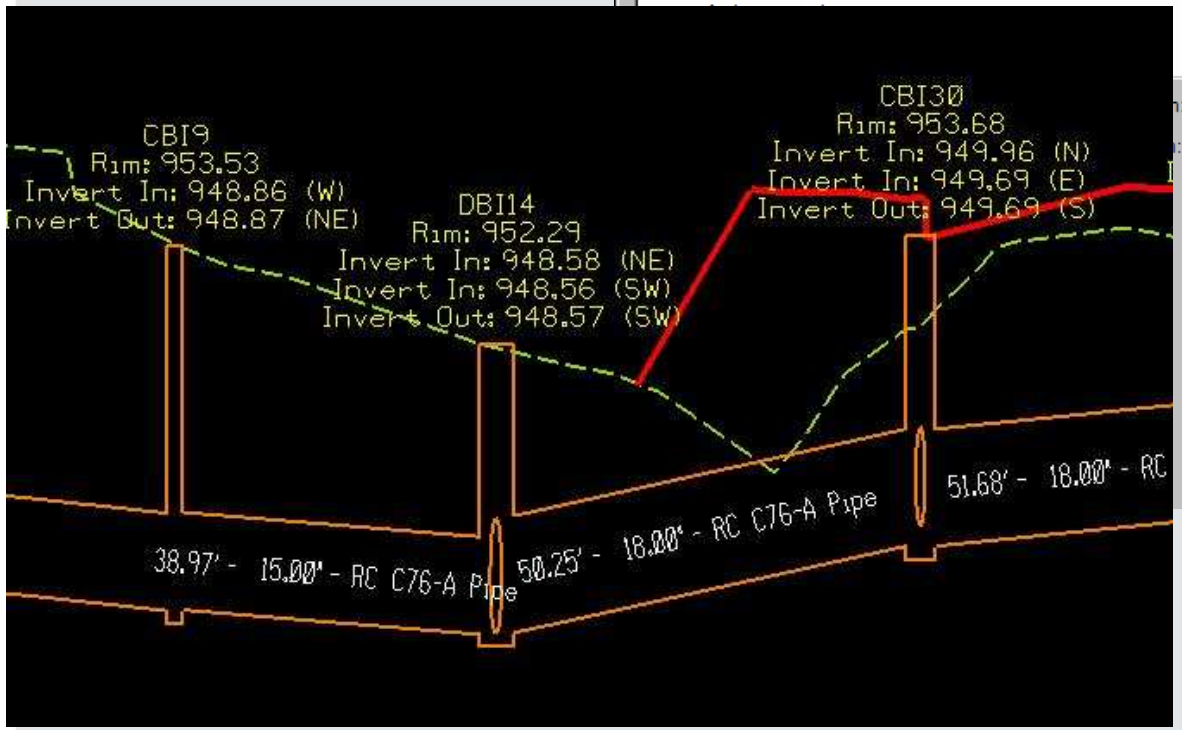


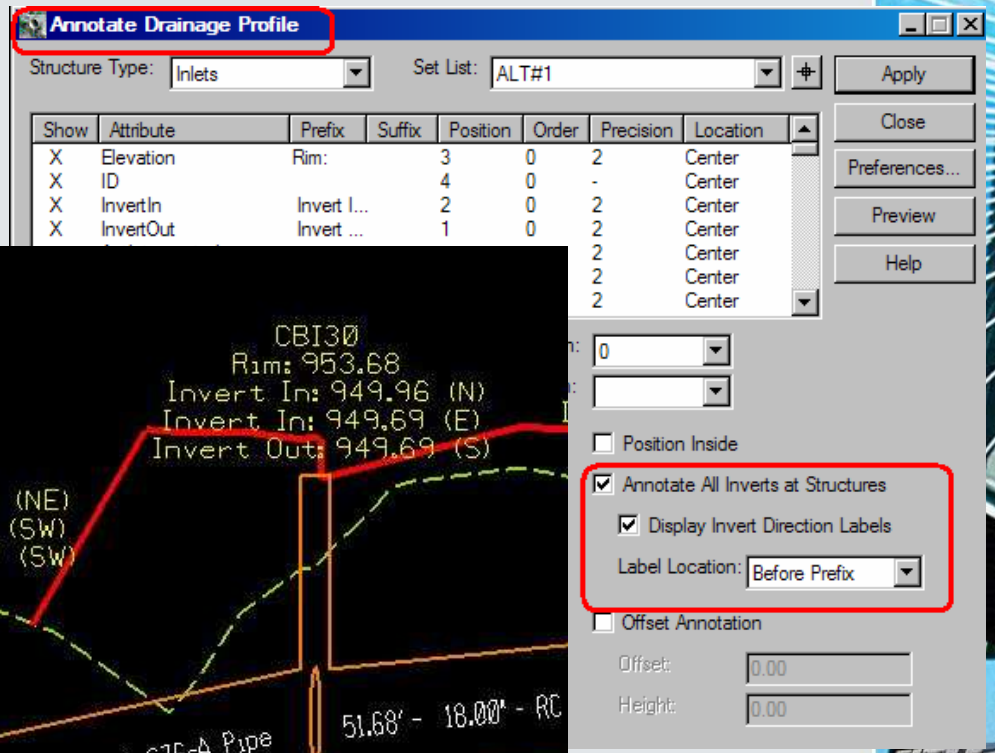
Profile Annotation

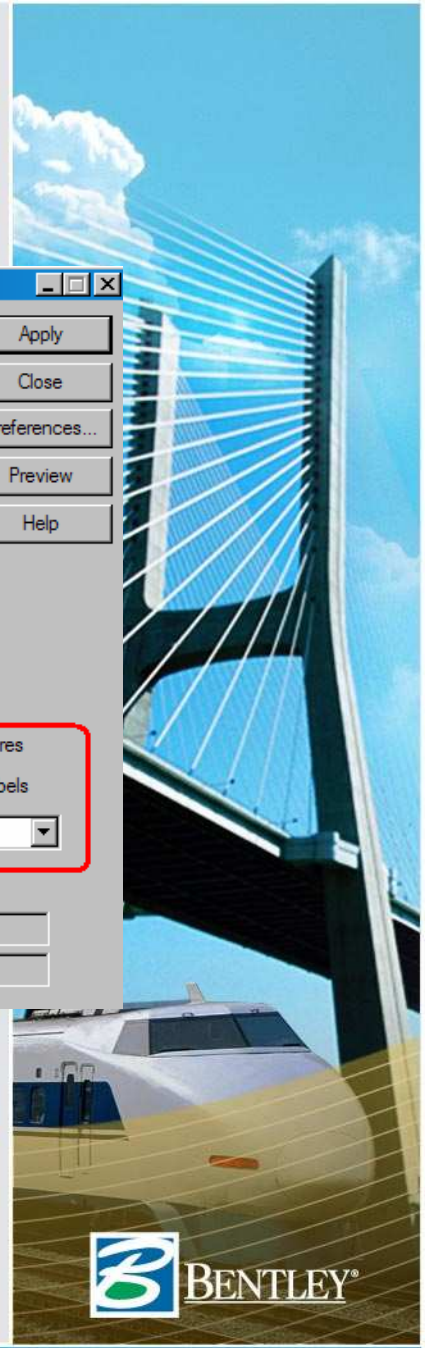


Annotate Structures

- Annotate ALL inverts at a structure.

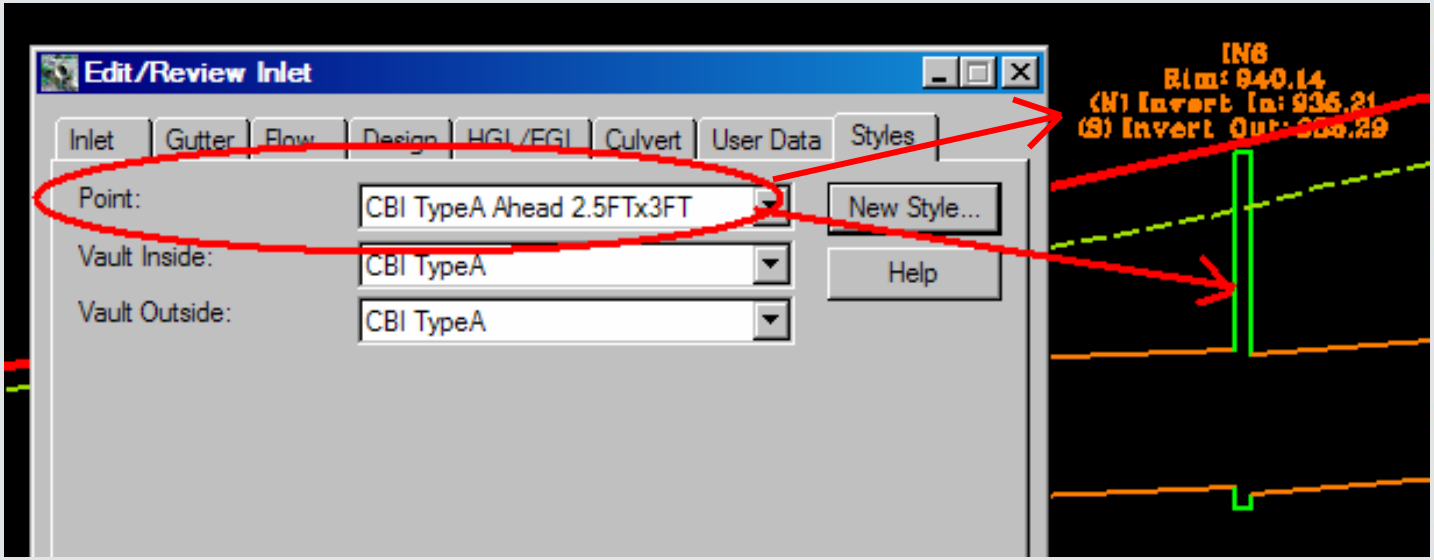




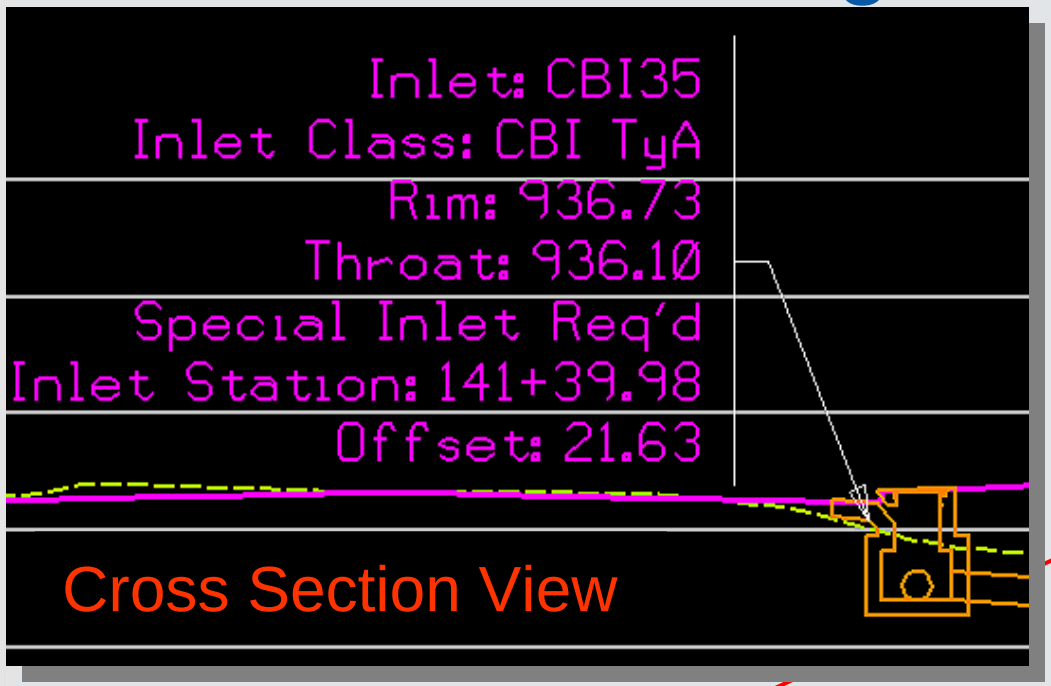


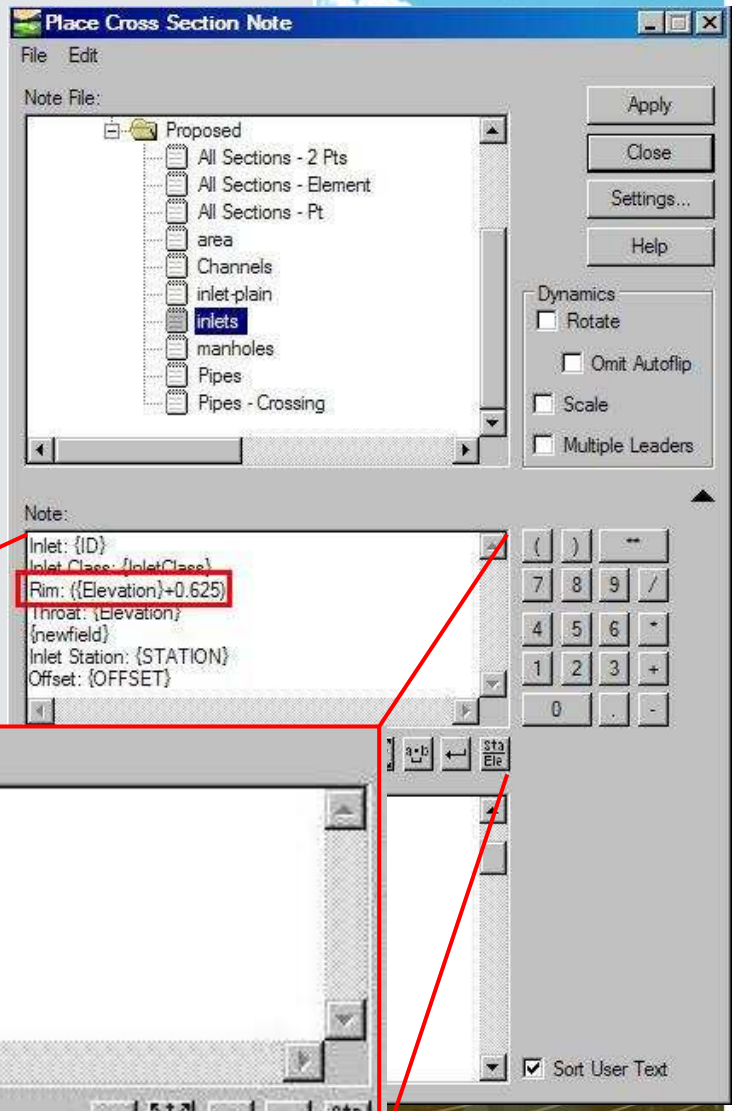
Inlet Symbology in Profiles

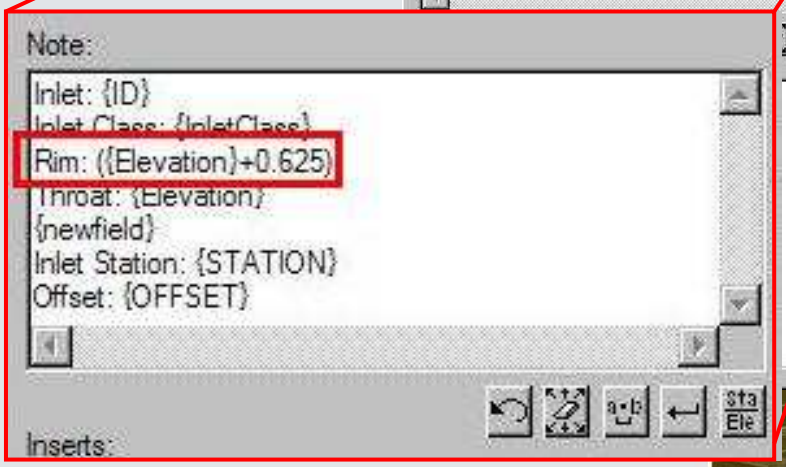
- Inlet Vault AND Text comes from the Point Feature Style.
- Wall display depends on connection type



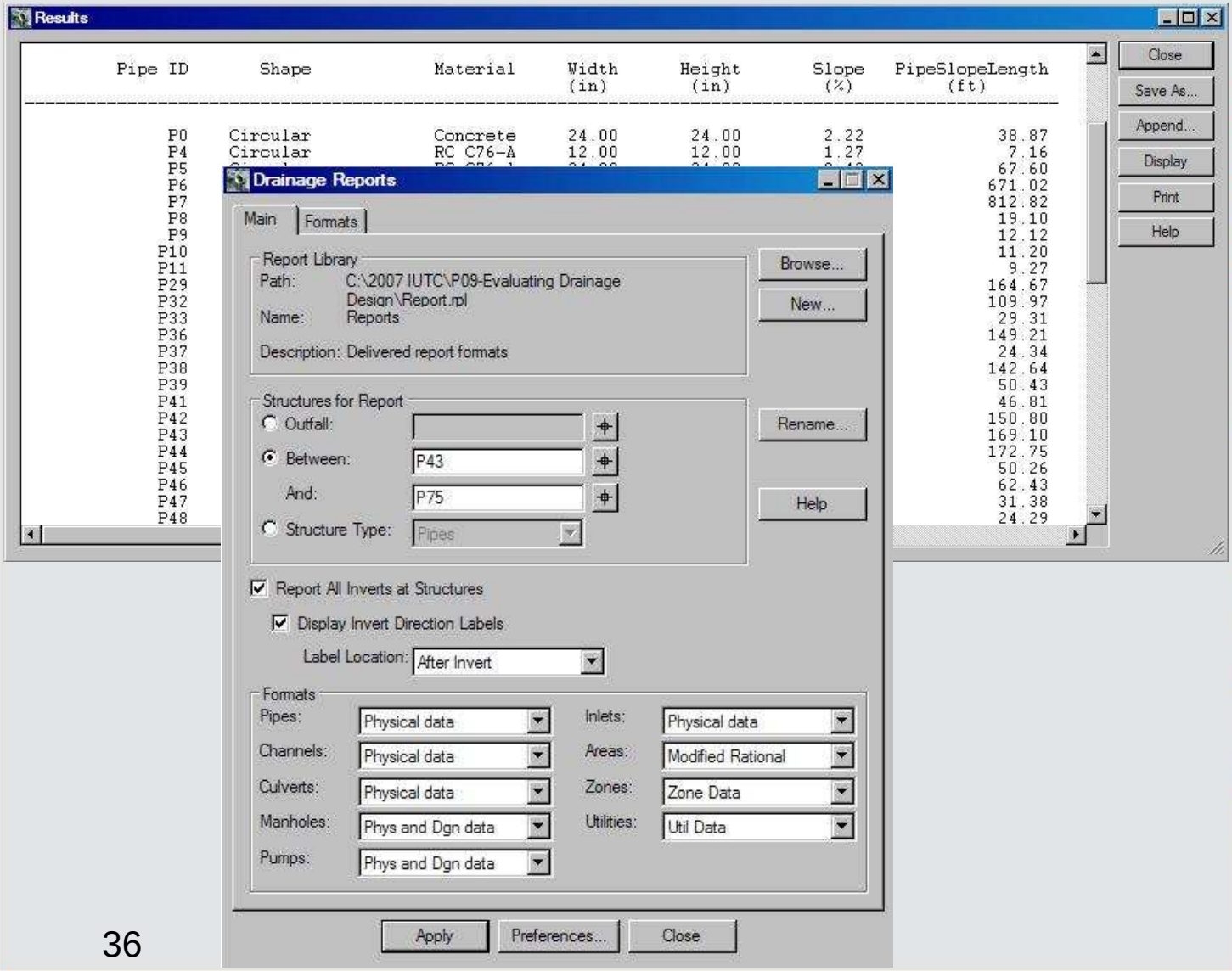
Place Drafting Notes

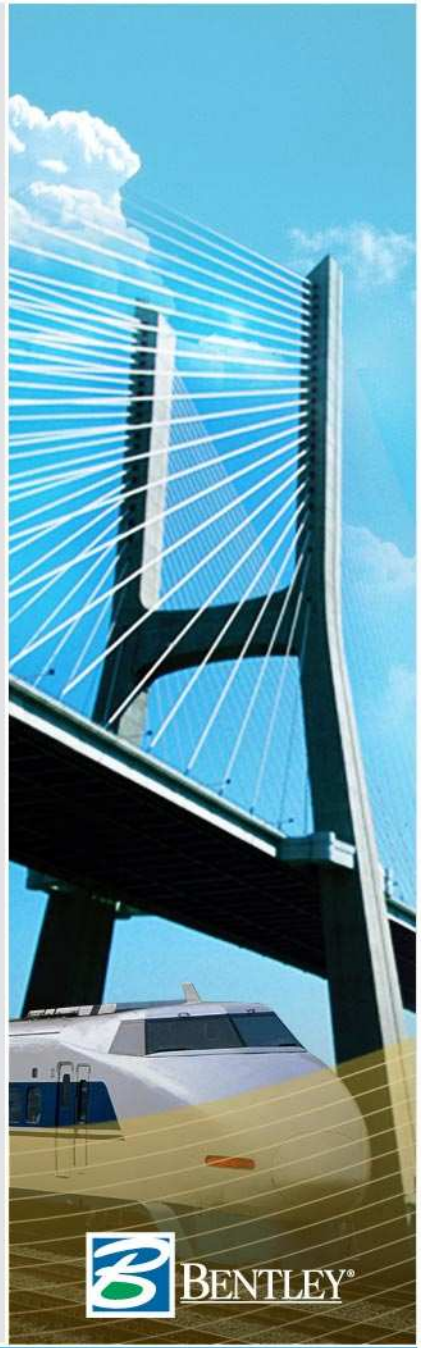






Reports


Results
Pipe ID Shape Material Width (in) Height (in) Slope (%) PipeSlopeLength (ft)
P0 Circular Concrete 24.00 24.00 2.22 38.87
P4 Circular RC C76-A 12.00 12.00 1.27 7.16
P5 67.60
P6 671.02
P7 812.82
P8 19.10
P9 12.12
P10 11.20
P11 9.27
P29 164.67
P32 109.97
P33 29.31
P36 149.21
P37 24.34
P38 142.64
P39 50.43
P41 46.81
P42 150.80
P43 169.10
P44 172.75
P45 50.26
P46 62.43
P47 31.38
P48 24.29
Close
Save As...
Append...
Display
Print
Help
Drainage Reports
Main
Formats
Report Library
Path: C:\2007 IUTC\P09-Evaluating Drainage Design\Report.rpl
Name: Reports
Description: Delivered report formats
Browse...
New...
Structures for Report
Outfall:
Between: P43
And: P75
Structure Type: Pipes
Rename...
Help
Report All Inverts at Structures
Display Invert Direction Labels
Label Location: After Invert
Formats
Pipes: Physical data
Channels: Physical data
Culverts: Physical data
Manholes: Phys and Dgn data
Pumps: Phys and Dgn data
Inlets: Physical data
Areas: Modified Rational
Zones: Zone Data
Utilities: Util Data
Apply
Preferences...
Close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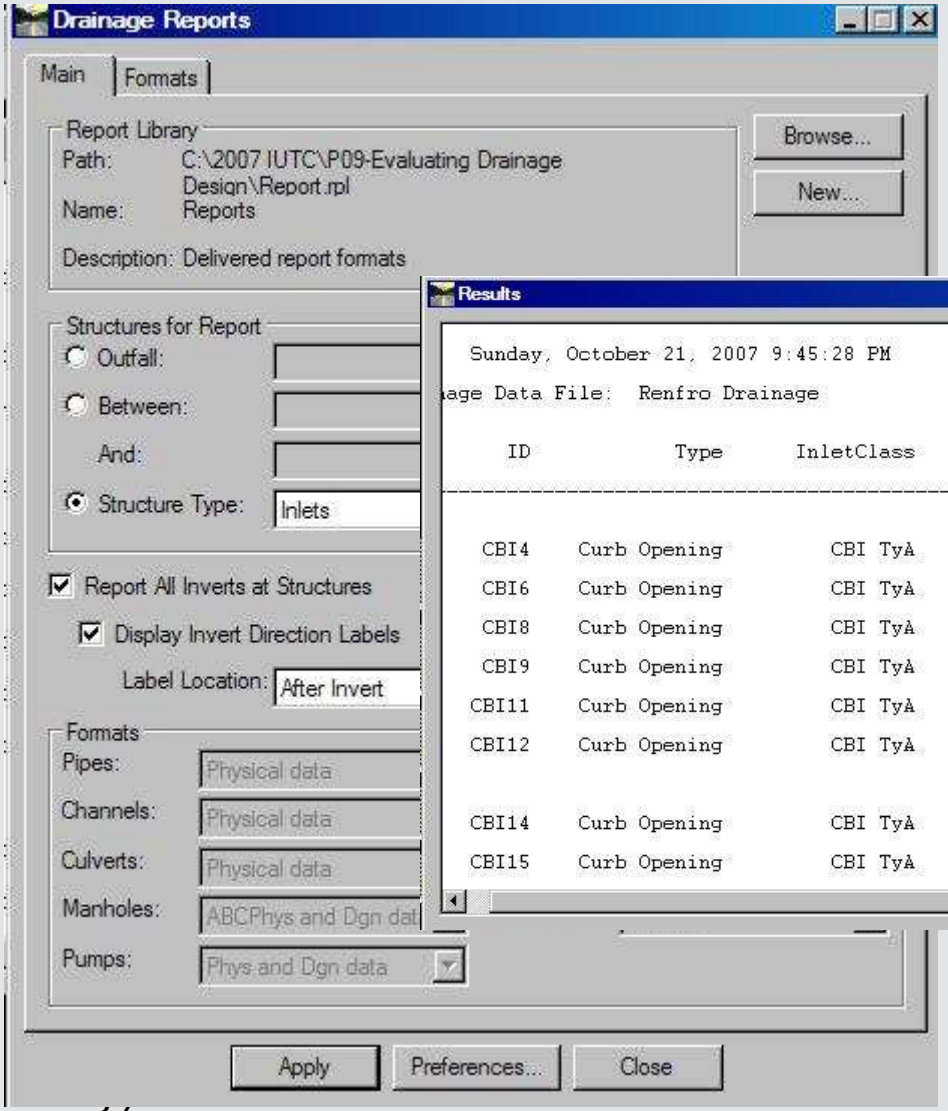
Report on All Pipes



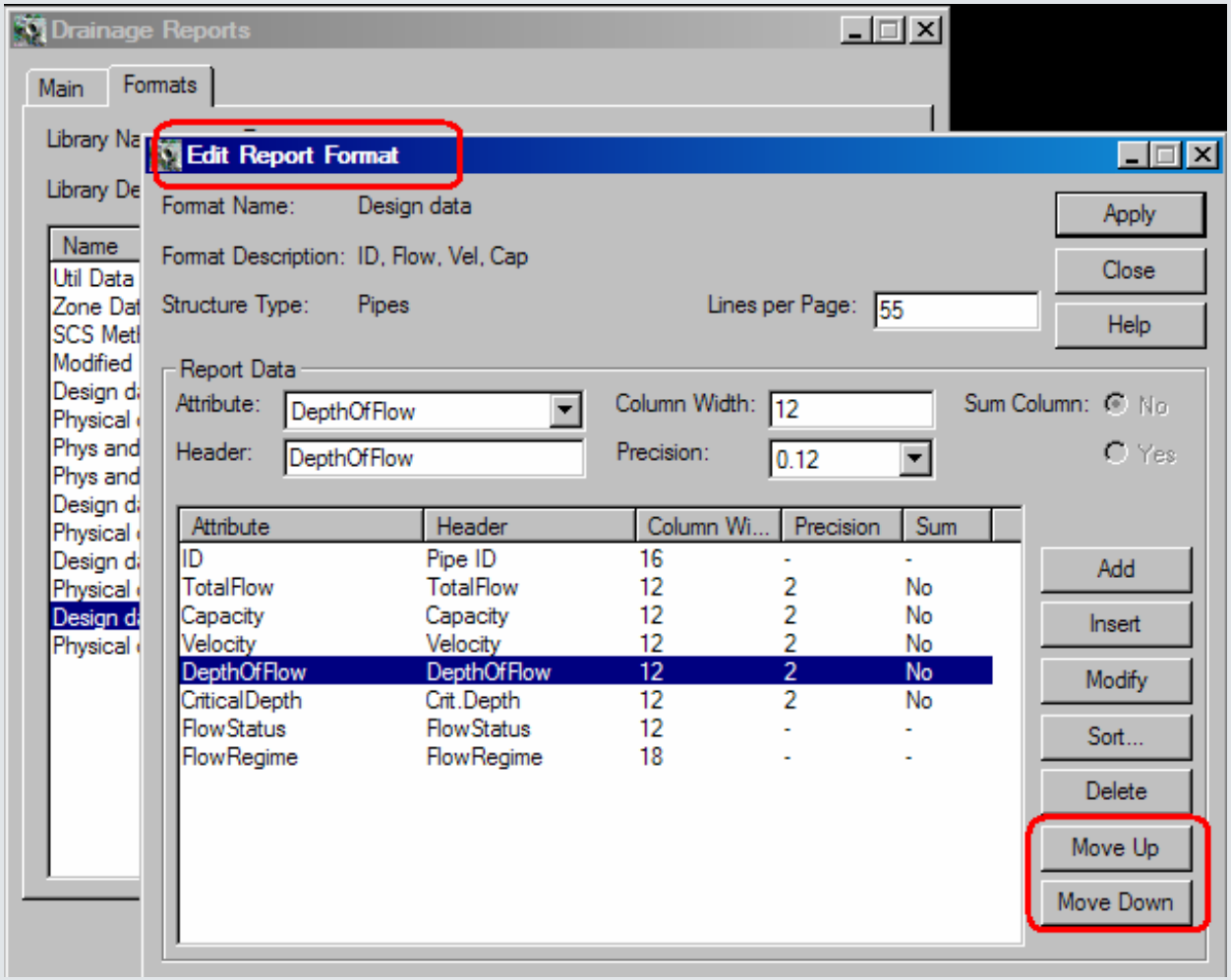
Results

Sunday, October 21, 2007 9:45:28 PM

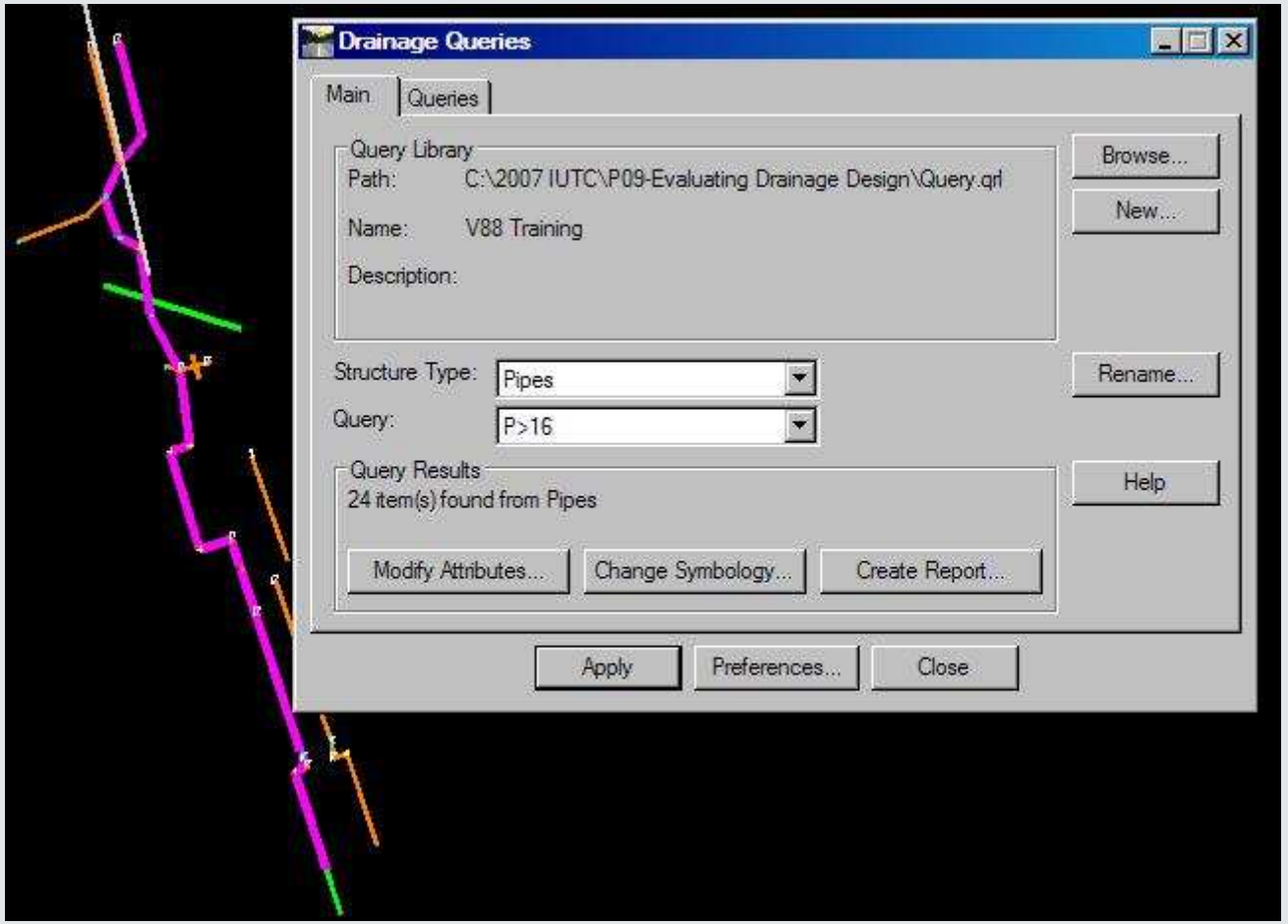
age Data File: Renfro Drainage

ID	Type	InletClass	GrateLen (ft)	VaultShape	VaultLength	VaultWidth	InvertIn (ft)	InvertOut (ft)
CBI4	Curb Opening	CBI TyA	10.00	Box	2.00	3.00	0.00	936.25 (S)
CBI6	Curb Opening	CBI TyA	10.00	Box	2.00	3.00	0.00	952.50 (S)
CBI8	Curb Opening	CBI TyA	10.00	Box	2.00	3.00	953.98 (W)	953.98 (E)
CBI9	Curb Opening	CBI TyA	10.00	Box	2.00	3.00	948.86 (W)	948.87 (NE)
CBI11	Curb Opening	CBI TyA	10.00	Box	2.00	3.00	0.00	952.50 (S)
CBI12	Curb Opening	CBI TyA	10.00	Box	2.00	3.00	943.11 (N) 943.05 (E) 943.10 (W)	943.07 (S)
CBI14	Curb Opening	CBI TyA	10.00	Box	2.00	3.00	0.00	944.58 (N)
CBI15	Curb Opening	CBI TyA	10.00	Box	2.00	3.00	0.00	947.69 (S)

Edit Reports



Queries


Drainage Queries
Main
Queries
Query Library
Path: C:\2007 IUTC\P09-Evaluating Drainage Design\Query.qrl
Name: V88 Training
Description:
Browse...
New...
Rename...
Structure Type: Pipes
Query: P>16
Query Results
24 item(s) found from Pipes
Help
Modify Attributes...
Change Symbology...
Create Report...
Apply
Preferences...
Close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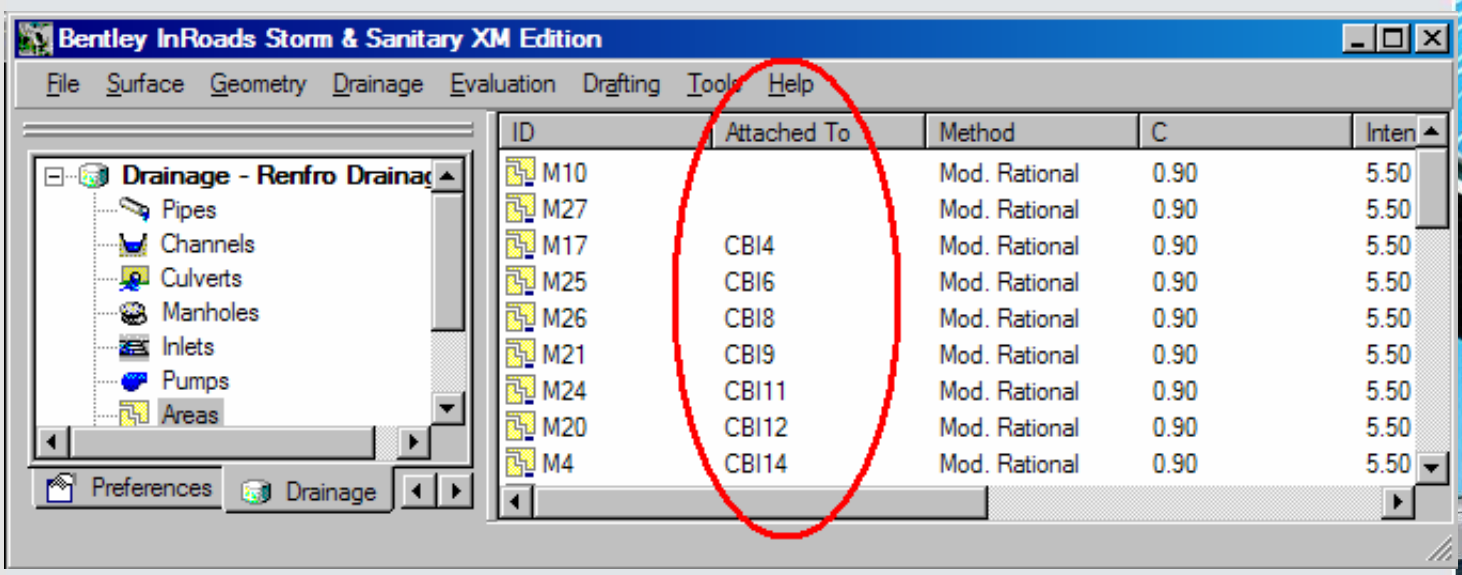
InRoads Explorer to Find Errors

(Contributed by: Karl Dauber of Parsons Brinckerhoff)

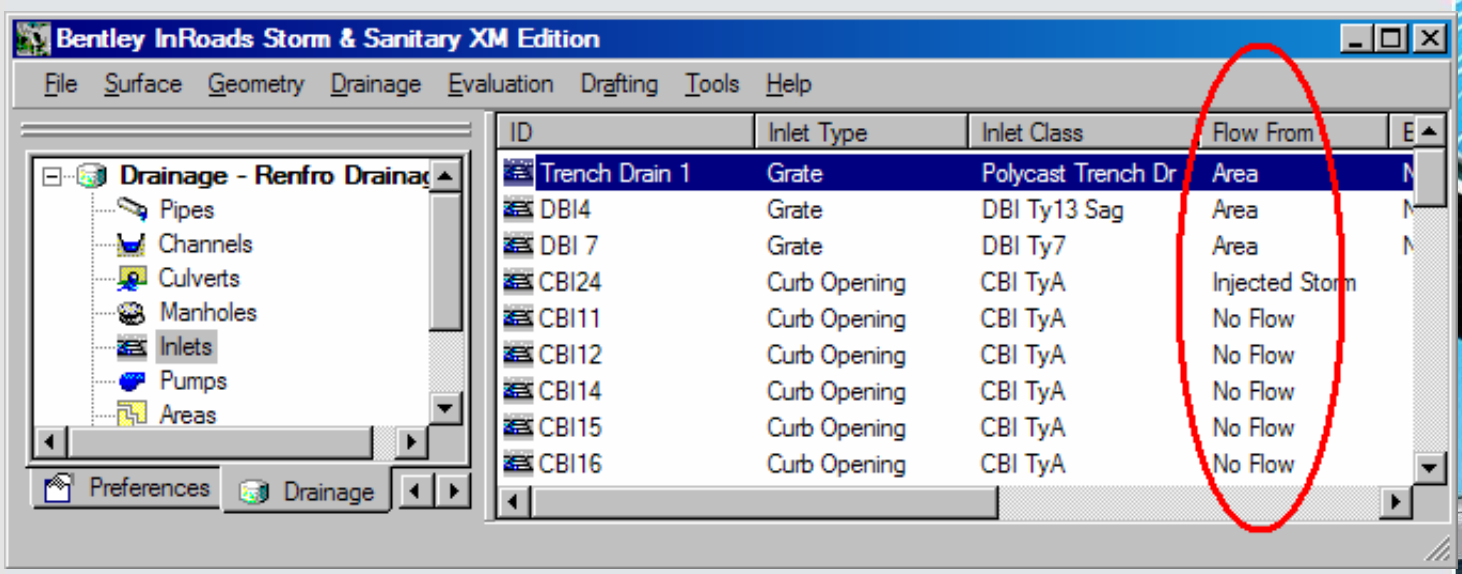
- Sort Areas by “Attached To”
- Check that all are attached to an Inlet



InRoads Explorer to Find Errors

(Contributed by: Karl Dauber of Parsons Brinckerhoff)

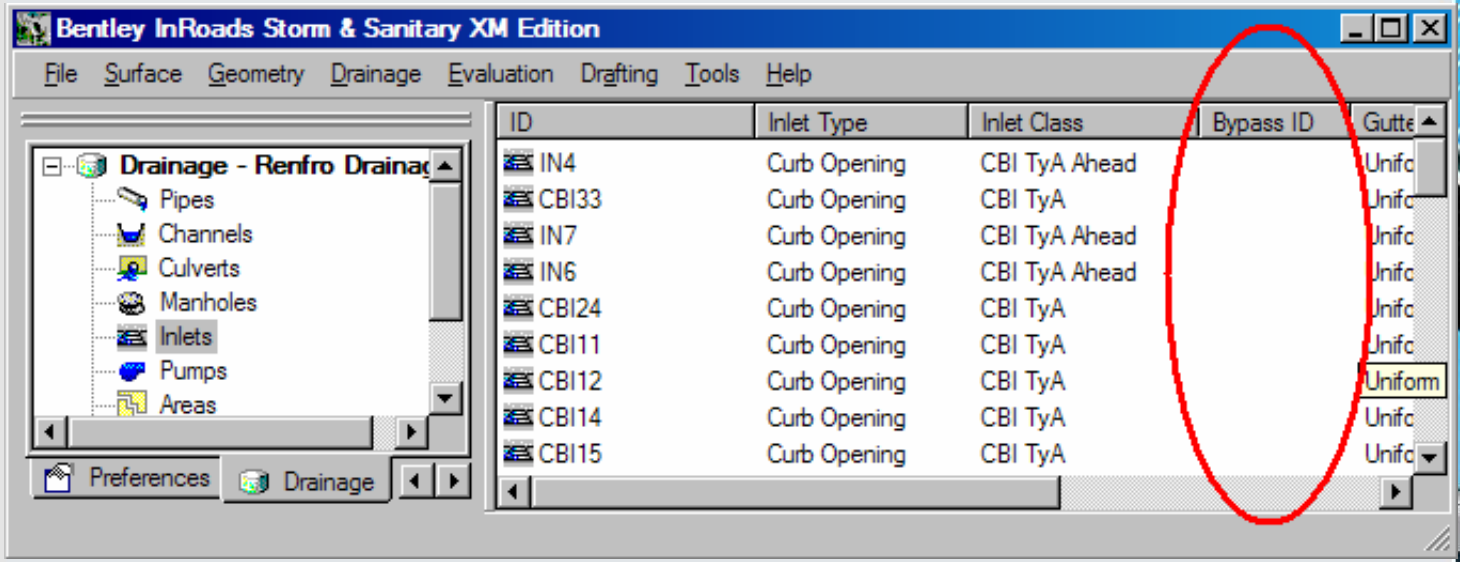
- Sort Inlets by “Flow From”
- Check that all have areas attached



InRoads Explorer to Find Errors

(Contributed by: Karl Dauber of Parsons Brinckerhoff)

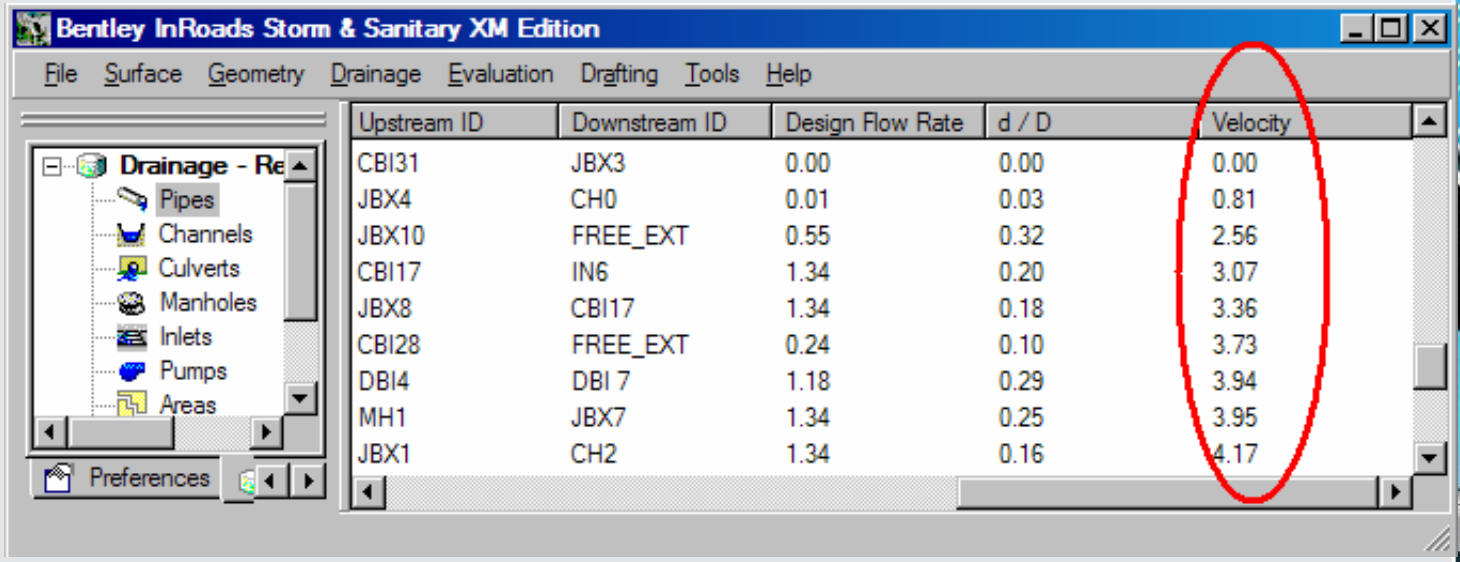
- Sort Inlets by “Bypass ID”
- Check that all on-grade inlets have an assigned bypass ID.



InRoads Explorer to Find Errors

(Contributed by: Karl Dauber of Parsons Brinckerhoff)

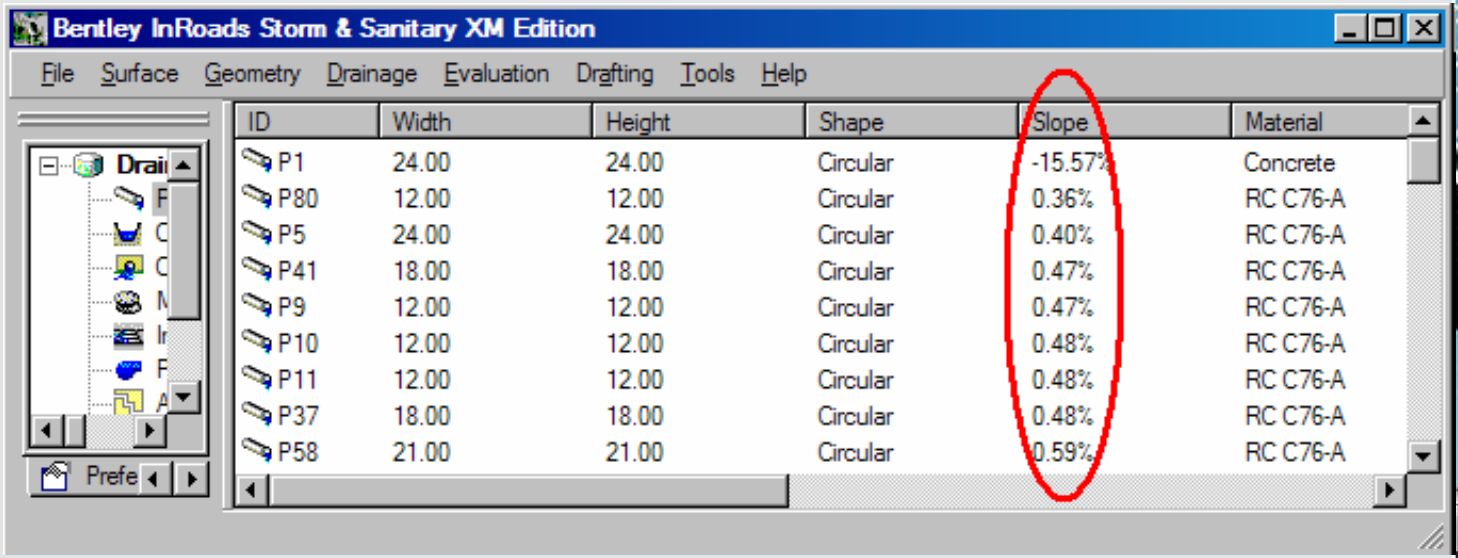
- Sort Pipes by “Velocity”
- Check for pipes that don’t meet minimum velocity standards.



InRoads Explorer to Find Errors

(Contributed by: Karl Dauber of Parsons Brinckerhoff)

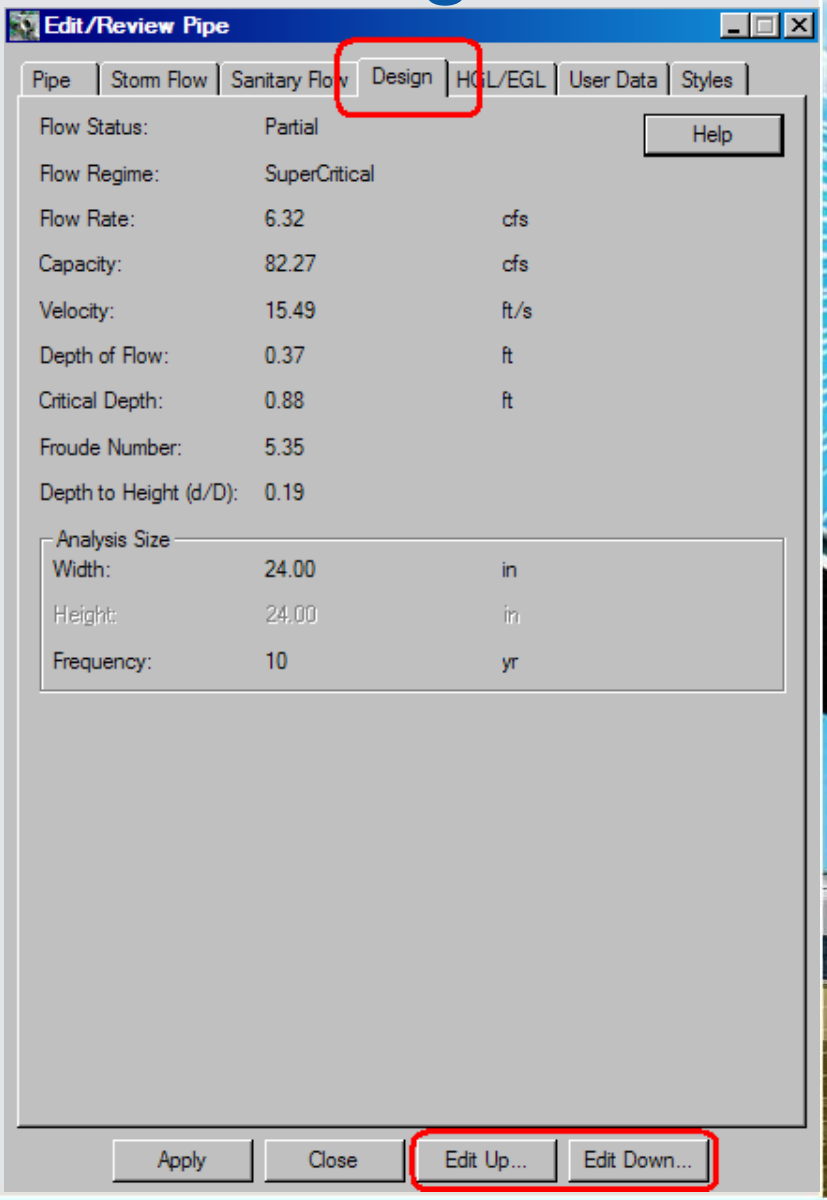
- Sort Pipes by “Slope”
- Find pipes with Zero or Negative slopes



ID	Width	Height	Shape	Slope	Material
P1	24.00	24.00	Circular	-15.57%	Concrete
P80	12.00	12.00	Circular	0.36%	RC C76-A
P5	24.00	24.00	Circular	0.40%	RC C76-A
P41	18.00	18.00	Circular	0.47%	RC C76-A
P9	12.00	12.00	Circular	0.47%	RC C76-A
P10	12.00	12.00	Circular	0.48%	RC C76-A
P11	12.00	12.00	Circular	0.48%	RC C76-A
P37	18.00	18.00	Circular	0.48%	RC C76-A
P58	21.00	21.00	Circular	0.59%	RC C76-A

Edit/Review Dialog

- Edit Up and Edit Down Buttons at the Bottom of the Dialog.



Questions?