

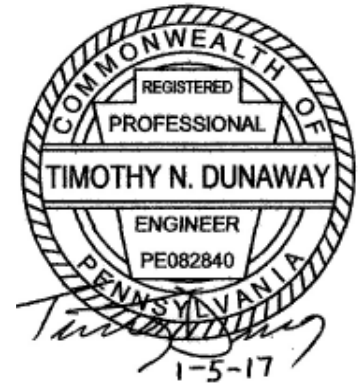


TETRA TECH

Hydrologic and Hydraulic Analysis

Floodplain Analysis Report for Chartiers Run and Westland Run Houston Injection Site Revision 2

Sunoco Logistics, L.P.
*Chartiers Township, Washington
County, Pennsylvania*



January 2017

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**FLOODPLAIN ANALYSIS REPORT
CHARTIERS RUN AND WESTLAND RUN
HOUSTON INJECTION SITE**

**SUNOCO PIPELINE, L.P.
WASHINGTON COUNTY, PENNSYLVANIA**

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1.0 PROJECT OVERVIEW

1.1 INTRODUCTION

Sunoco Pipeline, L.P. (Sunoco) has contracted Tetra Tech, Inc. (Tetra Tech) to conduct a floodplain study at the Houston Injection Site in Chartiers Township, Washington County, Pennsylvania (Project Site). Sunoco is proposing to install natural gas liquid facilities at the Houston Injection Site located at the confluence of Chartiers Run and Westland Run. The proposed facilities are located within a Federal Emergency Management Agency (FEMA) Zone A floodplain (no base flood elevations defined). In accordance with the Chartiers Township Floodplain Management Ordinance, the intent of this study is to determine base flood elevations at the proposed Project Site to quantify the effect of Sunoco's proposed development on the base flood elevations of Chartiers Run and Westland Run. According to the ordinance, Water Surface Elevations resulting from the proposed encroachment shall not cause an increase of more than one (1) foot in the 100-year Base Flood Elevation (BFE). Study reaches extend approximately 870 feet along Westland Run and 2,090 feet along Chartiers Run (past the confluence of these two streams). Upstream on Westland Run exists a bridge at the crossing of Ullom Road. A site location map is located in Appendix A.

Hydrologic and Hydraulic (H&H) calculations were completed to estimate and route the 100-year flood flow rate through Chartiers Run and Westland Run to the downstream confluence on Chartiers Run. Existing and proposed Project Site conditions were modeled. This revision includes revised final grading at the Project Site.

1.2 PROJECT DESCRIPTION

The purpose of the floodplain study on Chartiers Run and Westland Run (Project) is to quantify changes to the base flood elevation resulting from proposed grading as part of site development at the Houston Injection site. Hydraulic analysis for the Project was completed using the computer program Hydrologic Engineering Center River Analysis System (HEC-RAS), developed by the US Department of Defense, Army Corps of Engineers.

1.3 SITE INFORMATION

The Project is located in Chartiers Township, Washington County, Pennsylvania. The Project site is at the confluence of Chartiers Run and Westland Run as shown on Figure A-1. A detailed Flood Insurance Study (FIS), Number 422144, of Chartiers Run was completed downstream of the Project site; however, no detailed study was completed for either Westland Run or Chartiers Run upstream of the confluence. The Flood Insurance Rate Map (FIRM) Panel 4221440005, effective February 1, 1980, shows the 100-year floodplain for the Project site as a Zone A floodplain, having no published water surface elevations or defined floodway. Zone A floodplains were originally delineated by FEMA using non-numerically supported approximate study techniques. Therefore, the Project Site near the confluence of Chartiers Run and Westland Run has been identified by FEMA as an area of elevated risk of flooding but no detailed study has been adopted by FEMA. Because no defined floodway exists, an assumed floodway has been

incorporated into the proposed site designs, defined as 50-feet from top of bank in accordance with the Pennsylvania Department of Environmental Protection Chapter 105.1. Under Title 25, Chapter 93 of the PA Code and PA eMaps, these reaches of Chartiers Run and Westland Run are designated as warm water fishes (WWF). There are no USGS stream gaging stations along Westland Run or Chartiers Run.

2.0 DATA COLLECTION

HEC-2 (analytical software developed by the Hydrologic Engineering Center) data for FIS 422144 on Chartiers Run was obtained from FEMA in microfiche format. Pending data from FEMA in HEC-RAS format could not be furnished at the time of request (July 2015) because it was before the data release date of September 30, 2015. Upon release of updated FEMA data on September 30, 2015, it was confirmed that no new modeling for the subject area was conducted; therefore, the use of data from FIS 422144 for this H&H analysis is appropriate.

Tetra Tech conducted limited topographic survey of the study area on June 30, 2015, August 6, 2015, and August 7, 2015. Photographs were taken of the study area on September 24, 2015 (see Appendix A, A-2 Study Area Photographs). The primary intent of the field surveys was to collect stream channel information (top of bank to top of bank) for use in hydraulic modeling. The survey data was tied into a benchmark used in the Chartiers Township FEMA FIS 422144. All site information for this study was tied into vertical datum NGVD29 feet in order to be consistent with the Chartiers Township FEMA FIS 422144 information used as the downstream boundary condition.

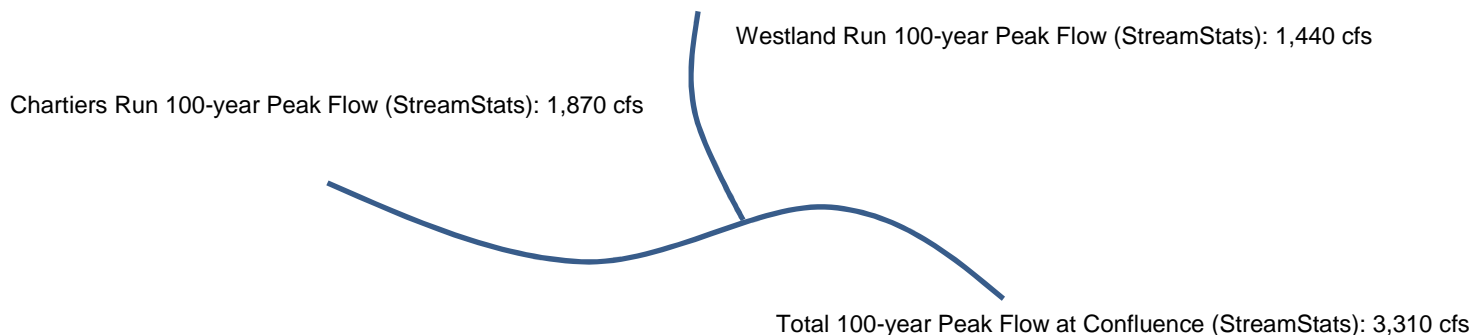
Additional information on existing site conditions outside of the stream channels was obtained from Pennsylvania Spatial Data Access (PASDA) Lidar PAMAP Program Topographic Contours (2 ft Interval) of Pennsylvania published June 15, 2007 through the PA Department of Conservation and Natural Resources, Bureau of Topographic and Geologic Survey. Final proposed site conditions and grading plans were provided by Sunoco. The base maps for existing and proposed conditions with cross sections are shown in Figures A-3 and A-4, respectively (see Appendix A).

3.0 HYDROLOGY

The watershed is a steeply sloped basin that consists of wooded areas, open lands, and commercial and residential development. The total contributing drainage area is approximately 13.7 square miles at the confluence of Westland Run and Chartiers Run. A map showing the watershed is included in Appendix B as Figure B-1. Sub-watersheds for Westland Run and Chartiers Run upstream of their confluence are also included in Appendix B, Figures B-2 and B-3, respectively. The main channel slope of Chartiers Run within the study reach is 0.388%. The main channel slope of Westland Run within the study reach is 0.521%.

The 100-year peak stream discharge downstream of the confluence of Chartiers Run and Westland Run was obtained from FEMA FIS 422144 for Chartiers Township; however, peak stream discharge information for Chartiers Run upstream of the confluence and Westland Run was not provided in FIS 422144. Therefore, USGS Pennsylvania StreamStats, a web-based

geographic information systems application for use in water resources planning and management, was used to calculate peak runoff for Westland Run and Chartiers Run upstream of their confluence (see Appendix B, Reports B-4 and B-5, respectively). StreamStats uses the SIR 20008-5102 regression equations for estimating stream flow statistics. From these estimates, percent total flows were calculated for the upstream reaches. These percentages were applied to the downstream flow of 2,950 cfs obtained from FEMA FIS 422144 (see Table 1).



- Westland Run %Total: $\frac{1,440 \text{ cfs}}{3,310 \text{ cfs}} * 100 = 43.5\%$
- Chartiers Run % Total: $\frac{1,870 \text{ cfs}}{3,310 \text{ cfs}} * 100 = 56.5 \%$

Table 1: Summary of Peak Discharge

Location	Drainage Area (square miles)	Peak Discharge (cfs)
		100-year
Chartiers Run Downstream of Confluence with Westland Run (FEMA)	13.7	2,950
Chartiers Run Upstream of Confluence with Westland Run (Calculated)	8.08	56.5% of 2,950 = 1,667
Westland Run Upstream of Confluence with Chartiers Run (Calculated)	5.61	43.5% of 2,950 = 1,283

A copy of the effective FEMA FIRM Map can be found in Appendix B-6. FEMA FIS Report 122144 is included in Appendix B-7. A copy of the FEMA HEC-2 Microfiche is included in Appendix B-8.

4.0 EXISTING CONDITIONS HYDRAULICS

4.1 MODEL SETUP

Hydraulic analysis for both existing and proposed conditions was performed using U.S. Army Corps of Engineers HEC-RAS computer program. HEC-RAS calculates water surface profiles for flow in natural or man-made channels. HEC-RAS has the capacity to model various obstructions such as bridges, culverts, weirs, and other structures. The program computes a wide range of hydraulic variables for each peak discharge simulated including water surface elevation, velocity, and shear stress.

The hydraulic analysis was performed such that it included a sufficient amount of stream channel upstream and downstream from the work areas. As such, it incorporated an 870 lineal foot section of Westland Run and a 2,090 lineal foot section of Chartiers Run.

Stream cross sections were chosen approximately every 100 lineal feet and incorporate the entire width of the FEMA-defined Zone A 100-year floodplain. Cross-section geometry used in the model was based on field survey obtained in June and August 2015 and PASDA Lidar Topographic Contours (2 ft Interval). Upon comparison of Lidar and field survey in areas of dense tree cover, it was determined that Lidar data were significantly different due to the dense vegetation. Therefore, to connect survey data to Lidar in areas of dense tree cover, elevation data was interpolated using best engineering judgement from the last field survey point (top of bank) to a Lidar contour outside areas of dense vegetation.

The manning's "n" values estimated for this model are based on reference values published in the HEC-RAS Hydraulic Reference Manual. These values were published originally in Chow's book "Open-Channel Hydraulics" [Chow, 1959]. The manning's "n" value estimated for the streambed channel was 0.045 (clean, winding, some pools and shoals with some weeds and stones). This value is within the range of manning's "n" values (i.e., 0.040 to 0.055) used for the channel in FIS 422144. Manning's "n" values for the overbanks were specified as 0.1 (heavy stand of timber, few down trees, little undergrowth with flow below and into branches) or 0.035 (high grass) depending on the cover at each particular cross section, as observed through aerial imagery. The manning's "n" values used in FIS 422144 ranged from 0.060 to 0.150, corresponding to mostly wooded overbanks downstream of the confluence of Chartiers Run and Westland Run.

Hydrology within the HEC-RAS model was divided into three reaches: (1) Chartiers Run downstream of the confluence, (2) Chartiers Run upstream of the confluence, and (3) Westland Run upstream of the confluence. Flow changes at Reaches 1 through 3 were specified based on Table 1 Flows. Reaches 2 and 3 boundary conditions in both the existing and proposed models are set to normal depth upstream (i.e., slopes of 0.006588 and 0.001774, respectively) and "Junction" downstream. Reach 1 boundary conditions in both the existing and proposed models are set to "Junction" upstream and known water surface elevation downstream (i.e., specified water surface elevation as reported in the FEMA FIS 422144 for Chartiers Township).

Within an 870 foot study reach on Westland Run, there is one road crossing (Ullom Road) over the channel. The bridge is rectangular with concrete side walls. This crossing is included in the existing conditions HEC-RAS model, as summarized in Table 2.

Table 2: Summary of Existing Bridge Crossing Configuration

Crossing	Ullom Road Bridge
River Station	RS 292 (Westland Run)
Structure Type	Automobile bridge
Bridge Length (ft)	37
Hydraulic Width (ft)	16
Vertical Opening (ft)	5.4
Streambed Elevation (ft)	990.849
Vertical Distance from Streambed to Top of Road (ft)	7.566
Elevation of Low Chord (ft)	996.249
Top of Road (High Chord) Elevation (ft)	998.416
Upstream Embankment Side Slopes (ft/ft)	0.212
Downstream Embankment Side Slopes (ft/ft)	0.258

No other hydraulic structures, such as bridges, culverts or dams are located near the Project site that would impact the flow regime in this area.

The model was run under subcritical flow using a steady flow regime. No error messages were reported for either the existing or proposed models. The warnings and notes generated from the model included only warnings regarding the possible need for additional cross sections due to conveyance ratios outside the limits of tolerance, significant energy losses (greater than 1.0 foot), or velocity head changes greater than 0.5 foot. These warnings and notes can safely be ignored because cross sections were placed every 100 feet and hydraulic results are found to be reasonable.

In comparing model results to the FEMA FIS 422144, it can be seen that there is a slight discrepancy (i.e., 0.45 feet) between the water surface elevations at the cross section immediately downstream of the confluence (i.e., cross section O). This may be explained by the accuracy of the survey data at cross section O in this model versus the FEMA FIS 422144. As discussed in Section 2.0, cross sections used in the model were surveyed on June 30, 2015, August 6, 2015, and August 7, 2015. Additionally, cross-section O was the most upstream cross-section studied by the FEMA FIS 422144; therefore, the water surface elevation may have been influenced by the upstream boundary conditions set at cross section O.

4.2 EXISTING CONDITIONS RESULTS

Tables 3 and 4 summarize the results for existing conditions at each of the modeled cross sections for the 100-year flows in Westland Run and Chartiers Run, respectively. Existing site conditions are shown on Figure A-2 in Appendix A. Flood profiles and copy of the HEC-RAS summary output for existing conditions are included in Appendix C-1.

Table 3: Results of Existing Conditions Hydraulic Analysis Westland Run Reach 3

Reach ¹	Rvr Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
3	700	1283.25	992.52	1000.53		1000.7	0.00131	4.22	697.37	224.94	0.27
3	600	1283.25	991.61	1000.45		1000.57	0.000988	3.94	857.74	243.11	0.25
3	500	1283.25	991.6	1000.27		1000.46	0.001148	4.38	659.34	178.02	0.27
3	400	1283.25	990.47	1000.24		1000.34	0.000716	3.47	842.09	189.61	0.2
3	300	1283.25	990.85	1000.14	996.31	1000.26	0.00091	3.8	889.46	286.54	0.23
3	292	Bridge									
3	275	1283.25	990.85	998.08		998.68	0.004864	7.36	396.85	193.61	0.5
3	200	1283.25	989.62	998.32		998.41	0.000736	3.13	814.1	293.02	0.2
3	100	1283.25	989.16	998.34		998.36	0.000132	1.37	1317.53	414.41	0.09
3	0	1283.25	988.87	998.34		998.35	0.000061	1.04	1737.25	483.82	0.06

1. Reach 1 = Chartiers Run downstream of confluence
Reach 2 = Chartiers Run upstream of confluence
Reach 3 = Westland Run

Table 4: Results of Existing Conditions Hydraulic Analysis Chartiers Run

Reach ¹	Rvr Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
2	1300	1666.75	992.72	999.37	999.06	1001.43	0.018112	11.5	144.99	29.7	0.92
2	1200	1666.75	993.28	1000.09		1000.37	0.002428	5.36	498.27	181.25	0.38
2	1100	1666.75	990.76	999.94		1000.16	0.001608	4.42	492.87	184.87	0.3
2	1000	1666.75	992.61	999.33		999.88	0.0042	6.51	334.4	157.18	0.46
2	900	1666.75	991.03	999.22		999.49	0.002349	5.34	578.96	211.87	0.37
2	800	1666.75	990.97	999.06		999.27	0.001673	4.65	596.99	206.3	0.31
2	700	1666.75	990.34	998.64		999.05	0.002414	5.8	399.68	181.73	0.37
2	600	1666.75	990.85	998.81		998.87	0.000384	2.36	915.37	265.1	0.15
2	500	1666.75	989.8	998.69		998.81	0.000893	3.64	668.14	243.15	0.23
2	400	1666.75	990.57	998.46		998.68	0.001687	4.62	522.76	227.67	0.3
2	300	1666.75	990.15	998.32		998.52	0.001429	4.38	570.82	231.67	0.28
2	200	1666.75	989.49	998.34		998.4	0.000491	2.73	968.38	344.95	0.17
2	100	1666.75	989.94	998.31		998.35	0.000327	2.27	1122.16	362.46	0.14
2	0	1666.75	989.88	998.31		998.33	0.000101	1.34	1779.48	492.52	0.08
1	690	2950	988.97	997.55		998.22	0.004459	8.31	709.33	156.5	0.52
1	0	2950	985.7	996.7	992.88	996.87	0.000916	4.25	1395.77	252.74	0.25

1. Reach 1 = Chartiers Run downstream of confluence
Reach 2 = Chartiers Run upstream of confluence
Reach 3 = Westland Run

5.0 PROPOSED CONDITIONS HYDRAULICS

Sunoco's proposed site development requires grading. Six (6) cross sections were modified to reflect the final proposed grade and consider elevation differences within the 100-year floodplain at the Project Site. These sections include Reach 2 River Station 400, 300, 200, 100, 000 and Reach 3 River Station 000.

5.1 MODEL SETUP

The purpose of the proposed grading at the Project site is to create a level pad for placing equipment. Proposed conditions were incorporated by editing the cross section geometry for each of the modification scenarios.

5.2 PROPOSED CONDITIONS RESULTS

Tables 5 and 6 summarize the results for final proposed conditions at each of the modeled cross sections for the 100-year flows in Westland Run and Chartiers Run, respectively. In comparing the existing and proposed conditions (Tables 3 through 6), the proposed cut and fill balance such that the largest proposed water surface elevation increase along Chartiers Run and Westland Run is 0.00 feet for the 100-year storm event (see Table 7). Therefore, the proposed grading will not raise the BFE. The proposed grading is consistent with the Chartiers Township ordinance.

Proposed conditions are shown in Figure A-3 in Appendix A. Figure A-3 shows the existing and proposed BFE as modeled by HEC-RAS. It should be noted that both the existing and proposed BFEs modeled through HEC-RAS are located inside the FEMA Zone A (approximate) floodplain boundary. Flood profiles and copy of the HEC-RAS summary output for proposed conditions are included in Appendix C-2.

Table 5: Results of Final Proposed Conditions Hydraulic Analysis Westland Run

Reach ¹	Rvr Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
3	700	1283.25	992.52	1000.53		1000.7	0.00131	4.22	697.37	224.94	0.27
3	600	1283.25	991.61	1000.45		1000.57	0.000988	3.94	857.74	243.11	0.25
3	500	1283.25	991.6	1000.27		1000.46	0.001148	4.38	659.34	178.02	0.27
3	400	1283.25	990.47	1000.24		1000.34	0.000716	3.47	842.09	189.61	0.2
3	300	1283.25	990.85	1000.14	996.31	1000.26	0.00091	3.8	889.46	286.54	0.23
3	292	Bridge									
3	275	1283.25	990.85	998.07		998.68	0.004896	7.38	395.42	193.34	0.5
3	200	1283.25	989.62	998.32		998.4	0.00074	3.13	812.46	292.69	0.2
3	100	1283.25	989.16	998.34		998.36	0.000133	1.38	1315.21	414.15	0.09
3	0	1283.25	988.87	998.34		998.35	0.000056	0.99	1787.19	483.7	0.06

1. Reach 1 = Chartiers Run downstream of confluence
Reach 2 = Chartiers Run upstream of confluence
Reach 3 = Westland Run

Table 6: Results of Proposed Conditions Hydraulic Analysis Chartiers Run

Reach ¹	Rvr Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
2	1300	1666.75	992.72	999.36	999.06	1001.42	0.01831	11.54	144.43	29.67	0.92
2	1200	1666.75	993.28	1000.07		1000.36	0.002465	5.39	495.08	180.51	0.38
2	1100	1666.75	990.76	999.92		1000.14	0.001636	4.45	489.03	183.7	0.3
2	1000	1666.75	992.61	999.27		999.85	0.004414	6.63	326.19	153.87	0.48
2	900	1666.75	991.03	999.16		999.44	0.002489	5.47	565.94	209.39	0.38
2	800	1666.75	990.97	998.99		999.21	0.001783	4.77	582.09	203.04	0.32
2	700	1666.75	990.34	998.51		998.97	0.002726	6.09	375.67	173.43	0.39
2	600	1666.75	990.85	998.7		998.76	0.00042	2.44	886.43	261.72	0.16
2	500	1666.75	989.8	998.56		998.69	0.001	3.82	638.16	236.56	0.24
2	400	1666.75	990.57	998.42		998.58	0.001308	4.05	585.73	240.51	0.27
2	300	1666.75	990.15	998.32		998.46	0.001016	3.69	658.3	247.24	0.24
2	200	1666.75	989.49	998.31		998.37	0.000431	2.56	952	290.08	0.16
2	100	1666.75	989.94	998.31		998.34	0.00016	1.59	1384.4	361.5	0.1
2	0	1666.75	989.88	998.31		998.32	0.000079	1.18	1912.91	492.41	0.07
1	690	2950	988.97	997.55		998.22	0.004457	8.31	709.36	156.49	0.52
1	0	2950	985.7	996.7	992.88	996.87	0.000916	4.25	1395.77	252.74	0.25

1. Reach 1 = Chartiers Run downstream of confluence
Reach 2 = Chartiers Run upstream of confluence
Reach 3 = Westland Run

Table 7: Comparison of Existing and Proposed Conditions

Reach ¹	Rvr Sta	W.S. Elev (Existing)	Vel Chnl (Existing)	W.S. Elev (Proposed)	Vel Chnl (Proposed)	W.S. Elevation Difference	Vel Chnl Difference
		(ft)	(ft/s)	(ft)	(ft/s)		
3	700	1000.53	4.22	1000.53	4.22	0	0
3	600	1000.45	3.94	1000.45	3.94	0	0
3	500	1000.27	4.38	1000.27	4.38	0	0
3	400	1000.24	3.47	1000.24	3.47	0	0
3	300	1000.14	3.8	1000.14	3.8	0	0
3	292	Bridge					
3	275	998.08	7.36	998.07	7.38	-0.010	0.02
3	200	998.32	3.13	998.32	3.13	0.000	0
3	100	998.34	1.37	998.34	1.38	0.000	0.01
3	0	998.34	1.04	998.34	0.99	0.000	-0.05
2	1300	999.37	11.5	999.36	11.54	-0.010	0.04
2	1200	1000.09	5.36	1000.07	5.39	-0.020	0.03
2	1100	999.94	4.42	999.92	4.45	-0.020	0.03
2	1000	999.33	6.51	999.27	6.63	-0.060	0.12
2	900	999.22	5.34	999.16	5.47	-0.060	0.13
2	800	999.06	4.65	998.99	4.77	-0.070	0.12
2	700	998.64	5.8	998.51	6.09	-0.130	0.29
2	600	998.81	2.36	998.7	2.44	-0.110	0.08
2	500	998.69	3.64	998.56	3.82	-0.130	0.18
2	400	998.46	4.62	998.42	4.05	-0.040	-0.57
2	300	998.32	4.38	998.32	3.69	0.000	-0.69
2	200	998.34	2.73	998.31	2.56	-0.030	-0.17
2	100	998.31	2.27	998.31	1.59	0.000	-0.68
2	0	998.31	1.34	998.31	1.18	0.000	-0.16
1	690	997.55	8.31	997.55	8.31	0.000	0
1	0	996.7	4.25	996.7	4.25	0.000	0

1. Reach 1 = Chartiers Run downstream of confluence
Reach 2 = Chartiers Run upstream of confluence
Reach 3 = Westland Run

6.0 RISK ASSESSMENT

The proposed grading at the Houston Injection Project Site will yield no increases (a maximum of 0.000 feet) in water surface elevations on Chartiers Run and Westland Run for the 100-year storm event. Additionally, all equipment and piping components are located above the flood plain, with the exception of the pipe support foundations and cable tray foundations. The associated calculated floodplain limits are contained within the boundary of the 100-year floodplain limits on the published FEMA FIRM Map (February 1, 1980).

There is a maximum increase in stream velocity of 0.02 ft/s along Westland Run and 0.29 ft/s along Chartiers Run. The increase in proposed velocity is minimal and will not result in accelerated erosion and sedimentation.

Therefore, the project will not result in a threat to property or hazard of life as outlined within this report.

7.0 CONCLUSIONS

A detailed floodplain analysis of the proposed grading at the Houston Injection Project site was performed for Westland Run and Chartiers Run. Study Reaches 2 and 3 are not part of a detailed FEMA Flood Insurance Study and are designated as a Zone A (approximate) floodplain, defined by FEMA as areas within the 100-year floodplain but do not have 100-year water surface elevations or a delineated floodway. The results of the H&H analysis indicate that the proposed grading will not cause an increase in the 100-year water surface elevations relative to the existing conditions within the study reaches for the 100-year peak flow rate of 2,950 cfs. No significant on-site or off-site increases in flood velocities are anticipated to occur. The proposed pipe support foundations and cable tray foundations within the BFE will be firmly anchored to resist flotation, collapse, and lateral movement. The proposed equipment and structures outside of the BFE but within the FEMA Zone A (approximate) floodplain will be flood proofed. Therefore, the proposed grading will not increase the risk of flooding within the limits of this study for the 100-year storm event along Westland Run and Chartiers Run.

REFERENCES

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<<http://www.depgis.state.pa.us/emappa/>>.
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5. Federal Emergency Management Agency *HEC-2, Water Surface Profiles*. Ft. Belvoir: Defense Technical Information Center, 1988. USACE, Sept. 1990.
6. Federal Emergency Management Agency, February 1, 1980, Flood Insurance Study, Washington County, Pennsylvania.
7. Federal Emergency Management Agency, Pennsylvania Department of Environmental Protection, 2006, PA Code Title 25, Chapter 93, Water Quality Standards.
8. Pennsylvania Department of Environmental Protection, 2006, PA Code Title 25, Chapter 106.
9. U.S. Army Corps of Engineers, January 2010, HEC-RAS River Analysis System, Version 4.1.0, Hydrologic Engineering Center, Davis, CA.
10. U.S. Army Corps of Engineers, January 2010, HEC-RAS River Analysis System Hydraulic Reference Manual, Version 4.1, Hydrologic Engineering Center, Davis, CA.

APPENDIX A

Site Information

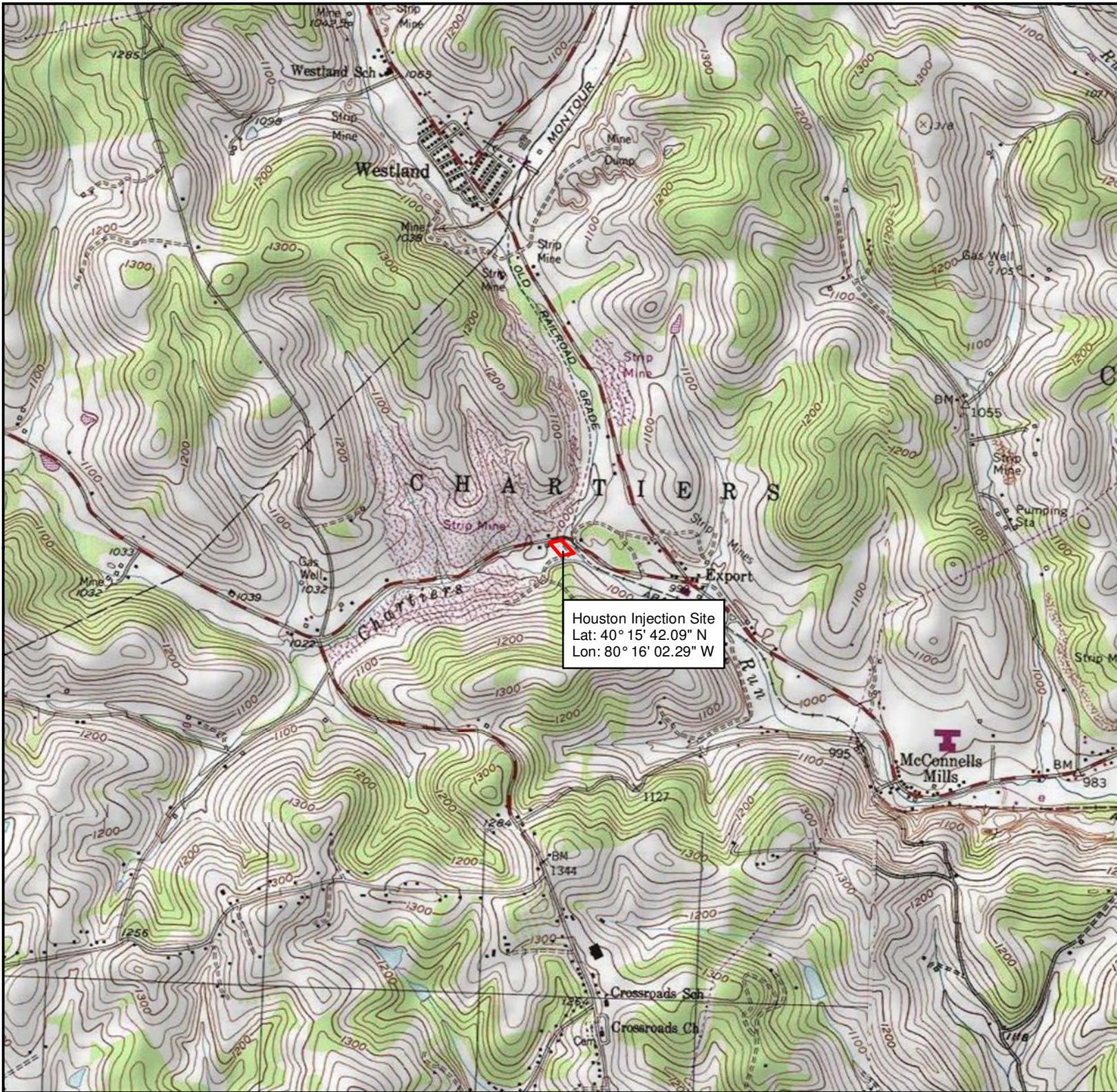
A-1 – Project Location Map


A-2 – Study Area Photographs

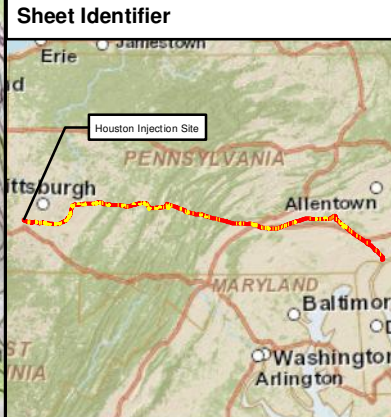
A-3 – Existing Conditions

A-4 – Proposed Conditions

A-1 PROJECT LOCATION MAP



Legend
 Houston Injection Site



Houston Injection Site
 Lat: 40° 15' 42.09" N
 Lon: 80° 16' 02.29" W

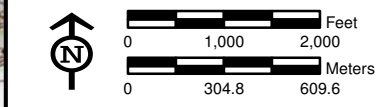


FIGURE A-1
USGS PROJECT LOCATION MAP
PENNSYLVANIA PIPELINE PROJECT
HOUSTON INJECTION SITE
SUNOCO LOGISTICS, L.P.
WASHINGTON COUNTY, PA



Notes:
 1) Topographic map provided by ESRI's ArcGIS Online USA Topo Maps map service (© 2013 National Geographic Society, i-cubed).
 2) Quadrangles displayed are Canonsburg, Midway, Washington East, and Washington West.

A-2 STUDY AREA PHOTOGRAPHS



Ullom Road Bridge over Westland Run Facing Northeast



Ullom Road Bridge Looking Upstream on Westland Run



Ullom Road Bridge Looking Downstream on Westland Run



Underside of Ullom Road Bridge



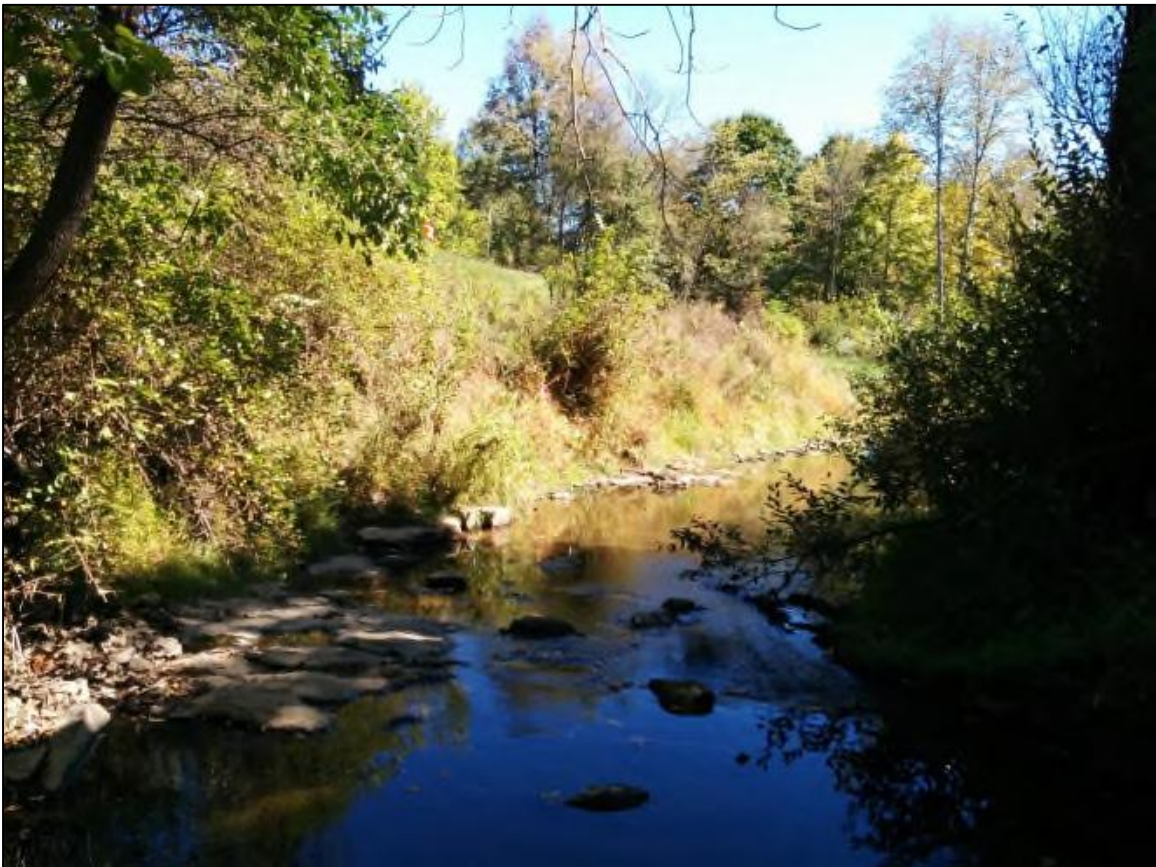
Chartiers Run Looking Upstream from Confluence with Westland Run



Chartiers Run (Downstream Right) Looking South from Confluence with Westland Run

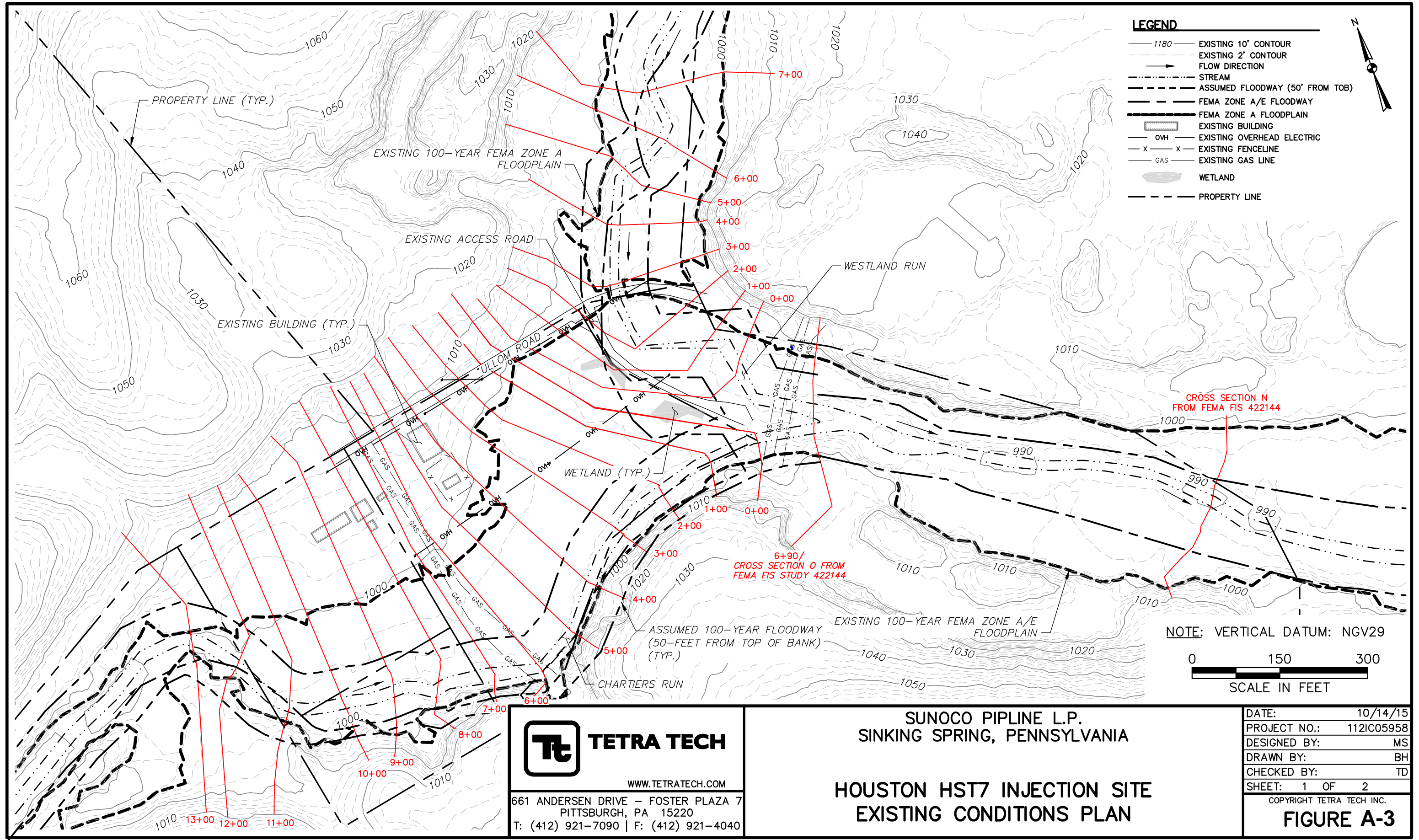


Westland Run Looking Upstream from Confluence with Chartiers Run



Chartiers Run (Downstream Left) Looking Southeast from Confluence with Westland Run

A-3 EXISTING CONDITIONS



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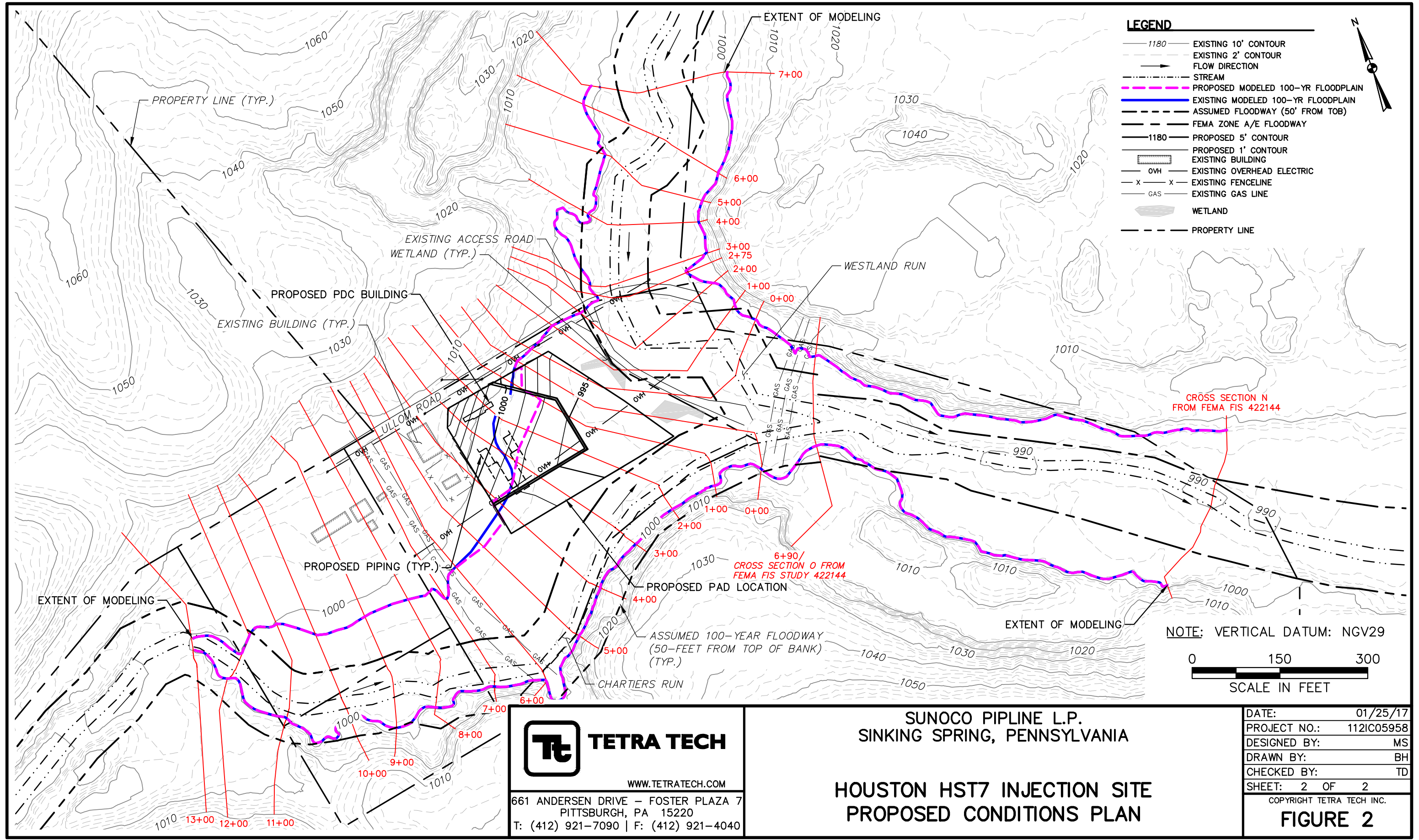
SUNOCO PIPELINE L.P.
 SINKING SPRING, PENNSYLVANIA

**HOUSTON HST7 INJECTION SITE
 EXISTING CONDITIONS PLAN**

DATE:	10/14/15
PROJECT NO.:	112IC05958
DESIGNED BY:	MS
DRAWN BY:	BH
CHECKED BY:	TD
SHEET:	1 OF 2

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FIGURE A-3

A-4 PROPOSED CONDITIONS

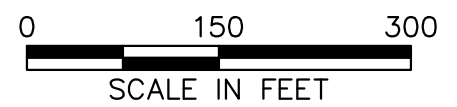


- LEGEND**
- 1180 — EXISTING 10' CONTOUR
 - 1000 — EXISTING 2' CONTOUR
 - FLOW DIRECTION
 - STREAM
 - PROPOSED MODELED 100-YR FLOODPLAIN
 - EXISTING MODELED 100-YR FLOODPLAIN
 - ASSUMED FLOODWAY (50' FROM TOB)
 - FEMA ZONE A/E FLOODWAY
 - 1180 — PROPOSED 5' CONTOUR
 - PROPOSED 1' CONTOUR
 - ▭ EXISTING BUILDING
 - OVH — EXISTING OVERHEAD ELECTRIC
 - x — EXISTING FENCELINE
 - GAS — EXISTING GAS LINE
 - ▭ WETLAND
 - — PROPERTY LINE

CROSS SECTION N
FROM FEMA FIS 422144

6+90/
CROSS SECTION O FROM
FEMA FIS STUDY 422144

NOTE: VERTICAL DATUM: NGV29



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SINKING SPRING, PENNSYLVANIA

**HOUSTON HST7 INJECTION SITE
PROPOSED CONDITIONS PLAN**

DATE:	01/25/17
PROJECT NO.:	112IC05958
DESIGNED BY:	MS
DRAWN BY:	BH
CHECKED BY:	TD
SHEET:	2 OF 2

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FIGURE 2

APPENDIX B

Hydrologic Analysis Documentation

B-1 – Chartiers Run Downstream StreamStats Drainage Area Map

B-2 – Westland Run Upstream StreamStats Drainage Area Map

B-3 – Chartiers Run Upstream StreamStats Drainage Area Map

B-4 – Westland Run Upstream StreamStats Ungaged Report

B-5 – Chartiers Run Upstream StreamStats Ungaged Report

B-6 – FEMA Effective FIRM Map

B-7 – FEMA Effective FIS Report

B-8 – FEMA HEC-2 MICROFICHE DATA

B-1 CHARTIERS RUN DOWNSTREAM STREAMSTATS DRAINAGE AREA MAP



Zoom To:

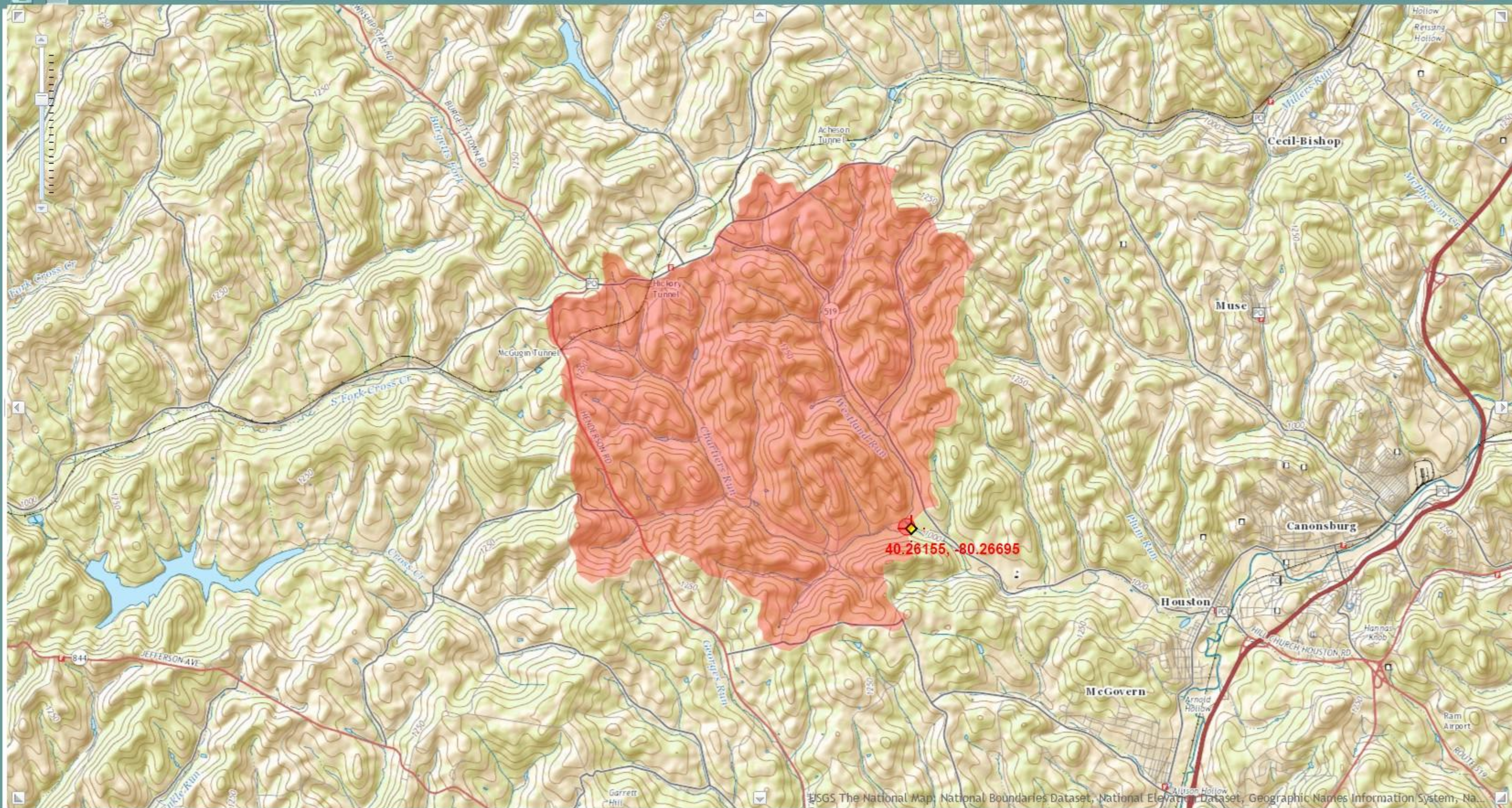
Select on a tool on the toolbar. If the icon remains depressed, click on the map to perform the desired action.

PA Map Layers

- Streamgages
- Stream Grid
- Area of limited functionality
- Pennsylvania
- Study Area Bndys
- Base Layers

Scale: 1 : 72,224

Latitude: 40.32082
Longitude: -80.34367



USGS The National Map: National Boundaries Dataset, National Elevation Dataset, Geographic Names Information System, Na...

B-1 CHARTIERS RUN DOWNSTREAM STREAMSTATS DRAINAGE AREA MAP

B-2 WESTLAND RUN UPSTREAM STREAMSTATS DRAINAGE AREA MAP



Zoom To: ▼

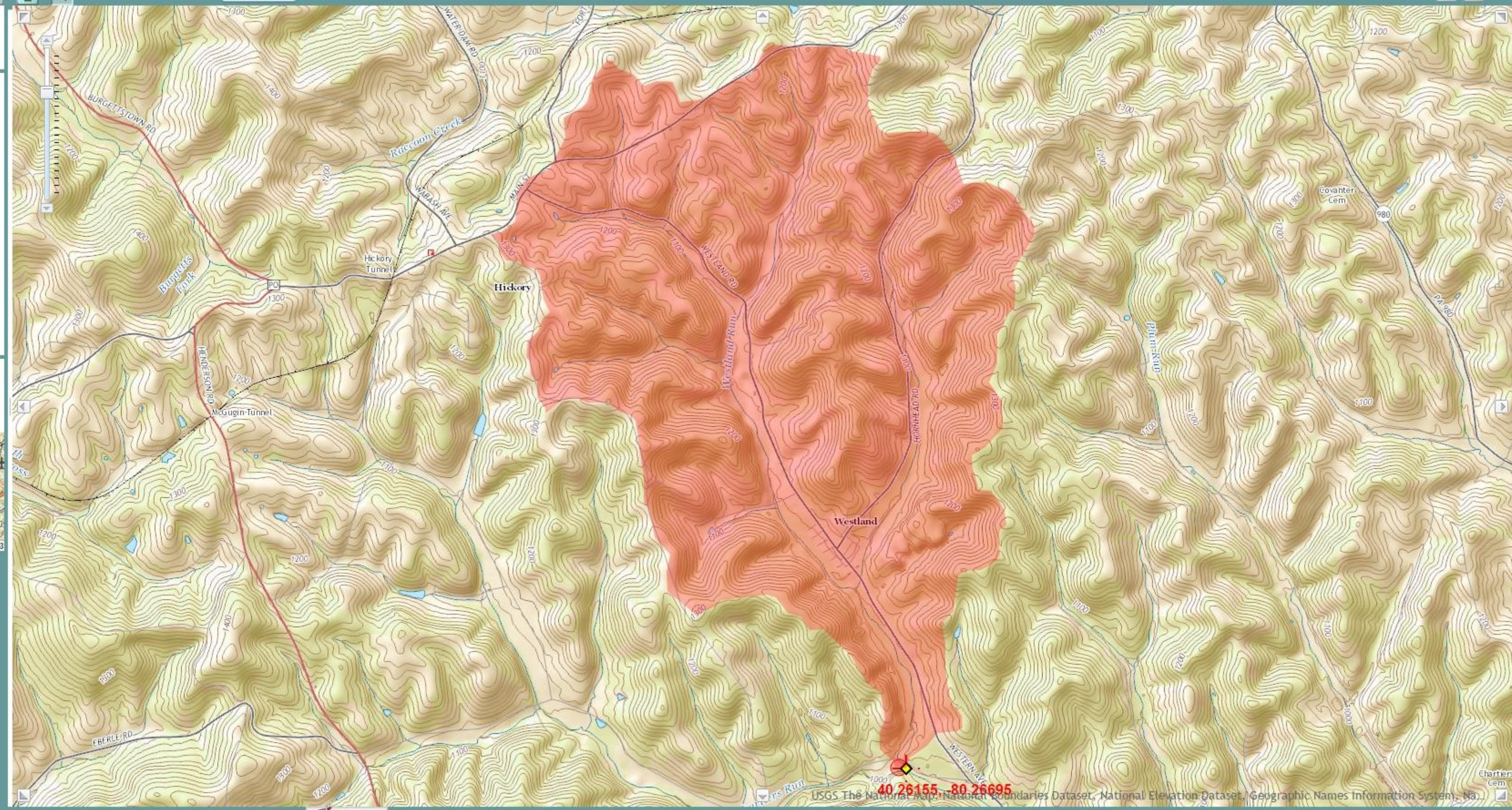
Select on a tool on the toolbar. If the icon remains depressed, click on the map to perform the desired action.

PA Map Layers

- Streamgages
- Stream Grid
- Area of limited functionality
- Pennsylvania
- Study Area Bndys
- Base Layers

0 0.2 0.4mi
 Scale: 1 : 36,112

Latitude: 40.30800
 Longitude: -80.30441 55



USGS The National Map, National Boundaries Dataset, National Elevation Dataset, Geographic Names Information System, Na...



B-3 CHARTIERS RUN UPSTREAM STREAMSTATS DRAINAGE AREA MAP



Zoom To: [dropdown]

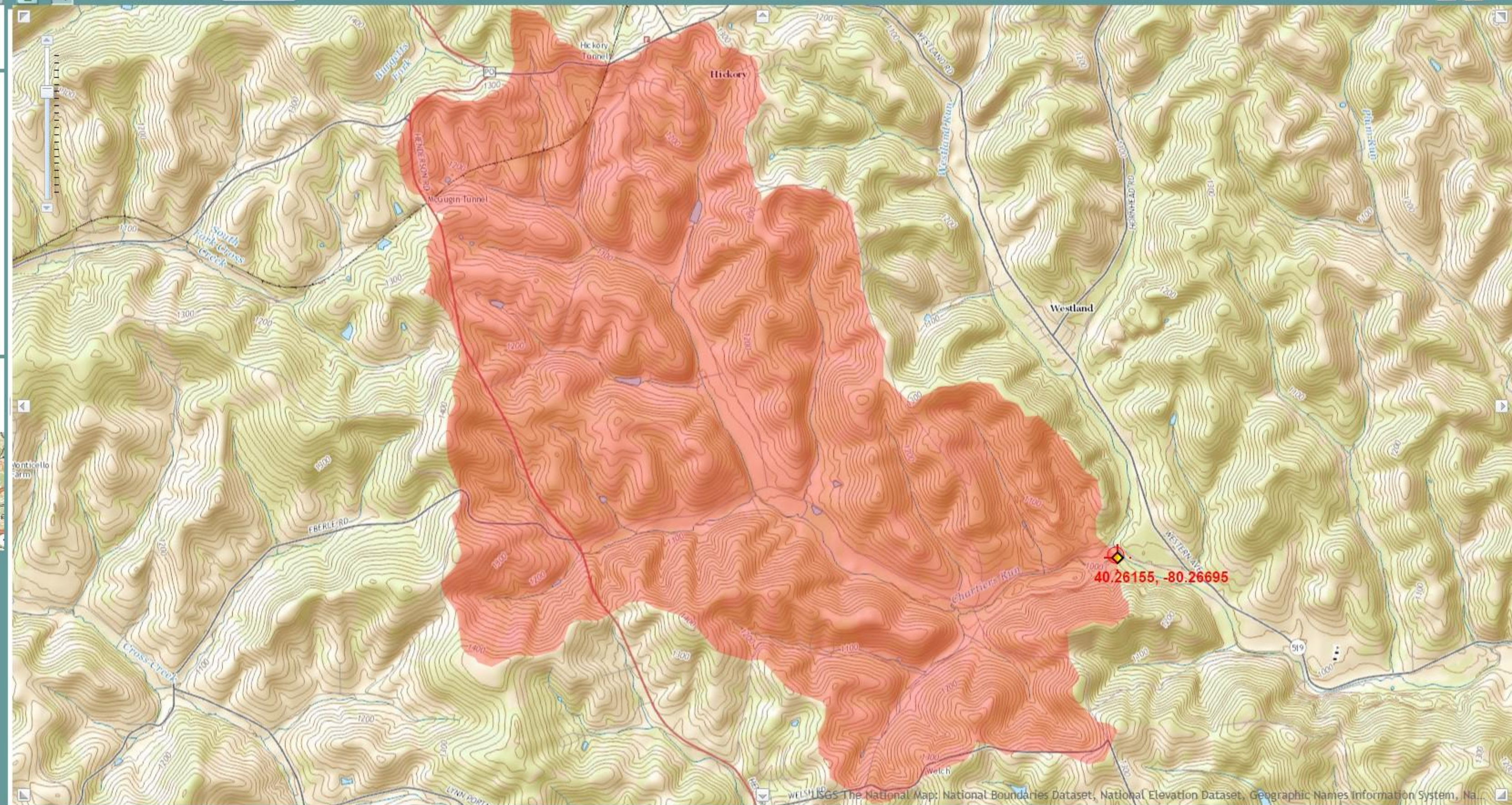
Select on a tool on the toolbar. If the icon remains depressed, click on the map to perform the desired action.

PA Map Layers

- Streamgages
- Stream Grid
- Area of limited functionality
- Pennsylvania
- Study Area Bndys
- Base Layers

0 0.2 0.4mi
Scale: 1 : 36,112

Latitude: 40.29275
Longitude: -80.32387 SS



B-4 WESTLAND RUN UPSTREAM STREAMSTATS UNGAGED REPORT

Flow Statistics Ungaged Site Report Westland Run

Date: Mon Aug 10, 2015 4:31:18 PM GMT-4

Site Location: Pennsylvania

NAD 1983 Latitude: 40.2615 (40 15 42)

NAD 1983 Longitude: -80.2662 (-80 15 59)

Drainage Area: 5.61 mi²

Low Flow Basin Characteristics

100% Low Flow Region 4 (5.61 mi²)

Parameter	Value	Regression Equation Valid Range	
		Min	Max
Drainage Area (square miles)	5.61	2.26	1400
Mean Basin Elevation (feet)	1182.2	1050	2580

Mean/Base-flow Basin Characteristics

100% Statewide Mean and Base Flow (5.61 mi²)

Parameter	Value	Regression Equation Valid Range	
		Min	Max
Drainage Area (square miles)	5.61	2.26	1720
Mean Basin Elevation (feet)	1182.2	130	2700
Mean Annual Precipitation (inches)	39.0	33.1	50.4
Percent Carbonate (percent)	0.0	0	99
Percent Forest (percent)	51.0	5.1	100
Percent Urban (percent)	4.0	0	89

Peak Flow Basin Characteristics

100% Peak Flow Region 3 (5.61 mi²)

Parameter	Value	Regression Equation Valid Range	
		Min	Max
Drainage Area (square miles)	5.61	1.44	1610
Mean Basin Elevation (feet)	1182.2	457	2150
Percent Carbonate (percent)	0.0	0	99
Percent Urban (percent)	4.0	0	64
Percent Storage (percent)	0.0	0	22.6

Low Flow Statistics

Statistic	Value	Unit	Prediction Error (percent)	Equivalent years of record	90-Percent Prediction Interval	
					Min	Max
M7D2Y	0.2	ft ³ /s	43			
M30D2Y	0.35	ft ³ /s	38			
M7D10Y	0.0683	ft ³ /s	66			
M30D10Y	0.13	ft ³ /s	54			
M90D10Y	0.24	ft ³ /s	41			

<http://pubs.usgs.gov/sir/2006/5130/> (<http://pubs.usgs.gov/sir/2006/5130/>)

Stuckey_ M.H._ 2006_ Low-flow_ base-flow_ and mean-flow regression equations for Pennsylvania streams: U.S. Geological Survey Scientific Investigations Report 2006-5130_ 84 p.

Mean/Base-flow Statistics						
Statistic	Value	Unit	Prediction Error (percent)	Equivalent years of record	90-Percent Prediction Interval	
					Min	Max
QA	7.07	ft3/s	12			
QAH	1.17	ft3/s	38			
BF10YR	2.29	ft3/s	21			
BF25YR	1.99	ft3/s	21			
BF50YR	1.82	ft3/s	23			

<http://pubs.usgs.gov/sir/2006/5130/> (<http://pubs.usgs.gov/sir/2006/5130/>)

Stuckey_ M.H._ 2006_ Low-flow_ base-flow_ and mean-flow regression equations for Pennsylvania streams: U.S. Geological Survey Scientific Investigations Report 2006-5130_ 84 p.

Peak Flow Statistics						
Statistic	Value	Unit	Prediction Error (percent)	Equivalent years of record	90-Percent Prediction Interval	
					Min	Max
PK2	318	ft3/s	31	3		
PK5	549	ft3/s	28	5		
PK10	733	ft3/s	28	7		
PK50	1210	ft3/s	31	11		
PK100	1440	ft3/s	36	11		
PK500	2060	ft3/s	43	11		

<http://pubs.usgs.gov/sir/2008/5102/> (<http://pubs.usgs.gov/sir/2008/5102/>)

Roland_ M.A._ and Stuckey_ M.H._ 2008_ Regression equations for estimating flood flows at selected recurrence intervals for ungaged streams in Pennsylvania: U.S. Geological Survey Scientific Investigations Report 2008-5102_ 57p.

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[Streamstats Status](#)

Page Last Modified: 07/10/2015 15:54:20 (Web1)

B-5 CHARTIERS RUN UPSTREAM STREAMSTATS UNGAGED REPORT

Flow Statistics Ungaged Site Report Chartiers Run

Date: Mon Aug 10, 2015 4:27:39 PM GMT-4

Site Location: Pennsylvania

NAD 1983 Latitude: 40.2613 (40 15 41)

NAD 1983 Longitude: -80.2667 (-80 16 00)

Drainage Area: 8.08 mi²

Low Flow Basin Characteristics

100% Low Flow Region 4 (8.08 mi²)

Parameter	Value	Regression Equation Valid Range	
		Min	Max
Drainage Area (square miles)	8.08	2.26	1400
Mean Basin Elevation (feet)	1198.0	1050	2580

Mean/Base-flow Basin Characteristics

100% Statewide Mean and Base Flow (8.08 mi²)

Parameter	Value	Regression Equation Valid Range	
		Min	Max
Drainage Area (square miles)	8.08	2.26	1720
Mean Basin Elevation (feet)	1198.0	130	2700
Mean Annual Precipitation (inches)	39.0	33.1	50.4
Percent Carbonate (percent)	0.0	0	99
Percent Forest (percent)	50.0	5.1	100
Percent Urban (percent)	3.0	0	89

Peak Flow Basin Characteristics

100% Peak Flow Region 3 (8.08 mi²)

Parameter	Value	Regression Equation Valid Range	
		Min	Max
Drainage Area (square miles)	8.08	1.44	1610
Mean Basin Elevation (feet)	1198.0	457	2150
Percent Carbonate (percent)	0.0	0	99
Percent Urban (percent)	3.0	0	64
Percent Storage (percent)	0.0	0	22.6

Low Flow Statistics

Statistic	Value	Unit	Prediction Error (percent)	Equivalent years of record	90-Percent Prediction Interval	
					Min	Max
M7D2Y	0.3	ft ³ /s	43			
M30D2Y	0.53	ft ³ /s	38			
M7D10Y	0.11	ft ³ /s	66			
M30D10Y	0.2	ft ³ /s	54			
M90D10Y	0.36	ft ³ /s	41			

<http://pubs.usgs.gov/sir/2006/5130/> (<http://pubs.usgs.gov/sir/2006/5130/>)

Stuckey_ M.H._ 2006_ Low-flow_ base-flow_ and mean-flow regression equations for Pennsylvania streams: U.S. Geological Survey Scientific Investigations Report 2006-5130_ 84 p.

Mean/Base-flow Statistics						
Statistic	Value	Unit	Prediction Error (percent)	Equivalent years of record	90-Percent Prediction Interval	
					Min	Max
QA	10.2	ft3/s	12			
QAH	1.69	ft3/s	38			
BF10YR	3.25	ft3/s	21			
BF25YR	2.82	ft3/s	21			
BF50YR	2.59	ft3/s	23			

<http://pubs.usgs.gov/sir/2006/5130/> (<http://pubs.usgs.gov/sir/2006/5130/>)

Stuckey_ M.H._ 2006_ Low-flow_ base-flow_ and mean-flow regression equations for Pennsylvania streams: U.S. Geological Survey Scientific Investigations Report 2006-5130_ 84 p.

Peak Flow Statistics						
Statistic	Value	Unit	Prediction Error (percent)	Equivalent years of record	90-Percent Prediction Interval	
					Min	Max
PK2	426	ft3/s	31	3		
PK5	728	ft3/s	28	5		
PK10	967	ft3/s	28	7		
PK50	1580	ft3/s	31	11		
PK100	1870	ft3/s	36	11		
PK500	2670	ft3/s	43	11		

<http://pubs.usgs.gov/sir/2008/5102/> (<http://pubs.usgs.gov/sir/2008/5102/>)

Roland_ M.A._ and Stuckey_ M.H._ 2008_ Regression equations for estimating flood flows at selected recurrence intervals for ungaged streams in Pennsylvania: U.S. Geological Survey Scientific Investigations Report 2008-5102_ 57p.

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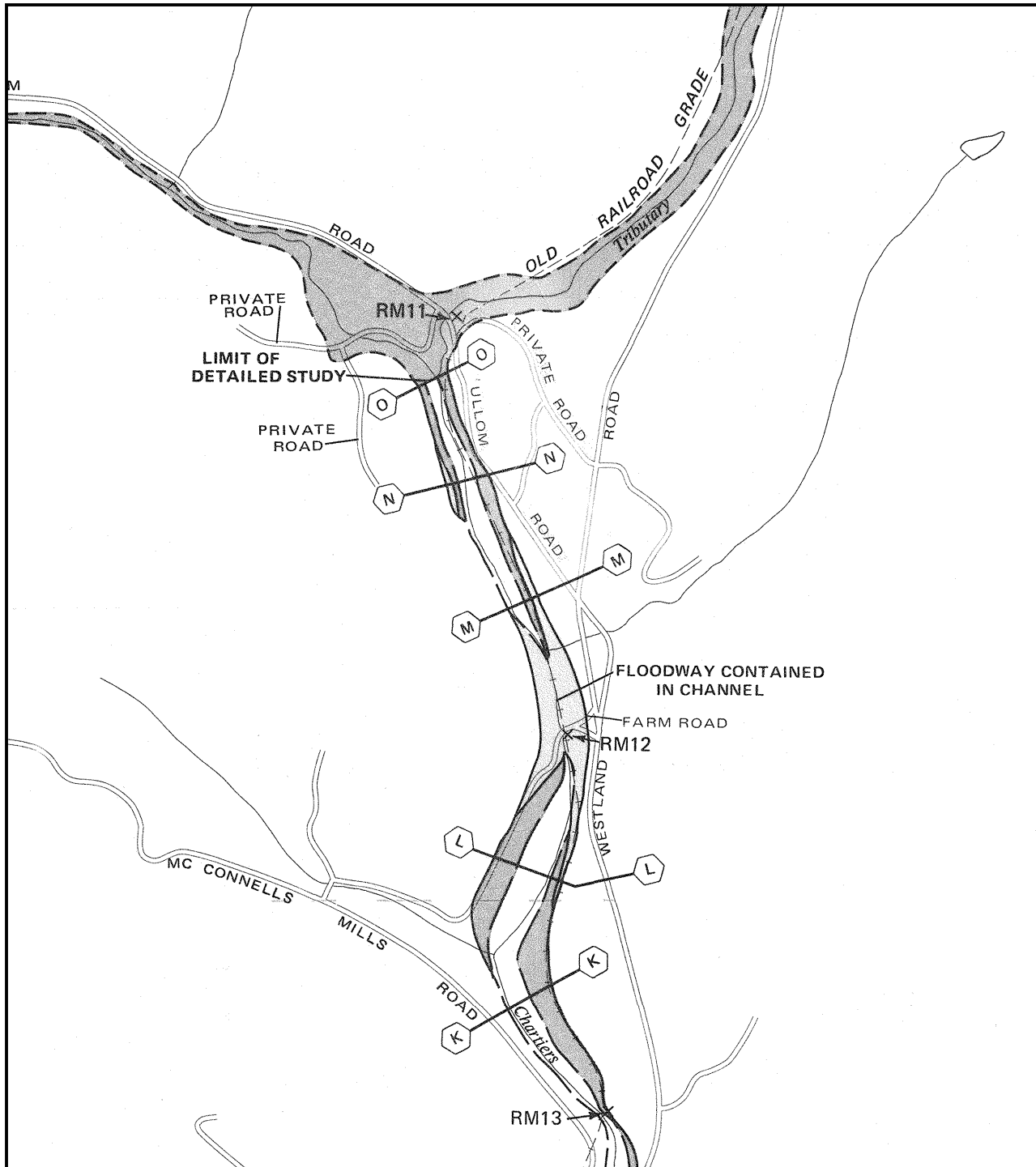
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B-6 FEMA EFFECTIVE FIRM MAP



APPROXIMATE SCALE



NATIONAL FLOOD INSURANCE PROGRAM

FLOODWAY
FLOOD BOUNDARY AND
FLOODWAY MAP

TOWNSHIP OF
CHARTIERS,
 PENNSYLVANIA
 WASHINGTON COUNTY

PANEL 5 OF 10
 (SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
 422144 0005
 EFFECTIVE DATE:
 FEBRUARY 1, 1980



U.S. DEPARTMENT OF HOUSING
 AND URBAN DEVELOPMENT
 FEDERAL INSURANCE ADMINISTRATION

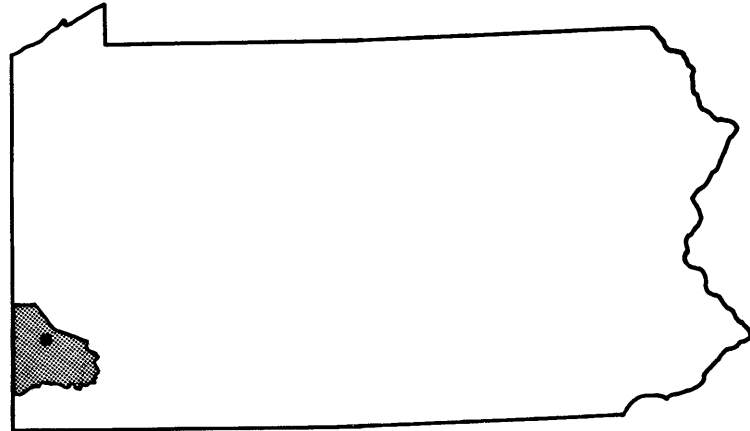
This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

B-7 FEMA EFFECTIVE FIS REPORT

FLOOD INSURANCE STUDY



**TOWNSHIP OF CHARTIERS,
PENNSYLVANIA
WASHINGTON COUNTY**



AUGUST 1979

**FEDERAL EMERGENCY MANAGEMENT AGENCY
FEDERAL INSURANCE ADMINISTRATION**

COMMUNITY NUMBER - 422144

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Georges Run	Panels 04P-05P
Brush Run	Panel 06P
Chartiers Run	Panels 07P-08P

Exhibit 2 - Flood Boundary and Floodway Map Index

Exhibit 3 - Flood Boundary and Floodway Map

PUBLISHED SEPARATELY:

Flood Insurance Rate Map Index

Flood Insurance Rate Map

FLOOD INSURANCE STUDY
TOWNSHIP OF CHARTIERS, PENNSYLVANIA

1.0 INTRODUCTION

1.1 Purpose of Study

The purpose of this Flood Insurance Study is to investigate the existence and severity of flood hazards in the Township of Chartiers, Washington County, Pennsylvania, and to aid in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. Initial use of this information will be to convert Chartiers to the regular program of flood insurance by the Federal Insurance Administration (FIA). Further use of the information will be made by local and regional planners in their efforts to promote sound land use and flood plain development.

1.2 Coordination

In June 1977, the initial Consultation and Coordination Officer's (CCO) meeting was held to determine the areas to be studied by detailed and approximate methods, and to gather information on the township's history, physical lay-out, and flooding records. In attendance were representatives of the Township of Chartiers, the FIA, and the study contractor, Michael Baker, Jr., Inc. Gannett, Fleming, Corddry, and Carpenter, Inc., provided a list of source data it used to prepare the Flood Hazard Boundary Map for Chartiers. A search was made on all levels of government for sources of information relating to flooding in the community's vicinity. Hydrologic and hydraulic data on Chartiers Creek were received from the Pittsburgh District of the U. S. Army Corps of Engineers.

On March 6, 1979, a final CCO meeting was held to present the results of the study to the township. Attending the meeting were community officials and representatives of FIA and the study contractor.

1.3 Authority and Acknowledgements

The source of authority for this Flood Insurance Study is the National Flood Insurance Act of 1968, as amended.

The hydrologic and hydraulic analyses for this study were prepared by Michael Baker, Jr., Inc., for the Federal Insurance Administration, under Contract No. H-4553. This work, which was completed in September 1978, covered all significant flooding sources in the Township of Chartiers.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the Township of Chartiers, Washington County, Pennsylvania. The area of study is shown on the Vicinity Map (Figure 1).

Chartiers Creek was studied in detail for the length of its course through the township, a distance of about 6.2 miles. Brush Run was studied by detailed methods from the township's corporate limits upstream a distance of 0.8 mile. Chartiers Run was studied in detail from its mouth upstream for 3.7 miles, excluding its 0.3-mile reach through the Borough of Houston. Georges Run was studied in detail from the township limits upstream a distance of 3.8 miles. The areas studied by detailed methods were selected with priority given to all known flood hazard areas, areas of projected development, and areas of proposed construction for the next five years, through September 1983.

The following streams were studied by approximate methods: Plum Run, from the township's corporate limits upstream a distance of 3.7 miles; Brush Run, from the limit of the detailed study upstream a distance of 3.6 miles; Chartiers Run, from the limit of the detailed study upstream to the corporate limits, a distance of 1.4 miles; Georges Run, from the limit of the detailed study upstream to the corporate limits, a total distance of 1.3 miles. Nine tributaries to Chartiers Run and Chartiers Creek, henceforth designated as Tributaries 1 through 9, were also studied by approximate methods. Approximate methods of analysis were used to study those areas having low development potential and minimal flood hazards as identified at the initiation of the study. The scope and methods of study were proposed to and agreed upon by the FIA.

2.2 Community Description

The Township of Chartiers is located in southwestern Pennsylvania, in north-central Washington County, about 1 mile north of the City of Washington and about 14 miles southwest of the City of Pittsburgh. The township is bordered on the north by the Township of Cecil, on the east by the Borough of Canonsburg, the Borough of Houston, and the Township of North Strabane, on the south by the Township of South Strabane and the Township of Canton, and on the west by the Township of Mount Pleasant.

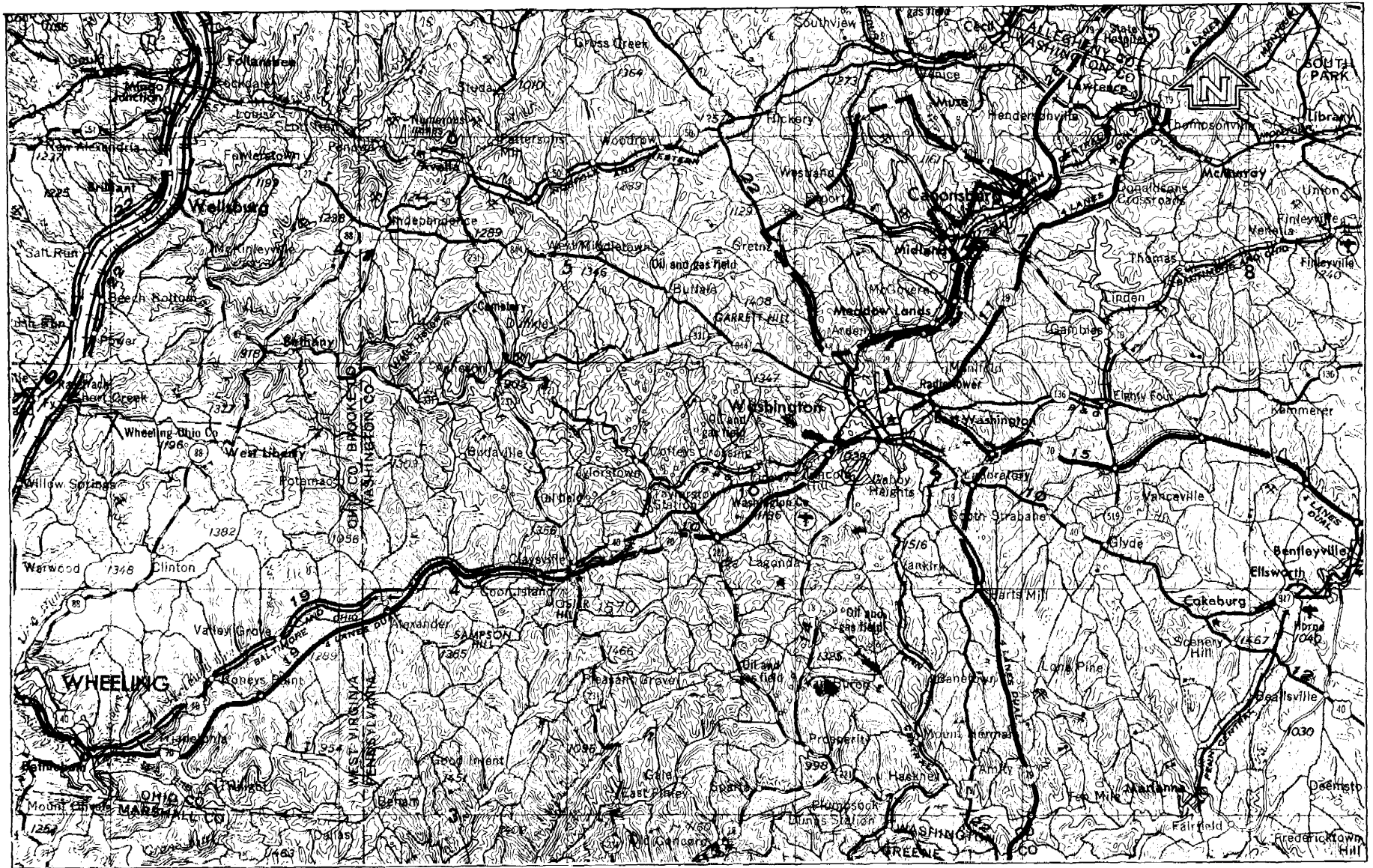


FIGURE 1

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

TOWNSHIP OF CHARTERS, PA
(WASHINGTON CO.)

APPROXIMATE SCALE



VICINITY MAP

Development in the Township of Chartiers is a mix of residential, commercial, and industrial structures. Building in the flood plains of the tributaries to Chartiers Creek is mostly residential, while in the flood plain of Chartiers Creek itself, development is mixed.

The Township of Chartiers, originally part of the Township of Cecil, was established by a Washington County Court action on March 23, 1970. Early industries in the area consisted of farming, lumbering, and coal mining. Today, while farming and mining are still important activities, new industries in Chartiers produce a variety of items including electrical, soap, and steel products (Reference 1). The township's population grew only slightly from 7,225 in 1960 to 7,324 in 1970.

The township has a temperate climate, with an average annual rainfall of 37 inches. It is located in the Kanawha section of the unglaciated Allegheny Plateau. The area is characterized by narrow stream valleys and hills with elevations ranging from about 930 to 1,410 feet. Soils on the hilltops are primarily composed of stoney, clayey soils about 10 feet in thickness. Hillsides are exposed or have thinly overlain rock, while the valleys are comprised of an alluvial mixture of clays, organic matter and a little gravel from the harder rock strata. This soil is fairly impervious and is conducive to a low rate of infiltration and high runoff, especially during rain storms.

Vegetation in the Brush Run, Chartiers Run and Georges Run watersheds consists of lawns, trees, and shrubbery in the residential areas, and trees, brush, and weeds in the undeveloped areas. Vegetation in the Chartiers Creek watershed consists of wooded and agricultural lands which surround the residential and industrial areas in the main valleys.

Chartiers Creek has a drainage area of 76.6 square miles at the downstream corporate limits of the township. It is located along the southeast corporate limits of the township and flows in a northeasterly direction, with an average channel slope of 7 feet per mile. Brush Run has a drainage area of 5.8 square miles at the downstream corporate limits of the township. It is located along the northeast corporate limits of the township and flows in a southeasterly direction, with an average channel slope of about 40 feet per mile. Chartiers Run has a drainage area of 22.1 square miles at its mouth. It is located in the central part of the township and flows in a southeasterly direction, with an average channel slope of 10 feet per mile. Georges Run has a drainage area of 7.2 square

miles at the downstream corporate limits of the township. It is located along the southwest corporate limits of the township and flows in a southeasterly direction, with an average channel slope of 25 feet per mile.

2.3 Principal Flood Problems

The streams in Chartiers flow in somewhat narrow valleys with steep side slopes, which during rainstorms are conducive to rapid runoff, causing streams to rise rapidly with high velocities. Flood damages and elevations can increase because of ice and floating debris, such as trees, logs and brush, which restrict the flow of water through the channel, culverts, and bridges. Although not a significant factor, snowmelt can cause flooding during sudden winter thaws, or in early spring.

Chartiers Creek and its tributaries have a history of flooding from the 1800s. The largest flood in the history of the township occurred in September 1912. Other floods occurred in August 1956, April 1961, March 1963, and February 1966 (Reference 2). The estimated frequencies of these floods are as follows: the flood of 1912 was slightly less than a 50-year flood; the flood of 1956 was about a 20-year flood; the flood of 1961 was less than a 10-year flood; the floods of 1963 and 1966 were slightly larger than a 10-year flood.

The flood of September 1912, was the result of severe thunderstorms which dropped about 6 inches of rain. Small streams became torrents, destroying many businesses and houses. Many bridges were damaged, if not washed away.

The following list shows elevations of five historical floods, measured at the Main Street bridge in the Borough of Houston:

<u>Historical Flood</u>	<u>Elevation</u>
September 1912	951.0
August 1956	949.4
April 1961	946.6
March 1963	948.5
February 1966	948.9

2.4 Flood Protection Measures

A U. S. Army Corps of Engineers (COE) flood protection project is proposed for a reach of Chartiers Creek in the Township of Chartiers

adjoining the Borough of Houston. This project, Unit 2B, consists of deepening, widening and re-aligning the channel of Chartiers Creek (Reference 3). Since the completion date is unknown, this analysis does not consider the effects of the channelization project, and flood profiles and maps have been prepared for present conditions. There are no existing flood protection measures in the Township of Chartiers at this time.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Floods having recurrence intervals of 10, 50, 100, and 500 years have been selected as having special significance for flood plain management and for flood insurance premium rates. The analyses reported here reflect current conditions in the watersheds of the flooding sources.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for floods of the selected recurrence intervals for each flooding source studied in detail in the community.

Peak discharge-frequency relationships for Chartiers Creek, Brush Run, Chartiers Run, and Georges Run were developed by correlating data from five gages in the Chartiers Creek watershed with those from similar watersheds. The relationships were then analyzed by the log-Pearson Type III method (Reference 4).

The gages (all in Pennsylvania) were: No. 855 on Chartiers Creek at Carnegie; No. 861 on Big Sewickley Creek at Ambridge; No. 11115 on Brush Run at Buffalo; No. 498 on Little Pine Creek at Etna; and No. 830 on Green Lick Run at Green Lick Reservoir.

Several ungaged streams studied by detailed methods in the Chartiers Creek watershed were analyzed by a multiple regression method developed by the COE, whereby equations are developed by analyzing twelve different gage records for watersheds of less than 25 square miles, each having more than 25 years of record. The gages are located in eastern Ohio, northern West Virginia, and western Pennsylvania (Reference 5). Flows for the streams in the Chartiers Creek watershed developed from the COE multiple regression method were compared to the drainage area versus discharge relationship and were found to agree.

A summary of drainage area-peak discharge relationships for the streams studied by detailed methods is shown in Table 1, "Summary of Discharges."

TABLE 1 - SUMMARY OF DISCHARGES

<u>FLOODING SOURCE AND LOCATION</u>	<u>DRAINAGE AREA (sq. miles)</u>	<u>PEAK DISCHARGES (cfs)</u>			
		<u>10-YEAR</u>	<u>50-YEAR</u>	<u>100-YEAR</u>	<u>500-YEAR</u>
CHARTIERS CREEK					
At downstream corporate limits	77.5	5,600	10,100	12,600	19,400
Above confluence with Chartiers Run	54.5	4,400	7,800	9,450	14,500
GEORGES RUN					
At the downstream corporate limits	7.2	950	1,620	1,960	2,890
1.9 miles above mouth	3.1	580	990	1,200	1,750
BRUSH RUN					
At downstream corporate limits	6.0	830	1,430	1,750	2,580
CHARTIERS RUN					
At its mouth	22.1	1,920	3,400	4,200	6,300
Above confluence with Plum Run	18.0	1,640	2,890	3,510	5,250
Above confluence of unnamed tributary 0.4 mile above McConnells Mills	14.3	1,380	2,400	2,950	4,400

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of the flooding sources studied in detail in the community were carried out to provide estimates of the elevations of floods of the selected recurrence intervals along each of these flooding sources.

Water-surface profiles for Chartiers Creek, Brush Run, Chartiers Run, and Georges Run were computed through the use of the COE HEC-2 step-backwater computer program (Reference 6).

Cross-section data for these flooding sources were obtained by conventional field surveys. All bridges were surveyed to obtain

structural geometry and elevation data. Roughness coefficients (Manning's "n") for Chartiers Creek, Brush Run, Chartiers Run, and Georges Run were assigned on the basis of field investigation and comparison with similar streams (Reference 7). The roughness coefficients for Chartiers Creek were 0.04 for the channel and 0.1 for the overbanks. For Brush Run, they were 0.055 for the channel and 0.1 for the overbanks; for Chartiers Run, the channel and overbank coefficients ranged from 0.04 to 0.055 and 0.1 to 0.15, respectively; and for Georges Run they ranged from 0.045 to 0.05 and 0.08 to 0.1, respectively.

Flood profiles were drawn showing computed water-surface elevations to an accuracy of 0.5 foot for floods of the selected recurrence intervals. Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway is computed (Section 4.2), selected cross-section locations are also shown on the Flood Boundary and Floodway Map (Exhibit 3).

All elevations used in this study are referenced to the National Geodetic Vertical Datum of 1929 (NGVD), formerly referred to as Sea Level Datum of 1929. Locations of the elevation reference marks used in the study are shown on the maps.

The hydraulic analyses for this study are based on the effects of unobstructed flow. The flood elevations shown on the profiles are valid only if the hydraulic structures remain unobstructed and do not fail.

For streams studied by approximate methods, the extent of flooding was determined by field investigation, use of standard 7.5-minute U. S. Geological Survey (USGS) topographic maps enlarged to a scale of 1"=1,000' with a contour interval of 20 feet (Reference 8), and by accepted engineering principles.

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

A prime purpose of the National Flood Insurance Program is to encourage state and local governments to adopt sound flood plain management programs. Each Flood Insurance Study, therefore, includes a flood boundary map designed to assist communities in developing sound flood plain management measures.

4.1 Flood Boundaries

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by the FIA as the base flood for purposes of flood plain management measures. The 500-year flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the boundaries of the 100- and the 500-year floods have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using topographic maps enlarged to a scale of 1"=1,000', with a contour interval of 20 feet (Reference 8). In cases where the 100- and the 500-year flood boundaries are close together, only the 100-year boundary has been shown.

The flood boundaries of approximate-study streams were delineated using field investigation, engineering judgement, and standard USGS topographical maps (Reference 8).

The boundaries of the 100- and 500-year floods are shown on the Flood Boundary and Floodway Map (Exhibit 3). Small areas within the flood boundaries may lie above the flood elevations and, therefore, may not be subject to flooding. Owing to limitations of the map scale and lack of detailed topographic data, such areas are not shown.

4.2 Floodways

Encroachment on flood plains, such as artificial fill, reduces the flood-carrying capacity, increases the flood heights of streams, and increases flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the Flood Insurance Program, the concept of a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent flood plain areas that must be kept free of encroachment in order that the 100-year flood can be carried without substantial increases in flood heights. Minimum standards of the FIA limit such increases in flood heights to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this report are presented to local agencies as minimum standards that can be adopted or that can be used as a basis for additional studies.

The floodways presented in this study were computed on the basis of equal conveyance reduction from each side of the flood plain. The results of these computations are tabulated at selected cross sections for each stream segment for which a floodway is computed (Table 2).

Portions of the floodway widths on Chartiers Creek, Brush Run, and Georges Run lie outside the corporate limits of the Township of Chartiers.

As shown on the Flood Boundary and Floodway Map (Exhibit 3), the floodway widths were determined at cross sections; between cross sections, the boundaries were interpolated. In cases where the boundaries of the floodway and the 100-year flood are either close together or collinear, only the floodway boundary has been shown.

The area between the floodway and the boundary of the 100-year flood is termed the floodway fringe. The floodway fringe thus encompasses the portion of the flood plain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood by more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 2.

5.0 INSURANCE APPLICATION

In order to establish actuarial insurance rates, the FIA has developed a process to transform the data from the engineering study into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors (FHF's), and flood insurance zone designations for each flooding source affecting the Township of Chartiers.

5.1 Reach Determinations

Reaches are defined as lengths of watercourses having relatively the same flood hazard, based on the average weighted difference in water-surface elevations between the 10- and 100-year floods. This difference does not have a variation greater than that indicated in the following table for more than 20 percent of the reach.

<u>Average Difference Between 10- and 100-Year Floods</u>	<u>Variation</u>
Less than 2 feet	0.5 foot
2 to 7 feet	1.0 foot
7.1 to 12 feet	2.0 feet
More than 12 feet	3.0 feet

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE ¹	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	REGULATORY (NGVD)	WITHOUT FLOODWAY (NGVD)	WITH FLOODWAY (NGVD)	INCREASE (FEET)
Chartiers Creek								
A	32,206	448/206 ²	4,892	1.9	953.8	953.8	954.6	0.8
B	33,736	464/431 ²	4,781	2.0	954.4	954.4	955.3	0.9
C	35,567	105	1,449	6.5	958.1	958.1	959.0	0.9
D	38,126	201/48 ²	2,186	4.3	964.8	964.8	965.3	0.5
E	39,096	251/195 ²	2,557	3.7	965.4	965.4	966.2	0.8
F	41,145	103	1,702	5.6	968.7	968.7	969.3	0.6
G	42,680	301/183 ²	3,418	2.8	970.2	970.2	970.9	0.7
H	44,030	105/76 ²	1,299	7.3	970.8	970.8	971.7	0.9
I	46,593	235/132 ²	2,825	3.0	976.3	976.3	977.1	0.8
J	48,208	145/145 ²	1,988	4.3	977.2	977.2	978.0	0.8
K	49,268	489/489 ²	3,977	2.1	977.8	977.8	978.6	0.8
L	51,976	92	1,212	7.0	980.6	980.6	981.1	0.5
M	53,126	372/337 ²	3,250	2.6	982.4	982.4	983.0	0.6
N	55,584	637/591 ²	4,880	1.7	985.1	985.1	986.0	0.9
O	56,999	635/319 ²	4,100	2.1	985.6	985.6	986.6	1.0
P	57,599	290/267 ²	2,168	3.9	986.1	986.1	987.1	1.0
Q	58,679	207/177 ²	1,887	4.5	988.1	988.1	988.8	0.7
R	60,975	495/471 ²	3,582	1.9	990.8	990.8	991.7	0.9
S	62,298	106/50 ²	1,035	6.5	993.5	993.5	994.4	0.9

¹ Feet above confluence with Little Chartiers Creek

² Width/width within corporate limits

TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration
TOWNSHIP OF CHARTIERS, PA
(WASHINGTON CO.)

FLOODWAY DATA

CHARTIERS CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH ³ (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	REGULATORY (NGVD)	WITHOUT FLOODWAY (NGVD)	WITH FLOODWAY (NGVD)	INCREASE (FEET)
Chartiers Creek (continued)								
T	63,254 ¹	84/35	758	8.8	994.5	994.5	994.8	0.3
U	63,954 ¹	71/30	962	7.0	996.1	996.1	996.1	0.0
Georges Run								
A	2,980 ²	77/65	443	4.4	1004.8	1004.8	1005.8	1.0
B	3,960 ²	107/94	584	3.4	1007.4	1007.4	1008.1	0.7
C	5,015 ²	51/39	278	7.0	1010.2	1010.2	1011.1	0.9
D	5,870 ²	72/37	460	4.3	1013.4	1013.4	1014.1	0.7
E	6,800 ²	93/49	432	4.5	1015.3	1015.3	1016.2	0.9
F	8,870 ²	92/32	564	3.5	1024.2	1024.2	1025.1	0.9
G	11,475 ²	79/49	364	3.3	1033.7	1033.7	1034.3	0.6
H	13,205 ²	65/14	254	4.7	1042.1	1042.1	1042.2	0.1
I	14,295 ²	71/10	331	3.6	1047.2	1047.2	1048.1	0.9
J	15,065 ²	68/57	260	4.6	1051.5	1051.5	1052.1	0.6
K	16,375 ²	66/51	246	4.9	1059.4	1059.4	1060.1	0.7
L	17,635 ²	63/27	263	4.6	1067.5	1067.5	1068.0	0.5
M	20,915 ²	56/41	253	4.7	1092.1	1092.1	1093.0	0.9

¹ Feet above confluence with Little Chartiers Creek

² Feet above mouth

³ Width/width within corporate limits

TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

TOWNSHIP OF CHARTIERS, PA
(WASHINGTON CO.)

FLOODWAY DATA

CHARTIERS CREEK AND GEORGES RUN

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE ¹	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	REGULATORY (NGVD)	WITHOUT FLOODWAY (NGVD)	WITH FLOODWAY (NGVD)	INCREASE (FEET)
Brush Run								
A	3,491	94/17 ²	471	3.7	944.1	944.1	944.9	0.8
B	5,588	116/102 ²	469	3.7	956.9	956.9	957.6	0.7
C	6,276	33/25 ²	225	7.8	964.2	964.2	965.0	0.8
Chartiers Run								
A	2,535	422	3,200	1.1	954.7	954.7	955.5	0.8
B	3,295	335	2,189	1.6	954.9	954.9	955.8	0.9
C	4,970	102	900	3.9	958.7	958.7	959.6	0.9
D	5,865	145	1,147	3.1	960.6	960.6	961.3	0.7
E	7,415	101	723	4.9	964.4	964.4	964.8	0.4
F	8,715	214	1,611	2.2	967.4	967.4	968.1	0.7
G	9,620	235	1,533	2.3	968.6	968.6	969.5	0.9
H	10,965	151	1,189	3.0	972.1	972.1	972.7	0.6
I	12,035	260	1,666	2.1	974.0	974.0	974.8	0.8
J	13,025	184	1,247	2.8	976.5	976.5	977.4	0.9
K	16,090	168	1,071	3.3	986.8	986.8	987.5	0.7
L	17,090	255	1,628	1.8	988.8	988.8	989.7	0.9
M	18,925	103	853	3.5	994.9	994.9	995.6	0.7
N	19,820	136	973	3.0	996.7	996.7	997.6	0.9
O	20,510	111	1,000	2.9	998.0	998.0	999.0	1.0

¹ Feet above mouth

² Width/width within corporate limits

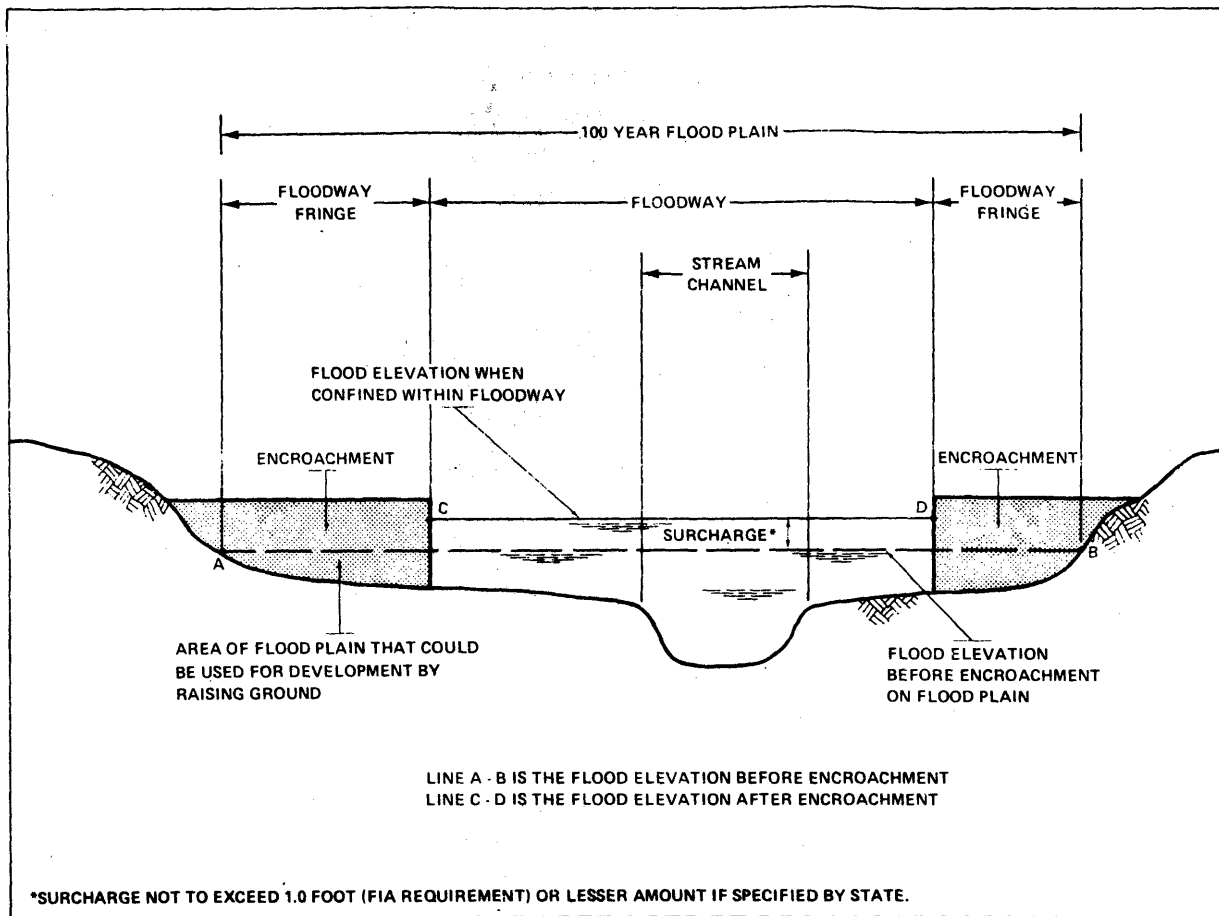
TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

TOWNSHIP OF CHARTIERS, PA
(WASHINGTON CO.)

FLOODWAY DATA

BRUSH RUN AND CHARTIERS RUN



FLOODWAY SCHEMATIC

Figure 2

The locations of reaches determined for the flooding sources of the Township of Chartiers are shown on the Flood Profiles (Exhibit 1) and are summarized in the Flood Insurance Zone Data Table (Table 3).

5.2 Flood Hazard Factors

The FHF is the FIA device used to correlate flood information with insurance rate tables. Correlations between property damage from floods and their FHF's are used to set actuarial insurance premium rate tables based on FHF's from 005 to 200.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water-surface elevations expressed to the nearest 0.5 foot, and shown as a three-digit code. For example, if the difference between water-surface elevations of the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4

FLOODING SOURCE	PANEL ¹	ELEVATION DIFFERENCE ²			FHF	ZONE	BASE FLOOD ELEVATION ³ (NGVD)
		BETWEEN 10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Chartiers Creek Reach 1 Reach 2	05, 10 05	-5.2	-1.7	+4.3	050 040	A10 A8	Varies Varies
		-4.2	-1.0	+2.4			
Georges Run Reach 1	05	-1.5	-0.4	+1.0	015	A3	Varies
Brush Run Reach 1	10	-2.3	-0.7	+1.8	025	A5	Varies
Chartiers Run Reach 1 Reach 2	05 05	-3.5	-0.8	+2.3	035 030	A7 A6	Varies Varies
		-2.8	-0.8	+2.0			

¹Flood Insurance Rate Map Panel

²Weighted average

³Rounded to the nearest foot - see map

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

TOWNSHIP OF CHARTIERS, PA
(WASHINGTON CO.)

FLOOD INSURANCE ZONE DATA

CHARTIERS CREEK, GEORGES RUN, BRUSH RUN AND CHARTIERS RUN

TABLE 3

feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10- and 100-year water-surface elevations is greater than 10.0 feet, accuracy for the FHF is to the nearest foot.

5.3 Flood Insurance Zones

After the determination of reaches and their respective FHF's, the entire incorporated area of the Township of Chartiers was divided into zones, each having a specific flood potential or hazard. Each zone was assigned one of the following flood insurance zone designations:

- | | |
|-----------------------------------|---|
| Zone A: | Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods; no base flood elevations shown or FHF's determined. |
| Zones A3, A5, A6,
A7, A8, A10: | Special Flood Hazard Areas inundated by the 100-year flood, determined by detailed methods; base flood elevations shown, and zones subdivided according to FHF. |
| Zone B: | Areas between the Special Flood Hazard Area and the limits of the 500-year flood, including areas of the 500-year flood plain that are protected from the 100-year flood by dike, levee, or other water control structure; also areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; and areas subject to 100-year flooding from sources with drainage areas less than 1 square mile. Zone B is not subdivided. |
| Zone C: | Areas of minimal flooding. |

Table 3, "Flood Insurance Zone Data," summarizes the flood elevation differences, FHF's, flood insurance zones, and base flood elevations for each flooding source studied in detail in the community.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the Township of Chartiers is, for insurance purposes, the principal result of the Flood Insurance

Study. This map (published separately) contains the official delineation of flood insurance zones and base flood elevation lines. Base flood elevation lines show the locations of the expected whole-foot water-surface elevations of the base (100-year) flood. This map is developed in accordance with the latest flood insurance map preparation guidelines published by the FIA.

6.0 OTHER STUDIES

The FIA is currently preparing studies for the Township of Cecil, the Borough of Canonsburg, the Borough of Houston, and the Townships of North and South Strabane, all of which are in the immediate vicinity of the Township of Chartiers (References 9, 10, 11, 12, and 13). The results of these studies, when completed, should be in exact agreement with the conclusions of this study. As of the date of this study, no other reports on flooding in Chartiers were found to exist.

This study is authoritative for purposes of the Flood Insurance Program, and the data presented here either supersede or are compatible with previous determinations.

7.0 LOCATION OF DATA

Survey, hydrologic, hydraulic, and other pertinent data used in this study can be obtained by contacting the Office of the Federal Insurance Administration, Regional Director, Region III, Curtis Building, Sixth and Walnut Streets, Philadelphia, Pennsylvania 19106.

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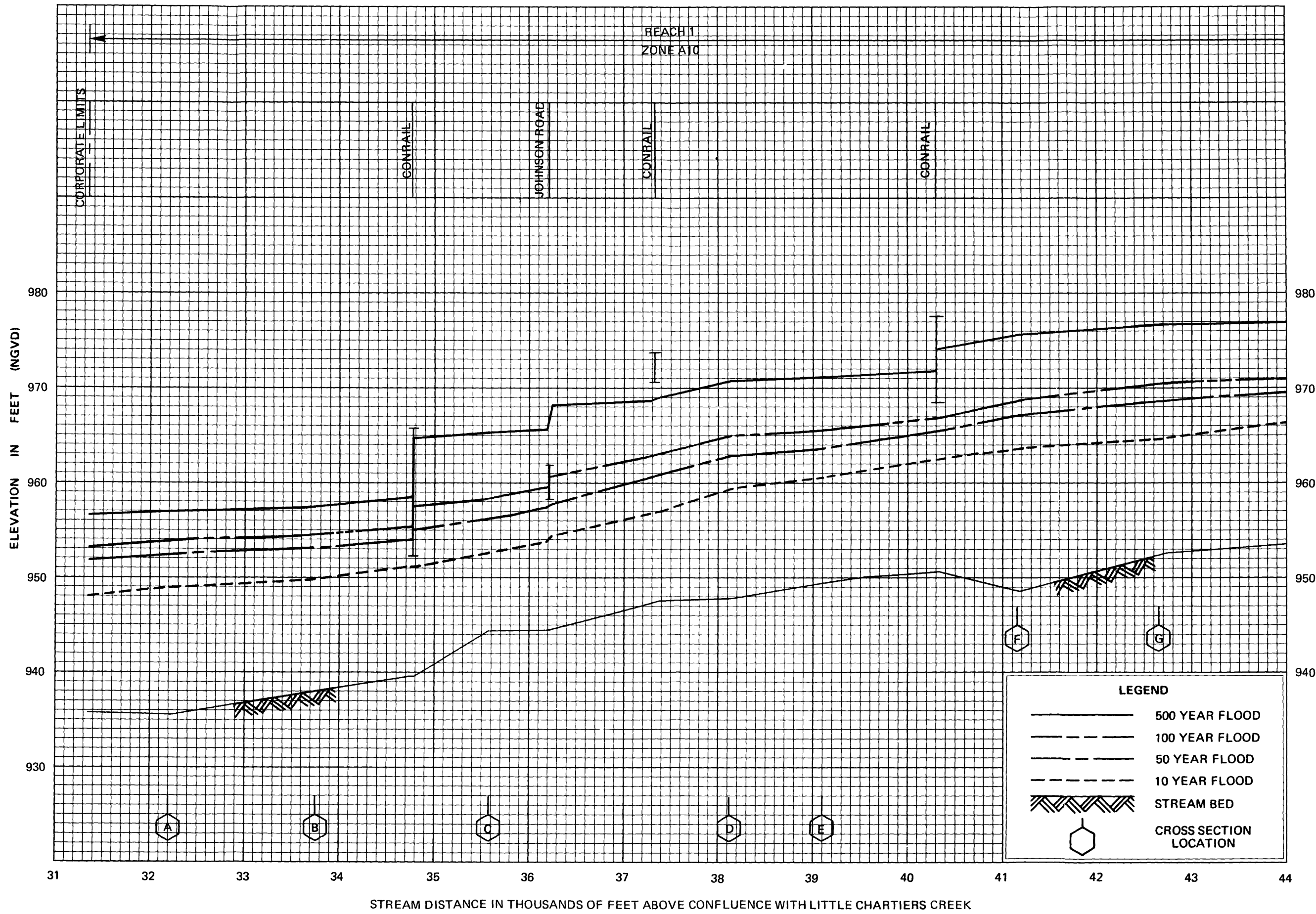
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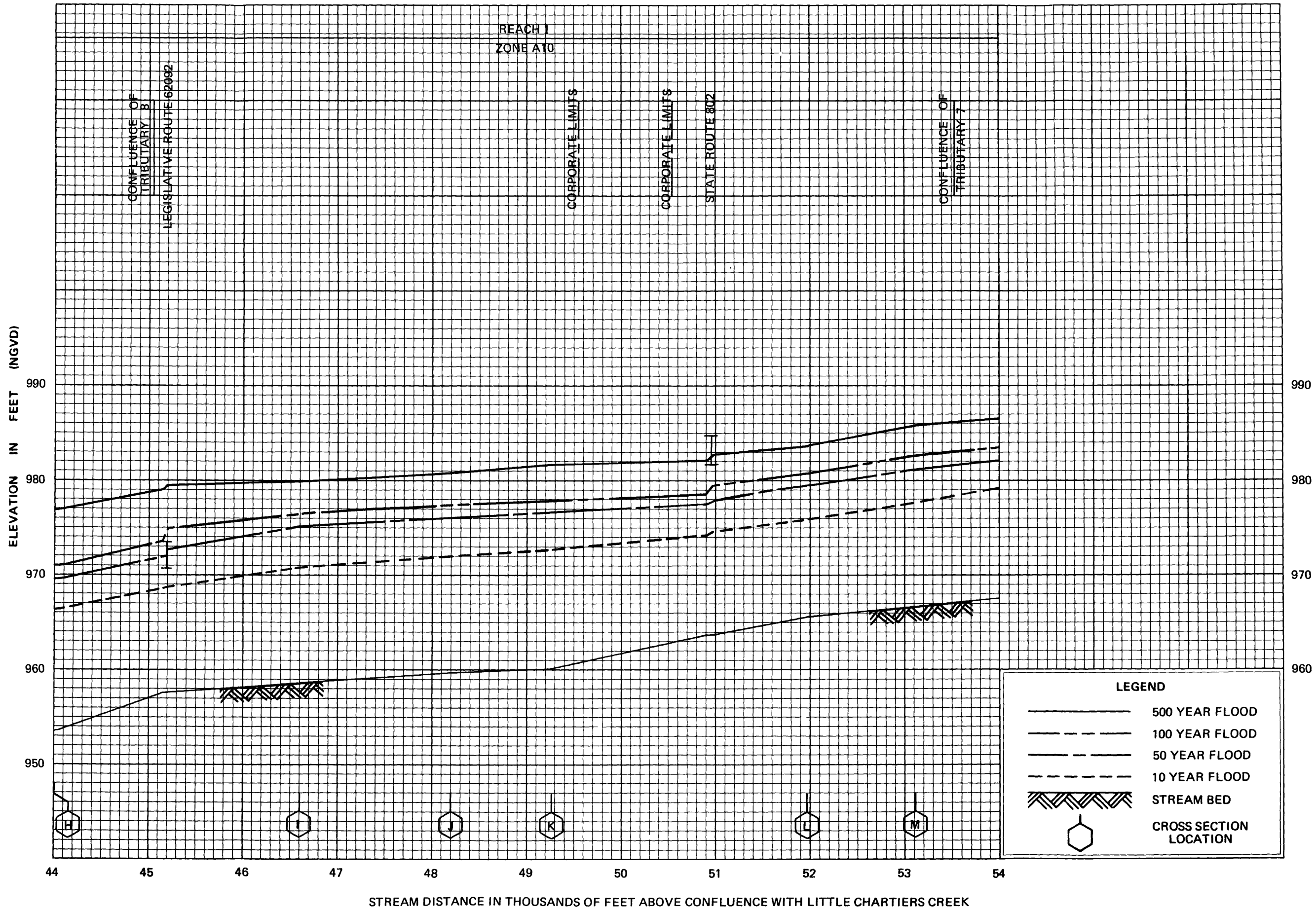


FLOOD PROFILES

CHARTIERS CREEK

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

TOWNSHIP OF CHARTIERS, PA
(WASHINGTON CO.)

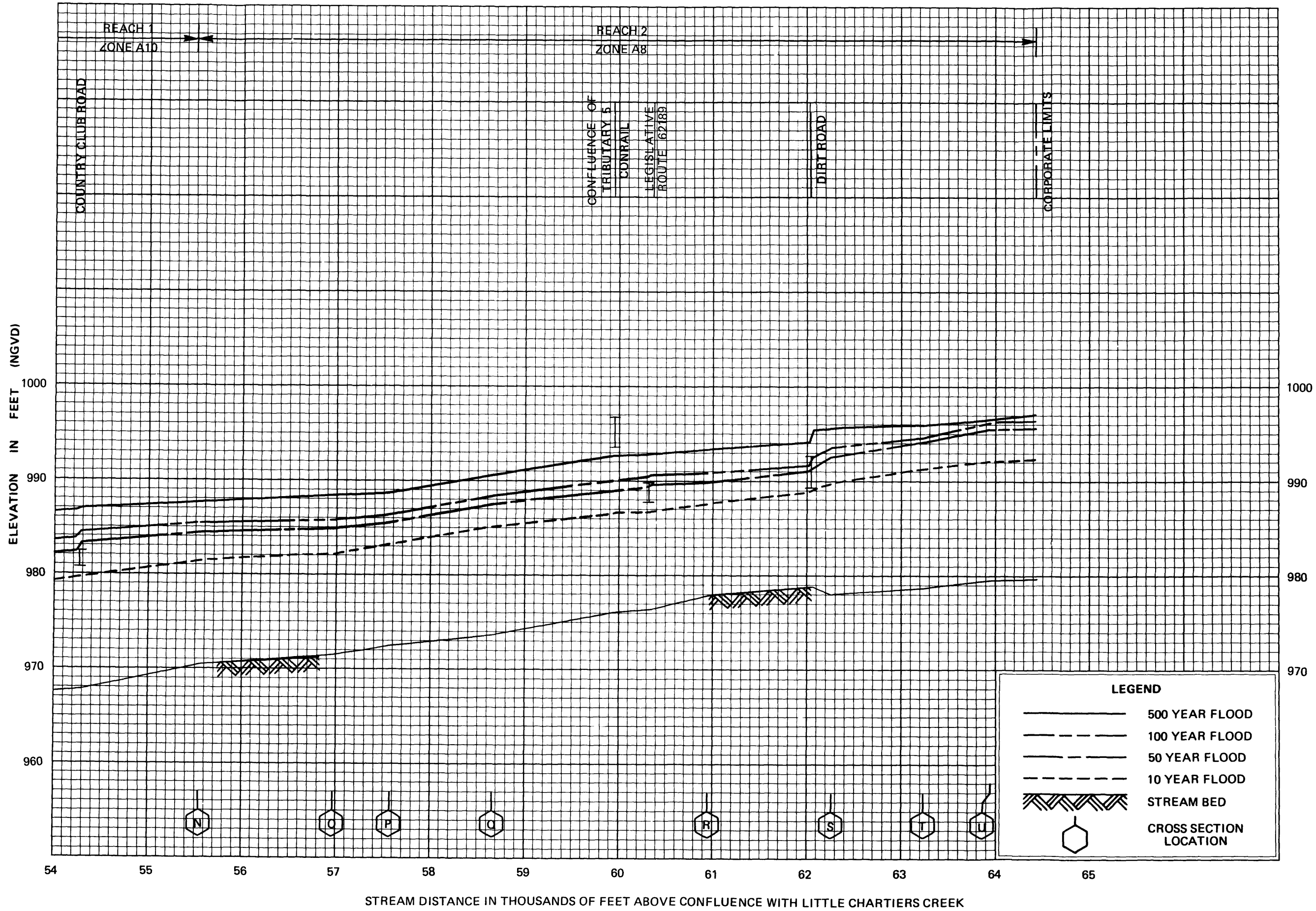


FLOOD PROFILES

CHARTIERS CREEK

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

TOWNSHIP OF CHARTIERS, PA
(WASHINGTON CO.)

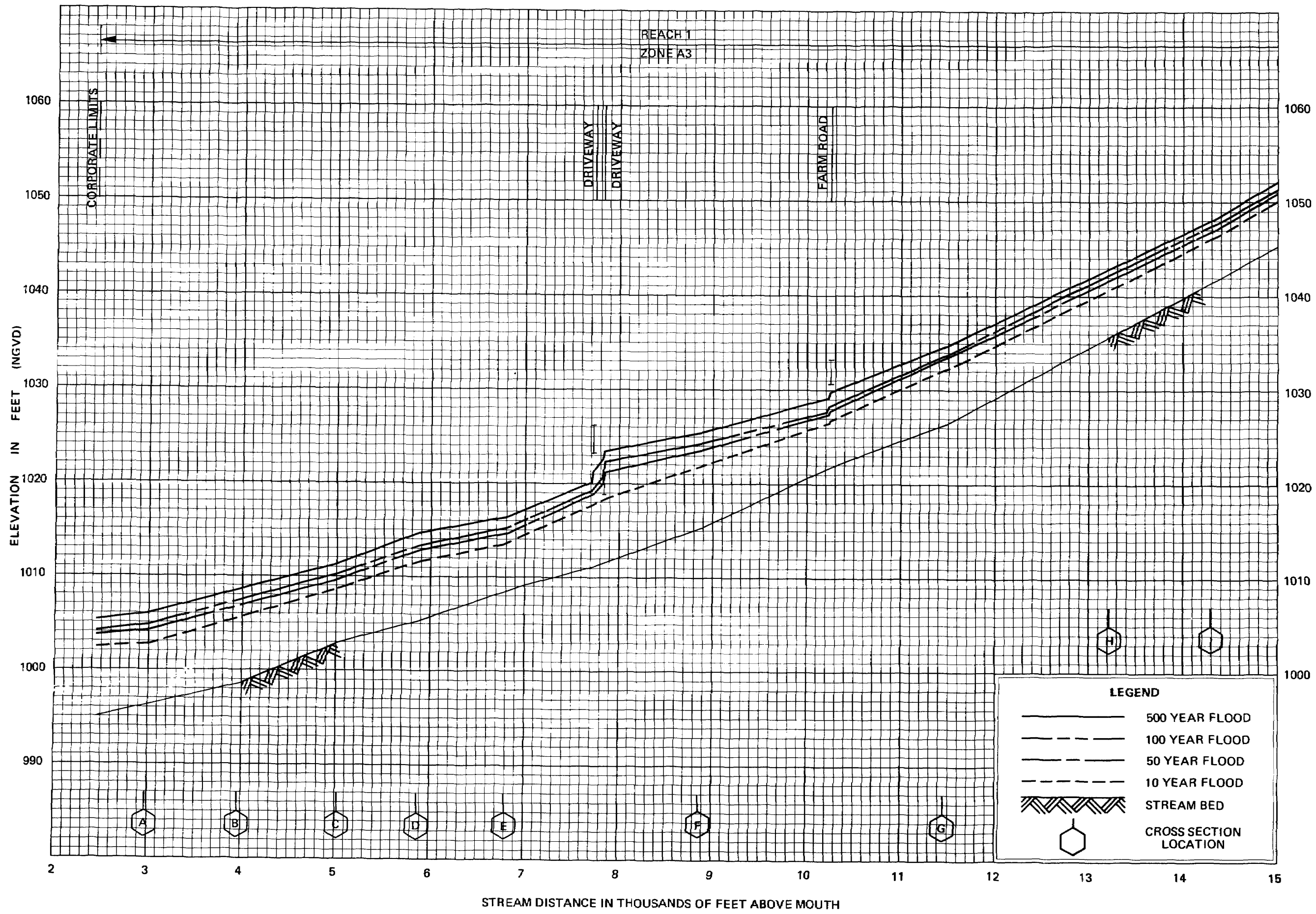


FLOOD PROFILES

CHARTIERS CREEK

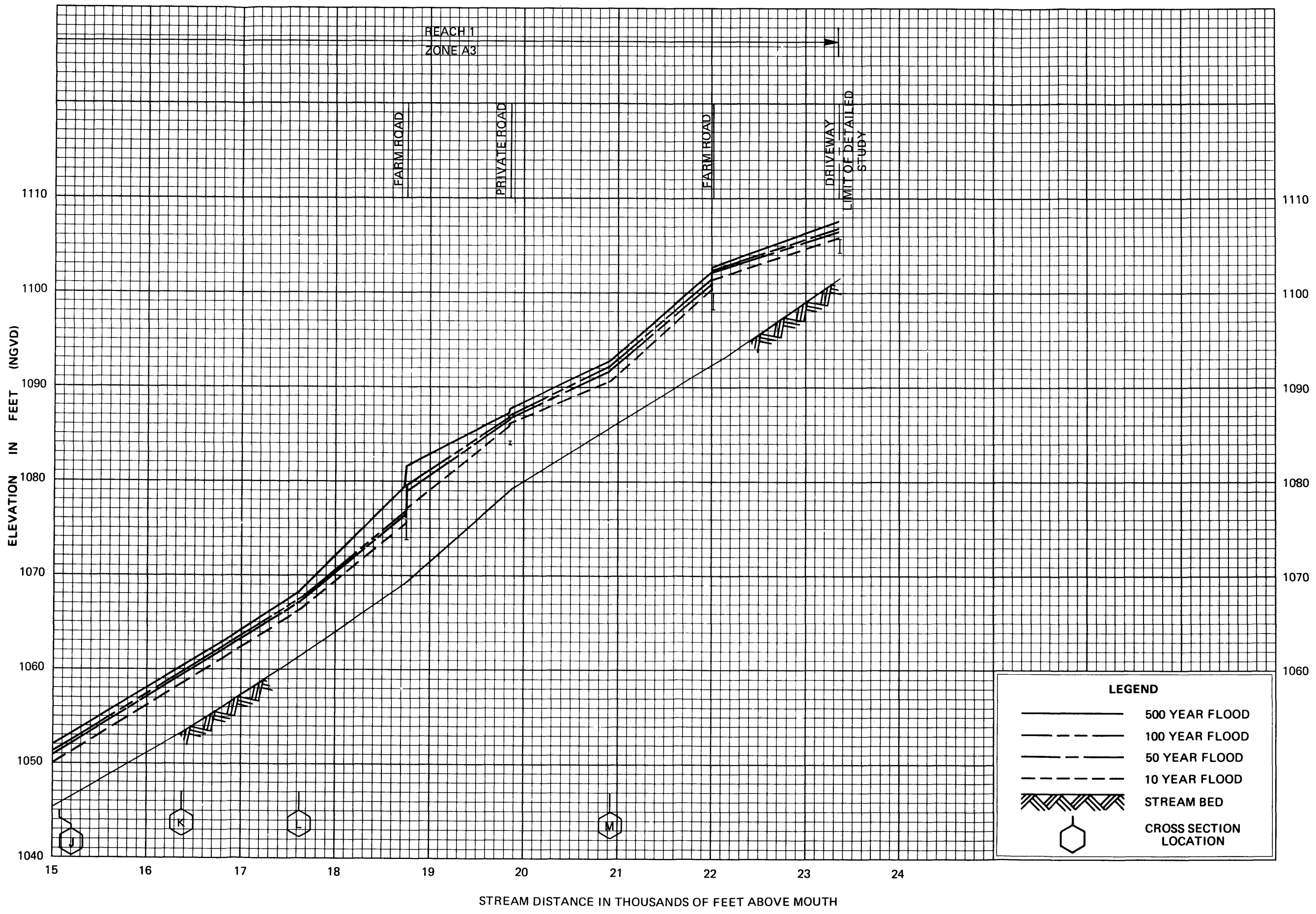
DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

TOWNSHIP OF CHARTIERS, PA
(WASHINGTON CO.)



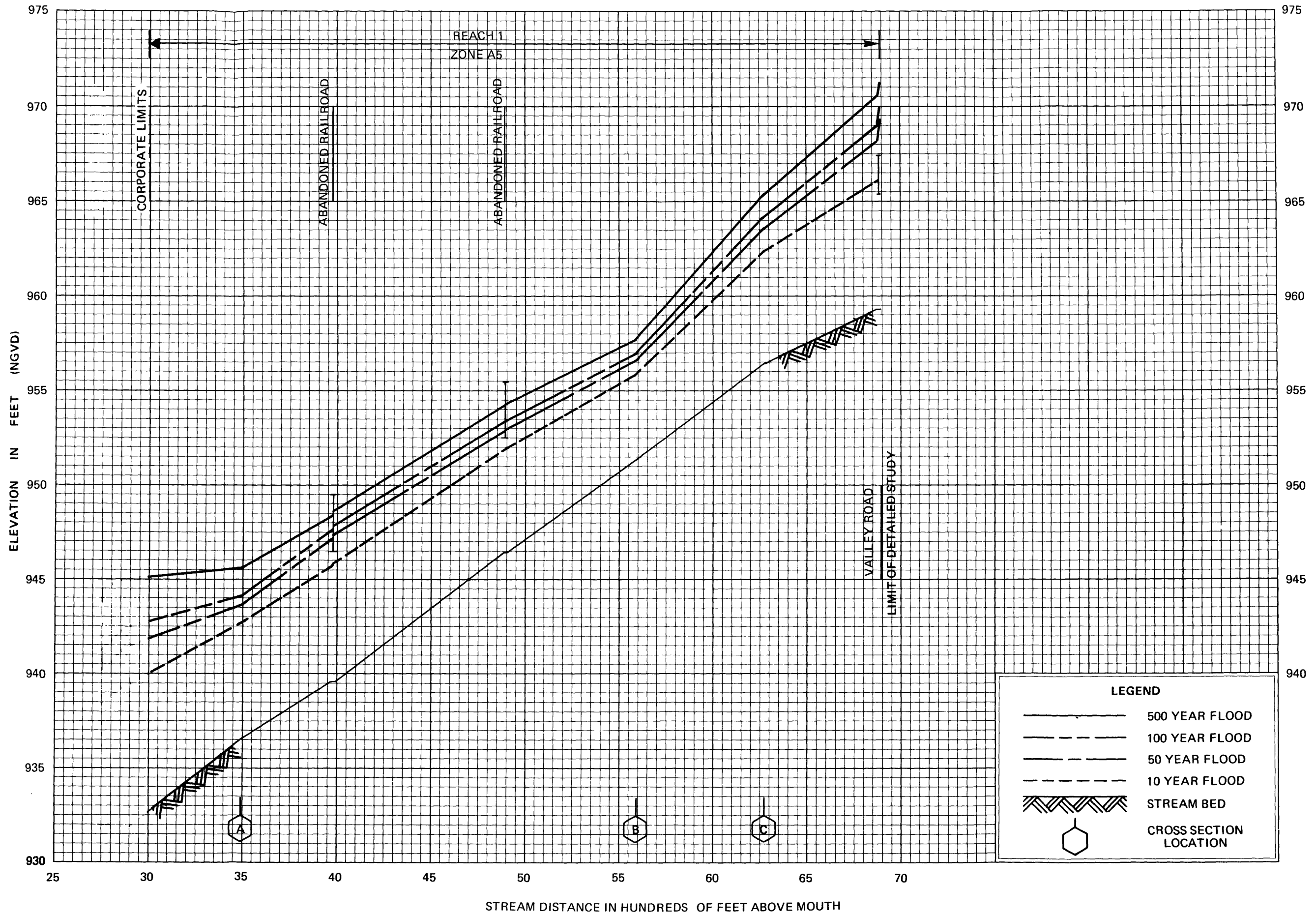
FLOOD PROFILES
GEORGES RUN

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
 Federal Insurance Administration
TOWNSHIP OF CHARTERS, PA
 (WASHINGTON CO.)



FLOOD PROFILES
GEORGES RUN

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration
TOWNSHIP OF CHARTIERS, PA
(WASHINGTON CO.)

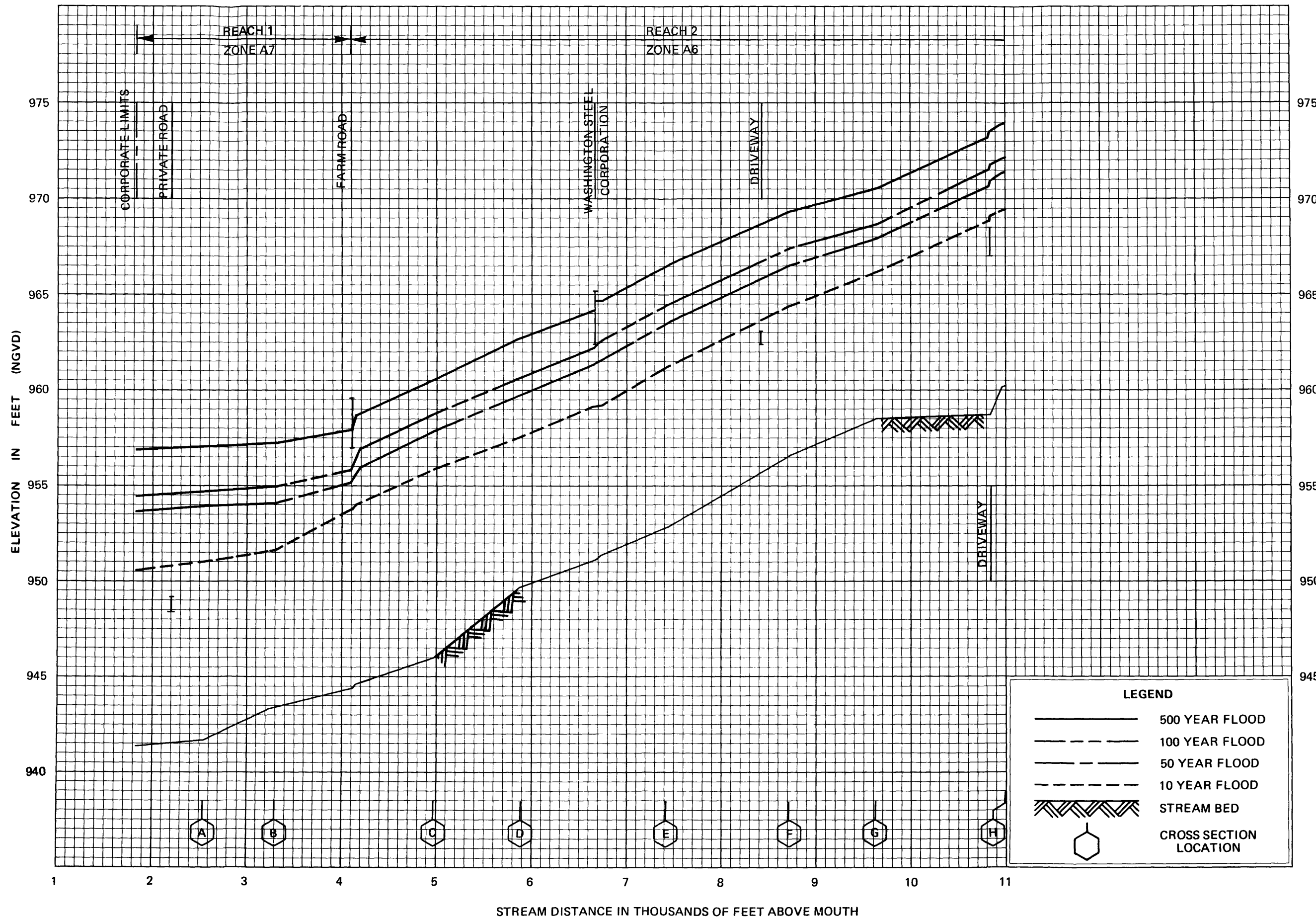


FLOOD PROFILES

BRUSH RUN

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

TOWNSHIP OF CHARTIERS, PA
(WASHINGTON CO.)

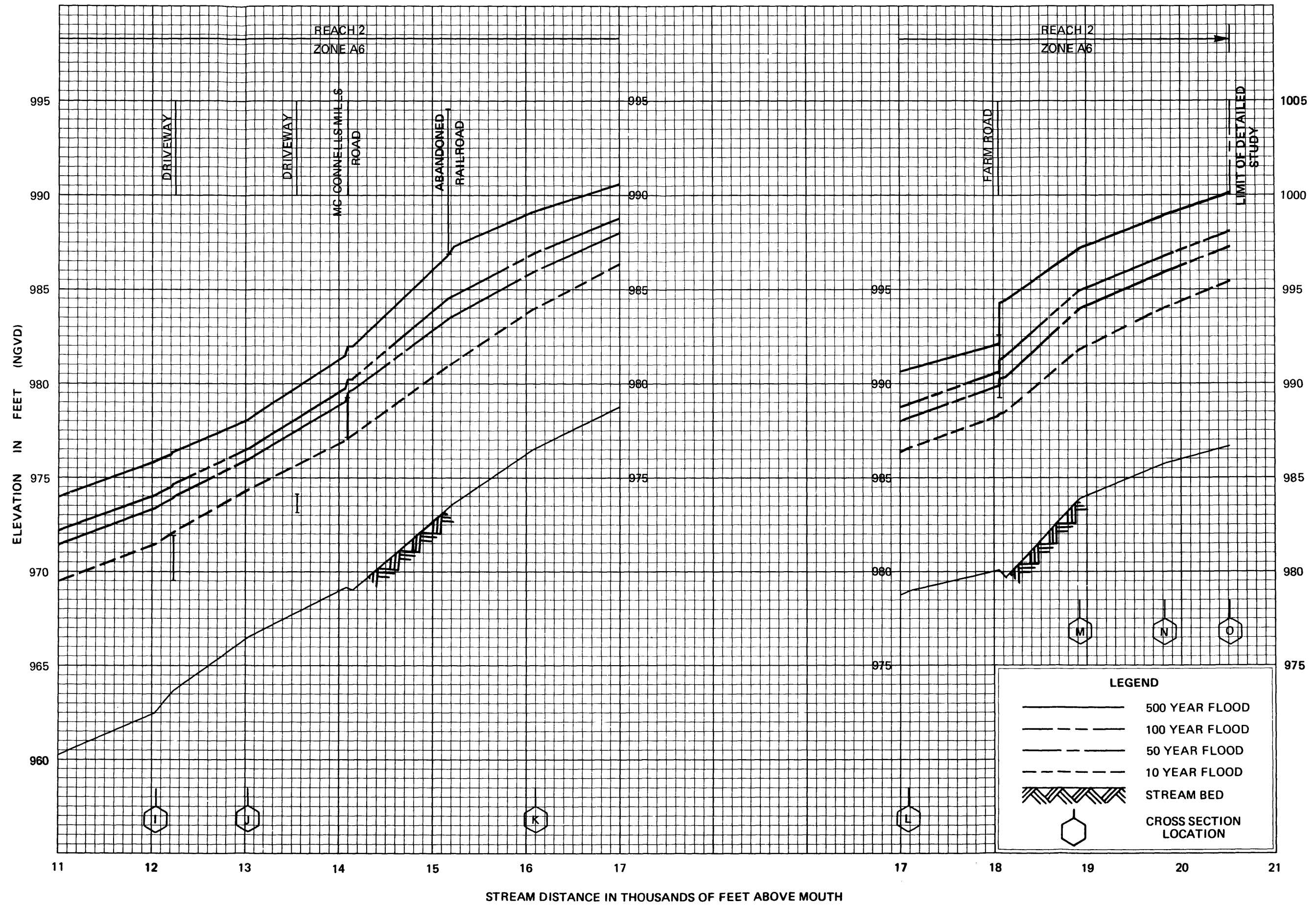


FLOOD PROFILES

CHARTIERS RUN

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

TOWNSHIP OF CHARTIERS, PA
(WASHINGTON CO.)



FLOOD PROFILES
CHARTIERS RUN

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration
TOWNSHIP OF CHARTIERS, PA
(WASHINGTON CO.)

B-8 FEMA HEC-2 MICROFICHE DATA

June 1978
 Existing Conditions
 Condition before Completion
 of COE Proposed Unit 2B

This information will apply and
 comprise the flood insurance study
 for this community until the COE
 proposed channelization project,
 Unit 2B is constructed.

 OBJECT RELEASE DATED NOV 79 UPDATED AUG 1977
 TRACK CORR 02
 MODIFICATION 50,51,52,53, HBJ UPDATE MADE 18 JAN 8 PM

T1 35 WFA FIS ACCRPT H-45531
 T2 CHARTERS-TENNSHIP WASHINGTON CO.
 T3 FLOOD-FLOOD-20-DCK-CHARTERS-LIN-NORMAL CHANNEL

J1	ICHECK	ING	NOV	IVIA	STRT	METRIC	HYHS	U	WSEL	SA
	0.	4.	0.	0.	0.002500	0.0	0.0	0.	980.000	0.0
J2	APPOF	IPLT	PRFS	XSECV	XSECF	FA	ALLUC	Ida	CHIM	ITRAE
	1.000	0.0	-1.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0
J3	VARIABLE CODES FOR SUMMARY PRINTOUT									
	38.000	43.000	1.000	8.000	35.000	65.000	53.000	25.000	21.000	22.000
	20.000	54.000	4.000	0.0	38.000	39.000	42.000	35.000	40.000	41.000
	1.000	59.000	51.000	52.000	3.000	61.000	64.000	200.000	0.0	0.0
ST	9.000	1920.000	3400.000	4200.000	6300.000	4200.000	4200.000	4200.000	4200.000	4200.000
AC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NC	0.100	0.100	0.040	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ET	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.400	0.0	0.0
Y1	0.010	11.000	1965.000	2030.000	0.0	0.0	0.0	0.0	0.0	0.0
GR	960.000	950.000	948.000	1955.000	940.000	1975.000	930.000	1990.000	930.000	2010.000
GR	942.000	2020.000	544.000	2030.000	540.000	2125.000	550.000	2135.000	550.000	2140.000
GR	960.000	2150.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NC	0.100	0.100	0.040	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y1	0.000	9.000	1975.000	2024.000	422.000	422.000	422.000	0.0	0.0	0.0
GR	980.000	1900.000	950.000	1900.000	951.000	1975.000	950.000	1975.000	950.000	2024.000
GR	951.000	2024.000	551.000	2024.000	545.000	2170.000	980.000	2440.000	0.0	0.0
NC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ET	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.100	0.0	1975.000
Y1	0.110	0.0	0.0	0.0	0.0	1.000	1.000	1.000	0.0	0.0
BT	4.000	1975.000	951.000	0.0	1975.000	953.000	947.000	2024.000	953.000	947.000
BT	2024.000	951.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ET	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.100	0.0	1975.000
Y1	0.12	0.0	0.0	0.0	0.0	14.000	14.000	14.000	0.0	0.0
X2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.000	0.0	0.0

MC	0.130	0.150	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ET	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
X1	9.000	16.000	1585.000	2116.000	551.000	525.000	1078.000	0.0	0.0	0.0
GR	905.300	1600.000	573.900	1700.000	565.700	1800.000	968.700	1658.000	570.400	1527.000
GR	972.100	1960.000	565.200	1685.000	565.700	1992.000	565.300	1995.000	565.300	2000.000
GR	963.700	2010.000	568.900	2010.000	907.800	2082.000	972.100	2152.000	576.000	2200.000
GR	985.700	2250.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
X1	9.100	14.000	1992.000	2005.000	188.000	185.000	185.000	0.0	0.0	0.0
GR	985.300	1600.000	573.900	1700.000	565.700	1800.000	968.700	1658.000	570.400	1527.000
GR	972.100	1960.000	565.200	1685.000	565.700	1992.000	565.300	1995.000	565.300	2000.000
GR	963.700	2010.000	568.900	2010.000	907.800	2082.000	972.100	2152.000	576.000	2200.000
GR	985.700	2250.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
X1	9.110	0.0	0.0	0.0	1.000	1.000	1.000	0.0	0.0	0.0
BT	3.000	1992.000	971.800	566.000	2005.000	971.800	569.000	2009.000	571.000	969.000
X1	9.120	0.0	0.0	0.0	12.000	12.000	12.000	0.0	0.0	0.0
X2	0.0	0.0	0.0	0.0	0.0	0.0	1.000	0.0	0.0	0.0
X1	9.130	0.0	0.0	0.0	1.000	1.000	1.000	0.0	0.0	0.0
ET	0.0	0.0	0.0	0.0	0.0	0.0	4.400	0.0	0.0	0.0
X1	10.000	14.000	1980.000	2020.000	788.000	788.000	788.000	0.0	0.0	0.0
GR	990.900	1500.000	987.200	1540.000	972.300	1505.000	972.300	1600.000	571.500	1515.000
GR	971.300	1943.000	570.300	1552.000	970.700	1500.000	500.000	1500.000	500.000	2000.000
GR	566.600	2014.000	566.100	2016.000	570.000	2020.000	992.800	2020.000	0.0	0.0
ET	0.0	0.0	0.0	0.0	0.0	0.0	7.100	0.0	1515.000	2021.000
X1	10.100	17.000	1565.000	2031.000	1000.000	1160.000	1057.000	0.0	0.0	0.0
X3	10.000	0.0	0.0	0.0	0.0	0.0	0.0	577.200	577.700	0.0
GR	989.800	1748.000	981.500	1800.000	575.300	1822.000	977.300	1528.000	576.200	1505.000
GR	976.800	1920.000	977.300	1935.000	978.900	1565.000	565.200	1569.000	565.200	1595.000
GR	977.400	1999.000	977.500	2102.000	570.200	2002.000	472.900	2031.000	575.500	2031.000
GR	982.600	2100.000	989.800	2134.000	0.0	0.0	0.0	0.0	0.0	0.0
AC	0.0	0.0	0.0	0.0	1.000	0.0	0.0	0.0	0.0	0.0
ET	0.0	0.0	0.0	0.0	0.0	0.0	9.100	0.0	1515.000	2021.000
X1	10.110	0.0	0.0	0.0	1.000	1.000	1.000	0.0	0.0	0.0
X3	10.000	0.0	0.0	0.0	0.0	0.0	0.0	577.200	577.700	0.0
BT	3.000	1992.000	978.500	577.200	2031.000	575.500	577.700	2031.000	575.500	577.700
NC	0.0	0.0	0.0	0.300	0.500	0.0	0.0	0.0	0.0	0.0
ET	0.0	0.0	0.0	0.0	0.0	0.0	9.100	0.0	1515.000	2021.000
X1	10.120	0.0	0.0	0.0	23.000	23.000	23.000	0.0	0.0	0.0
X2	0.0	0.0	0.0	0.0	0.0	0.0	1.000	0.0	0.0	0.0
X3	10.000	0.0	0.0	0.0	0.0	0.0	0.0	577.200	577.700	0.0
ET	0.0	0.0	0.0	0.0	0.0	0.0	5.100	0.0	1515.000	2021.000
X1	10.130	0.0	0.0	0.0	1.000	1.000	1.000	0.0	0.0	0.0
X3	10.000	0.0	0.0	0.0	0.0	0.0	0.0	577.200	577.700	0.0
NC	0.0	0.0	0.0	0.400	0.600	0.0	0.0	0.0	0.0	0.0
ET	0.0	0.0	0.0	0.0	0.0	0.0	3.400	0.0	0.0	0.0
X1	10.150	15.000	1987.000	2010.000	50.000	50.000	50.000	0.0	0.0	0.0
X4	2.000	980.000	1960.000	577.200	1576.000	0.0	0.0	0.0	0.0	0.0
GR	1000.000	1750.000	972.400	1967.000	571.000	1995.000	909.700	1550.000	909.200	1597.000
GR	569.000	2000.000	965.200	2022.000	565.800	2004.000	570.700	2005.000	571.600	2020.000
GR	971.900	2029.000	570.100	2035.000	575.000	2048.000	980.000	2100.000	570.000	2000.000
AC	0.0	0.0	0.0	0.100	0.500	0.0	0.0	0.0	0.0	0.0
ET	0.0	0.0	0.0	0.0	0.0	0.0	10.400	0.0	0.0	0.0

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Y2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ET	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y1	12.130	0.0	0.0	0.0	1.500	1.500	1.000	0.0	0.0	0.0	0.0
Y3	10.000	0.0	0.0	0.0	0.0	0.0	0.0	992.700	992.700	0.0	0.0
AC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ET	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y1	12.150	11.000	1586.000	2013.000	50.000	50.000	50.000	0.0	0.0	0.0	0.0
Y4	1.000	961.600	1965.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GR	1000.000	1890.000	986.000	1981.000	585.500	1980.000	983.000	1985.000	587.500	1992.000	0.0
GR	979.800	2000.000	979.600	2000.000	983.000	2011.000	984.000	2013.000	987.000	2029.000	0.0
GR	1000.000	2225.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NC	0.0	0.0	0.0	0.100	0.000	0.0	0.0	0.0	0.0	0.0	0.0
ET	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y1	13.000	22.000	1982.000	2020.000	806.000	806.000	806.000	0.0	0.0	0.0	0.0
GR	1008.500	1505.000	1003.300	2152.000	2100.500	1563.000	1060.500	1576.000	1000.200	1006.000	0.0
GR	1001.900	1719.000	992.200	2151.000	994.600	1667.000	992.700	1652.000	992.700	1650.000	0.0
GR	990.600	1882.000	988.100	2151.000	982.600	1582.000	983.700	1167.000	984.300	1550.000	0.0
GR	983.800	1994.000	983.900	2000.000	984.200	2068.000	980.000	2020.000	997.700	2029.000	0.0
GR	998.700	2081.000	1005.400	2072.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ET	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y1	14.000	23.000	1976.000	2013.000	895.000	895.000	895.000	0.0	0.0	0.0	0.0
GR	1006.300	1715.000	1000.400	1725.000	1000.400	1773.000	1001.500	1702.000	1001.500	1792.000	0.0
GR	1001.400	1808.000	995.500	1812.000	993.500	1850.000	993.500	1800.000	992.500	1801.000	0.0
GR	990.600	1978.000	985.700	1587.000	984.200	1997.000	985.500	2000.000	985.700	2005.000	0.0
GR	986.200	2006.000	990.900	2013.000	990.300	2038.000	991.500	2084.000	990.900	2080.000	0.0
GR	999.300	2145.000	1007.000	2222.000	1026.600	2222.000	0.0	0.0	0.0	0.0	0.0
ET	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y1	15.000	14.000	1973.000	2010.000	890.000	890.000	890.000	0.0	0.0	0.0	0.0
GR	1008.300	1851.000	996.500	1510.000	994.600	1948.000	994.200	1973.000	988.000	1900.000	0.0
GR	987.100	1988.000	986.600	1594.000	981.600	2000.000	987.300	2100.000	987.500	2000.000	0.0
GR	991.800	2016.000	989.700	2051.000	992.600	2103.000	1000.500	2142.000	0.0	0.0	0.0
EJ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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*PROF 1
 CCHV= 0.300 CEHV= 0.500
 SECAC= 0.10

SECD DEPTH CNSEL CRINS NSEL EL HY HL ULUSS BARRLEY

THIS RUN EXECUTED 08/11/76 11.51

HECZ RELEASE DATED NOV 76; UPDATED AUG 1977
ERRR CORR: Q102
MODIFICATION: 50, 51, 52, 53, HBJ; UPDATE MADE 16 JAN 5 PP

35 WPA FIS CONTRACT H-45531
12 CHARTERS TOWNSHIP WASHINGTON CO.
13 PLCE 21 DCA-CHARTERS RUN

J1	ICHECK	INO	NINV	IDIR	TRT	PETRIC	NVINS	G	NSCL	FU
	0.	7.	0.	0.	0.0	0.0	0.0	0.	549.510	0.0
J2	NPROF	IFLOT	PRFVS	XSECV	XSECH	FN	ALLOC	IB	CNHIF	INALE
	2.000	0.0	-1.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0

*PROF 2

CCHV= 0.30C CENV= 0.500
SECAD= 0.10

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11 35 MPA FIS (CONTACT M-4953)
 12 CHARITERS TOWNHILL WASH DC
 13 10 VA FLDG-29-CK-CHARTERS MUM

J1 CHECK INQ MINV IOIN STRI METRIC MAINS N NSEL FC
 0.0 2.0 0.0 0.0 0.0 0.0 0.0 0.0
 J2 NPROF IPLOT PREVS XSECV XSECH FN ALLOC IEN CHNTR ITHACE
 3.000 0.0 -1.000 0.0 0.0 0.0 0.0 0.0

***** THIS RUN EXECUTED 08/11/79 11.00 *****

 HEC2 RELEASED AND UPDATED ARG177
 GENERAL CORRE 0102
 MODIFICATION - 3051524537 MRD UPDATE MA 16 JAN 9 PM

 2800 NAT CH - 704.57 MSEL - 996.01 ENC. C/M - 704.51 MSEL - 994.71 NATID - 0.0000
 NATID - 517 NATID FOR CH. NO. - 0.0573 C. 2703 C. 2703 MSEL - 994.71
 2470 ENCROACHMENT STATIONS - 1973.0 2008.5 1798.5 1798.5 1798.5 1798.5
 1973.0 12.43 599.03 598.01 588.55 588.55 588.55 588.55 588.55 588.55
 2950 0.0 2070.0 680.0 435.0 435.0 435.0 435.0 435.0 435.0
 0.0 0.0 4.71 1.57 0.150 0.055 0.050 0.051 0.051 0.051
 0.00715 690.0 690.0 690.0 690.0 690.0 690.0 690.0 690.0 690.0

THIS RUN EXECUTED ON/11/79 11.00

MESSAGE CANCELED: NCA 76 UPDATED AUGUST 77

ERRATA CORR - 001.02

MODIFICATION - SC 51.52.53. MBI UPDATE MADE 16 JAN 5 PM

11 95 PARTIS (CCTACT) 1-45931

12 CHARITERS TOWNSHIP WASHINGTON CO

13 50 YR FLOOD-25-DCK-CHARITERS RUN

J1	ICHECK	IND	NINV	DIR	STRT	*ETHNIC	HVANS	U	*SEL	FL	
J2	PRPF	PLQT	PRFS	XSECV	XSELV	FA	ALDLC	18M	CHNLP	ITRACE	
	0.	3.	0.	0.	0.	0.0	0.0	0.	0.0	0.0	
	J1	ICHECK	IND	NINV	DIR	STRT	*ETHNIC	HVANS	U	*SEL	FL
	J2	PRPF	PLQT	PRFS	XSECV	XSELV	FA	ALDLC	18M	CHNLP	ITRACE
		0.	3.	0.	0.	0.0	0.0	0.	0.0	0.0	0.0
		4.000	0.0	1.600	0.0	0.0	0.0	0.0	0.0	0.0	0.0

THIS RUN EXECUTED 06/11/76 12:01

HECZ RELEASE CATED, NCY 76 LPCATEE AUG1977
SERIAL CARR 01702
MODIFICATION - 50, 51, 52, 53, REJ UPDATE MADE 16 JAN 76 PM

T1 35 WPA FIS-1 CONTRACT F-455J1
T2 CHARTIERS TOWNSHIP WASHINGTON CO.
T3 DUCF-29-DCK-CHARTIERS, BVA

J1	ICHECK	IND	NINV	IDIR	STRT	PETRIC	HNINS	C	#SEL	FL
	0.	5.	0.	0.	0.002500	0.0	0.0	0.	500.000	0.0
J2	NPROF	IPLOT	PRFVS	XSECV	YSECV	FA	ALLOC	IBW	CHNIP	ITRACE
	15.000	0.0	-1.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0

HEC2 RELEASE CATED NOV 76 UPDATED AUG1977
 EARTHQUAKE 201102
 MODIFICATION TO 50,51,52,53, NEJ UPDATE PAGE 10 JAN 5 PM

THIS RUN EXECUTED 08/11/78 12.03

AGTE - ASSESSMENT (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

100 YR FLOOD-25-DEF-CHAR
 SUMMARY PRINTOUT

SECNO	Q	CASEL	CEPIT	ALCH	CUM DIS	SLIA	STACT	STENC	STCH	STENCK	ENCL	TEPIC
0-010	4200.00	948.53	12.03	0.0	0.0	1415.98	0.0	1505.00	2030.00	0.0	410.00	410.00
0-010	4200.00	949.53	13.03	0.0	0.0	1605.00	0.0	1505.00	2030.00	0.0	409.51	410.00
0-010	1920.00	945.34	8.98	0.0	0.0	1575.53	0.0	1505.00	2030.00	0.0	409.51	410.00
0-010	3400.00	947.27	11.17	0.0	0.0	1500.00	0.0	1505.00	2030.00	0.0	409.51	410.00
0-010	6300.00	950.21	13.72	0.0	0.0	1770.43	0.0	1505.00	2030.00	0.0	409.51	410.00
0-100	4200.00	945.51	11.41	422.00	422.00	1475.00	0.0	1575.00	2024.00	0.0	410.00	410.00
0-100	4200.00	950.40	12.40	422.00	422.00	1475.00	0.0	1575.00	2024.00	0.0	410.00	410.00
0-100	1920.00	946.33	8.29	422.00	422.00	1575.00	0.0	1575.00	2024.00	0.0	410.00	410.00
0-100	3400.00	948.63	10.53	422.00	422.00	1575.00	0.0	1575.00	2024.00	0.0	410.00	410.00
0-100	6300.00	951.19	13.06	422.00	422.00	1500.00	0.0	1575.00	2024.00	0.0	410.00	410.00
0-110	4200.00	944.51	11.41	1.00	423.00	1575.00	0.0	1575.00	2024.00	0.0	410.00	410.00
0-110	4200.00	950.40	12.40	1.00	423.00	1575.00	0.0	1575.00	2024.00	0.0	410.00	410.00
0-110	1920.00	946.33	8.29	1.00	423.00	1575.00	0.0	1575.00	2024.00	0.0	410.00	410.00
0-110	3400.00	948.63	10.53	1.00	423.00	1575.00	0.0	1575.00	2024.00	0.0	410.00	410.00
0-110	6300.00	951.20	13.10	1.00	423.00	1500.00	0.0	1575.00	2024.00	0.0	410.00	410.00
0-120	4200.00	945.45	11.55	14.00	437.00	1575.00	0.0	1575.00	2024.00	0.0	410.00	410.00
0-120	4200.00	950.54	12.44	14.00	437.00	1575.00	0.0	1575.00	2024.00	0.0	410.00	410.00
0-120	1920.00	946.41	8.21	14.00	437.00	1575.00	0.0	1575.00	2024.00	0.0	410.00	410.00
0-120	3400.00	948.72	10.62	14.00	437.00	1575.00	0.0	1575.00	2024.00	0.0	410.00	410.00
0-120	6300.00	951.48	13.38	14.00	437.00	1500.00	0.0	1575.00	2024.00	0.0	410.00	410.00
0-130	4200.00	950.45	12.35	1.00	438.00	1500.00	0.0	1575.00	2024.00	0.0	410.00	410.00
0-130	4200.00	951.49	13.29	1.00	438.00	1975.00	0.0	1575.00	2024.00	0.0	410.00	410.00
0-130	1920.00	946.41	8.31	1.00	438.00	1575.00	0.0	1575.00	2024.00	0.0	410.00	410.00
0-130	3400.00	948.62	10.52	1.00	438.00	1575.00	0.0	1575.00	2024.00	0.0	410.00	410.00
0-130	6300.00	951.45	13.35	1.00	438.00	1500.00	0.0	1575.00	2024.00	0.0	410.00	410.00
0-200	4200.00	951.10	13.20	91.00	525.00	1500.00	0.0	1575.00	2024.00	0.0	410.00	410.00
0-200	4200.00	952.00	13.20	91.00	525.00	1575.00	0.0	1575.00	2024.00	0.0	410.00	410.00
0-200	1920.00	946.31	7.71	91.00	525.00	1500.00	0.0	1575.00	2024.00	0.0	410.00	410.00
0-200	3400.00	948.15	10.34	91.00	525.00	1500.00	0.0	1575.00	2024.00	0.0	410.00	410.00
0-200	6300.00	953.07	13.27	91.00	525.00	1400.00	0.0	1575.00	2024.00	0.0	410.00	410.00

SECD	C	CKSEL	DEPTH	KLCH	CUM DIS	SS14	STENGL	SIGHL	STCHR	STEALY	ENUST	TUPALE
0.210	4200.00	951.0	12.30	1.00	530.00	150.00	0.00	1770.00	2024.00	0.00	2500.00	670.00
0.210	4200.00	952.00	13.50	1.00	530.00	170.00	170.00	1570.00	2024.00	0.00	2500.00	670.00
0.210	4200.00	953.00	14.70	1.00	530.00	190.00	0.00	1570.00	2024.00	0.00	2500.00	670.00
0.210	4200.00	954.00	15.90	1.00	530.00	210.00	0.00	1570.00	2024.00	0.00	2500.00	670.00
0.210	4200.00	955.00	17.10	1.00	530.00	230.00	0.00	1570.00	2024.00	0.00	2500.00	670.00
0.220	4200.00	951.00	12.60	45.00	575.00	150.00	0.00	1770.00	2024.00	0.00	2500.00	670.00
0.220	4200.00	952.00	13.80	45.00	575.00	170.00	170.00	1570.00	2024.00	0.00	2500.00	670.00
0.220	4200.00	953.00	15.00	45.00	575.00	190.00	0.00	1570.00	2024.00	0.00	2500.00	670.00
0.220	4200.00	954.00	16.20	45.00	575.00	210.00	0.00	1570.00	2024.00	0.00	2500.00	670.00
0.220	4200.00	955.00	17.40	45.00	575.00	230.00	0.00	1570.00	2024.00	0.00	2500.00	670.00
0.230	4200.00	951.00	12.78	1.00	580.00	150.00	0.00	1770.00	2024.00	0.00	2500.00	670.00
0.230	4200.00	952.00	13.96	1.00	580.00	170.00	170.00	1570.00	2024.00	0.00	2500.00	670.00
0.230	4200.00	953.00	15.14	1.00	580.00	190.00	0.00	1570.00	2024.00	0.00	2500.00	670.00
0.230	4200.00	954.00	16.32	1.00	580.00	210.00	0.00	1570.00	2024.00	0.00	2500.00	670.00
0.230	4200.00	955.00	17.50	1.00	580.00	230.00	0.00	1570.00	2024.00	0.00	2500.00	670.00
0.250	4200.00	951.00	13.45	50.00	630.00	150.00	0.00	1770.00	2024.00	0.00	2500.00	670.00
0.250	4200.00	952.00	14.63	50.00	630.00	170.00	170.00	1570.00	2024.00	0.00	2500.00	670.00
0.250	4200.00	953.00	15.81	50.00	630.00	190.00	0.00	1570.00	2024.00	0.00	2500.00	670.00
0.250	4200.00	954.00	16.99	50.00	630.00	210.00	0.00	1570.00	2024.00	0.00	2500.00	670.00
0.250	4200.00	955.00	18.17	50.00	630.00	230.00	0.00	1570.00	2024.00	0.00	2500.00	670.00
0.300	3510.00	952.00	13.00	350.00	480.00	150.00	0.00	1770.00	2024.00	0.00	2500.00	670.00
0.300	3510.00	953.00	14.18	350.00	480.00	170.00	170.00	1570.00	2024.00	0.00	2500.00	670.00
0.300	3510.00	954.00	15.36	350.00	480.00	190.00	0.00	1570.00	2024.00	0.00	2500.00	670.00
0.300	3510.00	955.00	16.54	350.00	480.00	210.00	0.00	1570.00	2024.00	0.00	2500.00	670.00
0.310	3510.00	951.00	13.43	1.00	550.00	150.00	0.00	1770.00	2024.00	0.00	2500.00	670.00
0.310	3510.00	952.00	14.61	1.00	550.00	170.00	170.00	1570.00	2024.00	0.00	2500.00	670.00
0.310	3510.00	953.00	15.79	1.00	550.00	190.00	0.00	1570.00	2024.00	0.00	2500.00	670.00
0.310	3510.00	954.00	16.97	1.00	550.00	210.00	0.00	1570.00	2024.00	0.00	2500.00	670.00
0.310	3510.00	955.00	18.15	1.00	550.00	230.00	0.00	1570.00	2024.00	0.00	2500.00	670.00
0.320	3510.00	953.00	13.50	20.00	1010.00	150.00	0.00	1770.00	2024.00	0.00	2500.00	670.00
0.320	3510.00	954.00	14.68	20.00	1010.00	170.00	170.00	1570.00	2024.00	0.00	2500.00	670.00
0.320	3510.00	955.00	15.86	20.00	1010.00	190.00	0.00	1570.00	2024.00	0.00	2500.00	670.00
0.330	3510.00	953.00	13.45	1.00	1011.00	150.00	0.00	1770.00	2024.00	0.00	2500.00	670.00
0.330	3510.00	954.00	14.63	1.00	1011.00	170.00	170.00	1570.00	2024.00	0.00	2500.00	670.00
0.330	3510.00	955.00	15.81	1.00	1011.00	190.00	0.00	1570.00	2024.00	0.00	2500.00	670.00
0.350	3510.00	954.00	13.00	50.00	1001.00	150.00	0.00	1770.00	2024.00	0.00	2500.00	670.00
0.350	3510.00	955.00	14.18	50.00	1001.00	170.00	170.00	1570.00	2024.00	0.00	2500.00	670.00
0.350	3510.00	956.00	15.36	50.00	1001.00	190.00	0.00	1570.00	2024.00	0.00	2500.00	670.00
0.350	3510.00	957.00	16.54	50.00	1001.00	210.00	0.00	1570.00	2024.00	0.00	2500.00	670.00
0.350	3510.00	958.00	17.72	50.00	1001.00	230.00	0.00	1570.00	2024.00	0.00	2500.00	670.00

SECD	C	CKSEL	DEPTH	KLCH	CUM DIS	SS14	STENGL	SIGHL	SICRM	STEALY	ENUST	TUPALE
0.400	3510.00	954.00	13.00	242.00	1403.00	180.00	0.00	1700.00	2011.00	0.00	2172.00	240.00
0.400	3510.00	955.00	14.18	242.00	1403.00	200.00	157.00	1500.00	2011.00	0.00	2172.00	240.00
0.400	3510.00	956.00	15.36	242.00	1403.00	220.00	0.00	1500.00	2011.00	0.00	2172.00	240.00
0.400	3510.00	957.00	16.54	242.00	1403.00	240.00	0.00	1500.00	2011.00	0.00	2172.00	240.00
0.400	3510.00	958.00	17.72	242.00	1403.00	260.00	0.00	1500.00	2011.00	0.00	2172.00	240.00

Table with columns: SECNO, CUST, DEPTH, YLTH, CLR, DIA, AREA, STEEL, STEEL, STEEL, ENCL, TYPE. Rows 0-460, 470, 480, 490, 500, 510.

Table with columns: SECNO, CUST, DEPTH, YLTH, CLR, DIA, AREA, STEEL, STEEL, STEEL, ENCL, TYPE. Rows 0-470, 480, 490, 500, 510.

Table with columns: SECNO, CUST, DEPTH, YLTH, CLR, DIA, AREA, STEEL, STEEL, STEEL, ENCL, TYPE. Rows 0-480, 490, 500, 510.

Table with columns: SECNO, CUST, DEPTH, YLTH, CLR, DIA, AREA, STEEL, STEEL, STEEL, ENCL, TYPE. Rows 0-490, 500, 510.

Table with columns: SECNO, CUST, DEPTH, YLTH, CLR, DIA, AREA, STEEL, STEEL, STEEL, ENCL, TYPE. Rows 0-500, 510.

SECNO	Q	CMSEL	DEPTM	PCHM	CUP-DIS	SSTA	STNCL	STNML	STCMA	STNCH	ENCL1	ICPML
5.000	3510.00	964.22	11.21	63.00	6442.00	1544.33	0.00	1971.00	2013.00	2013.00	0.00	2137.77
5.000	3510.00	964.22	11.21	50.00	6442.00	1544.33	0.00	1971.00	2013.00	2013.00	0.00	2137.77

4.150	3510.00	962.01	11.21	50.00	6442.00	1544.33	0.00	1971.00	2013.00	2013.00	0.00	2137.77
4.150	2890.00	961.58	11.21	50.00	6442.00	1544.33	0.00	1971.00	2013.00	2013.00	0.00	2137.77
4.150	2890.00	961.58	11.21	35.00	6442.00	1544.33	0.00	1971.00	2013.00	2013.00	0.00	2137.77
4.130	3510.00	962.24	11.21	50.00	6442.00	1544.33	0.00	1971.00	2013.00	2013.00	0.00	2137.77
4.130	2890.00	961.58	11.21	50.00	6442.00	1544.33	0.00	1971.00	2013.00	2013.00	0.00	2137.77
4.130	1640.00	959.13	11.21	1.00	6352.00	1519.00	0.00	1572.00	2023.00	2023.00	0.00	2072.00
4.130	3510.00	962.24	11.21	50.00	6442.00	1544.33	0.00	1971.00	2013.00	2013.00	0.00	2137.77
4.130	2890.00	961.58	11.21	50.00	6442.00	1544.33	0.00	1971.00	2013.00	2013.00	0.00	2137.77
4.120	3510.00	962.24	11.21	50.00	6442.00	1544.33	0.00	1971.00	2013.00	2013.00	0.00	2137.77
4.120	2890.00	961.58	11.21	50.00	6442.00	1544.33	0.00	1971.00	2013.00	2013.00	0.00	2137.77
4.120	1640.00	959.13	11.21	1.00	6352.00	1519.00	0.00	1572.00	2023.00	2023.00	0.00	2072.00
4.120	3510.00	962.24	11.21	50.00	6442.00	1544.33	0.00	1971.00	2013.00	2013.00	0.00	2137.77
4.120	2890.00	961.58	11.21	50.00	6442.00	1544.33	0.00	1971.00	2013.00	2013.00	0.00	2137.77
4.120	1640.00	959.13	11.21	1.00	6352.00	1519.00	0.00	1572.00	2023.00	2023.00	0.00	2072.00
4.110	3510.00	962.24	11.21	50.00	6442.00	1544.33	0.00	1971.00	2013.00	2013.00	0.00	2137.77
4.110	2890.00	961.58	11.21	50.00	6442.00	1544.33	0.00	1971.00	2013.00	2013.00	0.00	2137.77
4.110	1640.00	959.13	11.21	1.00	6352.00	1519.00	0.00	1572.00	2023.00	2023.00	0.00	2072.00
4.110	3510.00	962.24	11.21	50.00	6442.00	1544.33	0.00	1971.00	2013.00	2013.00	0.00	2137.77
4.110	2890.00	961.58	11.21	50.00	6442.00	1544.33	0.00	1971.00	2013.00	2013.00	0.00	2137.77
4.110	1640.00	959.13	11.21	1.00	6352.00	1519.00	0.00	1572.00	2023.00	2023.00	0.00	2072.00
4.100	3510.00	962.24	11.21	50.00	6442.00	1544.33	0.00	1971.00	2013.00	2013.00	0.00	2137.77
4.100	2890.00	961.58	11.21	50.00	6442.00	1544.33	0.00	1971.00	2013.00	2013.00	0.00	2137.77
4.100	1640.00	959.13	11.21	1.00	6352.00	1519.00	0.00	1572.00	2023.00	2023.00	0.00	2072.00
4.100	3510.00	962.24	11.21	50.00	6442.00	1544.33	0.00	1971.00	2013.00	2013.00	0.00	2137.77
4.100	2890.00	961.58	11.21	50.00	6442.00	1544.33	0.00	1971.00	2013.00	2013.00	0.00	2137.77
4.100	1640.00	959.13	11.21	1.00	6352.00	1519.00	0.00	1572.00	2023.00	2023.00	0.00	2072.00
4.000	3510.00	960.02	10.22	85.00	5945.00	1944.34	0.00	1119.00	2017.00	2017.00	0.00	2214.21
4.000	2890.00	957.70	10.22	85.00	5945.00	1944.34	0.00	1119.00	2017.00	2017.00	0.00	2214.21
4.000	1640.00	952.41	10.22	55.00	5945.00	1944.34	0.00	1119.00	2017.00	2017.00	0.00	2214.21
3.000	3510.00	958.09	12.61	67.00	6071.00	1910.59	0.00	1181.00	2020.00	2020.00	0.00	2004.13
3.000	2890.00	957.03	11.83	67.00	6071.00	1910.59	0.00	1181.00	2020.00	2020.00	0.00	2004.13
3.000	1640.00	955.78	12.28	67.00	6071.00	1910.59	0.00	1181.00	2020.00	2020.00	0.00	2004.13
2.150	3510.00	956.98	12.19	50.00	3633.00	1950.00	0.00	1500.00	2011.00	2011.00	0.00	2204.12
2.150	2890.00	955.55	11.25	50.00	3633.00	1950.00	0.00	1500.00	2011.00	2011.00	0.00	2204.12
2.150	1640.00	953.95	7.25	50.00	3633.00	1950.00	0.00	1500.00	2011.00	2011.00	0.00	2204.12
2.130	3510.00	956.97	11.57	1.00	3813.00	1976.00	1570.00	1570.00	2023.00	2023.00	0.00	2023.00
2.130	2890.00	955.32	10.52	1.00	3813.00	1976.00	1570.00	1570.00	2023.00	2023.00	0.00	2023.00
2.130	1640.00	953.81	9.41	1.00	3813.00	1976.00	1570.00	1570.00	2023.00	2023.00	0.00	2023.00

4130 1640.00 959.17 7.21 50.00 644.00 1512.00 0.0 1512.00 205.00 4130 217.72 413.03
 4150 2080.00 967.58 7.24 50.00 644.00 1512.00 0.0 1512.00 205.00 4150 217.72 413.03
 4150 2250.00 967.15 7.32 50.00 644.00 1512.00 0.0 1512.00 205.00 4150 217.72 413.03

SECCN 0 CSERL DEPTH WCH CLM BIS STA STREL STREL STREL STREL STREL
 E 3.000 3510.00 966.42 11.62 475.00 7115.00 1512.00 0.0 1512.00 205.00 4130 217.72 413.03
 5.000 3510.00 966.46 12.02 475.00 7115.00 1512.00 0.0 1512.00 205.00 4130 217.72 413.03
 5.000 3510.00 963.18 0.38 475.00 7115.00 1512.00 0.0 1512.00 205.00 4130 217.72 413.03
 5.000 3510.00 963.44 0.68 475.00 7115.00 1512.00 0.0 1512.00 205.00 4130 217.72 413.03
 5.000 3510.00 964.19 13.65 475.00 7115.00 1512.00 0.0 1512.00 205.00 4130 217.72 413.03
 F 5.000 3510.00 967.35 10.75 475.00 7115.00 1512.00 0.0 1512.00 205.00 4130 217.72 413.03
 6.000 3510.00 968.01 11.41 475.00 7115.00 1512.00 0.0 1512.00 205.00 4130 217.72 413.03
 6.000 3510.00 968.44 7.88 475.00 7115.00 1512.00 0.0 1512.00 205.00 4130 217.72 413.03
 6.000 3510.00 968.49 9.88 475.00 7115.00 1512.00 0.0 1512.00 205.00 4130 217.72 413.03
 6.000 3510.00 969.28 12.68 475.00 7115.00 1512.00 0.0 1512.00 205.00 4130 217.72 413.03

G 7.000 3510.00 968.04 10.14 475.00 7115.00 1512.00 0.0 1512.00 205.00 4130 217.72 413.03
 7.000 3510.00 968.21 11.01 475.00 7115.00 1512.00 0.0 1512.00 205.00 4130 217.72 413.03
 7.000 3510.00 968.06 7.38 475.00 7115.00 1512.00 0.0 1512.00 205.00 4130 217.72 413.03
 7.000 3510.00 967.83 5.33 475.00 7115.00 1512.00 0.0 1512.00 205.00 4130 217.72 413.03
 7.000 3510.00 970.55 12.60 475.00 7115.00 1512.00 0.0 1512.00 205.00 4130 217.72 413.03
 F 7.000 3510.00 971.45 12.75 475.00 7115.00 1512.00 0.0 1512.00 205.00 4130 217.72 413.03
 7.000 3510.00 972.16 13.48 475.00 7115.00 1512.00 0.0 1512.00 205.00 4130 217.72 413.03
 7.000 3510.00 968.54 10.44 475.00 7115.00 1512.00 0.0 1512.00 205.00 4130 217.72 413.03
 7.000 3510.00 970.74 12.09 475.00 7115.00 1512.00 0.0 1512.00 205.00 4130 217.72 413.03
 7.000 3510.00 973.18 14.45 475.00 7115.00 1512.00 0.0 1512.00 205.00 4130 217.72 413.03

H 7.000 3510.00 971.67 14.57 475.00 7115.00 1512.00 0.0 1512.00 205.00 4130 217.72 413.03
 7.000 3510.00 972.35 13.02 475.00 7115.00 1512.00 0.0 1512.00 205.00 4130 217.72 413.03
 7.000 3510.00 968.94 10.28 475.00 7115.00 1512.00 0.0 1512.00 205.00 4130 217.72 413.03
 7.000 3510.00 970.92 12.82 475.00 7115.00 1512.00 0.0 1512.00 205.00 4130 217.72 413.03
 7.000 3510.00 973.45 19.75 475.00 7115.00 1512.00 0.0 1512.00 205.00 4130 217.72 413.03
 F 7.000 3510.00 971.15 13.05 475.00 7115.00 1512.00 0.0 1512.00 205.00 4130 217.72 413.03
 7.000 3510.00 972.52 13.72 475.00 7115.00 1512.00 0.0 1512.00 205.00 4130 217.72 413.03
 7.000 3510.00 969.48 10.30 475.00 7115.00 1512.00 0.0 1512.00 205.00 4130 217.72 413.03
 7.000 3510.00 971.50 14.81 475.00 7115.00 1512.00 0.0 1512.00 205.00 4130 217.72 413.03
 7.000 3510.00 973.51 16.81 475.00 7115.00 1512.00 0.0 1512.00 205.00 4130 217.72 413.03

I 8.000 3510.00 972.14 11.04 475.00 7115.00 1512.00 0.0 1512.00 205.00 4130 217.72 413.03
 8.000 3510.00 972.77 14.57 475.00 7115.00 1512.00 0.0 1512.00 205.00 4130 217.72 413.03
 8.000 3510.00 968.43 9.83 475.00 7115.00 1512.00 0.0 1512.00 205.00 4130 217.72 413.03
 8.000 3510.00 971.39 12.19 475.00 7115.00 1512.00 0.0 1512.00 205.00 4130 217.72 413.03
 8.000 3510.00 973.58 17.58 475.00 7115.00 1512.00 0.0 1512.00 205.00 4130 217.72 413.03

J 9.000 3510.00 974.03 11.53 475.00 7115.00 1512.00 0.0 1512.00 205.00 4130 217.72 413.03
 9.000 3510.00 974.42 12.32 475.00 7115.00 1512.00 0.0 1512.00 205.00 4130 217.72 413.03
 9.000 3510.00 971.35 8.93 475.00 7115.00 1512.00 0.0 1512.00 205.00 4130 217.72 413.03
 9.000 3510.00 973.47 10.77 475.00 7115.00 1512.00 0.0 1512.00 205.00 4130 217.72 413.03
 9.000 3510.00 975.72 13.28 475.00 7115.00 1512.00 0.0 1512.00 205.00 4130 217.72 413.03

SENO	Q	CHSEL	DEPTH	PLCH	CUM DIS	SSIA	STERCL	STCHL	STCHR	STERLN	ENEST	TOP 10
9.100	3510.00	974.50	10.50	188.00	11523.00	1874.77	0.0	1552.00	2009.00	0.0	2162.03	427.00
9.100	3510.00	974.50	11.00	188.00	11523.00	1874.77	1803.49	1552.00	2009.00	2052.21	2162.03	427.00
9.100	1640.00	973.57	8.21	188.00	11523.00	1749.00	0.0	1552.00	2009.00	0.0	2172.00	427.00
9.100	2890.00	973.77	10.07	188.00	11523.00	1742.76	0.0	1552.00	2009.00	0.0	2174.24	427.00
9.100	5250.00	976.21	12.51	188.00	11523.00	1674.76	0.0	1552.00	2009.00	0.0	2200.00	521.51
9.110	3510.00	974.50	10.85	1.00	11524.00	1874.20	0.0	1552.00	2009.00	0.0	2162.03	427.00
9.110	3510.00	974.43	11.73	1.00	11524.00	1800.31	1800.31	1552.00	2009.00	2052.12	2162.03	427.00
9.110	1640.00	972.10	8.40	1.00	11524.00	1737.08	0.0	1552.00	2009.00	0.0	2154.00	427.00
9.110	2890.00	973.53	10.12	1.00	11524.00	1701.30	0.0	1552.00	2009.00	0.0	2175.22	427.00
9.110	5250.00	976.25	12.55	1.00	11524.00	1675.36	0.0	1552.00	2009.00	0.0	2201.25	521.55
9.120	3510.00	974.60	10.90	12.00	11536.00	1874.50	0.0	1552.00	2009.00	0.0	2163.14	427.00
9.120	3510.00	974.48	11.70	12.00	11536.00	1794.57	1794.57	1552.00	2009.00	2052.32	2163.14	427.00
9.120	1640.00	972.15	8.44	12.00	11536.00	1737.08	0.0	1552.00	2009.00	0.0	2155.00	427.00
9.120	2890.00	973.85	10.15	12.00	11536.00	1701.30	0.0	1552.00	2009.00	0.0	2175.22	427.00
9.120	5250.00	976.28	12.58	12.00	11536.00	1679.12	0.0	1552.00	2009.00	0.0	2201.44	521.58
9.130	3510.00	974.57	10.87	1.00	11537.00	1874.10	0.0	1552.00	2009.00	0.0	2163.14	427.00
9.130	3510.00	974.44	11.74	1.00	11537.00	1800.21	1800.21	1552.00	2009.00	2052.04	2163.14	427.00
9.130	1640.00	972.13	8.43	1.00	11537.00	1737.08	0.0	1552.00	2009.00	0.0	2155.00	427.00
9.130	2890.00	973.85	10.15	1.00	11537.00	1701.30	0.0	1552.00	2009.00	0.0	2175.22	427.00
9.130	5250.00	976.26	12.56	1.00	11537.00	1679.24	0.0	1552.00	2009.00	0.0	2201.35	521.56
10.000	3510.00	974.47	9.97	700.00	12725.00	1800.14	0.0	1500.00	2000.00	0.0	2020.00	300.00
10.000	3510.00	977.39	10.05	700.00	12725.00	1830.14	1830.14	1500.00	2000.00	2020.00	2020.00	300.00
10.000	1640.00	974.30	7.00	700.00	12725.00	1700.00	0.0	1500.00	2000.00	0.0	2000.00	200.00
10.000	2890.00	974.25	9.25	700.00	12725.00	1807.00	0.0	1500.00	2000.00	0.0	2020.00	300.00
10.000	5250.00	977.39	11.44	700.00	12725.00	1840.00	0.0	1500.00	2000.00	0.0	2020.00	300.00
10.100	3510.00	974.72	10.52	1057.00	13782.00	1817.00	0.0	1500.00	2000.00	0.0	2020.00	300.00
10.100	3510.00	976.34	11.57	1057.00	13782.00	1515.00	1515.00	1500.00	2000.00	2031.00	2031.00	300.00
10.100	1640.00	976.96	7.76	1057.00	13782.00	1509.00	0.0	1500.00	2000.00	0.0	2031.00	300.00
10.100	2890.00	978.55	9.75	1057.00	13782.00	1827.00	0.0	1500.00	2000.00	0.0	2031.00	300.00
10.100	5250.00	981.25	12.15	1057.00	13782.00	1801.00	0.0	1500.00	2000.00	0.0	2070.15	370.00
10.110	3510.00	974.71	10.57	1.00	13783.00	1817.78	0.0	1500.00	2000.00	0.0	2031.00	300.00
10.110	3510.00	976.33	11.57	1.00	13783.00	1515.00	1515.00	1500.00	2000.00	2031.00	2031.00	300.00
10.110	1640.00	976.96	7.76	1.00	13783.00	1509.00	0.0	1500.00	2000.00	0.0	2031.00	300.00
10.110	2890.00	979.00	9.00	1.00	13783.00	1827.00	0.0	1500.00	2000.00	0.0	2031.00	300.00
10.110	5250.00	981.62	12.43	1.00	13783.00	1797.10	0.0	1500.00	2000.00	0.0	2070.43	370.00
10.120	3510.00	980.20	11.00	23.00	13800.00	1812.50	0.0	1500.00	2000.00	0.0	2040.00	340.00
10.120	3510.00	980.34	11.64	23.00	13800.00	1515.00	1515.00	1500.00	2000.00	2031.00	2031.00	340.00
10.120	1640.00	977.04	7.84	23.00	13800.00	1509.00	0.0	1500.00	2000.00	0.0	2031.00	340.00
10.120	2890.00	979.42	10.22	23.00	13800.00	1820.00	0.0	1500.00	2000.00	0.0	2031.00	340.00
10.120	5250.00	981.96	12.76	23.00	13800.00	1797.12	0.0	1500.00	2000.00	0.0	2070.74	370.00
10.130	3510.00	980.20	11.00	1.00	13807.00	1812.91	0.0	1500.00	2000.00	0.0	2040.00	340.00
10.130	3510.00	980.56	11.76	1.00	13807.00	1515.00	1515.00	1500.00	2000.00	2031.00	2031.00	340.00
10.130	1640.00	977.04	7.84	1.00	13807.00	1509.00	0.0	1500.00	2000.00	0.0	2031.00	340.00
10.130	2890.00	979.50	10.30	1.00	13807.00	1820.00	0.0	1500.00	2000.00	0.0	2031.00	340.00
10.130	5250.00	981.91	12.71	1.00	13807.00	1797.43	0.0	1500.00	2000.00	0.0	2070.43	370.00

SENO	Q	CHSEL	DEPTH	PLCH	CUM DIS	SSIA	STERCL	STCHL	STCHR	STERLN	ENEST	TOP 10
10.150	3510.00	980.23	11.23	20.00	13807.00	1515.00	0.0	1500.00	2000.00	0.0	2040.00	340.00
10.150	3510.00	980.99	11.99	20.00	13807.00	1500.00	1500.00	1500.00	2000.00	2000.00	2000.00	340.00
10.150	1640.00	977.15	8.15	20.00	13807.00	1509.00	0.0	1500.00	2000.00	0.0	2031.00	340.00
10.150	2890.00	979.50	10.50	20.00	13807.00	1820.00	0.0	1500.00	2000.00	0.0	2031.00	340.00
10.150	5250.00	981.91	12.71	20.00	13807.00	1797.43	0.0	1500.00	2000.00	0.0	2070.43	370.00

SECNO	D	CWSEL	DEPTH	PLCH	CUM DIS	GSTA	STENCE	STCHL	STCHR	STENCH	GHCST	TCRNIC	
12.116	2950.00	990.51	10.51	1.00	17752.00	1575.00	0.00	1575.00	2022.00	0.00	2022.00	43.00	
12.110	2950.00	991.33	11.33	1.00	17752.00	1575.00	1575.00	1575.00	2022.00	2022.00	2022.00	43.00	
12.110	1380.00	998.24	8.24	1.00	17752.00	1575.00	0.00	1575.00	2022.00	0.00	2022.00	43.00	
12.110	2400.00	989.85	9.85	1.00	17752.00	1575.00	0.00	1575.00	2022.00	0.00	2022.00	43.00	
12.110	4400.00	991.98	11.98	1.00	17752.00	1575.00	0.00	1575.00	2022.00	0.00	2135.76	130.21	
12.120	2950.00	990.76	10.76	10.00	17768.00	1575.00	0.00	1575.00	2022.00	0.00	2022.00	43.00	
12.120	2950.00	991.59	11.59	16.00	17768.00	1575.00	1575.00	1575.00	2022.00	2022.00	2022.00	43.00	
12.120	1380.00	988.28	8.28	16.00	17768.00	1575.00	0.00	1575.00	2022.00	0.00	2022.00	43.00	
12.120	2400.00	990.01	10.01	16.00	17768.00	1575.00	0.00	1575.00	2022.00	0.00	2022.00	43.00	
12.120	4400.00	993.95	13.95	16.00	17768.00	1643.19	0.00	1575.00	2022.00	0.00	2106.74	123.22	
12.130	2950.00	991.17	11.17	1.00	17765.00	1575.00	0.00	1575.00	2022.00	0.00	2022.00	43.00	
12.130	2950.00	992.13	12.13	1.00	17765.00	1575.00	1575.00	1575.00	2022.00	2022.00	2022.00	43.00	
12.130	1380.00	988.29	8.29	1.00	17765.00	1575.00	0.00	1575.00	2022.00	0.00	2022.00	43.00	
12.130	2400.00	990.18	10.18	1.00	17765.00	1575.00	0.00	1575.00	2022.00	0.00	2022.00	43.00	
12.130	4400.00	994.19	14.19	1.00	17765.00	1638.38	0.00	1575.00	2022.00	0.00	2106.74	130.27	
12.150	2950.00	991.35	11.70	50.00	17819.00	1565.70	0.00	1565.00	2013.00	0.00	2000.30	122.88	
12.150	2950.00	992.26	12.00	50.00	17815.00	1570.55	1570.55	1565.00	2013.00	2051.42	2051.42	174.47	
12.150	1380.00	988.39	8.75	50.00	17815.00	1570.10	0.00	1565.00	2013.00	0.00	2051.53	177.27	
12.150	2400.00	990.32	10.72	50.00	17815.00	1575.06	0.00	1565.00	2013.00	0.00	2071.54	163.30	
12.150	4400.00	994.34	14.74	50.00	17819.00	1562.33	0.00	1565.00	2013.00	0.00	2137.56	171.17	
M	13.000	2950.00	994.50	11.10	800.00	18025.00	1841.35	0.00	1802.00	2020.00	0.00	2020.51	161.31
	13.000	2950.00	995.58	11.10	800.00	18025.00	1841.35	1510.50	1802.00	2020.00	2020.00	2020.51	163.46
	13.000	1380.00	991.71	7.51	800.00	18025.00	1841.35	0.00	1802.00	2020.00	0.00	2020.51	159.63
	13.000	2400.00	995.92	10.12	800.00	18025.00	1841.35	0.00	1802.00	2020.00	0.00	2020.51	170.25
	13.000	4400.00	997.13	13.33	800.00	18025.00	1841.35	0.00	1802.00	2020.00	0.00	2020.51	171.50
N	14.000	2950.00	996.73	11.00	650.00	15520.00	1515.29	0.00	1570.00	2013.00	0.00	2017.47	205.59
	14.000	2950.00	997.63	11.93	650.00	15520.00	1515.29	1515.29	1570.00	2013.00	2050.50	2050.50	155.01
	14.000	1380.00	993.87	8.17	650.00	15520.00	1515.29	0.00	1570.00	2013.00	0.00	2007.52	235.75
	14.000	2400.00	995.00	10.10	650.00	15520.00	1515.29	0.00	1570.00	2013.00	0.00	2007.52	240.03
	14.000	4400.00	998.75	13.05	650.00	15520.00	1515.29	0.00	1570.00	2013.00	0.00	2137.67	295.27
O	15.000	2950.00	998.01	11.41	650.00	20210.00	1910.00	0.00	1910.00	2010.00	0.00	2110.20	201.72
	15.000	2950.00	999.63	12.43	650.00	20210.00	1910.00	1910.00	1910.00	2010.00	2000.00	2000.00	160.05
	15.000	1380.00	995.31	8.71	650.00	20210.00	1910.00	0.00	1910.00	2010.00	0.00	2107.05	170.03
	15.000	2400.00	997.16	10.56	650.00	20210.00	1910.00	0.00	1910.00	2010.00	0.00	2114.15	171.70
	15.000	4400.00	999.98	13.30	650.00	20210.00	1910.00	0.00	1910.00	2010.00	0.00	2110.11	211.00

ICD YR FLOOD-25-DCX-CHAN

SUMMARY PRINTOUT

SEGNO	YECM	ELMIN	RCHST	PLTRD	ELTC	CASL	CIFASP	DIRCX	LIPKMS	EO	CIFEG	INPLT E
0-25C	50-00	938-2C	-12-00	T.G	0-0	951-05	U-0	U-0	U-0	52-03	U-0	U-0
0-25C	50-00	938-2C	-12-00	D-0	0-0	952-07	U-0	U-0	U-0	52-03	U-0	U-0
0-25C	50-00	938-2C	-12-00	U-0	0-0	952-05	-0-02	U-0	U-0	52-03	U-0	U-0
0-250	50-00	938-2C	-12-00	C.C	0-0	951-34	-3-74	U-0	U-0	52-03	U-0	U-0
0-256	50-00	938-2C	-12-00	C.C	0-0	952-45	3-51	U-0	U-0	52-03	U-0	U-0
0-300	359-00	940-40	0-13	U-0	0-0	953-49	0-0	U-0	U-0	52-03	U-0	U-0
0-300	359-00	940-40	0-13	U-0	0-0	952-43	0-74	U-0	U-0	52-03	U-0	U-0
0-300	359-00	940-40	0-13	U-0	0-0	948-71	2-55	U-0	U-0	54-00	U-0	U-0
0-300	359-00	940-40	0-13	U-0	0-0	952-38	2-77	U-0	U-0	52-03	U-0	U-0
0-310	1-00	940-40	0-6	C.C	0-0	952-37	2-50	U-0	U-0	52-03	U-0	U-0
0-310	1-00	940-40	0-6	U-0	0-0	952-63	U-0	U-0	U-0	52-03	U-0	U-0
0-310	1-00	940-40	0-6	U-0	0-0	952-40	U-56	U-0	U-0	52-03	U-0	U-0
0-310	1-00	940-40	0-6	U-0	0-0	948-47	-2-00	U-0	U-0	52-03	U-0	U-0
0-310	1-00	940-40	0-6	U-0	0-0	952-75	4-04	U-0	U-0	52-03	U-0	U-0
0-310	1-00	940-40	0-6	U-0	0-0	950-45	4-74	U-15	U-0	52-03	U-0	U-0
0-32C	20-00	940-40	0-0	U-0	0-0	953-33	U-0	U-0	U-0	52-03	U-0	U-0
0-320	20-00	940-40	0-0	U-0	0-0	952-40	U-58	U-0	U-0	52-03	U-0	U-0
0-320	20-00	940-40	0-0	U-0	0-0	948-01	2-01	U-0	U-0	52-03	U-0	U-0
0-320	20-00	940-40	0-0	U-0	0-0	952-91	4-03	U-0	U-0	52-03	U-0	U-0
0-320	20-00	940-40	0-0	U-0	0-0	952-01	3-00	U-0	U-0	52-03	U-0	U-0
0-33C	1-00	940-40	0-0	U-0	0-0	952-05	0-0	U-0	U-0	52-03	U-0	U-0
0-33C	1-00	940-40	0-0	U-0	0-0	952-05	0-60	U-0	U-0	52-03	U-0	U-0
0-33C	1-00	940-40	0-0	U-0	0-0	949-29	-5-10	U-0	U-0	52-03	U-0	U-0
0-330	1-00	940-40	0-0	U-0	0-0	952-07	3-07	U-0	U-0	52-03	U-0	U-0
0-330	1-00	940-40	0-0	U-0	0-0	952-48	3-02	U-0	U-0	52-03	U-0	U-0
0-350	50-00	941-10	14-00	C.C	0-0	952-10	U-0	U-0	U-0	52-03	U-0	U-0
0-350	50-00	941-10	14-00	C.C	0-0	952-10	U-0	U-0	U-0	52-03	U-0	U-0
0-350	50-00	941-10	14-00	C.C	0-0	952-43	5-27	U-0	U-0	52-03	U-0	U-0
0-400	342-00	941-30	0-58	U-0	0-0	952-40	U-0	U-0	U-0	52-03	U-0	U-0
0-400	342-00	941-30	0-58	U-0	0-0	952-56	0-35	U-0	U-0	52-03	U-0	U-0
0-400	342-00	941-30	0-58	U-0	0-0	952-56	0-23	U-0	U-0	52-03	U-0	U-0
0-400	342-00	941-30	0-58	U-0	0-0	952-36	2-22	U-0	U-0	52-03	U-0	U-0
0-400	342-00	941-30	0-58	U-0	0-0	952-36	2-17	U-0	U-0	52-03	U-0	U-0
0-410	1-00	941-30	0-0	U-0	0-0	952-44	U-0	U-0	U-0	52-03	U-0	U-0
0-410	1-00	941-30	0-0	U-0	0-0	952-40	U-0	U-0	U-0	52-03	U-0	U-0
0-410	1-00	941-30	0-0	U-0	0-0	952-40	U-0	U-0	U-0	52-03	U-0	U-0
0-410	1-00	941-30	0-0	U-0	0-0	952-40	U-0	U-0	U-0	52-03	U-0	U-0
0-420	11-00	941-30	0-0	U-0	0-0	952-47	U-0	U-0	U-0	52-03	U-0	U-0
0-420	11-00	941-30	0-0	U-0	0-0	952-47	U-0	U-0	U-0	52-03	U-0	U-0
0-420	11-00	941-30	0-0	U-0	0-0	952-47	U-0	U-0	U-0	52-03	U-0	U-0
0-420	11-00	941-30	0-0	U-0	0-0	952-47	U-0	U-0	U-0	52-03	U-0	U-0

SECNO	XICH	ELMIN	R#CML	ELTNO	ELIC	CASL	GFA5P	DIF5AX	ELFA5S	EL	ELF5D	INPLT E
0.420	11.00	946.30	U.0	545.80	U.0	526.98	1.01	U.01	U.0	526.25	U.0	U.0
0.420	11.00	946.30	U.0	545.80	U.0	526.98	3.16	U.00	U.0	526.50	U.00	U.0
0.420	11.00	946.30	U.0	545.80	U.0	526.98	3.17	U.00	U.0	526.50	U.00	U.0

A

0.430	1.00	946.30	U.0	545.80	U.0	526.98	U.0	U.01	U.0	526.25	U.0	U.0
0.430	1.00	946.30	U.0	545.80	U.0	526.98	U.0	U.02	U.0	526.50	U.0	U.0
0.430	1.00	946.30	U.0	545.80	U.0	526.98	U.0	U.02	U.0	526.50	U.0	U.0
0.430	1.00	946.30	U.0	545.80	U.0	526.98	2.16	U.01	U.0	526.50	U.0	U.0
0.430	1.00	946.30	U.0	545.80	U.0	526.98	3.17	U.01	U.0	526.50	U.0	U.0

B

1.000	819.00	946.70	U.45	U.0	U.0	526.88	U.0	U.25	U.0	526.13	U.0	U.0
1.000	819.00	946.70	U.45	U.0	U.0	526.88	U.0	U.25	U.0	526.13	U.0	U.0
1.000	819.00	946.70	U.45	U.0	U.0	526.88	3.15	U.22	U.0	526.03	U.0	U.0

B

2.000	760.00	943.45	2.24	U.0	U.0	526.93	U.0	U.45	U.0	526.02	U.0	U.0
2.000	760.00	943.45	2.24	U.0	U.0	526.93	U.0	U.45	U.0	526.02	U.0	U.0
2.000	760.00	943.45	2.24	U.0	U.0	526.93	2.02	U.02	U.0	526.02	U.0	U.0

A

2.100	802.00	944.40	1.45	U.0	U.0	526.82	U.0	U.05	U.0	526.21	U.0	U.0
2.100	802.00	944.40	1.45	U.0	U.0	526.82	U.0	U.05	U.0	526.21	U.0	U.0
2.100	802.00	944.40	1.45	U.0	U.0	526.82	U.0	U.05	U.0	526.21	U.0	U.0

B

2.110	802.00	944.40	1.25	U.0	U.0	526.79	U.0	U.06	U.0	526.25	U.0	U.0
2.110	802.00	944.40	1.25	U.0	U.0	526.79	U.0	U.06	U.0	526.25	U.0	U.0
2.110	802.00	944.40	1.25	U.0	U.0	526.79	U.0	U.06	U.0	526.25	U.0	U.0

A

2.110	802.00	944.40	1.25	U.0	U.0	526.79	U.0	U.06	U.0	526.25	U.0	U.0
2.110	802.00	944.40	1.25	U.0	U.0	526.79	U.0	U.06	U.0	526.25	U.0	U.0
2.110	802.00	944.40	1.25	U.0	U.0	526.79	U.0	U.06	U.0	526.25	U.0	U.0

C

3.000	807.00	946.00	1.01	U.0	U.0	526.89	U.0	1.02	U.0	526.15	U.0	U.0
3.000	807.00	946.00	1.01	U.0	U.0	526.89	U.0	1.02	U.0	526.15	U.0	U.0
3.000	807.00	946.00	1.01	U.0	U.0	526.89	U.0	1.02	U.0	526.15	U.0	U.0

SECD	PLCH	ELM	KECSL	ELMO	ELLC	CASEL	DIFLSP	DIFLFX	DIFLNS	EG	DIFLW	INVT E
D	4-000	895.00	549.70	0.0	0.0	901.64	0.0	1.53	0.0	500.52		
	4-000	895.00	945.70	0.0	0.0	901.64	0.0	1.74	0.0	500.52		
	4-000	895.00	945.70	0.0	0.0	901.64	0.0	1.87	0.0	500.52		
	4-000	895.00	945.70	0.0	0.0	901.64	0.0	1.90	0.0	500.52		
	4-000	895.00	945.70	0.0	0.0	901.64	0.0	2.01	0.0	500.52		
	4-000	895.00	945.70	0.0	0.0	901.64	0.0	2.11	0.0	500.52		
	4-000	895.00	945.70	0.0	0.0	901.64	0.0	2.21	0.0	500.52		
	4-000	895.00	945.70	0.0	0.0	901.64	0.0	2.31	0.0	500.52		
	4-000	895.00	945.70	0.0	0.0	901.64	0.0	2.41	0.0	500.52		
	4-000	895.00	945.70	0.0	0.0	901.64	0.0	2.51	0.0	500.52		
E	4-130	33.00	931.10	0.0	0.0	902.37	0.0	0.13	0.0	500.52		
	4-130	33.00	931.10	0.0	0.0	902.37	0.0	0.22	0.0	500.52		
	4-130	33.00	931.10	0.0	0.0	902.37	0.0	0.31	0.0	500.52		
	4-130	33.00	931.10	0.0	0.0	902.37	0.0	0.41	0.0	500.52		
	4-130	33.00	931.10	0.0	0.0	902.37	0.0	0.51	0.0	500.52		
	4-130	33.00	931.10	0.0	0.0	902.37	0.0	0.61	0.0	500.52		
	4-130	33.00	931.10	0.0	0.0	902.37	0.0	0.71	0.0	500.52		
	4-130	33.00	931.10	0.0	0.0	902.37	0.0	0.81	0.0	500.52		
	4-130	33.00	931.10	0.0	0.0	902.37	0.0	0.91	0.0	500.52		
	4-130	33.00	931.10	0.0	0.0	902.37	0.0	1.01	0.0	500.52		
F	4-150	50.00	931.10	0.0	0.0	902.37	0.0	0.10	0.0	500.52		
	4-150	50.00	931.10	0.0	0.0	902.37	0.0	0.20	0.0	500.52		
	4-150	50.00	931.10	0.0	0.0	902.37	0.0	0.30	0.0	500.52		
	4-150	50.00	931.10	0.0	0.0	902.37	0.0	0.40	0.0	500.52		
	4-150	50.00	931.10	0.0	0.0	902.37	0.0	0.50	0.0	500.52		
	4-150	50.00	931.10	0.0	0.0	902.37	0.0	0.60	0.0	500.52		
	4-150	50.00	931.10	0.0	0.0	902.37	0.0	0.70	0.0	500.52		
	4-150	50.00	931.10	0.0	0.0	902.37	0.0	0.80	0.0	500.52		
	4-150	50.00	931.10	0.0	0.0	902.37	0.0	0.90	0.0	500.52		
	4-150	50.00	931.10	0.0	0.0	902.37	0.0	1.00	0.0	500.52		
G	4-100	1300.00	956.60	0.0	0.0	901.64	0.0	0.54	0.0	500.52		
	4-100	1300.00	956.60	0.0	0.0	901.64	0.0	0.64	0.0	500.52		
	4-100	1300.00	956.60	0.0	0.0	901.64	0.0	0.74	0.0	500.52		
	4-100	1300.00	956.60	0.0	0.0	901.64	0.0	0.84	0.0	500.52		
	4-100	1300.00	956.60	0.0	0.0	901.64	0.0	0.94	0.0	500.52		
	4-100	1300.00	956.60	0.0	0.0	901.64	0.0	1.04	0.0	500.52		
	4-100	1300.00	956.60	0.0	0.0	901.64	0.0	1.14	0.0	500.52		
	4-100	1300.00	956.60	0.0	0.0	901.64	0.0	1.24	0.0	500.52		
	4-100	1300.00	956.60	0.0	0.0	901.64	0.0	1.34	0.0	500.52		
	4-100	1300.00	956.60	0.0	0.0	901.64	0.0	1.44	0.0	500.52		

SECCG	VECH	ELMIN	KOCHSL	ELTRG	ELLC	CHSEL	DIFASH	DIFASH	LIFASH	EL	LIFCC	INPL
12-150	50.00	979.60	-8.01	0.0	0.0	551.33	0.0	0.10	0.0	542.47	0.0	0.0
12-150	50.00	979.60	-8.01	0.0	0.0	552.20	0.91	0.13	0.51	552.60	0.75	0.00
12-150	50.00	979.60	-8.01	0.0	0.0	586.37	-3.67	0.11	0.0	581.00	-2.55	0.00
12-150	50.00	979.60	-8.01	0.0	0.0	590.32	1.43	0.10	0.0	591.20	1.11	0.00
12-150	50.00	979.60	-8.01	0.0	0.0	595.34	-0.02	0.14	0.0	595.24	-2.77	0.00
M 13.000	806.00	983.80	5.21	0.0	0.0	546.50	0.0	3.24	0.0	955.17	0.0	0.0
M 13.000	806.00	983.80	5.21	0.0	0.0	545.50	0.24	3.32	0.0	945.95	0.75	10.00
M 13.000	806.00	983.80	5.21	0.0	0.0	551.71	-3.87	3.32	0.0	551.73	-3.84	0.0
M 13.000	806.00	983.80	5.21	0.0	0.0	953.92	2.21	3.00	0.0	546.17	-1.00	0.0
M 13.000	806.00	983.80	5.21	0.0	0.0	547.11	3.21	2.74	0.0	557.44	2.27	0.0
N 14.000	895.00	985.70	2.12	0.0	0.0	540.73	0.0	1.00	0.0	540.73	0.0	0.0
N 14.000	895.00	985.70	2.12	0.0	0.0	547.03	0.93	2.00	0.93	547.00	1.05	0.00
N 14.000	895.00	985.70	2.12	0.0	0.0	553.07	-3.70	1.10	0.0	549.12	-2.04	0.0
N 14.000	895.00	985.70	2.12	0.0	0.0	553.00	1.43	1.00	0.0	543.00	-0.50	0.0
N 14.000	895.00	985.70	2.12	0.0	0.0	550.74	2.99	1.00	0.0	549.00	2.10	0.0
O 15.000	870.00	986.00	1.30	0.0	0.0	540.01	0.0	1.00	0.0	540.01	0.0	0.0
O 15.000	870.00	986.00	1.30	0.0	0.0	547.03	1.00	1.00	1.00	547.03	1.00	0.00
O 15.000	870.00	986.00	1.30	0.0	0.0	550.31	-3.72	1.00	0.0	546.90	-2.75	0.0
O 15.000	870.00	986.00	1.30	0.0	0.0	957.10	1.55	1.00	0.0	547.27	-0.01	0.0
O 15.000	870.00	986.00	1.30	0.0	0.0	549.40	2.02	1.00	0.0	1000.00	2.00	0.0

	1.000	50.000	51.000	52.000	3.000	61.000	64.000	200.000	0.0	0.0
OT	9.000	1920.000	3400.000	4200.000	6300.000	4200.000	4200.000	4200.000	4200.000	4200.000
NC	0.0	0.0	0.0	0.100	0.300	0.0	0.0	0.0	0.0	0.0
ET	0.100	0.100	0.030	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	1.400	0.0	0.0	0.0
Y1	0.010	3.000	1970.000	2055.000	300.000	300.000	300.000	0.0	0.0	0.0
GR	940.000	550.300	948.900	1970.000	935.600	1990.000	935.600	2020.000	947.300	2025.000
GR	948.000	2135.000	950.000	2140.000	940.000	2150.000	0.0	0.0	0.0	0.0
NC	0.100	0.100	0.040	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ET	0.0	0.0	0.0	0.0	0.0	0.0	0.100	0.0	1975.000	2024.000
Y1	0.100	9.000	1975.000	2024.000	422.000	422.000	422.000	0.0	0.0	0.0
GR	980.000	1900.000	950.000	1900.000	951.500	1975.000	938.100	1975.000	938.100	2024.000
GR	951.500	2024.000	951.800	2095.000	949.100	2170.000	960.000	2440.000	0.0	0.0
NC	0.0	0.0	0.0	0.800	1.000	0.0	0.0	0.0	0.0	0.0
ET	0.0	0.0	0.0	0.0	0.0	0.0	9.100	0.0	1975.000	2024.000
Y1	0.110	0.0	0.0	0.0	1.000	1.000	1.000	0.0	0.0	0.0
BT	4.000	1975.000	951.500	0.0	1975.000	953.800	947.000	2024.000	953.800	947.000
BT	2024.000	951.500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NC	0.0	0.0	0.0	0.500	0.700	0.0	0.0	0.0	0.0	0.0
ET	0.0	0.0	0.0	0.0	0.0	0.0	9.100	0.0	1975.000	2024.000
Y1	0.120	0.0	0.0	0.0	14.000	14.000	14.000	0.0	0.0	0.0
Y2	0.0	0.0	0.0	0.0	0.0	0.0	1.000	0.0	0.0	0.0
NC	0.0	0.0	0.0	0.100	0.300	0.0	0.0	0.0	0.0	0.0
ET	0.0	0.0	0.0	0.0	0.0	0.0	9.100	0.0	1975.000	2024.000
Y1	0.130	0.0	0.0	0.0	1.000	1.000	1.000	0.0	0.0	0.0
Y3	10.000	0.0	0.0	0.0	0.0	0.0	0.0	951.500	951.500	0.0
NC	0.0	0.0	0.0	0.800	1.000	0.0	0.0	0.0	0.0	0.0
ET	0.0	0.0	0.0	0.0	0.0	0.0	9.100	0.0	1976.000	2024.000
Y1	0.150	21.000	1976.000	2024.000	41.000	41.000	41.000	0.0	0.0	0.0

Future Conditions
Conditions after Completion
of COE Proposed Unit 2B

This information should be retained on file and is to be used to revise the flood insurance study for this community after the COE proposed channelization project, Unit 2B, is completed.

HEC2 RELEASE DATED NOV 76 UPDATED AUG1977
 REPORT CORR 01.02
 MODIFICATION 50,51,52,53, PBJ UPDATE MADE 16 JAN 3 PM

T1 35 WPA FLS (CONTRACT W-4553)
 T2 CHARTERS TOWNSHIP WASHINGTON CO
 T3 100 YR FLOOD 29 DCK CHARTERS RIV

proposed channel

J1	ICHECK	INC	NINV	IDIR	STRT	METRIC	HVINS	Q	MSL	FO
	0.	4.	0.	0.	0.002500	0.0	0.0	0.	960.000	0.0
J2	NPROF	IPLDT	PREVS	VSECV	XSECH	FN	LOC	IGN	CHIN	ITRACE
	1.000	0.0	-1.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0
J3	VARIABLE CODES FOR SUMMARY PRINTOUT									
	32.000	43.000	1.000	8.000	39.000	65.000	53.000	27.000	21.000	22.000
	29.000	54.000	4.000	0.0	30.000	39.000	42.000	33.000	40.000	41.000
	1.000	50.000	51.000	52.000	3.000	61.000	64.000	200.000	0.0	0.0
QY	9.000	1920.000	3400.000	4200.000	6300.000	4200.000	4200.000	4200.000	4200.000	4200.000
NC	0.0	0.0	0.0	0.100	0.300	0.0	0.0	0.0	0.0	0.0
NT	0.100	0.100	0.030	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ET	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.400	0.0	0.0
X1	0.010	8.000	1970.000	2055.000	300.000	300.000	300.000	0.0	0.0	0.0
GR	960.000	950.000	948.900	1970.000	935.600	1990.000	935.600	2024.000	947.300	2055.000
GR	948.000	2135.000	650.000	2140.000	960.000	2150.000	0.0	0.0	0.0	0.0
NC	0.100	0.100	0.040	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ET	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.100	0.0	1975.000
X1	0.100	0.000	1975.000	2024.000	422.000	422.000	422.000	0.0	0.0	0.0
GR	980.000	1900.000	950.000	1900.000	941.500	1975.000	938.100	1975.000	938.100	2024.000
GR	951.500	2024.000	951.800	2024.000	949.100	2175.000	949.100	2440.000	0.0	0.0
NC	0.0	0.0	0.0	0.000	1.000	0.0	0.0	0.0	0.0	0.0
ET	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.100	0.0	1975.000
X1	0.110	0.0	0.0	0.0	1.000	1.000	1.000	0.0	0.0	0.0
BT	4.000	1975.000	951.500	0.0	1975.000	953.800	947.000	2024.000	952.800	947.000
BT	2024.000	951.500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NC	0.0	0.0	0.0	0.500	0.500	0.0	0.0	0.0	0.0	0.0
ET	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.100	0.0	1975.000
X1	0.120	0.0	0.0	0.0	14.000	14.000	14.000	0.0	0.0	0.0
X2	0.0	0.0	0.0	0.0	0.0	0.0	1.000	0.0	0.0	0.0
NC	0.0	0.0	0.0	0.100	0.300	0.0	0.0	0.0	0.0	0.0
ET	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.100	0.0	1975.000
X1	0.130	0.0	0.0	0.0	1.000	1.000	1.000	0.0	0.0	0.0
X3	10.000	0.0	0.0	0.0	0.0	0.0	0.0	951.500	951.500	0.0
NC	0.0	0.0	0.0	0.800	1.000	0.0	0.0	0.0	0.0	0.0
ET	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.100	0.0	1975.000
X1	0.150	21.000	1970.000	2024.000	41.000	41.000	41.000	0.0	0.0	0.0

ET	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.400	0.0	0.0	0.0
X1	0.300	12.000	1982.000	2018.000	375.000	325.000	359.000	0.0	0.0	0.0	0.0
X4	1.000	954.000	1930.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GR	950.000	1500.000	952.000	1940.000	952.000	1940.000	951.000	1945.000	949.700	1982.000	0.0
GR	943.900	1982.000	940.400	1999.000	940.400	2006.000	943.100	2018.000	949.700	2018.000	0.0
GR	953.000	2300.000	950.000	2400.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NC	0.0	0.0	0.0	0.500	1.000	0.0	0.0	0.0	0.0	0.0	0.0
ET	0.0	0.0	0.0	0.0	0.0	0.0	9.400	0.0	0.0	0.0	0.0

X1	0.310	0.0	0.0	0.0	1.000	1.000	1.000	0.0	0.0	0.0	0.0
X4	1.000	954.000	1930.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BT	3.000	1989.000	945.700	947.900	2018.000	949.700	947.900	2018.000	949.700	947.900	0.0
NC	0.0	0.0	0.0	0.500	0.700	0.0	0.0	0.0	0.0	0.0	0.0

X1	0.320	0.0	0.0	0.0	20.000	20.000	20.000	0.0	0.0	0.0	0.0
X2	0.0	0.0	0.0	0.0	0.0	0.0	1.000	0.0	0.0	0.0	0.0
X4	1.000	954.000	1930.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ET	0.0	0.0	0.0	0.0	0.0	0.0	7.400	0.0	0.0	0.0	0.0

X1	0.330	0.0	0.0	0.0	1.000	1.000	1.000	0.0	0.0	0.0	0.0
X4	1.000	954.000	1930.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ET	0.0	0.0	0.0	0.0	0.0	0.0	13.400	0.0	0.0	0.0	0.0

X1	0.350	21.000	1985.000	2015.000	50.000	50.000	50.000	0.0	0.0	0.0	0.0
GR	961.600	1880.000	957.500	1923.000	954.700	1941.000	953.300	1950.500	952.700	1971.000	0.0
GR	943.900	1985.000	942.700	1991.000	941.800	1992.000	941.200	1995.000	941.100	2003.000	0.0
GR	941.400	2009.000	942.800	2010.000	943.600	2015.000	946.800	2027.000	949.300	2103.000	0.0
GR	950.900	2200.000	951.100	2270.000	952.800	2300.000	953.600	2326.000	957.400	2340.000	0.0
GR	962.000	2369.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ET	0.0	0.0	0.0	0.0	0.0	0.0	35.400	0.0	0.0	0.0	0.0

X1	0.400	15.000	1989.000	2011.000	400.000	300.000	342.000	0.0	0.0	0.0	0.0
GR	962.700	1819.000	949.300	1842.000	948.300	1893.000	948.200	1936.000	945.800	1976.000	0.0
GR	945.800	1989.000	941.300	1985.000	941.300	2005.000	944.800	2011.000	945.400	2011.000	0.0
GR	945.800	2015.000	948.100	2030.000	948.800	2144.000	953.700	2169.000	960.000	2200.000	0.0
ET	0.0	0.0	0.0	0.0	0.0	0.0	40.400	0.0	0.0	0.0	0.0

X1	0.410	0.0	0.0	0.0	1.000	1.000	1.000	0.0	0.0	0.0	0.0
BT	3.000	1989.000	945.800	944.800	2011.000	945.800	944.800	2011.000	945.800	944.800	0.0

X1	0.420	0.0	0.0	0.0	11.000	11.000	11.000	0.0	0.0	0.0	0.0
X2	0.0	0.0	0.0	0.0	0.0	0.0	1.000	0.0	0.0	0.0	0.0
ET	0.0	0.0	0.0	0.0	0.0	0.0	35.400	0.0	0.0	0.0	0.0

X1	0.430	0.0	0.0	0.0	1.000	1.000	1.000	0.0	0.0	0.0	0.0
QT	9.000	1640.000	2890.000	3510.000	5250.000	3510.000	3510.000	3510.000	3510.000	3510.000	3510.000
NC	0.100	0.100	0.040	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NC	0.0	0.0	0.0	0.100	0.300	0.0	0.0	0.0	0.0	0.0	0.0
ET	0.0	0.0	0.0	0.0	0.0	0.0	12.400	0.0	0.0	0.0	0.0

X1	1.000	22.000	1981.000	2021.000	750.000	850.000	819.000	0.0	0.0	0.0	0.0
GR	970.270	1697.000	961.900	1820.000	960.500	1838.000	955.000	1860.000	949.700	1920.000	0.0
GR	946.600	1971.000	947.100	1981.000	945.100	1988.000	943.500	1990.000	942.200	1991.000	0.0
GR	941.700	2000.000	941.900	2012.000	943.500	2013.000	947.000	2021.000	948.400	2034.000	0.0
GR	947.500	2100.000	948.900	2300.000	950.500	2500.000	954.700	2600.000	958.700	2630.000	0.0
GR	963.000	2643.000	963.500	2650.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NC	0.150	0.150	0.050	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ET	0.0	0.0	0.0	0.0	0.0	0.0	9.400	0.0	0.0	0.0	0.0

X1	2.000	17.000	1980.000	2021.000	650.000	700.000	740.000	0.0	0.0	0.0	0.0
GR	963.200	1932.000	960.800	1948.000	957.600	1961.000	950.000	1980.000	946.400	1989.000	0.0
GR	944.600	1993.000	943.400	2000.000	943.600	2005.000	944.600	2007.000	947.400	2010.000	0.0
GR	949.800	2021.000	949.500	2340.000	952.500	2500.000	955.600	2542.000	962.700	2577.000	0.0
GR	972.700	2595.000	971.900	2612.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ET	0.0	0.0	0.0	0.0	0.0	0.0	8.400	0.0	0.0	0.0	0.0

X1	4.100	17.000	1975.000	2025.000	192.000	775.000	1792.000	0.0	0.0	0.0
X3	10.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GR	973.700	1795.000	961.900	1819.000	962.300	1845.000	963.600	1975.000	963.600	1975.000
GR	951.100	1975.000	951.100	1987.000	952.500	2000.000	951.100	1975.000	951.100	2025.000
GR	963.600	2025.000	963.600	1980.000	962.800	2194.000	962.800	2025.000	962.800	2368.000
GR	961.900	2420.000	968.400	2432.000	0.0	0.0	0.0	0.0	0.0	2025.000
ET	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
X1	4.120	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
X2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
X3	10.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GR	963.600	1975.000	963.600	1975.000	962.400	2025.000	962.400	1975.000	963.600	2025.000
ET	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
X1	4.130	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
X3	10.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GR	963.600	1975.000	963.600	1975.000	962.400	2025.000	962.400	1975.000	963.600	2025.000
ET	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
X1	4.150	12.000	1974.000	2015.000	50.000	50.000	50.000	50.000	0.0	0.0
X4	2.000	660.000	1920.000	1957.900	0.0	0.0	0.0	0.0	0.0	0.0
GR	980.000	1800.000	953.800	1974.000	953.000	1988.000	1988.000	1957.900	1992.000	1992.000
GR	952.900	2071.000	953.500	1974.000	952.800	2000.000	2000.000	1974.000	2008.000	2008.000
GR	967.800	2500.000	972.900	2615.000	0.0	0.0	0.0	0.0	0.0	0.0
GR	960.000	1640.000	2690.000	3510.000	2520.000	3510.000	3510.000	3510.000	3510.000	3510.000
NC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NC	0.150	0.150	0.055	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ET	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
X1	5.000	17.000	1966.000	2024.000	650.000	600.000	600.000	600.000	1300.000	0.0
GR	980.700	1695.000	963.300	1731.000	961.200	1826.000	1826.000	961.200	1826.000	1826.000
GR	961.000	1980.000	959.300	2012.000	960.900	2055.000	2055.000	959.300	2008.000	2008.000
GR	957.400	2019.000	959.300	2012.000	0.0	0.0	0.0	0.0	0.0	0.0
ET	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
X1	7.000	18.000	1577.000	2025.000	800.000	905.000	905.000	905.000	905.000	0.0
GR	981.700	1600.000	968.300	1675.000	964.300	1710.000	1710.000	964.300	1800.000	1800.000
GR	962.600	1916.000	964.500	1949.000	964.300	1971.000	1971.000	964.500	1967.000	1967.000
GR	958.700	2000.000	958.500	2011.000	959.200	2014.000	2014.000	960.500	2015.000	2015.000
GR	993.800	2187.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ET	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
X1	7.100	11.000	1585.000	2015.000	1174.000	1269.000	1269.000	1269.000	1269.000	0.0
GR	985.000	1679.000	972.500	1713.000	968.600	1915.000	1915.000	967.000	1915.000	1915.000
GR	958.700	1985.000	958.700	2015.000	968.500	2015.000	2015.000	968.500	2015.000	2015.000
ET	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
X1	7.110	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GR	964.500	2025.000	990.100	2065.000	991.000	2075.000	2075.000	990.500	2075.000	2075.000
ET	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
X1	7.120	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GR	961.900	2025.000	968.400	2432.000	0.0	0.0	0.0	0.0	0.0	0.0

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Table with 13 columns and 3 rows of data. Columns contain numerical values, some with leading zeros. Rows correspond to categories Y1, Y2, and Y3.

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THIS RUN EXECUTED 08/15/78 11.07

THECZ RELEASE DATED NOV 76 UPDATED AUG1977
ERRCR CORR = 001,02
MODIFICATION = 50,51,52,53, HBJ UPDATE MADE 16 JAN 5 PM

T1 -35-NPA ELS (CONTRACT H-4553)
T2 -CHARTIERS TOWNSHIP WASHINGTON CO.
T3 -MODE 29-DCK-CHARTIERS RUN

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
	0.	7.	0.	0.	0.0	0.0	0.0	0.	945.180	0.0
J2	NPROF	LFLQT	PREVS	XSECV	XSECH	FH	ALLDC	IBM	CHNIK	ITRACE
	2.000	0.0	-1.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0

*PROF 2

CCHV= 0.100 CFHV= 0.300

*SECNO .010

2800 NAT Q1= 840.24 WSEL= 945.18 ENC Q1= 357.45 WSEL= 945.28 RATIO= 0.0000
NAT Q1= 857. RATIO= 0.0000 WSEL= 945.20

THIS RUN EXECUTED 08/15/78 11.25

HEC2 RELEASE DATED NOV 74 UPDATED AUG 1977
ERROR CORR 01.02
MODIFICATION 50,51,52,53, HBJ UPDATE MADE 16 JAN 5 PM

T1 35 WPA/EIS (CONTRACT H-4553)
T2 CHARTERS TOWNSHIP WASHINGTON CO
T3 500 YR FLOOD 29 DCK CHARTERS RUN

J1	LCHECK	IND	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FG
	0.	3.	0.	0.	0.002500	0.0	0.0	0.	960.000	0.0

J2	NPROF	IPLOT	PREVS	XSECV	XSECH	EN	ALLDC	IBM	CHNIN	ITRACE
	4.000	0.0	-1.000	0.0	0.0	0.0	0.0	3.0	0.0	0.0

THIS RUN EXECUTED: 08/15/78 11.35

HECA RELEASED: NOV 76 UPDATED AUG1977
ERROR CORR: 01.02
MODIFICATION: 50.51.52.53. MBJ_UPDATE MADE 16 JAN 5 PH

T1 35 NP: FIS (CONTRACT H-4553)
T2 CHARTIERS TOMNSHIP WASHINGTON CO.
T3 500F 28 DCK CHARTIERS RUN

J1	CHECK	INO	NIW	IDIR	STRT	METRIC	RVINS	Q	WSEL	FO
	0.	5.	0.	0.	0.002500	0.0	0.0	0.	960.000	0.0
J2	MPROF	IPLOT	PREVS	XSECV	ZSECH	FN	ALDLC	IBM	CHNIM	ITRAGE
	15.000	0.0	-1.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0

*PROF 5

CGHV= 0.100 CEHV= 0.300
*SECA= .010
SECHO DEPTH CWSFI
0 CLR OCH

CR1WS WSFLK EG HV AROR HL YDI
020B ALDA ACH

WLOSS MARK ELEV
TM ELEV (MNT)

THIS RUN EXECUTED 08/15/78 12.00

 HECZ RELEASE DATED NOV 76 UPDATED AUG1977
 EPRDR CORR 01.02
 MODIFICATION 50,51,52,53. MBI UPDATE MADE 16 JAN 5 PM

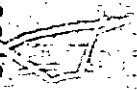
NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

100 YR FLOOD-29-DCK-CHAR

SUMMARY PRINTOUT

SECNC	D	CWSEL	DEPTH	FLCH	CUM DIS	SSTA	STENCL	STCHL	STCHR	STENCR	ENDST	TOPID
0.010	4200.00	945.18	9.58	300.00	0.0	1975.59	0.0	1970.00	2055.00	0.0	2045.00	73.00
0.010	4200.00	945.18	9.58	300.00	0.0	1975.59	1976.00	1970.00	2055.00	2055.00	2048.00	73.07
0.010	1920.00	941.97	6.37	300.00	0.0	1980.42	0.0	1970.00	2055.00	0.0	2039.07	58.00
0.010	3400.00	944.19	8.59	300.00	0.0	1977.08	0.0	1970.00	2055.00	0.0	2045.71	68.00
0.010	6300.00	947.36	11.76	300.00	0.0	1972.32	0.0	1970.00	2055.00	0.0	2061.66	89.35
0.100	4200.00	946.44	8.34	422.00	422.00	1975.00	0.0	1975.00	2024.00	0.0	2024.00	49.00
0.100	4200.00	946.44	8.34	422.00	422.00	1975.00	1975.00	1975.00	2024.00	2024.00	2024.00	49.00
0.100	1920.00	943.38	5.29	422.00	422.00	1975.00	0.0	1975.00	2024.00	0.0	2024.00	49.00
0.100	3400.00	945.52	7.42	422.00	422.00	1975.00	0.0	1975.00	2024.00	0.0	2024.00	49.00
0.100	6300.00	948.38	10.28	422.00	422.00	1975.00	0.0	1975.00	2024.00	0.0	2024.00	49.00
0.110	4200.00	946.45	8.35	1.00	423.00	1975.00	0.0	1975.00	2024.00	0.0	2024.00	49.00
0.110	4200.00	946.45	8.35	1.00	423.00	1975.00	1975.00	1975.00	2024.00	2024.00	2024.00	49.00
0.110	1920.00	943.39	5.29	1.00	423.00	1975.00	0.0	1975.00	2024.00	0.0	2024.00	49.00
0.110	3400.00	945.53	7.43	1.00	423.00	1975.00	0.0	1975.00	2024.00	0.0	2024.00	49.00
0.110	6300.00	948.39	10.29	1.00	423.00	1975.00	0.0	1975.00	2024.00	0.0	2024.00	49.00
0.120	4200.00	946.67	8.57	14.00	437.00	1975.00	0.0	1975.00	2024.00	0.0	2024.00	49.00
0.120	4200.00	946.67	8.57	14.00	437.00	1975.00	1975.00	1975.00	2024.00	2024.00	2024.00	49.00
0.120	1920.00	943.53	5.43	14.00	437.00	1975.00	0.0	1975.00	2024.00	0.0	2024.00	49.00
0.120	3400.00	945.71	7.61	14.00	437.00	1975.00	0.0	1975.00	2024.00	0.0	2024.00	49.00
0.120	6300.00	948.69	10.59	14.00	437.00	1975.00	0.0	1975.00	2024.00	0.0	2024.00	49.00
0.130	4200.00	946.67	8.57	1.00	438.00	1975.00	0.0	1975.00	2024.00	0.0	2024.00	49.00
0.130	4200.00	946.67	8.57	1.00	438.00	1975.00	1975.00	1975.00	2024.00	2024.00	2024.00	49.00
0.130	1920.00	943.54	5.44	1.00	438.00	1975.00	0.0	1975.00	2024.00	0.0	2024.00	49.00
0.130	3400.00	945.72	7.62	1.00	438.00	1975.00	0.0	1975.00	2024.00	0.0	2024.00	49.00
0.130	6300.00	948.74	11.64	1.00	438.00	1975.00	0.0	1975.00	2024.00	0.0	2024.00	49.00
0.150	4200.00	946.95	8.45	41.00	479.00	1961.47	0.0	1976.00	2024.00	0.0	2035.08	73.01
0.150	4200.00	946.99	8.49	41.00	479.00	1976.00	1976.00	1976.00	2024.00	2024.00	2024.00	73.00
0.150	1920.00	943.83	5.33	41.00	479.00	1960.38	0.0	1976.00	2024.00	0.0	2027.40	59.00
0.150	3400.00	945.99	7.49	41.00	479.00	1963.58	0.0	1976.00	2024.00	0.0	2032.91	69.00
0.150	6300.00	949.90	11.40	41.00	479.00	1029.18	0.0	1976.00	2024.00	0.0	2264.93	73.00

SECNO	Q	CMSL	DEPTH	PLCH	CUM DIS	SSTA	STENCL	SICHL	STCHR	STENCR	ENDST	TOPRID
0.100	4200.00	947.86	9.16	25.00	504.00	1754.29	0.0	1976.00	2024.00	0.0	2037.12	147.00
0.160	4200.00	947.15	8.46	25.00	504.00	1976.00	1976.00	1976.00	2024.00	2024.00	2024.00	48.00
0.160	1920.00	944.92	6.22	25.00	504.00	1976.00	0.0	1976.00	2024.00	0.0	2037.12	48.00
0.160	3600.00	946.82	8.12	25.00	504.00	1561.82	0.0	1976.00	2024.00	0.0	2034.65	42.88
0.160	6300.00	951.61	12.91	25.00	504.00	1537.82	0.0	1976.00	2024.00	0.0	2319.12	427.53
0.200	4200.00	947.99	9.19	25.00	529.00	1739.15	0.0	1976.00	2024.00	2024.00	2037.22	170.24
0.200	4200.00	948.98	9.28	25.00	529.00	1976.00	1976.00	1976.00	2024.00	2024.00	2024.00	48.00
0.200	1920.00	945.05	6.25	25.00	529.00	1976.00	0.0	1976.00	2024.00	0.0	2024.00	48.00
0.200	3600.00	946.96	8.16	25.00	529.00	1976.00	0.0	1976.00	2024.00	0.0	2024.00	48.00
0.200	6300.00	951.68	12.89	25.00	529.00	1534.26	0.0	1976.00	2024.00	0.0	2320.61	488.21
0.210	4200.00	948.00	9.20	1.00	530.00	1738.53	0.0	1976.00	2024.00	0.0	2037.22	171.15
0.210	4200.00	948.09	9.29	1.00	530.00	1815.02	1815.62	1976.00	2024.00	2024.00	2024.00	47.40
0.210	1920.00	945.05	6.25	1.00	530.00	1976.00	0.0	1976.00	2024.00	0.0	2024.00	48.00
0.210	3600.00	946.97	8.17	1.00	530.00	1976.00	0.0	1976.00	2024.00	0.0	2024.00	48.00
0.210	6300.00	952.37	13.57	1.00	530.00	1501.30	0.0	1976.00	2024.00	0.0	2334.45	493.15
0.220	4200.00	951.93	13.03	45.00	579.00	1526.65	0.0	1976.00	2024.00	0.0	2323.42	789.87
0.220	4200.00	948.99	11.19	49.00	579.00	1658.87	1658.87	1976.00	2024.00	2024.00	2024.00	151.54
0.220	1920.00	945.55	6.75	49.00	579.00	1976.00	0.0	1976.00	2024.00	0.0	2024.00	48.00
0.220	3600.00	947.73	8.93	45.00	579.00	1976.00	0.0	1976.00	2024.00	0.0	2024.00	48.00
0.220	6300.00	952.68	13.88	49.00	579.00	1490.33	0.0	1976.00	2024.00	0.0	2340.01	850.29
0.230	4200.00	951.77	12.57	1.00	580.00	1529.88	0.0	1976.00	2024.00	0.0	2322.45	774.74
0.230	4200.00	952.56	13.76	1.00	580.00	1679.57	1679.57	1976.00	2024.00	2024.00	2024.00	144.44
0.230	1920.00	945.76	6.96	1.00	580.00	1976.00	0.0	1976.00	2024.00	0.0	2024.00	48.00
0.230	3600.00	948.40	9.60	1.00	580.00	1976.00	0.0	1976.00	2024.00	0.0	2024.00	48.00
0.230	6300.00	952.54	13.74	1.00	580.00	1495.02	0.0	1976.00	2024.00	0.0	2337.69	642.88
0.250	4200.00	951.83	13.63	50.00	630.00	1646.98	0.0	1994.00	2017.00	0.0	2091.32	244.32
0.250	4200.00	952.64	14.44	50.00	630.00	1934.92	1934.92	1994.00	2017.00	2037.42	2037.42	58.50
0.250	1920.00	945.98	7.78	50.00	630.00	1964.27	0.0	1994.00	2017.00	0.0	2037.42	58.50
0.250	3600.00	948.61	10.41	50.00	630.00	1980.14	0.0	1994.00	2017.00	0.0	2040.17	60.03
0.250	6300.00	952.63	14.44	50.00	630.00	1812.85	0.0	1994.00	2017.00	0.0	2125.40	412.75
0.300	2510.00	953.56	13.16	359.00	989.00	1932.22	0.0	1982.00	2018.00	0.0	2507.54	375.74
0.300	3110.00	954.14	13.74	359.00	989.00	1982.00	1982.00	1982.00	2018.00	2125.74	2125.74	433.74
0.300	1640.00	948.26	7.68	255.00	585.00	1982.00	0.0	1982.00	2018.00	0.0	2125.74	433.74
0.300	2890.00	951.38	10.28	359.00	989.00	1963.12	0.0	1982.00	2018.00	0.0	2161.21	159.06
0.300	5250.00	955.78	15.38	359.00	589.00	1602.50	0.0	1982.00	2018.00	0.0	2335.70	537.20
0.310	4200.00	953.84	13.48	1.00	950.00	1930.54	0.0	1982.00	2018.00	0.0	2312.63	362.63
0.310	4200.00	954.32	13.92	1.00	950.00	1982.00	1982.00	1982.00	2018.00	2125.32	2125.32	362.63
0.310	1640.00	948.28	7.88	1.00	950.00	1982.00	0.0	1982.00	2018.00	0.0	2018.00	36.00
0.310	2090.00	951.39	10.99	1.00	950.00	1963.06	0.0	1982.00	2018.00	0.0	2162.43	159.17
0.310	5250.00	955.98	15.50	1.00	990.00	1787.87	0.0	1982.00	2018.00	0.0	2342.62	554.74
0.320	3510.00	953.95	13.55	20.00	1010.00	1930.36	0.0	1982.00	2018.00	0.0	2513.53	384.27
0.320	3510.00	954.41	14.01	20.00	1010.00	1982.00	1982.00	1982.00	2018.00	2128.60	2128.60	440.60
0.320	1640.00	948.44	8.04	20.00	1010.00	1982.00	0.0	1982.00	2018.00	0.0	2018.00	36.00
0.320	2890.00	952.56	12.16	20.00	1010.00	1937.21	0.0	1982.00	2018.00	0.0	2262.22	325.01
0.330	3510.00	953.95	13.55	20.00	1010.00	1930.36	0.0	1982.00	2018.00	0.0	2513.53	384.27
0.330	3510.00	954.38	13.98	1.00	1011.00	1982.00	1982.00	1982.00	2018.00	2124.00	2124.00	362.40
0.330	1640.00	948.71	8.31	1.00	1011.00	1982.00	0.0	1982.00	2018.00	0.0	2018.00	36.00



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SECG	Q	CMSL	DEPTH	XLCH	CUM DIS	SSTA	STENCL	STCHL	STCHR	STENCR	ENDST	TCPLID	
0.330	3510.00	953.90	13.51	1.00	1011.00	1930.48	0.0	1982.00	2018.00	0.0	2312.43	382.45	
0.330	3910.00	954.38	13.98	1.00	1011.00	1962.00	1982.00	1982.00	2018.00	2124.05	2124.05	142.05	
0.330	1640.00	948.71	8.31	1.00	1011.00	1982.00	0.0	1982.00	2018.00	0.0	2018.00	36.00	
0.330	2890.00	952.54	12.14	1.00	1011.00	1937.31	0.0	1982.00	2018.00	0.0	2280.47	323.15	
0.330	5250.00	955.98	15.58	1.00	1011.00	1788.36	0.0	1982.00	2018.00	0.0	2342.32	554.13	
0.350	3510.00	954.19	13.09	50.00	1061.00	1944.24	0.0	1985.00	2015.00	0.0	2328.03	383.79	
0.350	3910.00	954.70	13.60	50.00	1061.00	1985.00	1985.00	1985.00	2015.00	2131.45	2131.45	146.45	
0.350	1640.00	948.82	7.73	50.00	1061.00	1977.16	0.0	1985.00	2015.00	0.0	2086.16	138.94	
0.350	2890.00	953.07	11.97	50.00	1061.00	1957.73	0.0	1985.00	2015.00	0.0	2309.68	351.35	
0.350	5250.00	956.11	15.02	50.00	1061.00	1932.21	0.0	1985.00	2015.00	0.0	2334.55	402.36	
0.400	3510.00	954.44	13.14	342.00	1403.00	1833.20	0.0	1989.00	2011.00	0.0	2172.58	339.35	
0.400	3910.00	954.9	13.62	342.00	1403.00	1967.97	1967.97	1969.00	2011.00	2086.77	2086.77	116.60	
0.400	1640.00	950.05	8.76	342.00	1403.00	1840.69	0.0	1989.00	2011.00	0.0	2156.44	339.75	
0.400	2890.00	953.39	12.09	342.00	1403.00	1834.97	0.0	1989.00	2011.00	0.0	2167.43	332.46	
0.400	5250.00	956.32	15.02	342.00	1403.00	1829.94	0.0	1989.00	2011.00	0.0	2181.91	351.46	
0.410	3510.00	954.48	13.18	1.00	1404.00	1833.11	0.0	1989.00	2011.00	0.0	2172.82	339.71	
0.410	3910.00	955.05	13.75	1.00	1404.00	1967.43	1967.44	1969.00	2011.00	2086.02	2086.02	120.59	
0.410	1640.00	950.18	8.88	1.00	1404.00	1840.49	0.0	1989.00	2011.00	0.0	2151.85	310.37	
0.410	2890.00	953.43	12.13	1.00	1404.00	1834.91	0.0	1989.00	2011.00	0.0	2167.62	332.70	
0.410	5250.00	956.37	15.07	1.00	1404.00	1829.87	0.0	1989.00	2011.00	0.0	2182.13	352.26	
0.420	3510.00	954.48	13.18	11.00	1415.00	1833.11	0.0	1989.00	2011.00	0.0	2172.84	339.73	
0.420	3910.00	955.06	13.76	11.00	1415.00	1967.41	1967.42	1989.00	2011.00	2086.05	2086.05	120.64	
0.420	1640.00	950.20	8.90	11.00	1415.00	1840.46	0.0	1989.00	2011.00	0.0	2151.11	313.65	
0.420	2890.00	953.43	12.13	11.00	1415.00	1834.91	0.0	1989.00	2011.00	0.0	2167.64	332.74	
0.420	5250.00	956.37	15.07	11.00	1415.00	1829.86	0.0	1989.00	2011.00	0.0	2182.14	352.28	
0.430	3510.00	954.47	13.17	1.00	1416.00	1833.11	0.0	1989.00	2011.00	0.0	2172.84	339.74	
0.430	3910.00	955.04	13.74	1.00	1416.00	1967.99	1966.99	1989.00	2011.00	2087.38	2087.38	120.35	
0.430	1640.00	950.18	8.88	1.00	1416.00	1840.49	0.0	1989.00	2011.00	0.0	2151.83	310.34	
0.430	2890.00	953.43	12.13	1.00	1416.00	1834.90	0.0	1989.00	2011.00	0.0	2167.64	332.74	
0.430	5250.00	956.36	15.06	1.00	1416.00	1829.86	0.0	1989.00	2011.00	0.0	2182.13	352.29	
A	1.000	3510.00	954.71	13.01	819.00	2235.00	1867.71	0.0	1931.00	2021.00	0.0	2600.56	737.85
A	1.000	3910.00	955.55	13.05	819.00	2235.00	1974.51	1974.51	1931.00	2021.00	2097.68	2097.68	473.17
A	1.000	1640.00	950.78	9.08	819.00	2235.00	1891.54	0.0	1981.00	2021.00	0.0	2586.70	614.66
A	1.000	2890.00	953.66	11.98	819.00	2235.00	1865.94	0.0	1931.00	2021.00	0.0	2573.76	709.83
A	1.000	5250.00	956.62	14.92	819.00	2235.00	1853.54	0.0	1981.00	2021.00	0.0	2614.37	760.83
B	2.000	3510.00	954.95	11.55	760.00	2995.00	1957.62	0.0	1980.00	2021.00	0.0	2532.22	565.00
B	2.000	3910.00	955.63	12.43	760.00	2995.00	1980.00	1980.00	1980.00	2021.00	2315.70	2315.70	335.70
B	2.000	1640.00	951.52	8.12	760.00	2995.00	1976.19	0.0	1980.00	2021.00	0.0	2447.58	471.79
B	2.000	2890.00	953.97	10.57	760.00	2995.00	1970.07	0.0	1980.00	2021.00	0.0	2519.42	545.85
B	2.000	5250.00	956.64	15.44	760.00	2995.00	1962.90	0.0	1980.00	2021.00	0.0	2548.12	565.22
2.100	3510.00	955.82	11.42	802.00	3797.00	1975.00	0.0	1978.00	2023.00	0.0	2023.00	45.00	
2.100	3910.00	956.81	12.41	802.00	3797.00	1975.00	1975.00	1978.00	2023.00	2023.00	2023.00	45.00	
2.100	1640.00	953.77	9.37	802.00	3797.00	1975.00	0.0	1978.00	2023.00	0.0	2023.00	45.00	
2.100	2890.00	955.14	10.76	802.00	3797.00	1975.00	0.0	1978.00	2023.00	0.0	2023.00	45.00	
2.100	5250.00	957.63	13.23	802.00	3797.00	1975.00	0.0	1978.00	2023.00	0.0	2322.52	432.16	

A

B

SECOND 0 CHSEL DEPTH MLCH CUM DIS SSTA STENCL STCHR STENCR ENDST TOPDIS

4.130	3510.00	972.38	11.28	1.00	6392.00	1975.00	0.00	1975.00	2025.00	0.00	2025.00	50.00
4.120	3510.00	962.37	11.27	33.00	6391.00	1975.00	0.00	1975.00	2025.00	0.00	2025.00	50.00
4.120	2890.00	961.45	10.35	33.00	6391.00	1975.00	0.00	1975.00	2025.00	0.00	2025.00	50.00
4.120	1640.00	959.13	8.03	33.00	6391.00	1975.00	0.00	1975.00	2025.00	0.00	2025.00	50.00
4.120	3510.00	962.38	11.28	1.00	6392.00	1975.00	0.00	1975.00	2025.00	0.00	2025.00	50.00
4.110	3510.00	962.25	11.15	1.00	6355.00	1975.00	0.00	1975.00	2025.00	0.00	2025.00	50.00
4.110	3510.00	962.86	11.76	1.00	6358.00	1975.00	0.00	1975.00	2025.00	0.00	2025.00	50.00
4.110	2890.00	961.34	10.24	1.00	6358.00	1975.00	0.00	1975.00	2025.00	0.00	2025.00	50.00
4.110	1640.00	959.06	7.96	1.00	6358.00	1975.00	0.00	1975.00	2025.00	0.00	2025.00	50.00
4.110	3510.00	962.25	11.15	1.00	6355.00	1975.00	0.00	1975.00	2025.00	0.00	2025.00	50.00
4.100	3510.00	962.24	11.14	792.00	6357.00	1975.00	0.00	1975.00	2025.00	0.00	2025.00	50.00
4.100	2890.00	961.33	10.23	792.00	6357.00	1975.00	0.00	1975.00	2025.00	0.00	2025.00	50.00
4.100	1640.00	959.06	7.96	792.00	6357.00	1975.00	0.00	1975.00	2025.00	0.00	2025.00	50.00
4.100	3510.00	962.24	11.14	792.00	6357.00	1975.00	0.00	1975.00	2025.00	0.00	2025.00	50.00
4.000	3510.00	962.24	11.14	792.00	6357.00	1975.00	0.00	1975.00	2025.00	0.00	2025.00	50.00
4.000	2890.00	961.33	10.23	792.00	6357.00	1975.00	0.00	1975.00	2025.00	0.00	2025.00	50.00
4.000	1640.00	959.06	7.96	792.00	6357.00	1975.00	0.00	1975.00	2025.00	0.00	2025.00	50.00
4.000	3510.00	962.24	11.14	792.00	6357.00	1975.00	0.00	1975.00	2025.00	0.00	2025.00	50.00
3.000	3510.00	960.62	10.92	895.00	5545.00	1944.32	0.00	1975.00	2025.00	0.00	2025.00	2213.38
3.000	2890.00	959.70	10.60	895.00	5545.00	1944.32	0.00	1975.00	2025.00	0.00	2025.00	2181.01
3.000	1640.00	957.47	7.77	895.00	5545.00	1944.32	0.00	1975.00	2025.00	0.00	2025.00	2138.35
3.000	3510.00	961.37	11.67	895.00	5545.00	1944.32	0.00	1975.00	2025.00	0.00	2025.00	2119.48
3.000	3510.00	960.62	10.92	895.00	5545.00	1944.32	0.00	1975.00	2025.00	0.00	2025.00	2094.18
3.000	2890.00	957.82	11.82	807.00	4670.00	1912.91	0.00	1981.00	2020.00	0.00	2020.00	2056.74
3.000	1640.00	955.78	9.78	807.00	4670.00	1912.91	0.00	1981.00	2020.00	0.00	2020.00	2036.31
3.000	3510.00	959.63	13.63	807.00	4670.00	1912.91	0.00	1981.00	2020.00	0.00	2020.00	2036.31
3.000	3510.00	958.69	12.69	807.00	4670.00	1912.91	0.00	1981.00	2020.00	0.00	2020.00	2036.31
2.150	3510.00	956.87	12.17	50.00	3863.00	1956.85	0.00	1990.00	2011.00	0.00	2011.00	2288.48
2.150	3510.00	957.60	12.98	50.00	3863.00	1990.00	0.00	1990.00	2011.00	0.00	2011.00	2229.37
2.150	2890.00	955.92	11.22	50.00	3863.00	1960.50	0.00	1990.00	2011.00	0.00	2011.00	2256.87
2.150	1640.00	953.97	9.27	50.00	3863.00	1960.50	0.00	1990.00	2011.00	0.00	2011.00	2187.76
2.150	3510.00	957.60	12.98	50.00	3863.00	1990.00	0.00	1990.00	2011.00	0.00	2011.00	2229.37
2.150	3510.00	956.87	12.17	50.00	3863.00	1956.85	0.00	1990.00	2011.00	0.00	2011.00	2288.48
2.130	3510.00	955.97	11.57	1.00	3813.00	1978.00	0.00	1978.00	2023.00	0.00	2023.00	2023.00
2.130	2890.00	955.30	10.90	1.00	3813.00	1978.00	0.00	1978.00	2023.00	0.00	2023.00	2023.00
2.130	1640.00	953.83	9.43	1.00	3813.00	1978.00	0.00	1978.00	2023.00	0.00	2023.00	2023.00
2.130	3510.00	956.98	12.58	1.00	3813.00	1978.00	0.00	1978.00	2023.00	0.00	2023.00	2023.00
2.130	3510.00	955.97	11.57	1.00	3813.00	1978.00	0.00	1978.00	2023.00	0.00	2023.00	2023.00
2.120	3510.00	955.91	12.51	14.00	3812.00	1978.00	1578.00	1978.00	2023.00	0.00	2023.00	2023.00
2.120	2890.00	955.29	10.89	14.00	3812.00	1978.00	0.00	1978.00	2023.00	0.00	2023.00	2023.00
2.120	1640.00	953.82	9.42	14.00	3812.00	1978.00	0.00	1978.00	2023.00	0.00	2023.00	2023.00
2.120	3510.00	956.91	12.51	14.00	3812.00	1978.00	1578.00	1978.00	2023.00	0.00	2023.00	2023.00
2.110	3510.00	955.97	11.57	1.00	3798.00	1978.00	0.00	1978.00	2023.00	0.00	2023.00	2023.00
2.110	2890.00	955.19	10.79	1.00	3798.00	1978.00	0.00	1978.00	2023.00	0.00	2023.00	2023.00
2.110	1640.00	953.78	9.38	1.00	3798.00	1978.00	0.00	1978.00	2023.00	0.00	2023.00	2023.00
2.110	3510.00	956.80	12.40	1.00	3798.00	1978.00	1978.00	1978.00	2023.00	0.00	2023.00	2023.00
2.110	3510.00	955.93	11.43	1.00	3798.00	1978.00	0.00	1978.00	2023.00	0.00	2023.00	2023.00

SECOND 0 CHSEL DEPTH MLCH CUM DIS SSTA STENCL STCHR STENCR ENDST TOPDIS

4.130 3510.00 972.38 11.28 1.00 6392.00 1975.00 0.00 1975.00 2025.00 0.00 2025.00 50.00

SECNO CMSEL DEPTH XLCM CUM DIS STCMA STCMB STCML STCMM STCNR ENDST TOPAID

6.130	3510.00	962.38	11.28	1.00	6322.00	1975.00	0.00	1975.00	2025.00	0.00	2025.00	50.00
6.130	3510.00	963.17	12.07	1.00	6322.00	1975.00	0.00	1975.00	2025.00	0.00	2025.00	50.00
6.130	3510.00	955.13	8.04	1.00	6322.00	1975.00	0.00	1975.00	2025.00	0.00	2025.00	50.00
6.130	2890.00	961.45	10.35	1.00	6322.00	1975.00	0.00	1975.00	2025.00	0.00	2025.00	50.00
6.130	5250.00	964.69	13.59	1.00	6322.00	1975.00	0.00	1975.00	2025.00	0.00	2025.00	50.00
6.150	3510.00	962.61	11.21	50.00	6442.00	1904.32	0.00	1974.00	2015.00	0.00	2110.54	206.61
6.150	3510.00	963.33	11.21	50.00	6442.00	1904.32	0.00	1974.00	2015.00	0.00	2074.63	113.44
6.150	5160.00	959.17	7.77	50.00	6442.00	1944.67	0.00	1974.00	2015.00	0.00	2044.44	109.78
6.150	2890.00	961.58	10.18	50.00	6442.00	1910.48	0.00	1974.00	2015.00	0.00	2065.01	174.53
6.150	5250.00	964.74	5.34	50.00	6442.00	1691.55	0.00	1974.00	2015.00	0.00	2164.70	273.15
5.000	3510.00	964.62	1.62	673.00	7115.00	1912.08	0.00	1966.00	2014.00	0.00	2137.70	225.62
5.000	3510.00	964.06	11.06	673.00	7115.00	1956.92	0.00	1966.00	2014.00	0.00	2057.77	133.65
5.000	1660.00	961.19	8.39	673.00	7115.00	1944.47	0.00	1966.00	2014.00	0.00	2042.62	88.35
5.000	2890.00	963.48	10.68	673.00	7115.00	1947.66	0.00	1966.00	2014.00	0.00	2063.49	135.63
5.000	5250.00	966.49	13.69	673.00	7115.00	1988.95	0.00	1966.00	2014.00	0.00	2466.53	428.59
6.000	3510.00	967.35	10.75	1300.00	8415.00	1727.55	0.00	1960.00	2012.00	0.00	2066.36	334.78
6.000	3510.00	968.01	11.41	1300.00	8415.00	1800.39	1800.39	1950.00	2012.00	0.00	2014.47	2014.47
6.000	1640.00	964.40	7.80	1300.00	8415.00	1734.79	0.00	1960.00	2012.00	0.00	2061.37	326.37
6.000	2050.00	966.48	9.88	1300.00	8415.00	1729.71	0.00	1960.00	2012.00	0.00	2064.83	359.12
6.000	5250.00	969.28	12.68	1300.00	8515.00	1722.88	0.00	1960.00	2012.00	0.00	2069.76	346.48
7.000	3510.00	968.64	10.14	505.00	9320.00	1673.15	0.00	1971.00	2025.00	0.00	2032.45	356.30
7.000	1640.00	966.06	7.56	505.00	9320.00	1644.67	0.00	1971.00	2025.00	0.00	2025.00	2025.00
7.000	2890.00	967.85	9.35	505.00	9320.00	1679.03	0.00	1971.00	2025.00	0.00	2030.22	351.19
7.000	5250.00	970.50	12.00	925.00	5129.00	1667.70	0.00	1977.00	2025.00	0.00	2034.37	371.68
7.100	3510.00	971.45	12.75	1209.00	10529.00	1625.70	0.00	1965.00	2015.00	0.00	2114.22	288.52
7.100	1640.00	972.16	13.46	1209.00	10529.00	1824.20	1924.20	1965.00	2015.00	0.00	2092.00	197.00
7.100	2890.00	970.74	12.04	1209.00	10529.00	1844.19	0.00	1965.00	2015.00	0.00	2112.58	264.38
7.100	5250.00	973.19	14.49	1209.00	10529.00	1786.71	0.00	1965.00	2015.00	0.00	2116.16	331.45
7.110	3510.00	971.67	12.97	10530.00	10530.00	1814.83	0.00	1965.00	2015.00	0.00	2134.71	295.88
7.110	3510.00	972.35	13.65	10530.00	10530.00	1825.00	1925.00	1965.00	2015.00	0.00	2092.00	202.00
7.110	1640.00	969.48	10.23	10530.00	10530.00	1803.03	0.00	1965.00	2015.00	0.00	2106.60	261.60
7.110	2890.00	970.42	12.23	10530.00	10530.00	1842.42	0.00	1965.00	2015.00	0.00	2113.08	270.58
7.110	5250.00	973.45	14.75	10530.00	10530.00	1784.33	0.00	1965.00	2015.00	0.00	2118.35	334.42
7.120	3510.00	971.75	13.65	10539.00	10539.00	1816.60	0.00	1965.00	2015.00	0.00	2114.88	296.27
7.120	3510.00	972.42	13.72	10539.00	10539.00	1825.00	1925.00	1965.00	2015.00	0.00	2092.00	202.00
7.120	1640.00	971.00	12.30	10539.00	10539.00	1834.96	0.00	1965.00	2015.00	0.00	2108.63	268.59
7.120	2890.00	973.51	14.41	10539.00	10539.00	1781.87	0.00	1965.00	2015.00	0.00	2113.18	273.22
7.120	5250.00	973.51	14.41	10539.00	10539.00	1781.87	0.00	1965.00	2015.00	0.00	2118.37	335.00
7.130	3510.00	971.75	13.05	10540.00	10540.00	1816.38	0.00	1965.00	2015.00	0.00	2114.88	296.52
7.130	3510.00	972.42	13.73	10540.00	10540.00	1825.00	1925.00	1965.00	2015.00	0.00	2092.00	202.00
7.130	1640.00	969.09	10.39	10540.00	10540.00	1839.55	0.00	1965.00	2015.00	0.00	2103.30	267.00
7.130	2890.00	971.00	12.30	10540.00	10540.00	1839.73	0.00	1965.00	2015.00	0.00	2113.20	273.46
7.130	5250.00	973.51	14.41	10540.00	10540.00	1783.74	0.00	1965.00	2015.00	0.00	2113.94	335.17

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SECD	Q	CWSEL	DEPTH	XLCH	CUM DIS	SSTA	STENCL	STCHL	STC=P	STENCR	ENDST	TOPWID	
H	8.000	3510.00	972.14	11.94	125.00	10665.00	1804.33	0.0	1978.00	2016.00	0.0	2115.77	311.44
	8.000	3510.00	972.77	12.57	125.00	10665.00	1931.72	1931.72	1978.00	2016.00	2083.12	2083.12	151.60
	8.000	1640.00	969.43	9.23	125.00	10665.00	1889.02	0.0	1978.00	2016.00	0.0	2109.81	220.59
	8.000	2890.00	971.39	11.19	125.00	10665.00	1827.81	0.0	1978.00	2016.00	0.0	2114.06	286.26
	8.000	5250.00	973.89	13.68	125.00	10665.00	1780.40	0.0	1978.00	2016.00	0.0	2119.73	339.33
I	9.000	3510.00	974.03	11.53	1070.00	11735.00	1696.90	0.0	1985.00	2016.00	0.0	2177.21	478.31
	9.000	3510.00	974.32	12.32	1070.00	11735.00	1821.95	1821.95	1985.00	2016.00	2082.34	2082.34	260.39
	9.000	1640.00	971.35	8.65	1070.00	11735.00	1753.04	0.0	1985.00	2016.00	0.0	2143.01	389.55
	9.000	2890.00	973.27	10.77	1070.00	11735.00	1713.15	0.0	1985.00	2016.00	0.0	2168.48	455.33
	9.000	5250.00	975.78	13.28	1070.00	11735.00	1683.51	0.0	1985.00	2016.00	0.0	2197.46	513.55
9.100	9.100	3510.00	975.50	10.80	188.00	11923.00	1694.77	0.0	1992.00	2009.00	0.0	2182.65	487.86
	9.100	3510.00	975.36	11.66	188.00	11923.00	1803.49	1803.49	1992.00	2009.00	2090.71	2090.71	286.71
	9.100	1640.00	971.97	8.27	188.00	11923.00	1742.28	0.0	1992.00	2009.00	0.0	2152.86	412.57
	9.100	2890.00	973.77	10.07	188.00	11923.00	1702.75	0.0	1992.00	2009.00	0.0	2174.24	471.49
	9.100	5250.00	976.21	12.51	188.00	11923.00	1679.76	0.0	1992.00	2009.00	0.0	2201.97	521.31
9.110	9.110	3510.00	974.55	10.65	1.00	11924.00	1694.28	0.0	1992.00	2009.00	0.0	2183.25	489.02
	9.110	3510.00	975.47	11.73	1.00	11924.00	1803.31	1803.31	1992.00	2009.00	2093.12	2093.12	292.81
	9.110	1640.00	972.10	8.40	1.00	11924.00	1737.58	0.0	1992.00	2009.00	0.0	2154.54	417.36
	9.110	2890.00	973.83	10.13	1.00	11924.00	1701.36	0.0	1992.00	2009.00	0.0	2175.02	473.66
	9.110	5250.00	976.25	12.53	1.00	11924.00	1679.39	0.0	1992.00	2009.00	0.0	2201.25	521.60
9.120	9.120	3510.00	974.60	10.90	12.00	11536.00	1692.94	0.0	1992.00	2009.00	0.0	2185.74	489.80
	9.120	3510.00	975.48	11.78	12.00	11936.00	1799.97	1799.97	1992.00	2009.00	2093.32	2093.32	293.35
	9.120	1640.00	972.19	8.49	12.00	11536.00	1735.84	0.0	1992.00	2009.00	0.0	2155.92	421.68
	9.120	2890.00	973.89	10.19	12.00	11536.00	1703.63	0.0	1992.00	2009.00	0.0	2175.53	475.10
	9.120	5250.00	976.28	12.58	12.00	11536.00	1679.12	0.0	1992.00	2009.00	0.0	2201.44	522.52
9.130	9.130	3510.00	974.97	10.37	1.00	11937.00	1694.15	0.0	1992.00	2009.00	0.0	2183.46	489.31
	9.130	3510.00	975.44	11.74	1.00	11937.00	1802.54	1802.54	1992.00	2009.00	2090.89	2090.89	288.34
	9.130	1640.00	972.13	8.43	1.00	11937.00	1736.82	0.0	1992.00	2009.00	0.0	2155.37	418.55
	9.130	2890.00	973.85	10.15	1.00	11937.00	1701.00	0.0	1992.00	2009.00	0.0	2175.22	474.22
	9.130	5250.00	976.26	12.56	1.00	11937.00	1679.28	0.0	1992.00	2009.00	0.0	2201.35	522.07
J	10.000	3510.00	976.47	9.97	788.00	12725.00	1683.14	0.0	1980.00	2020.00	0.0	2026.51	365.37
	10.000	3510.00	977.39	10.89	788.00	12725.00	1836.14	1836.14	1980.00	2020.00	2020.00	2020.00	163.86
	10.000	1640.00	974.30	7.80	788.00	12725.00	1764.51	0.0	1980.00	2020.00	0.0	2025.67	251.16
	10.000	2890.00	975.85	9.35	788.00	12725.00	1687.65	0.0	1980.00	2020.00	0.0	2027.64	339.64
	10.000	5250.00	977.99	11.49	788.00	12725.00	1666.59	0.0	1980.00	2020.00	0.0	2030.52	383.93
10.100	10.100	3510.00	979.72	10.52	1057.00	13782.00	1817.82	0.0	1969.00	2031.00	0.0	2035.84	218.02
	10.100	3510.00	980.34	11.14	1057.00	13782.00	1915.00	1915.00	1969.00	2031.00	2031.00	2031.00	116.00
	10.100	1640.00	976.96	7.76	1057.00	13782.00	1969.00	0.0	1969.00	2031.00	0.0	2031.00	59.00
	10.100	2890.00	978.99	9.79	1057.00	13782.00	1827.56	0.0	1969.00	2031.00	0.0	2031.00	203.44
	10.100	5250.00	981.35	12.15	1057.00	13782.00	1801.52	0.0	1969.00	2031.00	0.0	2072.15	270.63
10.110	10.110	3510.00	979.73	10.53	1.00	13783.00	1817.78	0.0	1969.00	2031.00	0.0	2035.53	218.15
	10.110	3510.00	980.35	11.15	1.00	13783.00	1915.00	1915.00	1969.00	2031.00	2031.00	2031.00	116.00
	10.110	1640.00	976.96	7.76	1.00	13783.00	1969.00	0.0	1969.00	2031.00	0.0	2031.00	59.00
	10.110	2890.00	979.00	9.60	1.00	13783.00	1827.52	0.0	1969.00	2031.00	0.0	2031.00	203.46
	10.110	5250.00	981.63	12.43	1.00	13783.00	1799.18	0.0	1969.00	2031.00	0.0	2074.45	275.52

SECD	Q	CWSEL	DEPTH	XLCH	CUM DIS	SSTA	STENCL	STCHL	STCHR	STENCR	ENDST	TOPWID
10.120	3510.00	980.20	11.00	23.00	13806.00	1812.95	0.0	1969.00	2031.00	0.0	2046.68	233.73
10.120	3510.00	980.84	11.84	23.00	13806.00	1915.00	1915.00	1969.00	2031.00	2031.00	2031.00	116.00
10.120	1640.00	977.04	7.84	23.00	13806.00	1969.00	0.0	1969.00	2031.00	0.0	2031.00	59.00
10.120	2890.00	979.42	10.22	23.00	13806.00	1820.87	0.0	1969.00	2031.00	0.0	2031.00	210.13

SECID	ENSEL	DEPTH	XLCH	CUM DIS	STA	STENCL	SICHL	STCMR	STENCR	ENDST	TOPHD
10.120	3510.00	980.20	11.00	23.00	13806.00	1812.95	0.00	1789.00	2051.00	2047.58	233.73
10.120	3510.00	980.84	11.54	23.00	13806.00	1915.00	1915.00	1569.00	2051.00	2051.00	116.00
10.120	1540.00	977.04	7.84	23.00	13806.00	1569.00	0.00	1569.00	2051.00	2051.00	59.00
10.120	2890.00	979.42	10.22	23.00	13806.00	1820.87	0.00	1449.00	2051.00	2051.00	210.13
10.120	5250.00	981.96	12.76	23.00	13806.00	1797.12	0.00	1969.00	2051.00	2051.00	288.82
10.130	3510.00	980.20	11.00	1.00	13807.00	1812.91	0.00	1969.00	2051.00	2044.77	233.76
10.130	3510.00	980.96	11.76	1.00	13807.00	1915.00	1915.00	1569.00	2051.00	2051.00	116.00
10.130	1640.00	977.04	7.84	1.00	13807.00	1569.00	0.00	1569.00	2051.00	2051.00	59.00
10.130	2890.00	979.50	10.30	1.00	13807.00	1820.82	0.00	1969.00	2051.00	2051.00	210.13
10.130	5250.00	981.91	12.71	1.00	13807.00	1797.43	0.00	1969.00	2051.00	2044.64	261.21
10.150	3510.00	980.23	11.23	50.00	13857.00	1957.52	0.00	1987.00	2056.00	2101.18	143.68
10.150	3510.00	980.99	11.99	50.00	13857.00	1980.91	1980.91	1987.00	2066.00	2066.55	85.00
10.150	1640.00	977.15	8.15	50.00	13857.00	1970.74	0.00	1987.00	2070.00	2070.76	99.56
10.150	2890.00	979.55	10.55	50.00	13857.00	1962.47	0.00	1987.00	2070.00	2069.12	139.65
10.150	5250.00	981.90	12.90	50.00	13857.00	1940.07	0.00	1987.00	2070.00	2109.45	169.42
10.200	3510.00	984.39	12.09	1012.00	14869.00	1969.00	0.00	1969.00	2032.00	2032.00	64.00
10.200	3510.00	984.85	7.55	1012.00	14869.00	1968.00	0.00	1969.00	2032.00	2032.00	64.00
10.200	1640.00	980.85	7.55	1012.00	14869.00	1968.00	0.00	1969.00	2032.00	2032.00	64.00
10.200	2890.00	983.39	10.08	1012.00	14869.00	1968.00	0.00	1969.00	2032.00	2032.00	64.00
10.200	5250.00	984.74	13.44	1012.00	14869.00	1968.00	0.00	1969.00	2032.00	2032.00	64.00
10.220	3510.00	984.42	11.12	10.00	14880.00	1969.00	0.00	1969.00	2032.00	2032.00	64.00
10.220	3510.00	984.75	7.45	10.00	14880.00	1968.00	1968.00	1968.00	2032.00	2032.00	64.00
10.220	1640.00	980.88	7.58	10.00	14880.00	1968.00	0.00	1968.00	2032.00	2032.00	64.00
10.220	2890.00	983.41	10.11	10.00	14880.00	1968.00	0.00	1968.00	2032.00	2032.00	64.00
10.220	5250.00	984.82	13.52	10.00	14880.00	1968.00	0.00	1968.00	2032.00	2032.00	64.00
10.230	3510.00	984.42	11.12	1.00	14881.00	1968.00	0.00	1968.00	2032.00	2032.00	64.00
10.230	3510.00	984.76	11.46	1.00	14881.00	1968.00	1968.00	1968.00	2032.00	2032.00	64.00
10.230	1640.00	980.88	7.58	1.00	14881.00	1968.00	0.00	1968.00	2032.00	2032.00	64.00
10.230	2890.00	983.41	10.11	1.00	14881.00	1968.00	0.00	1968.00	2032.00	2032.00	64.00
10.230	5250.00	984.82	13.52	1.00	14881.00	1968.00	0.00	1968.00	2032.00	2032.00	64.00
10.250	3510.00	984.62	11.02	50.00	14931.00	1947.07	0.00	1759.00	2018.00	2109.05	197.57
10.250	3510.00	984.97	7.37	50.00	14931.00	1959.12	0.00	1969.00	2018.00	2062.78	2062.78
10.250	1640.00	980.97	7.37	50.00	14931.00	1959.12	0.00	1969.00	2018.00	2062.78	2062.78
10.250	2890.00	983.56	9.96	50.00	14931.00	1950.59	0.00	1969.00	2018.00	2102.74	2102.74
10.250	5250.00	984.13	13.59	50.00	14931.00	1938.61	0.00	1969.00	2018.00	2110.60	2110.60
11.000	3510.00	986.77	10.27	859.00	15790.00	1711.69	0.00	1779.00	2013.00	2028.04	318.33
11.000	3510.00	987.47	10.97	859.00	15790.00	1845.49	1845.49	1919.00	2013.00	2013.00	167.51
11.000	1640.00	983.86	7.36	859.00	15790.00	1740.72	0.00	1979.00	2013.00	2017.50	2017.50
11.000	2890.00	985.97	9.37	859.00	15790.00	1714.48	0.00	1979.00	2013.00	2074.65	2074.65
11.000	5250.00	986.77	10.27	859.00	15790.00	1711.69	0.00	1979.00	2013.00	2037.91	2037.91

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SECHO	Q	CASHL	DEPTH	MLCH	CUM DIS	STIA	STEMT	STCHL	STCHR	STEMR	ENDST	TDP-ID
12.000	2950.00	988.81	10.84	1000.00	16790.00	1952.92	0.00	1983.00	2028.00	0.00	2237.67	450.02
12.000	2950.00	988.74	10.84	1000.00	16790.00	1983.00	0.00	1983.00	2028.00	0.00	2237.67	450.02
12.000	1380.00	988.53	7.63	1000.00	15790.00	1944.96	0.00	1983.00	2028.00	0.00	2391.25	420.26
12.000	2400.00	988.10	9.20	1000.00	16790.00	1956.70	0.00	1983.00	2028.00	0.00	2409.37	463.67
12.000	4400.00	987.70	11.80	1000.00	16790.00	1926.52	0.00	1983.00	2028.00	0.00	2409.37	483.26
12.100	2950.00	990.50	10.50	961.00	17751.00	1979.00	0.00	1979.00	2022.00	0.00	2022.00	43.00
12.100	2950.00	991.33	11.33	1.00	17752.00	1979.00	0.00	1979.00	2022.00	0.00	2022.00	43.00
12.110	1380.00	988.24	8.24	1.00	17752.00	1979.00	0.00	1979.00	2022.00	0.00	2022.00	43.00
12.110	2400.00	988.85	9.85	1.00	17752.00	1979.00	0.00	1979.00	2022.00	0.00	2022.00	43.00
12.110	4400.00	991.98	11.98	1.00	17752.00	1979.00	0.00	1979.00	2022.00	0.00	2022.00	43.00
12.120	2950.00	990.76	10.76	16.00	17768.00	1979.00	0.00	1979.00	2022.00	0.00	2022.00	43.00
12.120	2950.00	991.59	11.59	16.00	17768.00	1979.00	0.00	1979.00	2022.00	0.00	2022.00	43.00
12.120	1380.00	988.28	8.28	16.00	17768.00	1979.00	0.00	1979.00	2022.00	0.00	2022.00	43.00
12.120	2400.00	990.01	10.01	16.00	17768.00	1979.00	0.00	1979.00	2022.00	0.00	2022.00	43.00
12.120	4400.00	993.99	13.99	16.00	17768.00	1979.00	0.00	1979.00	2022.00	0.00	2022.00	43.00
12.130	2950.00	991.17	11.17	1.00	17769.00	1979.00	0.00	1979.00	2022.00	0.00	2022.00	43.00
12.130	2950.00	992.00	12.00	1.00	17769.00	1979.00	0.00	1979.00	2022.00	0.00	2022.00	43.00
12.130	1380.00	988.29	8.29	1.00	17769.00	1979.00	0.00	1979.00	2022.00	0.00	2022.00	43.00
12.130	2400.00	990.16	10.16	1.00	17769.00	1979.00	0.00	1979.00	2022.00	0.00	2022.00	43.00
12.130	4400.00	994.19	15.19	1.00	17769.00	1979.00	0.00	1979.00	2022.00	0.00	2022.00	43.00
12.150	2950.00	991.35	11.76	50.00	17819.00	1965.70	0.00	1988.00	2013.00	0.00	2013.00	285.50
12.150	2950.00	992.26	12.64	50.00	17819.00	1975.95	0.00	1988.00	2013.00	0.00	2013.00	285.50
12.150	1380.00	988.39	8.79	50.00	17819.00	1975.95	0.00	1988.00	2013.00	0.00	2013.00	285.50
12.150	2400.00	990.32	10.72	50.00	17819.00	1968.66	0.00	1988.00	2013.00	0.00	2013.00	285.50
12.150	4400.00	994.34	14.74	50.00	17819.00	1862.33	0.00	1988.00	2013.00	0.00	2013.00	285.50
13.000	2950.00	996.58	11.10	806.00	18625.00	1841.35	0.00	1982.00	2023.00	0.00	2023.00	197.51
13.000	2950.00	995.53	11.78	806.00	18625.00	1916.54	0.00	1982.00	2023.00	0.00	2023.00	197.51
13.000	1380.00	991.71	7.91	806.00	18625.00	1867.18	0.00	1982.00	2023.00	0.00	2023.00	197.51
13.000	2400.00	993.92	10.12	806.00	18625.00	1848.82	0.00	1982.00	2023.00	0.00	2023.00	197.51
13.000	4400.00	997.13	13.33	806.00	18625.00	1801.00	0.00	1982.00	2023.00	0.00	2023.00	197.51
14.000	2950.00	997.70	11.00	855.00	19220.00	1841.45	0.00	1976.00	2013.00	0.00	2013.00	239.57
14.000	2950.00	997.63	11.53	855.00	19220.00	1915.29	0.00	1976.00	2013.00	0.00	2013.00	239.57
14.000	1380.00	993.87	8.17	855.00	19220.00	1849.79	0.00	1976.00	2013.00	0.00	2013.00	239.57
14.000	2400.00	995.80	10.10	855.00	19220.00	1844.09	0.00	1976.00	2013.00	0.00	2013.00	239.57
14.000	4400.00	998.79	13.05	855.00	19220.00	1835.30	0.00	1976.00	2013.00	0.00	2013.00	239.57
15.000	2950.00	998.01	11.41	500.00	20210.00	1914.55	0.00	1973.00	2016.00	0.00	2016.00	214.62
15.000	2950.00	999.03	12.43	500.00	20210.00	1973.00	0.00	1973.00	2016.00	0.00	2016.00	214.62
15.000	1380.00	995.31	8.71	500.00	20210.00	1939.01	0.00	1973.00	2016.00	0.00	2016.00	214.62
15.000	2400.00	997.16	10.56	500.00	20210.00	1913.49	0.00	1973.00	2016.00	0.00	2016.00	214.62
15.000	4400.00	999.98	13.38	500.00	20210.00	1910.03	0.00	1973.00	2016.00	0.00	2016.00	214.62

100 YR FLOOD-29-DGR-CHAR
SUMMARY PRINTOUT

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100_YR_FLOOD-29-DCK-CHAR

SUMMARY PRINTOUT

SECNO	YLCH	ELMIN	K*CHSL	ELTRD	ELLC	CMSEL	DIFWSP	DIFWSE	DIFWSS	EG	DIFEG	INPUT E
0.010	300.00	935.60	0.0	0.0	0.0	945.18	0.0	0.0	-14.82	946.30	0.0	0.0
0.010	300.00	935.60	0.0	0.0	0.0	945.18	0.09	0.0	0.00	946.30	0.00	1.40
0.010	300.00	935.60	0.0	0.0	0.0	941.97	-3.21	0.0	-18.03	942.69	-3.61	0.0
0.010	300.00	935.60	0.0	0.0	0.0	944.19	-2.22	0.0	-15.81	945.19	-1.11	0.0
0.010	300.00	935.60	0.0	0.0	0.0	947.36	3.16	0.0	-12.64	946.76	2.45	0.0
0.100	422.00	938.10	5.92	0.0	0.0	946.44	0.0	1.24	0.0	946.08	0.0	0.0
0.100	422.00	938.10	5.92	0.0	0.0	946.44	0.00	1.26	0.00	946.08	0.00	0.10
0.100	422.00	938.10	5.92	0.0	0.0	943.33	-3.00	1.41	0.0	944.24	-3.00	0.0
0.100	422.00	938.10	5.92	0.0	0.0	945.52	-2.14	1.33	0.0	946.86	-1.20	0.0
0.100	422.00	938.10	5.92	0.0	0.0	948.38	2.85	1.02	0.0	950.21	2.73	0.0
0.110	1.00	938.10	0.0	951.50	947.60	946.45	0.0	0.01	0.0	946.09	0.0	0.0
0.110	1.00	938.10	0.0	951.50	947.60	946.45	0.00	0.01	0.00	946.09	0.00	0.10
0.110	1.00	938.10	0.0	951.50	947.60	943.39	-3.06	0.01	0.0	944.24	-3.05	0.0
0.110	1.00	938.10	0.0	951.50	947.60	945.53	-2.14	0.01	0.0	946.89	-1.20	0.0
0.110	1.00	938.10	0.0	951.50	947.60	948.39	2.86	0.01	0.0	951.23	3.14	0.0
0.120	14.00	938.10	0.0	951.50	947.60	946.67	0.0	0.21	0.0	946.22	0.0	0.0
0.120	14.00	938.10	0.0	951.50	947.60	946.67	0.00	0.21	0.00	946.22	0.00	0.10
0.120	14.00	938.10	0.0	951.50	947.60	943.53	-3.13	0.21	0.0	944.34	-3.09	0.0
0.120	14.00	938.10	0.0	951.50	947.60	945.71	-2.18	0.16	0.0	947.02	-1.02	0.0
0.120	14.00	938.10	0.0	951.50	947.60	948.69	2.98	0.10	0.0	951.59	3.01	0.0
0.130	1.00	938.10	0.0	0.0	0.0	946.67	0.0	0.01	0.0	946.23	0.0	0.0
0.130	1.00	938.10	0.0	0.0	0.0	946.67	0.00	0.01	0.00	946.23	0.00	0.10
0.130	1.00	938.10	0.0	0.0	0.0	943.54	-3.13	0.01	0.0	944.34	-3.09	0.0
0.130	1.00	938.10	0.0	0.0	0.0	945.72	-2.16	0.01	0.0	947.01	-1.02	0.0
0.130	1.00	938.10	0.0	0.0	0.0	949.74	4.02	1.05	0.0	951.64	3.41	0.0
0.150	41.00	938.50	9.77	0.0	0.0	946.95	0.0	0.27	0.0	946.96	0.0	0.0
0.150	41.00	938.50	9.77	0.0	0.0	946.99	0.05	0.32	0.05	949.25	0.05	0.10
0.150	41.00	938.50	9.77	0.0	0.0	943.83	-3.16	0.29	0.0	945.24	-3.02	0.0
0.150	41.00	938.50	9.77	0.0	0.0	945.99	-2.16	0.27	0.0	947.76	-1.17	0.0
0.150	41.00	938.50	9.77	0.0	0.0	949.90	3.91	0.15	0.0	951.40	2.50	0.0
0.160	25.00	938.70	7.99	0.0	0.0	947.83	0.0	0.92	0.0	947.44	0.0	0.0
0.160	25.00	938.70	7.99	0.0	0.0	947.15	-0.71	0.16	-0.71	949.34	-0.01	0.10
0.160	25.00	938.70	7.99	0.0	0.0	944.92	-2.24	1.09	0.0	946.62	-3.03	0.0
0.160	25.00	938.70	7.99	0.0	0.0	946.82	-1.90	0.63	0.0	948.24	-1.21	0.0
0.160	25.00	938.70	7.99	0.0	0.0	951.61	4.79	1.71	0.0	952.26	2.65	0.0
0.200	25.00	938.80	3.99	0.0	0.0	947.99	0.0	0.12	0.0	949.08	0.0	0.0
0.200	25.00	938.80	3.99	0.0	0.0	948.08	0.09	0.93	0.09	949.92	0.04	0.10
0.200	25.00	938.80	3.99	0.0	0.0	945.05	-3.03	0.13	0.0	946.03	-3.03	0.0
0.200	25.00	938.80	3.99	0.0	0.0	946.96	-1.91	0.11	0.0	948.08	-1.00	0.0
0.200	25.00	938.80	3.99	0.0	0.0	951.60	4.72	0.97	0.0	952.31	2.73	0.0
0.210	1.00	938.80	0.0	950.30	948.60	946.00	0.0	0.01	0.0	951.32	0.0	0.0
0.210	1.00	938.80	0.0	950.30	948.60	946.00	0.10	0.01	0.10	951.43	0.11	0.10
0.210	1.00	938.80	0.0	950.30	948.60	945.05	-3.04	0.01	0.0	946.15	-3.14	0.0
0.210	1.00	938.80	0.0	950.30	948.60	946.97	-1.91	0.01	0.0	948.00	-2.02	0.0
0.210	1.00	938.80	0.0	950.30	948.60	952.67	5.40	0.69	0.0	952.62	1.00	0.0

SECNO	YLCH	ELMIN	K*CHSL	ELTRD	ELLC	CHSEL	DIFWSP	DIFWXY	DIFWYS	EG	DIFEG	INPUT E
0.220	49.00	938.80	0.0	950.30	948.60	951.83	0.0	2.82	0.0	952.01	0.0	0.0
0.220	49.00	938.80	0.0	950.30	948.60	949.99	-1.84	1.52	-1.84	952.83	0.82	0.0
0.220	49.00	938.80	0.0	950.30	948.60	945.55	-4.44	0.50	0.0	946.42	-5.52	0.0
0.220	49.00	938.80	0.0	950.30	948.60	947.73	2.18	0.76	0.0	949.45	-2.57	0.0
0.220	49.00	938.80	0.0	950.30	948.60	952.68	4.95	0.31	0.0	952.87	0.85	0.0
0.230	1.00	938.80	0.0	0.0	0.0	951.77	0.0	-0.05	0.0	952.04	0.0	0.0
0.230	1.00	938.80	0.0	0.0	0.0	952.56	0.79	2.57	0.79	953.07	1.04	15.40
0.230	1.00	938.80	0.0	0.0	0.0	945.76	-6.80	0.21	0.0	946.52	-5.52	0.0
0.230	1.00	938.80	0.0	0.0	0.0	948.40	2.64	0.67	0.0	949.51	-2.52	0.0
0.230	1.00	938.80	0.0	0.0	0.0	952.54	4.14	-0.14	0.0	952.93	0.89	0.0
0.250	50.00	938.20	-12.00	0.0	0.0	951.83	0.0	0.06	0.0	953.00	0.0	0.0
0.250	50.00	938.20	-12.00	0.0	0.0	952.64	0.81	0.00	0.81	953.70	0.71	2.40
0.250	50.00	938.20	-12.00	0.0	0.0	945.98	-6.66	0.22	0.0	947.24	-5.71	0.0
0.250	50.00	938.20	-12.00	0.0	0.0	948.61	2.63	0.22	0.0	950.50	-2.50	0.0
0.250	50.00	938.20	-12.00	0.0	0.0	952.63	4.03	3.09	0.0	954.62	1.62	0.0
0.300	359.00	940.40	6.13	0.0	0.0	953.56	0.0	1.73	0.0	953.97	0.0	0.0
0.300	359.00	940.40	6.13	0.0	0.0	954.14	0.58	1.50	0.58	954.27	6.61	5.40
0.300	359.00	940.40	6.13	0.0	0.0	948.23	-5.86	2.29	0.0	949.01	-4.55	0.0
0.300	359.00	940.40	6.13	0.0	0.0	951.38	3.11	2.77	0.0	952.30	-1.67	0.0
0.300	359.00	940.40	6.13	0.0	0.0	955.78	4.40	3.14	0.0	956.03	-2.06	0.0
0.310	1.00	940.40	0.0	945.70	947.90	953.88	0.0	0.33	0.0	954.88	0.0	0.0
0.310	1.00	940.40	0.0	949.70	947.90	954.32	0.43	0.15	0.43	954.64	0.56	0.0
0.310	1.00	940.40	0.0	949.70	947.90	948.28	-6.04	0.00	0.0	949.11	-4.96	0.0
0.310	1.00	940.40	0.0	949.70	947.90	951.39	3.11	0.00	0.0	952.48	-1.54	0.0
0.310	1.00	940.40	0.0	949.70	947.90	955.98	4.59	0.20	0.0	956.10	2.02	0.0
0.320	20.00	940.40	0.0	949.70	947.90	953.95	0.0	0.04	0.0	954.13	0.0	2.0
0.320	20.00	940.40	0.0	949.70	947.90	954.41	0.46	0.04	0.46	954.71	0.56	9.40
0.320	20.00	940.40	0.0	949.70	947.90	948.44	-5.97	0.16	0.0	949.27	-4.86	0.0
0.320	20.00	940.40	0.0	949.70	947.90	952.56	4.13	1.16	0.0	952.99	-1.14	0.0
0.320	20.00	940.40	0.0	949.70	947.90	956.31	3.45	0.03	0.0	956.12	1.99	0.0
0.330	1.00	940.40	0.0	0.0	0.0	953.93	0.0	-0.04	0.0	954.23	0.0	0.0
0.330	1.00	940.40	0.0	0.0	0.0	954.36	0.48	-0.03	0.48	954.79	0.59	7.40
0.330	1.00	940.40	0.0	0.0	0.0	948.71	-5.67	0.23	0.0	949.36	-4.87	0.0
0.330	1.00	940.40	0.0	0.0	0.0	952.54	3.62	-0.03	0.0	953.06	-1.12	0.0
0.330	1.00	940.40	0.0	0.0	0.0	955.98	3.44	-0.05	0.0	956.20	1.97	0.0
0.350	50.00	941.10	14.00	0.0	0.0	954.19	0.0	0.24	0.0	954.35	0.0	0.0
0.350	50.00	941.10	14.00	0.0	0.0	954.70	0.51	0.32	0.51	954.92	0.57	13.40
0.350	50.00	941.10	14.00	0.0	0.0	948.82	-5.88	0.11	0.0	949.50	-4.85	0.0
0.350	50.00	941.10	14.00	0.0	0.0	953.07	4.25	0.54	0.0	953.26	-1.09	0.0
0.350	50.00	941.10	14.00	0.0	0.0	956.11	3.04	0.14	0.0	956.27	1.52	0.0
0.400	342.00	941.30	0.58	0.0	0.0	954.44	0.0	0.24	0.0	954.51	0.0	0.0
0.400	342.00	941.30	0.58	0.0	0.0	954.92	0.48	0.22	0.48	955.13	0.67	13.60
0.400	342.00	941.30	0.58	0.0	0.0	950.06	-4.80	1.23	0.0	950.22	-4.56	0.0
0.400	342.00	941.30	0.58	0.0	0.0	953.39	3.33	0.31	0.0	953.46	-1.05	0.0
0.400	342.00	941.30	0.58	0.0	0.0	956.32	2.94	0.21	0.0	956.41	1.90	0.0

SECNO	YLCH	ELMIN	K*CHSL	ELTRD	ELLC	CHSEL	DIFWSP	DIFWXY	DIFWYS	EG	DIFEG	INPUT E
0.410	1.00	941.30	0.0	945.80	944.80	954.48	0.0	0.04	0.0	954.52	0.0	0.0
0.410	1.00	941.30	0.0	945.80	944.80	955.05	0.57	0.13	0.57	955.22	0.70	40.40
0.410	1.00	941.30	0.0	945.80	944.80	950.18	-4.87	0.12	0.0	950.26	-4.26	0.0
0.410	1.00	941.30	0.0	945.80	944.80	953.53	3.25	0.04	0.0	953.47	-1.05	0.0

SECD	XLIC	ELMIN	K-CHSL	ELRAD	ELIC	CASEL	DIFHSP	DIFHST	DIKMS	EG	DIFEG	INPUT E
0.410	1.00	941.30	0.0	945.80	944.80	942.49	0.0	0.04	0.0	944.52	0.0	0.0
0.410	1.00	941.30	0.0	945.80	944.80	945.05	0.57	0.13	0.0	945.22	0.70	40.00
0.410	1.00	941.30	0.0	945.80	944.80	945.14	-4.87	0.1	0.0	945.26	-3.22	0.0
0.410	1.00	941.30	0.0	945.80	944.80	945.42	3.25	0.06	0.0	945.47	-1.05	0.0
0.410	1.00	941.30	0.0	945.80	944.80	945.37	2.94	0.06	0.0	945.43	1.51	0.0
0.420	11.00	941.30	0.0	945.80	944.80	945.46	0.58	0.09	0.0	945.53	0.0	0.0
0.420	11.00	941.30	0.0	945.80	944.80	945.06	-4.88	0.01	0.0	945.23	0.71	42.00
0.420	11.00	941.30	0.0	945.80	944.80	945.20	3.24	0.02	0.0	945.27	-4.25	0.0
0.420	11.00	941.30	0.0	945.80	944.80	945.43	2.94	0.00	0.0	945.44	-1.03	0.0
0.420	11.00	941.30	0.0	945.80	944.80	945.37	2.94	0.00	0.0	945.43	1.51	0.0
0.430	1.00	941.30	0.0	945.80	944.80	945.47	0.0	-0.01	0.0	945.54	0.0	0.0
0.430	1.00	941.30	0.0	945.80	944.80	945.04	-4.86	-0.02	0.0	945.28	-0.74	35.00
0.430	1.00	941.30	0.0	945.80	944.80	945.18	3.25	0.0	0.0	945.32	-4.22	0.0
0.430	1.00	941.30	0.0	945.80	944.80	945.43	2.94	-0.01	0.0	945.53	-1.05	0.0
0.430	1.00	941.30	0.0	945.80	944.80	945.36	2.94	0.0	0.0	945.45	1.91	0.0
1.000	819.00	941.70	0.49	0.0	0.0	944.71	0.0	0.23	0.0	944.74	0.0	0.0
1.000	819.00	941.70	0.49	0.0	0.0	945.55	0.34	0.51	0.0	945.60	0.86	12.00
1.000	819.00	941.70	0.49	0.0	0.0	945.78	-4.72	0.60	0.0	945.87	-3.87	0.0
1.000	819.00	941.70	0.49	0.0	0.0	945.68	2.99	0.26	0.0	945.72	-1.02	0.0
1.000	819.00	941.70	0.49	0.0	0.0	946.42	2.91	0.25	0.0	946.65	1.51	0.0
2.000	760.00	943.40	2.24	0.0	0.0	946.95	0.0	0.24	0.0	946.95	0.0	0.0
2.000	760.00	943.40	2.24	0.0	0.0	945.83	0.68	0.24	0.0	945.95	0.93	9.00
2.000	760.00	943.40	2.24	0.0	0.0	945.52	-4.31	0.74	0.0	945.71	-3.22	0.0
2.000	760.00	943.40	2.24	0.0	0.0	945.97	2.45	0.29	0.0	946.02	-0.57	0.0
2.000	760.00	943.40	2.24	0.0	0.0	946.84	2.87	0.22	0.0	946.94	1.65	0.0
2.100	802.00	944.40	1.25	0.0	0.0	945.82	0.0	0.37	0.0	946.92	0.0	0.0
2.100	802.00	944.40	1.25	0.0	0.0	946.81	0.98	0.37	0.0	947.10	0.74	0.0
2.100	802.00	944.40	1.25	0.0	0.0	946.72	-3.03	2.25	0.0	946.87	-2.72	0.0
2.100	802.00	944.40	1.25	0.0	0.0	946.18	1.41	1.21	0.0	946.34	-0.68	0.0
2.100	802.00	944.40	1.25	0.0	0.0	947.63	2.45	0.75	0.0	948.47	1.56	0.0
2.110	1.00	944.40	0.0	958.80	958.00	955.83	0.0	0.01	0.0	956.92	0.0	0.0
2.110	1.00	944.40	0.0	958.80	958.00	956.30	0.97	-0.01	0.0	957.11	0.79	9.00
2.110	1.00	944.40	0.0	958.80	958.00	955.79	-3.02	0.20	0.0	956.17	-2.75	0.0
2.110	1.00	944.40	0.0	958.80	958.00	955.19	1.41	0.28	0.0	956.04	-0.60	0.0
2.110	1.00	944.40	0.0	958.80	958.00	957.91	2.73	0.28	0.0	958.51	1.58	0.0
2.120	14.00	944.40	0.0	958.80	958.00	955.97	0.0	0.14	0.0	957.03	0.0	0.0
2.120	14.00	944.40	0.0	958.80	958.00	956.91	0.95	0.12	0.0	957.01	0.75	9.00
2.120	14.00	944.40	0.0	958.80	958.00	956.82	-3.09	0.0	0.0	956.21	-2.52	0.0
2.120	14.00	944.40	0.0	958.80	958.00	955.29	1.47	0.10	0.0	956.12	-0.54	0.0
2.120	14.00	944.40	0.0	958.80	958.00	955.14	2.65	0.23	0.0	958.67	1.65	0.0
2.130	1.00	944.40	0.0	944.40	944.00	945.97	0.0	0.1	0.0	947.02	0.0	0.0
2.130	1.00	944.40	0.0	944.40	944.00	946.80	-1.01	0.07	1.01	947.62	0.61	6.00
2.130	1.00	944.40	0.0	944.40	944.00	945.43	-7.16	0.00	0.0	944.21	-2.84	0.0
2.130	1.00	944.40	0.0	944.40	944.00	945.30	1.47	0.01	0.0	945.13	-0.53	0.0
2.130	1.00	944.40	0.0	944.40	944.00	946.15	2.65	0.01	0.0	946.62	1.79	0.0

A
B

B
A

SECTION	ALPH	ELMIN	RECHSL	ELTRD	ELLC	CASEL	DIFMSP	DIFMST	DIFMKS	EG	DIFEC	INPUT E
F	6.000	1100.00	956.60	2.92	0.0	967.35	0.0	2.44	0.0	967.42	0.0	0.0
F	6.000	1100.00	956.60	2.92	0.0	965.01	0.65	3.15	0.05	968.20	0.74	10.40
F	6.000	1100.00	956.60	2.92	0.0	964.40	-3.61	3.21	0.0	966.50	-2.56	0.0
F	6.000	1100.00	956.60	2.92	0.0	966.48	2.07	3.01	0.0	966.59	-0.68	0.0
F	6.000	1100.00	956.60	2.92	0.0	969.26	2.80	2.19	0.0	969.42	1.55	0.0
G	7.000	1209.00	958.50	2.10	0.0	965.64	0.0	1.28	0.0	968.83	0.2	0.0
G	7.000	1209.00	958.50	2.10	0.0	969.51	-3.67	1.50	0.01	969.71	-0.88	0.0
G	7.000	1209.00	958.50	2.10	0.0	966.06	1.79	1.66	0.0	966.25	-2.58	0.0
G	7.000	1209.00	958.50	2.10	0.0	967.85	1.79	1.36	0.0	968.04	-0.73	0.0
G	7.000	1209.00	958.50	2.10	0.0	970.50	2.05	1.22	0.0	970.71	-1.88	0.0
G	7.100	1209.00	958.50	0.17	0.0	971.45	0.0	2.82	0.0	971.67	0.0	0.0
G	7.100	1209.00	958.50	0.17	0.0	972.16	0.70	2.65	0.0	972.59	-0.72	0.0
G	7.100	1209.00	958.50	0.17	0.0	968.94	-3.21	2.89	0.0	969.64	-2.63	0.0
G	7.100	1209.00	958.50	0.17	0.0	970.74	1.79	2.45	0.0	971.43	-0.74	0.0
G	7.100	1209.00	958.50	0.17	0.0	973.19	2.45	2.68	0.0	973.83	1.76	0.0
H	7.110	1.00	958.50	0.0	0.0	971.67	0.0	0.42	0.0	971.79	0.0	0.0
H	7.110	1.00	958.50	0.0	0.0	972.35	0.68	0.14	0.0	972.81	0.72	0.0
H	7.110	1.00	958.50	0.0	0.0	968.98	-3.37	0.04	0.0	969.45	-2.64	0.0
H	7.110	1.00	958.50	0.0	0.0	970.92	1.94	0.18	0.0	971.15	-0.74	0.0
H	7.110	1.00	958.50	0.0	0.0	972.45	2.53	0.26	0.0	973.65	1.76	0.0
H	7.120	9.00	958.50	0.0	0.0	971.75	0.0	0.07	0.0	971.96	0.0	0.0
H	7.120	9.00	958.50	0.0	0.0	972.42	0.67	0.07	0.0	972.67	0.72	0.0
H	7.120	9.00	958.50	0.0	0.0	968.08	-3.91	0.13	0.0	969.33	-2.63	0.0
H	7.120	9.00	958.50	0.0	0.0	972.00	1.91	0.38	0.0	973.32	-0.74	0.0
H	7.120	9.00	958.50	0.0	0.0	973.51	2.51	0.46	0.0	973.71	1.75	0.0
I	7.130	1.00	958.50	0.0	0.0	971.75	0.0	0.03	0.0	971.81	0.0	0.0
I	7.130	1.00	958.50	0.0	0.0	972.42	0.68	0.03	0.0	972.82	0.71	0.0
I	7.130	1.00	958.50	0.0	0.0	969.05	-3.14	0.03	0.0	969.46	-2.75	0.0
I	7.130	1.00	958.50	0.0	0.0	971.05	1.91	0.03	0.0	971.35	-0.72	0.0
I	7.130	1.00	958.50	0.0	0.0	973.51	2.51	0.03	0.0	973.93	1.75	0.0
H	8.000	125.00	960.50	12.00	0.0	972.14	0.0	0.33	0.0	972.40	0.0	0.0
H	8.000	125.00	960.50	12.00	0.0	972.17	0.03	0.33	0.0	972.40	0.0	0.0
H	8.000	125.00	960.50	12.00	0.0	969.23	-3.04	0.33	0.0	969.61	-2.75	0.0
H	8.000	125.00	960.50	12.00	0.0	971.39	1.96	0.38	0.0	971.83	-0.77	0.0
H	8.000	125.00	960.50	12.00	0.0	973.64	2.50	0.31	0.0	974.40	1.79	0.0
I	9.000	1070.00	962.50	2.15	0.0	974.92	0.0	1.67	0.0	974.16	0.0	0.0
I	9.000	1070.00	962.50	2.15	0.0	971.35	-3.47	1.92	0.0	971.94	-2.64	0.0
I	9.000	1070.00	962.50	2.15	0.0	973.27	1.92	1.58	0.0	973.43	-0.72	0.0
I	9.000	1070.00	962.50	2.15	0.0	975.76	2.51	1.53	0.0	975.54	1.75	0.0
I	9.100	189.00	963.70	6.33	0.0	974.50	0.0	0.47	0.0	974.94	0.0	0.0
I	9.100	189.00	963.70	6.33	0.0	975.36	0.86	0.53	0.0	975.94	0.70	0.0
I	9.100	189.00	963.70	6.33	0.0	971.97	-3.59	0.50	0.0	971.14	-2.42	0.0
I	9.100	189.00	963.70	6.33	0.0	973.77	1.80	0.50	0.0	974.87	-0.72	0.0
I	9.100	189.00	963.70	6.33	0.0	976.21	2.44	0.42	0.0	976.30	1.70	0.0

SECNO	YLCH	ELMIN	X*CHSL	ELTRD	ELLC	CWSEL	DIFWSP	DIFWSX	DIFWSS	EG	DIFEG	INPUT E
9.110	1.00	963.70	0.0	971.80	969.60	974.55	0.0	0.38	0.0	974.60	0.0	0.0
9.110	1.00	963.70	0.0	971.80	969.60	975.43	0.88	0.08	0.88	975.50	0.90	10.40
9.110	1.00	963.70	0.0	971.80	969.60	972.10	-3.34	0.13	0.0	972.10	-2.44	0.0
9.110	1.00	963.70	0.0	971.80	969.60	973.83	1.74	0.07	0.0	973.88	-0.72	0.0
9.110	1.00	963.70	0.0	971.80	969.60	976.25	2.42	0.04	0.0	976.30	1.70	0.0
9.120	12.00	963.70	0.0	971.80	969.60	974.60	0.0	0.04	0.0	974.64	0.0	0.0
9.120	12.00	963.70	0.0	971.80	969.60	975.48	0.88	0.05	0.88	975.55	0.90	10.40
9.120	12.00	963.70	0.0	971.80	969.60	972.19	-3.29	0.09	0.0	972.24	-2.40	0.0
9.120	12.00	963.70	0.0	971.80	969.60	973.89	1.70	0.05	0.0	973.93	-0.72	0.0
9.120	12.00	963.70	0.0	971.80	969.60	976.28	2.40	0.03	0.0	976.34	1.69	0.0
9.130	1.00	963.70	0.0	0.0	0.0	974.57	0.0	-0.03	0.0	974.60	0.0	0.0
9.130	1.00	963.70	0.0	0.0	0.0	975.44	0.57	-0.04	0.57	975.57	0.91	10.40
9.130	1.00	963.70	0.0	0.0	0.0	972.13	-3.31	-0.06	0.0	972.28	-2.38	0.0
9.130	1.00	963.70	0.0	0.0	0.0	973.85	1.72	-0.03	0.0	973.95	-0.71	0.0
9.130	1.00	963.70	0.0	0.0	0.0	976.26	2.41	-0.02	0.0	976.35	1.69	0.0
J 10.000	788.00	966.50	3.55	0.0	0.0	976.47	0.0	1.91	0.0	976.62	0.0	0.0
10.000	788.00	966.50	3.55	0.0	0.0	977.35	0.92	1.95	0.92	977.69	0.87	10.40
10.000	788.00	966.50	3.55	0.0	0.0	972.20	-3.09	2.17	0.0	972.54	-2.28	0.0
10.000	788.00	966.50	3.55	0.0	0.0	975.85	1.55	2.00	0.0	976.17	-0.25	0.0
10.000	789.00	966.50	3.55	0.0	0.0	977.99	2.14	1.73	0.0	978.38	1.56	0.0
10.100	1057.00	969.20	2.55	0.0	0.0	979.72	0.0	3.24	0.0	980.15	0.0	0.0
10.100	1057.00	969.20	2.55	0.0	0.0	980.34	0.62	2.94	0.62	980.80	0.65	10.10
10.100	1057.00	969.20	2.55	0.0	0.0	976.96	-3.38	2.65	0.0	977.23	-2.92	0.0
10.100	1057.00	969.20	2.55	0.0	0.0	978.99	2.03	3.14	0.0	979.36	-0.77	0.0
10.100	1057.00	969.20	2.55	0.0	0.0	981.35	2.36	3.36	0.0	981.83	1.73	0.0
10.110	1.00	969.20	0.0	978.90	977.70	979.73	0.0	0.01	0.0	980.17	0.0	0.0
10.110	1.00	969.20	0.0	978.90	977.70	980.35	0.62	0.01	0.62	980.92	0.75	10.10
10.110	1.00	969.20	0.0	978.90	977.70	976.96	-3.39	0.00	0.0	977.21	-2.93	0.0
10.110	1.00	969.20	0.0	978.90	977.70	979.00	2.04	0.01	0.0	979.48	-0.69	0.0
10.110	1.00	969.20	0.0	978.90	977.70	981.63	2.63	0.28	0.0	982.01	1.64	0.0
10.120	23.00	969.20	0.0	978.90	977.70	980.20	0.0	0.40	0.0	980.54	0.0	0.0
10.120	23.00	969.20	0.0	978.90	977.70	980.84	0.53	0.43	0.63	981.32	0.77	10.10
10.120	23.00	969.20	0.0	978.90	977.70	977.04	-3.80	0.06	0.0	977.31	-3.23	0.0
10.120	23.00	969.20	0.0	978.90	977.70	979.42	2.38	0.42	0.0	979.79	-0.35	0.0
10.120	23.00	969.20	0.0	978.90	977.70	981.96	2.54	0.33	0.0	982.29	1.75	0.0
10.130	1.00	969.20	0.0	0.0	0.0	980.20	0.0	-0.00	0.0	980.56	0.0	0.0
10.130	1.00	969.20	0.0	0.0	0.0	980.96	0.76	0.12	0.76	981.35	0.79	10.10
10.130	1.00	969.20	0.0	0.0	0.0	977.04	-3.91	0.00	0.0	977.31	-3.24	0.0
10.130	1.00	969.20	0.0	0.0	0.0	979.50	2.45	0.08	0.0	979.82	-0.74	0.0
10.130	1.00	969.20	0.0	0.0	0.0	981.91	2.41	-0.05	0.0	982.30	1.74	0.0
10.150	50.00	969.00	-3.99	0.0	0.0	980.23	0.0	0.04	0.0	981.03	0.0	0.0
10.150	50.00	969.00	-3.99	0.0	0.0	980.99	0.75	0.03	0.75	981.70	0.70	10.10
10.150	50.00	969.00	-3.99	0.0	0.0	977.15	-3.84	0.10	0.0	977.69	-3.35	0.0
10.150	50.00	969.00	-3.99	0.0	0.0	979.55	2.40	0.05	0.0	980.23	-0.80	0.0
10.150	50.00	969.00	-3.99	0.0	0.0	981.90	2.34	-0.01	0.0	982.55	1.92	0.0

SECNO	YLCH	ELMIN	X*CHSL	ELTRD	ELLC	CWSEL	DIFWSP	DIFWSX	DIFWSS	EG	DIFEG	INPUT E
10.200	1012.00	973.30	4.25	0.0	0.0	984.39	0.0	4.15	0.0	984.40	0.0	0.0
10.200	1012.00	973.30	4.25	0.0	0.0	984.73	0.34	3.74	0.34	985.16	0.31	10.40
10.200	1012.00	973.30	4.25	0.0	0.0	980.85	-3.87	3.71	0.0	981.10	-3.70	0.0
10.200	1012.00	973.30	4.25	0.0	0.0							

SECND	XLCM	ELMN	K*CHSL	ELTAD	FLLC	CMSEL	DIFMSP	DIFMST	DIFKMS	EG	DIFEG	INPUT E
12.120	16.00	940.00	0.0	992.50	989.30	990.76	0.0	0.25	0.0	0.0	0.0	0.0
12.120	16.00	980.00	0.0	992.50	989.30	991.59	0.83	0.26	0.83	0.83	0.83	0.0
12.120	16.00	980.00	0.0	992.50	989.30	988.28	0.05	0.05	0.05	0.05	0.05	0.0
12.120	16.00	980.00	0.0	992.50	989.30	990.01	1.73	0.16	0.0	0.0	-1.12	0.0
12.120	16.00	980.00	0.0	992.50	989.30	993.99	3.98	2.01	0.0	0.0	4.99	0.0
12.130	1.00	980.00	0.0	991.17	991.17	992.13	0.0	0.41	0.0	0.0	0.0	0.0
12.130	1.00	980.00	0.0	992.13	992.13	988.29	-3.85	0.00	0.0	0.0	0.86	10.43
12.130	1.00	980.00	0.0	990.16	990.16	990.16	1.87	0.15	0.0	0.0	0.0	0.0
12.130	1.00	980.00	0.0	990.16	990.16	994.19	4.04	0.20	0.0	0.0	2.97	0.0
12.150	50.00	979.60	-8.01	991.60	991.60	991.35	0.0	0.18	0.0	0.0	0.0	0.0
12.150	50.00	979.60	-8.01	992.26	992.26	989.39	-3.87	0.11	0.51	0.51	0.73	1.40
12.150	50.00	979.60	-8.01	990.32	990.32	990.32	1.53	0.16	0.0	0.0	-1.11	0.0
12.150	50.00	979.60	-8.01	994.34	994.34	994.34	4.02	0.14	0.0	0.0	2.77	0.0
12.150	50.00	979.60	-8.01	991.60	991.60	991.60	0.0	0.0	0.0	0.0	0.0	0.0
13.000	806.00	983.80	5.21	992.50	992.50	992.50	0.0	0.0	0.0	0.0	0.0	0.0
13.000	806.00	983.80	5.21	992.50	992.50	992.50	0.0	0.0	0.0	0.0	0.0	0.0
13.000	806.00	983.80	5.21	992.50	992.50	992.50	0.0	0.0	0.0	0.0	0.0	0.0
13.000	806.00	983.80	5.21	992.50	992.50	992.50	0.0	0.0	0.0	0.0	0.0	0.0
13.000	806.00	983.80	5.21	992.50	992.50	992.50	0.0	0.0	0.0	0.0	0.0	0.0
14.000	895.00	985.70	2.12	992.50	992.50	992.50	0.0	0.0	0.0	0.0	0.0	0.0
14.000	895.00	985.70	2.12	992.50	992.50	992.50	0.0	0.0	0.0	0.0	0.0	0.0
14.000	895.00	985.70	2.12	992.50	992.50	992.50	0.0	0.0	0.0	0.0	0.0	0.0
14.000	895.00	985.70	2.12	992.50	992.50	992.50	0.0	0.0	0.0	0.0	0.0	0.0
14.000	895.00	985.70	2.12	992.50	992.50	992.50	0.0	0.0	0.0	0.0	0.0	0.0
15.000	690.00	986.00	1.30	992.50	992.50	992.50	0.0	0.0	0.0	0.0	0.0	0.0
15.000	690.00	986.00	1.30	992.50	992.50	992.50	0.0	0.0	0.0	0.0	0.0	0.0
15.000	690.00	986.00	1.30	992.50	992.50	992.50	0.0	0.0	0.0	0.0	0.0	0.0
15.000	690.00	986.00	1.30	992.50	992.50	992.50	0.0	0.0	0.0	0.0	0.0	0.0
15.000	690.00	986.00	1.30	992.50	992.50	992.50	0.0	0.0	0.0	0.0	0.0	0.0

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APPENDIX C

Hydraulic Analysis Documentation
C-1 – HEC-RAS Existing Conditions Model Data
C-1 – HEC-RAS Proposed Conditions Model Data

C-1 HEC-RAS EXISTING CONDITIONS MODEL DATA

HoustonInjection.rep

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X      X  XXXXXX      XXXX      XXXX      XX      XXXX
X      X  X          X      X      X  X      X
X      X  X          X          X  X      X  X      X
XXXXXXXX XXXX      X          XXX XXXX      XXXXXX      XXXX
X      X  X          X          X  X      X  X      X
X      X  X          X      X      X  X      X  X      X
X      X  XXXXXX      XXXX      X  X      X  X      XXXXX
```

PROJECT DATA

Project Title: Houston Injection
Project File : HoustonInjection.prj
Run Date and Time: 10/16/2015 11:08:16 AM

Project in English units

PLAN DATA

Plan Title: Plan 26
Plan File : s:\Marcellus_M-Z - Mark Sladic\Sunoco Logistics (SXL)\Houston Injection
HEC-RAS_091415\HoustonInjection.p26

Geometry Title: Houston Injection X-Sections Existing R4
Geometry File : s:\Marcellus_M-Z - Mark Sladic\Sunoco Logistics
(SXL)\Houston Injection HEC-RAS_091415\HoustonInjection.g09

Flow Title : 100yr Storm R4
Flow File : s:\Marcellus_M-Z - Mark Sladic\Sunoco Logistics
(SXL)\Houston Injection HEC-RAS_091415\HoustonInjection.f04

Plan Summary Information:

Number of:	Cross Sections	=	25	Multiple Openings	=	0
	Culverts	=	0	Inline Structures	=	0
	Bridges	=	1	Lateral Structures	=	0

Computational Information

Water surface calculation tolerance	=	0.01
Critical depth calculation tolerance	=	0.01
Maximum number of iterations	=	20
Maximum difference tolerance	=	0.3
Flow tolerance factor	=	0.001

Computation Options

Critical depth computed only	where necessary
Conveyance Calculation Method:	At breaks in n values only
Friction Slope Method:	Average Conveyance
Computational Flow Regime:	Subcritical Flow

HoustonInjection.rep

FLOW DATA

Flow Title: 100yr Storm R4
 Flow File : s:\Marcellus_M-Z - Mark Sladic\Sunoco Logistics (SXL)\Houston Injection
 HEC-RAS_091415\HoustonInjection.f04

Flow Data (cfs)

River	Reach	RS	100yr Storm
Chartiers Run	2	1300	1666.75
Chartiers Run	1	690	2950
Westland Run	3	700	1283.25

Boundary Conditions

River	Reach	Profile	Upstream
Downstream			
Chartiers Run	2	100yr Storm	Normal S = 0.006588
Chartiers Run	1	100yr Storm	
Known WS = 996.7			
Westland Run	3	100yr Storm	Normal S = 0.001774

GEOMETRY DATA

Geometry Title: Houston Injection X-Sections Existing R4
 Geometry File : s:\Marcellus_M-Z - Mark Sladic\Sunoco Logistics (SXL)\Houston
 Injection HEC-RAS_091415\HoustonInjection.g09

Reach Connection Table

River	Reach	Upstream Boundary	Downstream Boundary
Chartiers Run	2		1
Chartiers Run	1	1	
Westland Run	3		1

JUNCTION INFORMATION

Name: 1
 Description: Junction 1
 Energy computation Method

River	Length across Junction	Tributary River	Reach	Length	Angle
Chartiers Run	2	to Chartiers Run	1	100	
Westland Run	3	to Chartiers Run	1	170	

CROSS SECTION

RIVER: Chartiers Run
 REACH: 2 RS: 1300

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INPUT

Description: 13+00

Station Elevation Data				num= 31					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1022	11.07	1020	20.94	1018	31.74	1016	49.99	1014
61.77	1012	97.91	1010	114.36	1008	125.87	1006	150.8	1004
164.76	1003.7	209.44	1002	220.48	1000	241.86	999.64	248.2	994.3
248.83	994.03	257.48	992.72	266.49	994.07	269.08	994.26	273.78	1002.86
310.1	1004	365.51	1004	382.39	1004	468.73	1006	483.56	1008
492.69	1010	501.23	1012	505.96	1014	510.6	1016	516.34	1018
522.21	1020								

Manning's n Values						num= 3	
Sta	n Val	Sta	n Val	Sta	n Val		
0	.1	241.86	.045	273.78	.1		

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	241.86	273.78		100	100	100		.1	.3

CROSS SECTION

RIVER: Chartiers Run

REACH: 2 RS: 1200

INPUT

Description: 12+00

Station Elevation Data				num= 26					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1022	6.34	1020	12.32	1018	18.56	1016	24.82	1014
34.91	1012	47.96	1010	74.92	1008	114.68	1006	133.11	1004
179.65	1002	263.05	999	325.95	995	328.64	994.32	330.02	993.89
335.85	993.28	342.23	993.95	344.59	994.23	347.57	995.41	526.28	1008
539.84	1010	550.59	1012	559.5	1014	568.23	1016	576.34	1018
583.58	1020								

Manning's n Values						num= 3	
Sta	n Val	Sta	n Val	Sta	n Val		
0	.035	325.95	.045	347.57	.1		

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	325.95	347.57		100	100	100		.1	.3

CROSS SECTION

RIVER: Chartiers Run

REACH: 2 RS: 1100

INPUT

Description: 11+00

Station Elevation Data				num= 27					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1020	5.56	1018	11.69	1016	17.69	1014	23.49	1012
32.37	1010	57	1008	90.4	1006	102.86	1004	141.39	1002
252.85	1000	324.8	998.7	376.75	997	407.3	995.87	410.28	993.33
410.45	993.34	424.95	990.76	435.44	993.29	436.12	993.53	441.29	999.99
481.01	1008	541.23	1010	557.62	1012	570.21	1014	577.45	1016
584.32	1018	591.16	1020						

Manning's n Values						num= 3	
Sta	n Val	Sta	n Val	Sta	n Val		

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0 .035 407.3 .045 441.29 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 407.3 441.29 100 100 100 .1 .3

CROSS SECTION

RIVER: Chartiers Run
 REACH: 2 RS: 1000

INPUT

Description: 10+00

Station Elevation Data			num=							
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	
0	1018	4.56	1016	10.03	1014	16.12	1012	24.25	1010	
68.33	1008	85.19	1006	104.4	1004	164.4	1002	258.05	1000	
410.45	997.45	412.99	993.5	413.63	993.25	424.72	993.2	444.4	992.71	
444.68	992.61	444.8	995.57	463.16	1002	488.84	1002	493.82	1004	
502.09	1006	513.73	1008	523.1	1010	529.27	1012	538.81	1014	

Manning's n Values			num=			
Sta	n Val	Sta	n Val	Sta	n Val	
0	.035	410.45	.045	444.8	.1	

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 410.45 444.8 100 100 100 .1 .3

CROSS SECTION

RIVER: Chartiers Run
 REACH: 2 RS: 900

INPUT

Description: 9+00

Station Elevation Data			num=							
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	
0	1018	5.23	1016	10.73	1014	17.6	1012	32.87	1010	
63.06	1009.01	98.76	1008	125.63	1006	219.27	1004	260.04	1002	
318.57	1000	386.21	998	449.32	996.78	455.58	992.73	456.44	992.36	
463.97	991.03	472.18	992.35	472.73	992.49	474	993.9	542.58	997	
561.7	1000	566.33	1002	570.19	1004	574.97	1006	581.02	1008	
587.22	1010	593.8	1012	600.84	1014					

Manning's n Values			num=			
Sta	n Val	Sta	n Val	Sta	n Val	
0	.035	449.32	.045	474	.1	

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 449.32 474 100 100 100 .1 .3

CROSS SECTION

RIVER: Chartiers Run
 REACH: 2 RS: 800

INPUT

Description: 8+00

Station Elevation Data			num=							
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	
0	1020	19.45	1018	26.39	1016	31.97	1014	37.47	1012	

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48.15	1010	129.59	1008	168.44	1006	245.01	1004	291.83	1002
340.73	1000	426.05	998	496.92	996	504.12	996.79	508.56	992.47
509.61	991.92	517.95	990.97	526.71	991.92	530.58	992.42	532.68	993.34
540.9	994	578.32	996	584.86	998	589.05	1000	593.45	1002
599.36	1002.6	620.86	1004	632.98	1006	638.18	1008	640.47	1010
642.81	1012								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	504.12	.045	532.68	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

504.12	532.68	100	100	100	.1	.3
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CROSS SECTION

RIVER: Chartiers Run
REACH: 2 RS: 700

INPUT

Description: 7+00

Station Elevation Data num= 24

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1018	8.32	1016	31.4	1014	48.64	1012	65.7	1010
115.56	1008	130.19	1006	214.37	1004	269.16	1002	304.44	1000.89
335.41	1000	456.48	998	518.32	998	542.34	998	547.32	994
567.4	993.59	569.75	991.78	570.79	991.23	583.23	990.34	594.92	991.58
595.26	991.83	595.92	994.75	611.69	1013	614.49	1014		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	567.4	.045	595.92	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

567.4	595.92	100	100	100	.1	.3
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CROSS SECTION

RIVER: Chartiers Run
REACH: 2 RS: 600

INPUT

Description: 6+00

Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1018	8.28	1016	17.93	1014	24.97	1012	64.42	1010
109.73	1008	134.72	1006	209.95	1004	262.21	1002	285.57	1001.19
328.45	1000	414.43	997	594.77	993.07	596.71	992.38	596.94	991.44
604.59	990.85	612.65	991.44	613.49	991.63	614.48	992.64	644.96	1007
649.16	1010								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	594.77	.045	614.48	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

594.77	614.48	100	100	100	.1	.3
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CROSS SECTION

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RIVER: Chartiers Run
REACH: 2

RS: 500

INPUT

Description: 5+00

Station Elevation Data		num= 22		Sta Elev		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1018	7.61	1016	14.82	1014	28.12	1012	77.14	1010		
105.48	1008	169.46	1006	204.58	1004	246.73	1002	265.12	1001.15		
289.81	1000	393.16	998	556.64	994.5	574.81	993.73	577.67	991.19		
578.9	990.88	585.96	989.8	592.87	991.16	593.94	991.28	594.81	992.76		
619.22	1017	626.63	1020								

Manning's n Values		num= 3		Sta n Val		Sta n Val	
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.035	574.81	.045	594.81	.1		

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	574.81	594.81		100	100		.1	.3

CROSS SECTION

RIVER: Chartiers Run
REACH: 2

RS: 400

INPUT

Description: 4+00

Station Elevation Data		num= 24		Sta Elev		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1020	8.4	1018	16.74	1016	30.8	1014	87.62	1012		
94.14	1010	112.83	1008	180.85	1006	197.47	1004	214.14	1002		
268.8	1000	352.86	998.14	390.23	997.06	521.56	996	536.02	994.67		
539.35	991.14	540.71	990.65	547.75	990.57	554.17	990.7	559.04	991.62		
561.11	995.02	577.68	1007	599.84	1010	605.13	1012				

Manning's n Values		num= 3		Sta n Val		Sta n Val	
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.035	536.02	.045	561.11	.1		

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	536.02	561.11		100	100		.1	.3

CROSS SECTION

RIVER: Chartiers Run
REACH: 2

RS: 300

INPUT

Description: 3+00

Station Elevation Data		num= 29		Sta Elev		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1016	13.91	1014	69.69	1012	108.77	1010	117.37	1008		
151.47	1006	154.28	1005.17	170.01	1004	190.52	1002	215.39	1000		
344.83	998	421.22	995.81	497.59	996	506.88	995.33	509.96	990.82		
510.96	990.36	517.04	990.15	522.36	990.36	530.74	991.22	533.86	993.31		
543.96	996	554.93	998	558.65	1000	561.82	1002	564.69	1004		
567.54	1006	570.49	1008	574.04	1010	578.12	1012				

Manning's n Values		num= 3		Sta n Val		Sta n Val	
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val

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Sta n Val Sta n Val Sta n Val
 0 .035 506.88 .045 533.86 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 506.88 533.86 100 100 100 .1 .3

CROSS SECTION

RIVER: Chartiers Run
 REACH: 2 RS: 200

INPUT

Description: 2+00

Station Elevation Data num= 28

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1016	34.24	1014	54.23	1012	88.6	1010	105.26	1008
110.95	1006	134.75	1004	155.42	1002.4	157.81	1002	183.48	1000
222.22	998	441.46	995.02	503.4	994	512.46	993.6	516.73	990.33
517.06	990.2	524.95	989.49	531.11	990.03	531.36	990.1	532.92	992.04
553.69	994	559.79	998	564.6	1000	568.47	1002	571.85	1004
575.03	1006	578.47	1008	581.57	1010				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	512.46	.045	532.92	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 512.46 532.92 100 100 100 .1 .3

CROSS SECTION

RIVER: Chartiers Run
 REACH: 2 RS: 100

INPUT

Description: 1+00

Station Elevation Data num= 26

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1016	18.49	1014	33	1012	57.1	1010	95.37	1008
101.51	1006	105.78	1004	121.71	1002	153.3	1000	156.48	999.9
321.97	996.18	388.78	996	456.12	994.2	530.11	993.13	531.92	990.21
532.37	990.09	541.57	989.94	550.34	990.46	550.61	990.82	588.39	998
596.38	1000	599.1	1002	601.43	1004	603.89	1006	606.39	1008
609.02	1010								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	530.11	.045	550.61	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 530.11 550.61 100 100 100 .1 .3

CROSS SECTION

RIVER: Chartiers Run
 REACH: 2 RS: 000

INPUT

Description: 0+00
 0+00

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Station Elevation Data num= 31

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1016	38.1	1014	49.42	1012	58.9	1010	78.48	1008
110.64	1006	116.83	1004	123.89	1002	144.04	1000	168.76	998
171.2	997.18	272.4	996	316.29	995.75	405.94	993.92	582.13	994
593.22	990.81	594.99	990.31	595.58	990.32	604.62	989.88	612.46	990.26
613.01	990.33	615.31	990.86	648.51	996	655.74	998	666.41	1000
688.85	1002	697.85	1004	702.06	1006	705.65	1008	708.85	1010
711.9	1012								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	593.22	.045	615.31	.1

Bank Sta: Left Right Coeff Contr. Expan.

593.22	615.31	.1	.3
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CROSS SECTION

RIVER: Chartiers Run
REACH: 1 RS: 690

INPUT

Description: 0
Station Elevation Data num= 31

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1010.45	3.83	1008.45	7.56	1006.45	12.24	1004.45	47.44	1002.45
51.87	1000.45	58.45	998.45	72.21	996.45	109.85	994.45	128.4	992.45
147.98	990.45	159.7	990.45	161.79	992.45	175.45	992.45	179.32	992.09
180.95	988.98	181.24	988.97	190.12	989.1	200.05	989.75	205.48	991.62
206.48	992.45	210.98	994.45	215.83	996.45	225.48	998.45	235.58	1000.45
249.66	1002.45	327.39	1003.59	419.76	1004.45	422.29	1006.45	424.19	1008.45
425.67	1010.45								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	179.32	.045	205.48	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

179.32	205.48	690	690	690	.1	.3
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CROSS SECTION

RIVER: Chartiers Run
REACH: 1 RS: 000

INPUT

Description: N
Station Elevation Data num= 22

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1715	1006.3	1725	1000.4	1773	1000.4	1782	1001.8	1793	1001.8
1808	1001.4	1832	999.9	1850	993.4	1866	993.3	1901	992.3
1970	990.6	1987	986.7	1997	986.2	2000	985.9	2005	985.7
2006	986.2	2013	990.8	2038	990.3	2084	991.9	2098	998.9
2145	999.3	2222	1007						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1715	.1	1970	.045	2013	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

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1970 2013

.1 .3

CROSS SECTION

RIVER: Westland Run
REACH: 3 RS: 700

INPUT

Description: 7+00

Station Elevation Data		num= 31		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1010.45	19.55	1008.45	32.84	1006.45	45.16	1004.45	60.48	1002.45
83.63	1000.45	105	998.45	199.77	996.45	215.09	995.25	216.25	993.4
216.84	992.88	221.96	992.52	226.8	992.87	234.82	992.86	239.2	996.42
241.34	996.45	244.65	998.45	271.7	998.45	295.52	998.45	303.77	1000.45
335.24	1001.1	401.57	1002.45	429.04	1004.45	434.97	1006.45	437.76	1008.45
440.58	1010.45	443.43	1012.45	445.83	1014.45	448.43	1016.45	451.05	1018.45
453.67	1020.45								

Manning's n Values		num= 3		Sta n Val	
Sta	n Val	Sta	n Val	Sta	n Val
0	.1	215.09	.045	239.2	.1

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	215.09	239.2		100	100	100		.1	.3

CROSS SECTION

RIVER: Westland Run
REACH: 3 RS: 600

INPUT

Description: 6+00

Station Elevation Data		num= 31		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1010.45	2.65	1008.45	5.6	1006.45	9.02	1004.45	12.9	1002.45
17.22	1000.45	24.53	998.45	98.22	996.45	102.18	994.45	108.86	995.33
111.12	992.92	112.83	992.29	116.79	991.61	120.05	992.21	122.46	992.44
126.95	992.92	134.4	994.45	151.84	996.45	161.39	998.45	188.75	998.45
232.09	996.45	239.86	996.45	252.57	998.45	260.19	1000.45	329.76	1002.45
366.35	1004.45	376.68	1006.45	386.51	1008.45	392.81	1010.45	396.78	1012.45
400.8	1014.45								

Manning's n Values		num= 3		Sta n Val	
Sta	n Val	Sta	n Val	Sta	n Val
0	.1	108.86	.045	126.95	.1

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	108.86	126.95		100	100	100		.1	.3

CROSS SECTION

RIVER: Westland Run
REACH: 3 RS: 500

INPUT

Description: 5+00

Station Elevation Data		num= 25		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1010.45	3.08	1008.45	6.16	1006.45	9.23	1004.45	12.31	1002.45

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15.44	1000.45	19.05	998.45	122.08	996.6	130.35	996.45	144.22	994.45
145.87	994.28	146.95	992.58	148.02	992.28	157.18	991.6	166.49	992.18
166.94	992.63	167.24	992.91	172.62	994.45	178.98	996.45	184.49	998.45
194.71	1000.45	356.68	1002.45	369.21	1004.45	379.49	1008.45	382.9	1010.45

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	145.87	.045	167.24	.1

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	145.87	167.24		100	100		.1	.3

CROSS SECTION

RIVER: Westland Run
 REACH: 3 RS: 400

INPUT

Description: 4+00

Station Elevation Data num= 27

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1010.45	3.11	1008.45	6.28	1006.45	9.45	1004.45	12.61	1002.45
15.72	1000.45	19.21	998.45	36.98	996.45	41.65	996.45	99.21	996.45
153.1	993.51	154.68	991.6	154.95	991.35	162.85	990.47	169.62	991.31
171.8	991.69	173.25	994.78	184.83	996.45	193.92	998.45	207.07	1000.45
236.59	1002.45	250.86	1002.45	282.12	1002.45	288.86	1004.45	309.36	1006.45
317.96	1008.45	327.35	1010.45						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	153.1	.045	173.25	.1

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	153.1	173.25		100	100		.1	.3

CROSS SECTION

RIVER: Westland Run
 REACH: 3 RS: 300

INPUT

Description: 3+00

Station Elevation Data num= 28

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1010.45	3	1008.45	6.97	1006.45	12.45	1004.45	17.34	1002.45
21.7	1000.45	25.86	998.45	81.48	996.45	131.06	996.45	171.03	996.45
181.63	994.45	186.94	993.61	188.03	991.3	188.87	991.47	196.07	990.85
202.62	991.23	203.61	991.2	205.07	994.1	216.1	996.45	231	998.23
233.34	998.45	318.93	1000.37	321.99	1000.45	334.41	1002.45	349.12	1004.45
360.12	1006.45	371.36	1008.45	382.06	1010.45				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	186.94	.045	205.07	.1

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	186.94	205.07		25	25		.1	.3

BRIDGE

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RIVER: Westland Run
 REACH: 3

RS: 292

INPUT

Description:

Distance from Upstream XS = 8
 Deck/Roadway width = 16
 Weir Coefficient = 2.6

Upstream Deck/Roadway Coordinates
 num= 28

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	998.416	996.249	3	998.416	996.249	6.97	998.416	996.249
12.45	998.416	996.249	17.34	998.416	996.249	21.7	998.416	996.249
25.86	998.416	996.249	81.48	998.416	996.249	131.06	998.416	996.249
171.03	998.416	996.249	181.63	998.416	996.249	186.94	998.416	996.249
188.03	998.416	996.249	188.87	998.416	996.249	196.07	998.416	996.249
202.62	998.416	996.249	203.61	998.416	996.249	205.07	998.416	996.249
216.1	998.416	996.249	231	998.416	996.249	233.34	998.416	996.249
318.93	998.416	996.249	321.99	998.416	996.249	334.41	998.416	996.249
349.12	998.416	996.249	360.12	998.416	996.249	371.36	998.416	996.249
382.06	998.416	996.249						

Upstream Bridge Cross Section Data

Station Elevation Data num= 28

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1010.45	3	1008.45	6.97	1006.45	12.45	1004.45	17.34	1002.45
21.7	1000.45	25.86	998.45	81.48	996.45	131.06	996.45	171.03	996.45
181.63	994.45	186.94	993.61	188.03	991.3	188.87	991.47	196.07	990.85
202.62	991.23	203.61	991.2	205.07	994.1	216.1	996.45	231	998.23
233.34	998.45	318.93	1000.37	321.99	1000.45	334.41	1002.45	349.12	1004.45
360.12	1006.45	371.36	1008.45	382.06	1010.45				

Manning's n Values

num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	186.94	.045	205.07	.1

Bank Sta: Left Right
 186.94 205.07

Coeff Contr. Expan.
 .1 .3

Downstream Deck/Roadway Coordinates

num= 28

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	998.416	996.249	3	998.416	996.249	6.97	998.416	996.249
12.45	998.416	996.249	17.34	998.416	996.249	21.7	998.416	996.249
25.86	998.416	996.249	81.48	998.416	996.249	131.06	998.416	996.249
171.03	998.416	996.249	181.63	998.416	996.249	186.94	998.416	996.249
188.03	998.416	996.249	188.87	998.416	996.249	196.07	998.416	996.249
202.62	998.416	996.249	203.61	998.416	996.249	205.07	998.416	996.249
216.1	998.416	996.249	231	998.416	996.249	233.34	998.416	996.249
318.93	998.416	996.249	321.99	998.416	996.249	334.41	998.416	996.249
349.12	998.416	996.249	360.12	998.416	996.249	371.36	998.416	996.249
382.06	998.416	996.249						

Downstream Bridge Cross Section Data

Station Elevation Data num= 28

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1010.45	3	1008.45	6.97	1006.45	12.45	1004.45	17.34	1002.45
21.7	1000.45	25.86	998.45	81.48	996.45	131.06	996.45	171.03	996.45
181.63	994.45	186.94	993.61	188.03	991.3	188.87	991.47	196.07	990.85
202.62	991.23	203.61	991.2	205.07	994.1	216.1	996.45	231	998.23
233.34	998.45	318.93	1000.37	321.99	1000.45	334.41	1002.45	349.12	1004.45
360.12	1006.45	371.36	1008.45	382.06	1010.45				

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Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .1 186.94 .045 205.07 .1

Bank Sta: Left Right Coeff Contr. Expan.
 186.94 205.07 .1 .3

Upstream Embankment side slope = .212 horiz. to 1.0 vertical
 Downstream Embankment side slope = .258 horiz. to 1.0 vertical
 Maximum allowable submergence for weir flow = .98
 Elevation at which weir flow begins =
 Energy head used in spillway design =
 Spillway height used in design =
 weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data

Energy
 Selected Low Flow Methods = Highest Energy Answer

High Flow Method
 Energy Only

Additional Bridge Parameters

Add Friction component to Momentum
 Do not add weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION

RIVER: Westland Run
 REACH: 3 RS: 275

INPUT

Description:

Station Elevation Data num= 28

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1010.45	3	1008.45	6.97	1006.45	12.45	1004.45	17.34	1002.45
21.7	1000.45	25.86	998.45	81.48	996.45	131.06	996.45	171.03	996.45
181.63	994.45	186.94	993.61	188.03	991.3	188.87	991.47	196.07	990.85
202.62	991.23	203.61	991.2	205.07	994.1	216.1	996.45	231	998.23
233.34	998.45	318.93	1000.37	321.99	1000.45	334.41	1002.45	349.12	1004.45
360.12	1006.45	371.36	1008.45	382.06	1010.45				

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .1 186.94 .045 205.07 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 186.94 205.07 75 75 75 .1 .3

CROSS SECTION

RIVER: Westland Run
 REACH: 3 RS: 200

INPUT

Description: 2+00

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Station Elevation Data num= 26

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1010.45	3.65	1008.45	6.15	1006.45	8.35	1004.45	10.72	1002.45
14.43	1000.45	18.13	998.45	86.3	996.45	114.76	994.45	156.3	994.45
184.6	994.34	188.13	990.61	189.66	990.12	196.34	989.62	202.93	990.18
204.23	990.52	207.82	994.73	213.02	994.45	269.55	996.45	318.58	998.45
393.56	1000.45	424.45	1002.45	433.17	1004.45	446.7	1006.45	459.07	1008.45
467.71	1010.45								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	184.6	.045	207.82	.035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

184.6	207.82	100	100	100	.1	.3
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CROSS SECTION

RIVER: Westland Run
REACH: 3 RS: 100

INPUT

Description: 1+00

Station Elevation Data num= 31

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1010.45	3.34	1008.45	6.55	1006.45	9.27	1004.45	11.61	1002.45
15.5	1000.45	18.5	998.45	67.97	996.45	81.85	994.45	100.64	992.06
104.5	990.01	105.55	989.65	114.96	989.16	121.1	989.65	124.43	990.35
130.94	997.21	161.66	994.45	169.6	994.48	189.96	994.45	221.79	994
295.39	994.96	395.01	996.45	437.81	998.45	460.09	1000.45	463.45	1000.45
473.66	1000.45	494.19	1002.45	520.57	1004.45	527.43	1006.45	534.56	1008.45
543.23	1010.45								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	100.64	.045	130.94	.035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

100.64	130.94	100	100	100	.1	.3
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CROSS SECTION

RIVER: Westland Run
REACH: 3 RS: 000

INPUT

Description: 0+00

Station Elevation Data num= 34

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1010.45	2.62	1008.45	5.23	1006.45	7.84	1004.45	10.47	1002.45
13.09	1000.45	30.96	998.45	67.11	996.45	89.34	994.45	106.61	992.51
110.75	989.74	110.96	989.64	126.33	988.87	134.71	989.63	136.89	992.53
186.09	994.45	193.64	994.47	247.36	994.45	320	994.45	354.52	994.45
374.47	994.6	379.63	994.91	466.64	996.45	500.95	996.69	517.8	998.45
551.34	1000.45	557.73	1001.22	568.93	1002.45	583.64	1004.45	597.42	1006.45
616.28	1008.45	622.68	1010.45	630.2	1012.45	645.48	1013.88		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	106.61	.045	136.89	.035

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 Bank Sta: Left Right Coeff Contr. Expan.
 106.61 136.89 .1 .3

SUMMARY OF MANNING'S N VALUES

River:Chartiers Run

Reach	River Sta.	n1	n2	n3
2	1300	.1	.045	.1
2	1200	.035	.045	.1
2	1100	.035	.045	.1
2	1000	.035	.045	.1
2	900	.035	.045	.1
2	800	.035	.045	.1
2	700	.035	.045	.1
2	600	.035	.045	.1
2	500	.035	.045	.1
2	400	.035	.045	.1
2	300	.035	.045	.1
2	200	.035	.045	.1
2	100	.035	.045	.1
2	000	.035	.045	.1
1	690	.1	.045	.1
1	000	.1	.045	.1

River:Westland Run

Reach	River Sta.	n1	n2	n3
3	700	.1	.045	.1
3	600	.1	.045	.1
3	500	.1	.045	.1
3	400	.1	.045	.1
3	300	.1	.045	.1
3	292	Bridge		
3	275	.1	.045	.1
3	200	.1	.045	.035
3	100	.1	.045	.035
3	000	.1	.045	.035

SUMMARY OF REACH LENGTHS

River: Chartiers Run

Reach	River Sta.	Left	Channel	Right
2	1300	100	100	100
2	1200	100	100	100
2	1100	100	100	100
2	1000	100	100	100
2	900	100	100	100
2	800	100	100	100
2	700	100	100	100
2	600	100	100	100
2	500	100	100	100
2	400	100	100	100

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2	300	100	100	100
2	200	100	100	100
2	100	100	100	100
2	000			
1	690	690	690	690
1	000	100	100	100

River: Westland Run

Reach	River Sta.	Left	Channel	Right
3	700	100	100	100
3	600	100	100	100
3	500	100	100	100
3	400	100	100	100
3	300	25	25	25
3	292	Bridge		
3	275	75	75	75
3	200	100	100	100
3	100	100	100	100
3	000			

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS

River: Chartiers Run

Reach	River Sta.	Contr.	Expan.
2	1300	.1	.3
2	1200	.1	.3
2	1100	.1	.3
2	1000	.1	.3
2	900	.1	.3
2	800	.1	.3
2	700	.1	.3
2	600	.1	.3
2	500	.1	.3
2	400	.1	.3
2	300	.1	.3
2	200	.1	.3
2	100	.1	.3
2	000	.1	.3
1	690	.1	.3
1	000	.1	.3

River: Westland Run

Reach	River Sta.	Contr.	Expan.
3	700	.1	.3
3	600	.1	.3
3	500	.1	.3
3	400	.1	.3
3	300	.1	.3
3	292	Bridge	
3	275	.1	.3
3	200	.1	.3
3	100	.1	.3

3

000

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.1 .3

Plan: 101015Model Chartiers Run 2 RS: 1300 Profile: 100yr Storm

E.G. Elev (ft)	1001.43	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.05	Wt. n-Val.		0.045	
W.S. Elev (ft)	999.37	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)	999.06	Flow Area (sq ft)		144.99	
E.G. Slope (ft/ft)	0.018112	Area (sq ft)		144.99	
Q Total (cfs)	1666.75	Flow (cfs)		1666.75	
Top Width (ft)	29.70	Top Width (ft)		29.70	
Vel Total (ft/s)	11.50	Avg. Vel. (ft/s)		11.50	
Max Chl Dpth (ft)	6.65	Hydr. Depth (ft)		4.88	
Conv. Total (cfs)	12384.6	Conv. (cfs)		12384.6	
Length Wtd. (ft)	100.00	Wetted Per. (ft)		34.85	
Min Ch El (ft)	992.72	Shear (lb/sq ft)		4.70	
Alpha	1.00	Stream Power (lb/ft s)	522.21	0.00	0.00
Frctn Loss (ft)	0.52	Cum Volume (acre-ft)	14.03	5.78	2.87
C & E Loss (ft)	0.53	Cum SA (acres)	5.46	0.76	0.81

Plan: 101015Model Chartiers Run 2 RS: 1200 Profile: 100yr Storm

E.G. Elev (ft)	1000.37	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.28	Wt. n-Val.	0.035	0.045	0.100
W.S. Elev (ft)	1000.09	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	210.87	131.96	155.44
E.G. Slope (ft/ft)	0.002428	Area (sq ft)	210.87	131.96	155.44
Q Total (cfs)	1666.75	Flow (cfs)	759.40	707.10	200.25
Top Width (ft)	181.25	Top Width (ft)	93.20	21.62	66.43
Vel Total (ft/s)	3.35	Avg. Vel. (ft/s)	3.60	5.36	1.29
Max Chl Dpth (ft)	6.81	Hydr. Depth (ft)	2.26	6.10	2.34
Conv. Total (cfs)	33828.2	Conv. (cfs)	15412.6	14351.2	4064.3
Length Wtd. (ft)	100.00	Wetted Per. (ft)	93.35	22.08	66.59
Min Ch El (ft)	993.28	Shear (lb/sq ft)	0.34	0.91	0.35
Alpha	1.63	Stream Power (lb/ft s)	583.58	0.00	0.00
Frctn Loss (ft)	0.20	Cum Volume (acre-ft)	13.78	5.46	2.69
C & E Loss (ft)	0.02	Cum SA (acres)	5.35	0.70	0.73

Plan: 101015Model Chartiers Run 2 RS: 1100 Profile: 100yr Storm

E.G. Elev (ft)	1000.16	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.22	Wt. n-Val.	0.035	0.045	
W.S. Elev (ft)	999.94	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	257.64	235.22	
E.G. Slope (ft/ft)	0.001608	Area (sq ft)	257.64	235.22	
Q Total (cfs)	1666.75	Flow (cfs)	626.35	1040.40	
Top Width (ft)	184.87	Top Width (ft)	150.92	33.95	
Vel Total (ft/s)	3.38	Avg. Vel. (ft/s)	2.43	4.42	
Max Chl Dpth (ft)	9.18	Hydr. Depth (ft)	1.71	6.93	
Conv. Total (cfs)	41564.2	Conv. (cfs)	15619.5	25944.7	
Length Wtd. (ft)	100.00	Wetted Per. (ft)	150.98	38.53	
Min Ch El (ft)	990.76	Shear (lb/sq ft)	0.17	0.61	
Alpha	1.26	Stream Power (lb/ft s)	591.16	0.00	0.00
Frctn Loss (ft)	0.25	Cum Volume (acre-ft)	13.25	5.04	2.51
C & E Loss (ft)	0.03	Cum SA (acres)	5.07	0.64	0.65

Plan: 101015Model Chartiers Run 2 RS: 1000 Profile: 100yr Storm

E.G. Elev (ft)	999.88	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.56	Wt. n-Val.	0.035	0.045	0.100
W.S. Elev (ft)	999.33	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	105.14	209.12	20.14
E.G. Slope (ft/ft)	0.004200	Area (sq ft)	105.14	209.12	20.14
Q Total (cfs)	1666.75	Flow (cfs)	277.16	1361.19	28.40
Top Width (ft)	157.18	Top Width (ft)	112.11	34.35	10.72
Vel Total (ft/s)	4.98	Avg. Vel. (ft/s)	2.64	6.51	1.41
Max Chl Dpth (ft)	6.72	Hydr. Depth (ft)	0.94	6.09	1.88
Conv. Total (cfs)	25718.9	Conv. (cfs)	4276.7	21003.9	438.3
Length Wtd. (ft)	100.00	Wetted Per. (ft)	112.12	39.42	11.36
Min Ch EI (ft)	992.61	Shear (lb/sq ft)	0.25	1.39	0.46
Alpha	1.44	Stream Power (lb/ft s)	538.81	0.00	0.00
Frctn Loss (ft)	0.31	Cum Volume (acre-ft)	12.83	4.53	2.49
C & E Loss (ft)	0.09	Cum SA (acres)	4.77	0.56	0.64

Plan: 101015Model Chartiers Run 2 RS: 900 Profile: 100yr Storm

E.G. Elev (ft)	999.49	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.26	Wt. n-Val.	0.035	0.045	0.100
W.S. Elev (ft)	999.22	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	140.90	163.62	274.44
E.G. Slope (ft/ft)	0.002349	Area (sq ft)	140.90	163.62	274.44
Q Total (cfs)	1666.75	Flow (cfs)	353.85	874.23	438.67
Top Width (ft)	211.87	Top Width (ft)	104.45	24.68	82.74
Vel Total (ft/s)	2.88	Avg. Vel. (ft/s)	2.51	5.34	1.60
Max Chl Dpth (ft)	8.19	Hydr. Depth (ft)	1.35	6.63	3.32
Conv. Total (cfs)	34393.2	Conv. (cfs)	7301.7	18039.7	9051.8
Length Wtd. (ft)	100.00	Wetted Per. (ft)	104.48	26.82	82.99
Min Ch EI (ft)	991.03	Shear (lb/sq ft)	0.20	0.89	0.48
Alpha	2.05	Stream Power (lb/ft s)	600.84	0.00	0.00
Frctn Loss (ft)	0.20	Cum Volume (acre-ft)	12.55	4.10	2.15
C & E Loss (ft)	0.02	Cum SA (acres)	4.52	0.49	0.53

Plan: 101015Model Chartiers Run 2 RS: 800 Profile: 100yr Storm

E.G. Elev (ft)	999.27	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.21	Wt. n-Val.	0.035	0.045	0.100
W.S. Elev (ft)	999.06	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	189.28	196.77	210.94
E.G. Slope (ft/ft)	0.001673	Area (sq ft)	189.28	196.77	210.94
Q Total (cfs)	1666.75	Flow (cfs)	437.17	915.50	314.08
Top Width (ft)	206.30	Top Width (ft)	123.34	28.56	54.40
Vel Total (ft/s)	2.79	Avg. Vel. (ft/s)	2.31	4.65	1.49
Max Chl Dpth (ft)	8.09	Hydr. Depth (ft)	1.53	6.89	3.88
Conv. Total (cfs)	40744.6	Conv. (cfs)	10686.9	22379.9	7677.8
Length Wtd. (ft)	100.00	Wetted Per. (ft)	123.42	30.78	55.02
Min Ch EI (ft)	990.97	Shear (lb/sq ft)	0.16	0.67	0.40
Alpha	1.76	Stream Power (lb/ft s)	642.81	0.00	0.00
Frctn Loss (ft)	0.20	Cum Volume (acre-ft)	12.17	3.69	1.59
C & E Loss (ft)	0.02	Cum SA (acres)	4.26	0.43	0.38

Plan: 101015Model Chartiers Run 2 RS: 700 Profile: 100yr Storm

E.G. Elev (ft)	999.05	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.41	Wt. n-Val.	0.035	0.045	0.100
W.S. Elev (ft)	998.64	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	178.24	214.89	6.55
E.G. Slope (ft/ft)	0.002414	Area (sq ft)	178.24	214.89	6.55
Q Total (cfs)	1666.75	Flow (cfs)	414.76	1246.38	5.61
Top Width (ft)	181.73	Top Width (ft)	149.85	28.52	3.36
Vel Total (ft/s)	4.17	Avg. Vel. (ft/s)	2.33	5.80	0.86
Max Chl Dpth (ft)	8.30	Hydr. Depth (ft)	1.19	7.53	1.95
Conv. Total (cfs)	33925.6	Conv. (cfs)	8442.1	25369.2	114.3
Length Wtd. (ft)	100.00	Wetted Per. (ft)	151.27	31.79	5.15
Min Ch EI (ft)	990.34	Shear (lb/sq ft)	0.18	1.02	0.19
Alpha	1.52	Stream Power (lb/ft s)	614.49	0.00	0.00
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	11.75	3.22	1.34
C & E Loss (ft)	0.11	Cum SA (acres)	3.95	0.36	0.31

Plan: 101015Model Chartiers Run 2 RS: 600 Profile: 100yr Storm

E.G. Elev (ft)	998.87	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.	0.035	0.045	0.100
W.S. Elev (ft)	998.81	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	728.35	146.58	40.44
E.G. Slope (ft/ft)	0.000384	Area (sq ft)	728.35	146.58	40.44
Q Total (cfs)	1666.75	Flow (cfs)	1297.66	345.75	23.34
Top Width (ft)	265.10	Top Width (ft)	232.29	19.71	13.10
Vel Total (ft/s)	1.82	Avg. Vel. (ft/s)	1.78	2.36	0.58
Max Chl Dpth (ft)	7.96	Hydr. Depth (ft)	3.14	7.44	3.09
Conv. Total (cfs)	85066.7	Conv. (cfs)	66229.0	17646.3	1191.4
Length Wtd. (ft)	100.00	Wetted Per. (ft)	232.37	21.06	14.48
Min Ch EI (ft)	990.85	Shear (lb/sq ft)	0.08	0.17	0.07
Alpha	1.09	Stream Power (lb/ft s)	649.16	0.00	0.00
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	10.71	2.80	1.29
C & E Loss (ft)	0.01	Cum SA (acres)	3.51	0.31	0.29

Plan: 101015Model Chartiers Run 2 RS: 500 Profile: 100yr Storm

E.G. Elev (ft)	998.81	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.12	Wt. n-Val.	0.035	0.045	0.100
W.S. Elev (ft)	998.69	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	493.79	156.66	17.69
E.G. Slope (ft/ft)	0.000893	Area (sq ft)	493.79	156.66	17.69
Q Total (cfs)	1666.75	Flow (cfs)	1082.94	570.91	12.89
Top Width (ft)	243.15	Top Width (ft)	217.18	20.00	5.97
Vel Total (ft/s)	2.49	Avg. Vel. (ft/s)	2.19	3.64	0.73
Max Chl Dpth (ft)	8.89	Hydr. Depth (ft)	2.27	7.83	2.96
Conv. Total (cfs)	55778.8	Conv. (cfs)	36241.4	19105.9	431.5
Length Wtd. (ft)	100.00	Wetted Per. (ft)	217.24	22.07	8.41
Min Ch EI (ft)	989.80	Shear (lb/sq ft)	0.13	0.40	0.12
Alpha	1.23	Stream Power (lb/ft s)	626.63	0.00	0.00
Frctn Loss (ft)	0.12	Cum Volume (acre-ft)	9.30	2.45	1.22
C & E Loss (ft)	0.01	Cum SA (acres)	2.99	0.26	0.27

Plan: 101015Model Chartiers Run 2 RS: 400 Profile: 100yr Storm

E.G. Elev (ft)	998.68	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.21	Wt. n-Val.	0.035	0.045	0.100
W.S. Elev (ft)	998.46	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	333.97	180.59	8.20
E.G. Slope (ft/ft)	0.001687	Area (sq ft)	333.97	180.59	8.20
Q Total (cfs)	1666.75	Flow (cfs)	825.56	834.93	6.25
Top Width (ft)	227.67	Top Width (ft)	197.82	25.09	4.76
Vel Total (ft/s)	3.19	Avg. Vel. (ft/s)	2.47	4.62	0.76
Max Chl Dpth (ft)	7.89	Hydr. Depth (ft)	1.69	7.20	1.72
Conv. Total (cfs)	40574.6	Conv. (cfs)	20097.1	20325.3	152.2
Length Wtd. (ft)	100.00	Wetted Per. (ft)	197.90	28.70	5.88
Min Ch El (ft)	990.57	Shear (lb/sq ft)	0.18	0.66	0.15
Alpha	1.35	Stream Power (lb/ft s)	605.13	0.00	0.00
Frctn Loss (ft)	0.15	Cum Volume (acre-ft)	8.35	2.07	1.19
C & E Loss (ft)	0.01	Cum SA (acres)	2.52	0.21	0.26

Plan: 101015Model Chartiers Run 2 RS: 300 Profile: 100yr Storm

E.G. Elev (ft)	998.52	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.19	Wt. n-Val.	0.035	0.045	0.100
W.S. Elev (ft)	998.32	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	321.22	197.92	51.68
E.G. Slope (ft/ft)	0.001429	Area (sq ft)	321.22	197.92	51.68
Q Total (cfs)	1666.75	Flow (cfs)	749.84	866.06	50.84
Top Width (ft)	231.67	Top Width (ft)	183.01	26.98	21.67
Vel Total (ft/s)	2.92	Avg. Vel. (ft/s)	2.33	4.38	0.98
Max Chl Dpth (ft)	8.17	Hydr. Depth (ft)	1.76	7.34	2.38
Conv. Total (cfs)	44097.9	Conv. (cfs)	19838.9	22913.8	1345.2
Length Wtd. (ft)	100.00	Wetted Per. (ft)	183.07	30.15	22.29
Min Ch El (ft)	990.15	Shear (lb/sq ft)	0.16	0.59	0.21
Alpha	1.46	Stream Power (lb/ft s)	578.12	0.00	0.00
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	7.60	1.63	1.12
C & E Loss (ft)	0.04	Cum SA (acres)	2.08	0.15	0.23

Plan: 101015Model Chartiers Run 2 RS: 200 Profile: 100yr Storm

E.G. Elev (ft)	998.40	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.	0.035	0.045	0.100
W.S. Elev (ft)	998.34	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	680.35	163.15	124.88
E.G. Slope (ft/ft)	0.000491	Area (sq ft)	680.35	163.15	124.88
Q Total (cfs)	1666.75	Flow (cfs)	1112.17	445.89	108.69
Top Width (ft)	344.95	Top Width (ft)	296.80	20.46	27.69
Vel Total (ft/s)	1.72	Avg. Vel. (ft/s)	1.63	2.73	0.87
Max Chl Dpth (ft)	8.85	Hydr. Depth (ft)	2.29	7.97	4.51
Conv. Total (cfs)	75247.7	Conv. (cfs)	50210.3	20130.5	4907.0
Length Wtd. (ft)	100.00	Wetted Per. (ft)	296.85	22.59	29.04
Min Ch El (ft)	989.49	Shear (lb/sq ft)	0.07	0.22	0.13
Alpha	1.29	Stream Power (lb/ft s)	581.57	0.00	0.00
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)	6.45	1.22	0.92
C & E Loss (ft)	0.01	Cum SA (acres)	1.53	0.10	0.17

Plan: 101015Model Chartiers Run 2 RS: 100 Profile: 100yr Storm

E.G. Elev (ft)	998.35	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.	0.035	0.045	0.100
W.S. Elev (ft)	998.31	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	809.37	165.22	147.57
E.G. Slope (ft/ft)	0.000327	Area (sq ft)	809.37	165.22	147.57
Q Total (cfs)	1666.75	Flow (cfs)	1196.90	374.71	95.14
Top Width (ft)	362.46	Top Width (ft)	302.94	20.50	39.02
Vel Total (ft/s)	1.49	Avg. Vel. (ft/s)	1.48	2.27	0.64
Max Chl Dpth (ft)	8.37	Hydr. Depth (ft)	2.67	8.06	3.78
Conv. Total (cfs)	92122.4	Conv. (cfs)	66153.2	20710.6	5258.6
Length Wtd. (ft)	100.00	Wetted Per. (ft)	303.00	22.34	39.74
Min Ch El (ft)	989.94	Shear (lb/sq ft)	0.05	0.15	0.08
Alpha	1.25	Stream Power (lb/ft s)	609.02	0.00	0.00
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	4.74	0.84	0.61
C & E Loss (ft)	0.01	Cum SA (acres)	0.84	0.05	0.09

Plan: 101015Model Chartiers Run 2 RS: 000 Profile: 100yr Storm

E.G. Elev (ft)	998.33	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.035	0.045	0.100
W.S. Elev (ft)	998.31	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	1428.12	179.48	171.88
E.G. Slope (ft/ft)	0.000101	Area (sq ft)	1428.12	179.48	171.88
Q Total (cfs)	1666.75	Flow (cfs)	1361.62	240.14	65.00
Top Width (ft)	492.52	Top Width (ft)	428.33	22.09	42.10
Vel Total (ft/s)	0.94	Avg. Vel. (ft/s)	0.95	1.34	0.38
Max Chl Dpth (ft)	8.43	Hydr. Depth (ft)	3.33	8.12	4.08
Conv. Total (cfs)	165479.0	Conv. (cfs)	135184.8	23841.3	6453.0
Length Wtd. (ft)	100.00	Wetted Per. (ft)	428.95	22.24	42.80
Min Ch El (ft)	989.88	Shear (lb/sq ft)	0.02	0.05	0.03
Alpha	1.15	Stream Power (lb/ft s)	711.90	0.00	0.00
Frctn Loss (ft)	0.05	Cum Volume (acre-ft)	2.17	0.44	0.24
C & E Loss (ft)	0.06	Cum SA (acres)			

Plan: 101015Model Chartiers Run 1 RS: 690 Profile: 100yr Storm

E.G. Elev (ft)	998.22	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.67	Wt. n-Val.	0.100	0.045	0.100
W.S. Elev (ft)	997.55	Reach Len. (ft)	690.00	690.00	690.00
Crit W.S. (ft)		Flow Area (sq ft)	464.76	207.49	37.07
E.G. Slope (ft/ft)	0.004459	Area (sq ft)	464.76	207.49	37.07
Q Total (cfs)	2950.00	Flow (cfs)	1164.34	1723.54	62.12
Top Width (ft)	156.50	Top Width (ft)	114.68	26.16	15.66
Vel Total (ft/s)	4.16	Avg. Vel. (ft/s)	2.51	8.31	1.68
Max Chl Dpth (ft)	8.58	Hydr. Depth (ft)	4.05	7.93	2.37
Conv. Total (cfs)	44179.3	Conv. (cfs)	17437.3	25811.8	930.2
Length Wtd. (ft)	690.00	Wetted Per. (ft)	115.84	28.38	16.89
Min Ch El (ft)	988.97	Shear (lb/sq ft)	1.12	2.04	0.61
Alpha	2.48	Stream Power (lb/ft s)	425.67	0.00	0.00
Frctn Loss (ft)	1.20	Cum Volume (acre-ft)	8.18	4.76	3.73
C & E Loss (ft)	0.15	Cum SA (acres)	1.93	0.55	0.76

Plan: 101015Model Chartiers Run 1 RS: 000 Profile: 100yr Storm

E.G. Elev (ft)	996.87	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.17	Wt. n-Val.	0.100	0.045	0.100
W.S. Elev (ft)	996.70	Reach Len. (ft)			
Crit W.S. (ft)	992.88	Flow Area (sq ft)	567.43	393.95	434.39
E.G. Slope (ft/ft)	0.000916	Area (sq ft)	567.43	393.95	434.39
Q Total (cfs)	2950.00	Flow (cfs)	682.34	1672.94	594.71
Top Width (ft)	252.74	Top Width (ft)	129.14	43.00	80.60
Vel Total (ft/s)	2.11	Avg. Vel. (ft/s)	1.20	4.25	1.37
Max Chl Dpth (ft)	11.00	Hydr. Depth (ft)	4.39	9.16	5.39
Conv. Total (cfs)	97482.9	Conv. (cfs)	22548.1	55282.5	19652.3
Length Wtd. (ft)		Wetted Per. (ft)	129.75	44.97	81.77
Min Ch EI (ft)	985.70	Shear (lb/sq ft)	0.25	0.50	0.30
Alpha	2.45	Stream Power (lb/ft s)	2222.00	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Plan: 101015Model Westland Run 3 RS: 700 Profile: 100yr Storm

E.G. Elev (ft)	1000.70	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.17	Wt. n-Val.	0.100	0.045	0.100
W.S. Elev (ft)	1000.53	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	386.70	176.84	133.83
E.G. Slope (ft/ft)	0.001310	Area (sq ft)	386.70	176.84	133.83
Q Total (cfs)	1283.25	Flow (cfs)	424.64	746.92	111.69
Top Width (ft)	224.94	Top Width (ft)	132.39	24.11	68.44
Vel Total (ft/s)	1.84	Avg. Vel. (ft/s)	1.10	4.22	0.83
Max Chl Dpth (ft)	8.01	Hydr. Depth (ft)	2.92	7.33	1.96
Conv. Total (cfs)	35453.0	Conv. (cfs)	11731.8	20635.5	3085.7
Length Wtd. (ft)	100.00	Wetted Per. (ft)	132.55	26.62	69.24
Min Ch EI (ft)	992.52	Shear (lb/sq ft)	0.24	0.54	0.16
Alpha	3.20	Stream Power (lb/ft s)	453.67	0.00	0.00
Frctn Loss (ft)	0.11	Cum Volume (acre-ft)	7.04	3.82	8.44
C & E Loss (ft)	0.02	Cum SA (acres)	1.98	0.36	2.06

Plan: 101015Model Westland Run 3 RS: 600 Profile: 100yr Storm

E.G. Elev (ft)	1000.57	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.12	Wt. n-Val.	0.100	0.045	0.100
W.S. Elev (ft)	1000.45	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	285.67	143.75	428.32
E.G. Slope (ft/ft)	0.000988	Area (sq ft)	285.67	143.75	428.32
Q Total (cfs)	1283.25	Flow (cfs)	282.92	567.00	433.33
Top Width (ft)	243.11	Top Width (ft)	91.65	18.09	133.37
Vel Total (ft/s)	1.50	Avg. Vel. (ft/s)	0.99	3.94	1.01
Max Chl Dpth (ft)	8.84	Hydr. Depth (ft)	3.12	7.95	3.21
Conv. Total (cfs)	40835.9	Conv. (cfs)	9003.3	18043.2	13789.4
Length Wtd. (ft)	100.00	Wetted Per. (ft)	92.48	19.40	134.31
Min Ch EI (ft)	991.61	Shear (lb/sq ft)	0.19	0.46	0.20
Alpha	3.32	Stream Power (lb/ft s)	400.80	0.00	0.00
Frctn Loss (ft)	0.11	Cum Volume (acre-ft)	6.27	3.45	7.79
C & E Loss (ft)	0.01	Cum SA (acres)	1.72	0.31	1.83

Plan: 101015Model Westland Run 3 RS: 500 Profile: 100yr Storm

E.G. Elev (ft)	1000.46	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.19	Wt. n-Val.	0.100	0.045	0.100
W.S. Elev (ft)	1000.27	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	393.35	175.88	90.11
E.G. Slope (ft/ft)	0.001148	Area (sq ft)	393.35	175.88	90.11
Q Total (cfs)	1283.25	Flow (cfs)	412.67	770.75	99.82
Top Width (ft)	178.02	Top Width (ft)	130.10	21.37	26.55
Vel Total (ft/s)	1.95	Avg. Vel. (ft/s)	1.05	4.38	1.11
Max Chl Dpth (ft)	8.67	Hydr. Depth (ft)	3.02	8.23	3.39
Conv. Total (cfs)	37878.0	Conv. (cfs)	12181.0	22750.5	2946.5
Length Wtd. (ft)	100.00	Wetted Per. (ft)	130.75	22.69	27.60
Min Ch EI (ft)	991.60	Shear (lb/sq ft)	0.22	0.56	0.23
Alpha	3.16	Stream Power (lb/ft s)	382.90	0.00	0.00
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)	5.49	3.09	7.20
C & E Loss (ft)	0.03	Cum SA (acres)	1.47	0.27	1.65

Plan: 101015Model Westland Run 3 RS: 400 Profile: 100yr Storm

E.G. Elev (ft)	1000.34	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.10	Wt. n-Val.	0.100	0.045	0.100
W.S. Elev (ft)	1000.24	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	571.85	180.75	89.49
E.G. Slope (ft/ft)	0.000716	Area (sq ft)	571.85	180.75	89.49
Q Total (cfs)	1283.25	Flow (cfs)	587.31	626.66	69.29
Top Width (ft)	189.61	Top Width (ft)	137.02	20.15	32.45
Vel Total (ft/s)	1.52	Avg. Vel. (ft/s)	1.03	3.47	0.77
Max Chl Dpth (ft)	9.77	Hydr. Depth (ft)	4.17	8.97	2.76
Conv. Total (cfs)	47972.3	Conv. (cfs)	21955.5	23426.7	2590.1
Length Wtd. (ft)	100.00	Wetted Per. (ft)	137.68	23.24	32.92
Min Ch EI (ft)	990.47	Shear (lb/sq ft)	0.19	0.35	0.12
Alpha	2.75	Stream Power (lb/ft s)	327.35	0.00	0.00
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	4.38	2.68	6.99
C & E Loss (ft)	0.00	Cum SA (acres)	1.16	0.22	1.58

Plan: 101015Model Westland Run 3 RS: 300 Profile: 100yr Storm

E.G. Elev (ft)	1000.26	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.11	Wt. n-Val.	0.100	0.045	0.100
W.S. Elev (ft)	1000.14	Reach Len. (ft)	8.00	8.00	8.00
Crit W.S. (ft)	996.31	Flow Area (sq ft)	565.91	159.84	163.71
E.G. Slope (ft/ft)	0.000910	Area (sq ft)	565.91	159.84	163.71
Q Total (cfs)	1283.25	Flow (cfs)	576.30	607.76	99.19
Top Width (ft)	286.54	Top Width (ft)	164.60	18.13	103.80
Vel Total (ft/s)	1.44	Avg. Vel. (ft/s)	1.02	3.80	0.61
Max Chl Dpth (ft)	9.29	Hydr. Depth (ft)	3.44	8.82	1.58
Conv. Total (cfs)	42535.9	Conv. (cfs)	19102.7	20145.4	3287.8
Length Wtd. (ft)	8.00	Wetted Per. (ft)	165.28	21.44	104.19
Min Ch EI (ft)	990.85	Shear (lb/sq ft)	0.19	0.42	0.09
Alpha	3.53	Stream Power (lb/ft s)	382.06	0.00	0.00
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	3.08	2.29	6.70
C & E Loss (ft)	0.01	Cum SA (acres)	0.82	0.18	1.42

Plan: 101015Model Westland Run 3 RS: 292 BR U Profile: 100yr Storm

E.G. Elev (ft)	1000.23	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.22	Wt. n-Val.	0.100	0.045	0.100
W.S. Elev (ft)	1000.01	Reach Len. (ft)	16.00	16.00	16.00
Crit W.S. (ft)	999.37	Flow Area (sq ft)	279.38	118.09	109.99
E.G. Slope (ft/ft)	0.009425	Area (sq ft)	279.38	118.09	109.99
Q Total (cfs)	1283.25	Flow (cfs)	521.63	610.28	151.34
Top Width (ft)	280.20	Top Width (ft)	164.32	18.13	97.74
Vel Total (ft/s)	2.53	Avg. Vel. (ft/s)	1.87	5.17	1.38
Max Chl Dpth (ft)	9.16	Hydr. Depth (ft)	1.70	6.51	1.13
Conv. Total (cfs)	13217.9	Conv. (cfs)	5373.0	6286.1	1558.9
Length Wtd. (ft)	16.00	Wetted Per. (ft)	194.60	57.70	118.16
Min Ch EI (ft)	990.85	Shear (lb/sq ft)	0.84	1.20	0.55
Alpha	2.24	Stream Power (lb/ft s)	382.06	0.00	0.00
Frctn Loss (ft)	0.23	Cum Volume (acre-ft)	3.00	2.26	6.68
C & E Loss (ft)	0.04	Cum SA (acres)	0.79	0.17	1.40

Plan: 101015Model Westland Run 3 RS: 292 BR D Profile: 100yr Storm

E.G. Elev (ft)	999.97	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.59	Wt. n-Val.	0.100	0.045	0.100
W.S. Elev (ft)	999.37	Reach Len. (ft)	1.00	1.00	1.00
Crit W.S. (ft)	999.37	Flow Area (sq ft)	175.43	106.58	56.89
E.G. Slope (ft/ft)	0.023470	Area (sq ft)	175.43	106.58	56.89
Q Total (cfs)	1283.25	Flow (cfs)	375.98	811.66	95.62
Top Width (ft)	250.56	Top Width (ft)	163.00	18.13	69.43
Vel Total (ft/s)	3.79	Avg. Vel. (ft/s)	2.14	7.62	1.68
Max Chl Dpth (ft)	8.52	Hydr. Depth (ft)	1.08	5.88	0.82
Conv. Total (cfs)	8376.3	Conv. (cfs)	2454.2	5298.0	624.1
Length Wtd. (ft)	1.00	Wetted Per. (ft)	193.14	57.70	89.84
Min Ch EI (ft)	990.85	Shear (lb/sq ft)	1.33	2.71	0.93
Alpha	2.67	Stream Power (lb/ft s)	382.06	0.00	0.00
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	2.92	2.22	6.64
C & E Loss (ft)	0.00	Cum SA (acres)	0.73	0.17	1.37

Plan: 101015Model Westland Run 3 RS: 275 Profile: 100yr Storm

E.G. Elev (ft)	998.68	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.60	Wt. n-Val.	0.100	0.045	0.100
W.S. Elev (ft)	998.08	Reach Len. (ft)	75.00	75.00	75.00
Crit W.S. (ft)		Flow Area (sq ft)	232.36	122.42	42.07
E.G. Slope (ft/ft)	0.004864	Area (sq ft)	232.36	122.42	42.07
Q Total (cfs)	1283.25	Flow (cfs)	320.83	900.78	61.64
Top Width (ft)	193.61	Top Width (ft)	150.80	18.13	24.68
Vel Total (ft/s)	3.23	Avg. Vel. (ft/s)	1.38	7.36	1.47
Max Chl Dpth (ft)	7.23	Hydr. Depth (ft)	1.54	6.75	1.70
Conv. Total (cfs)	18400.1	Conv. (cfs)	4600.3	12916.0	883.9
Length Wtd. (ft)	75.00	Wetted Per. (ft)	151.08	21.44	25.02
Min Ch EI (ft)	990.85	Shear (lb/sq ft)	0.47	1.73	0.51
Alpha	3.69	Stream Power (lb/ft s)	382.06	0.00	0.00
Frctn Loss (ft)	0.11	Cum Volume (acre-ft)	2.91	2.22	6.64
C & E Loss (ft)	0.15	Cum SA (acres)	0.72	0.17	1.37

Plan: 101015Model Westland Run 3 RS: 200 Profile: 100yr Storm

E.G. Elev (ft)	998.41	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.09	Wt. n-Val.	0.100	0.045	0.035
W.S. Elev (ft)	998.32	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	413.64	175.62	224.85
E.G. Slope (ft/ft)	0.000736	Area (sq ft)	413.64	175.62	224.85
Q Total (cfs)	1283.25	Flow (cfs)	311.18	549.13	422.94
Top Width (ft)	293.02	Top Width (ft)	162.15	23.22	107.65
Vel Total (ft/s)	1.58	Avg. Vel. (ft/s)	0.75	3.13	1.88
Max Chl Dpth (ft)	8.70	Hydr. Depth (ft)	2.55	7.56	2.09
Conv. Total (cfs)	47301.3	Conv. (cfs)	11470.3	20241.1	15589.9
Length Wtd. (ft)	100.00	Wetted Per. (ft)	162.25	26.93	107.73
Min Ch El (ft)	989.62	Shear (lb/sq ft)	0.12	0.30	0.10
Alpha	2.21	Stream Power (lb/ft s)	467.71	0.00	0.00
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)	2.35	1.96	6.41
C & E Loss (ft)	0.02	Cum SA (acres)	0.45	0.13	1.26

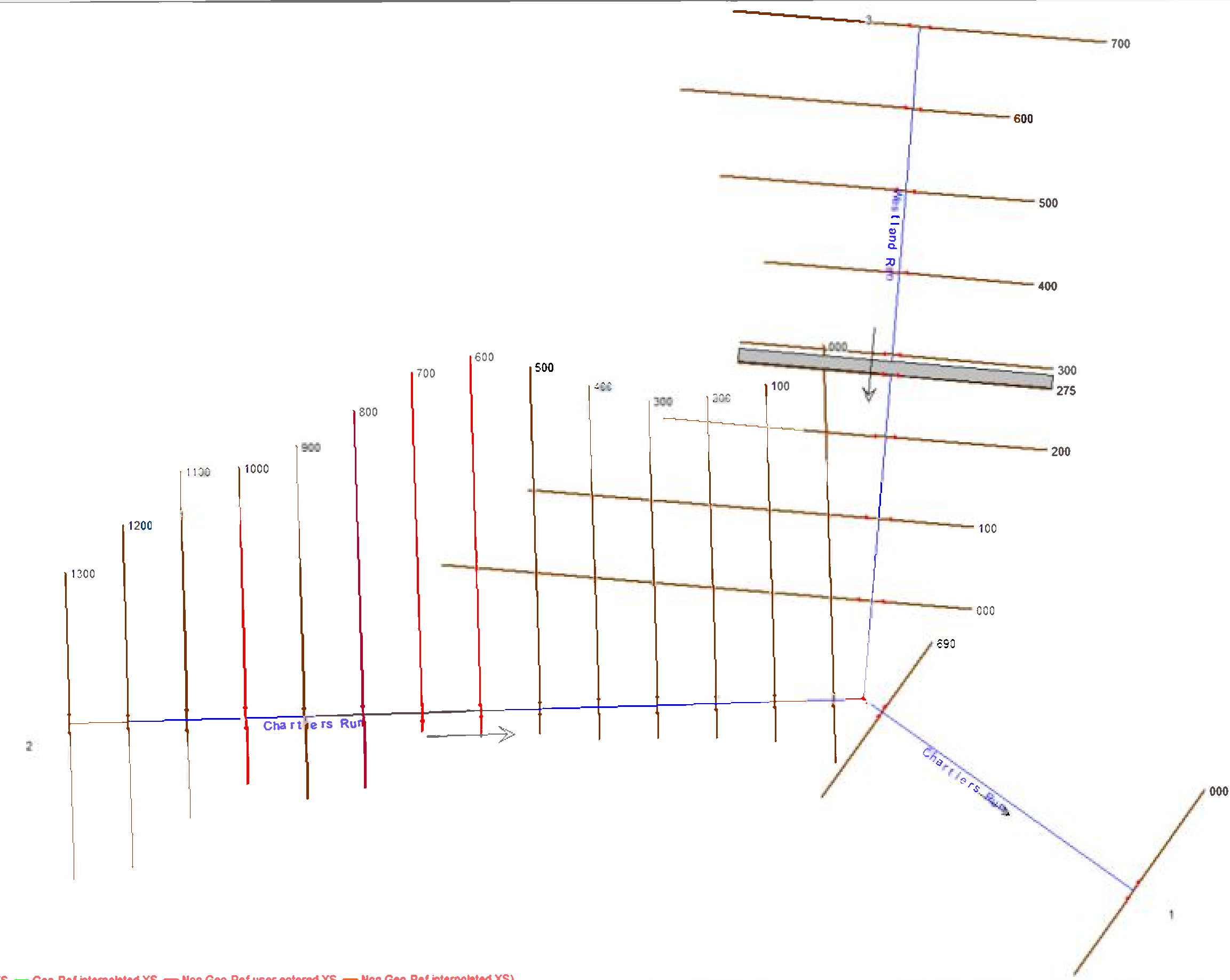
Plan: 101015Model Westland Run 3 RS: 100 Profile: 100yr Storm

E.G. Elev (ft)	998.36	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.100	0.045	0.035
W.S. Elev (ft)	998.34	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	180.15	233.65	903.74
E.G. Slope (ft/ft)	0.000132	Area (sq ft)	180.15	233.65	903.74
Q Total (cfs)	1283.25	Flow (cfs)	52.89	320.79	909.57
Top Width (ft)	414.41	Top Width (ft)	79.51	30.30	304.60
Vel Total (ft/s)	0.97	Avg. Vel. (ft/s)	0.29	1.37	1.01
Max Chl Dpth (ft)	9.18	Hydr. Depth (ft)	2.27	7.71	2.97
Conv. Total (cfs)	111723.5	Conv. (cfs)	4604.6	27929.0	79190.0
Length Wtd. (ft)	100.00	Wetted Per. (ft)	79.85	33.92	304.79
Min Ch El (ft)	989.16	Shear (lb/sq ft)	0.02	0.06	0.02
Alpha	1.26	Stream Power (lb/ft s)	543.23	0.00	0.00
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	1.67	1.49	5.12
C & E Loss (ft)	0.00	Cum SA (acres)	0.18	0.07	0.79

Plan: 101015Model Westland Run 3 RS: 000 Profile: 100yr Storm

E.G. Elev (ft)	998.35	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.100	0.045	0.035
W.S. Elev (ft)	998.34	Reach Len. (ft)	170.00	170.00	170.00
Crit W.S. (ft)		Flow Area (sq ft)	180.53	263.35	1293.37
E.G. Slope (ft/ft)	0.000061	Area (sq ft)	180.53	263.35	1293.37
Q Total (cfs)	1283.25	Flow (cfs)	38.04	273.55	971.65
Top Width (ft)	483.82	Top Width (ft)	73.68	30.28	379.87
Vel Total (ft/s)	0.74	Avg. Vel. (ft/s)	0.21	1.04	0.75
Max Chl Dpth (ft)	9.47	Hydr. Depth (ft)	2.45	8.70	3.40
Conv. Total (cfs)	164084.0	Conv. (cfs)	4864.4	34978.1	124241.6
Length Wtd. (ft)	170.00	Wetted Per. (ft)	73.93	32.65	380.01
Min Ch El (ft)	988.87	Shear (lb/sq ft)	0.01	0.03	0.01
Alpha	1.21	Stream Power (lb/ft s)	645.48	0.00	0.00
Frctn Loss (ft)	0.07	Cum Volume (acre-ft)	1.26	0.92	2.60
C & E Loss (ft)	0.07	Cum SA (acres)			

- Junct.
- Cross Section
- Brdg/Culv
- Inline Structure
- Lateral Structure
- Storage Area
- Storage Area Conn
- Pump Station
- HTab Param.
- View Picture



None of the XS's are Geo-Referenced (— Geo-Ref user entered XS — Geo-Ref interpolated XS — Non Geo-Ref user entered XS — Non Geo-Ref interpolated XS)

Enter/Edit Number of Profiles (25000 max): Reach Boundary Conditions

Locations of Flow Data Changes

River: Reach: River Sta.:

Flow Change Location

River	Reach	RS	100yr Storm
1 Charlers Run	2	1300	1666.75
2 Charlers Run	1	690	2950
3 Westland Run	3	700	1283.25

Profile Names and Flow Rates

Steady Flow Boundary Conditions

Set boundary for all profiles Set boundary for one profile at a time

Available External Boundary Condition Types

Select Junctions and Junction Types

River	Reach	Profile	Upstream	Downstream
Charlers Run	2	all	Normal Depth S = 0.0065889	Junction=1
Charlers Run	1	all	Junction=1	Known WS
Westland Run	3	all	Normal Depth S = 0.001774	Junction=1

Enter to accept data changes.

River: Chartiers Run Keep Prev XS Plots

Reach: 2 River Sta.: 1300

Description: 13+00

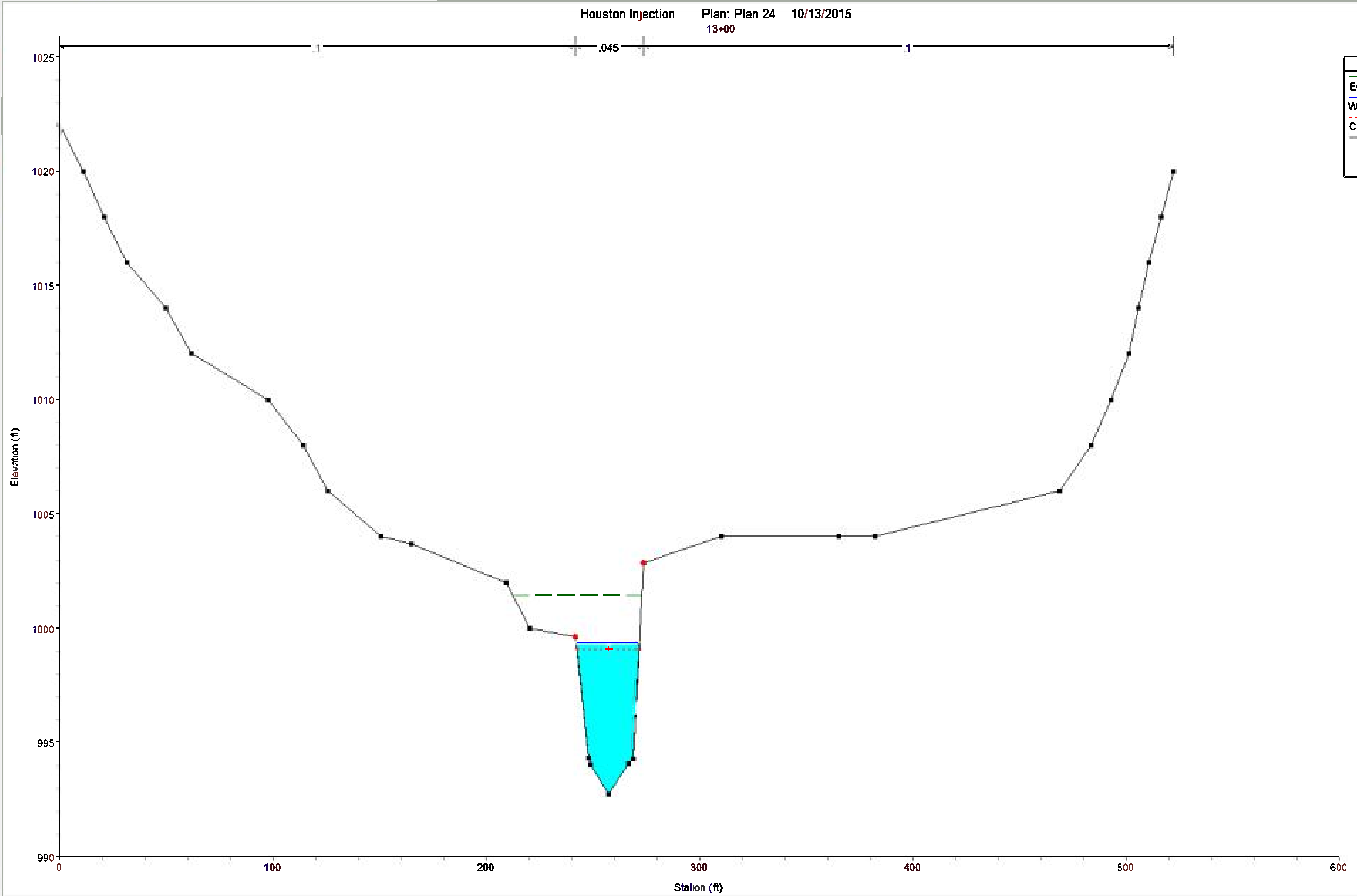
Del Row	Ins Row	Station	Elevation
1		0	1022
2		11.07	1020
3		20.94	1018
4		31.74	1016
5		49.99	1014
6		61.77	1012
7		97.91	1010
8		114.36	1008
9		125.87	1006
10		150.8	1004
11		164.76	1003.7
12		209.44	1002
13		220.48	1000
14		241.86	999.64
15		248.2	994.3
16		248.83	994.03
17		257.48	992.72
18		266.49	994.07
19		269.08	994.26
20		273.78	1002.86
21		310.1	1004
22		365.51	1004
23		382.39	1004
24		468.73	1006
25		483.56	1008
26		492.69	1010
27		501.23	1012
28		505.96	1014
29		510.6	1016
30		516.34	1018
31		522.21	1020
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Downstream Reach Lengths		
LOB	Channel	ROB
100	100	100

Manning's n Values		
LOB	Channel	ROB
0.1	0.045	0.1

Main Channel Bank Stations	
Left Bank	Right Bank
241.86	273.78

Cont/Exp Coefficient (Steady Flow)	
Contraction	Expansion
0.1	0.3



Legend

- EG 100yr Storm
- WS 100yr Storm
- Crit 100yr Storm
- Ground
- Bank Sta

Select river station for cross section editing.

Cross Section Coordinates	
Station	Elevation
1	0
2	6.34
3	12.32
4	18.56
5	24.82
6	34.91
7	47.96
8	74.92
9	114.68
10	133.11
11	179.65
12	263.05
13	325.95
14	328.64
15	330.02
16	335.85
17	342.23
18	344.59
19	347.57
20	526.28
21	539.84
22	550.59
23	559.5
24	568.23
25	576.34
26	583.58
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Downstream Reach Lengths

LOB	Channel	ROB
100	100	100

Manning's n Values

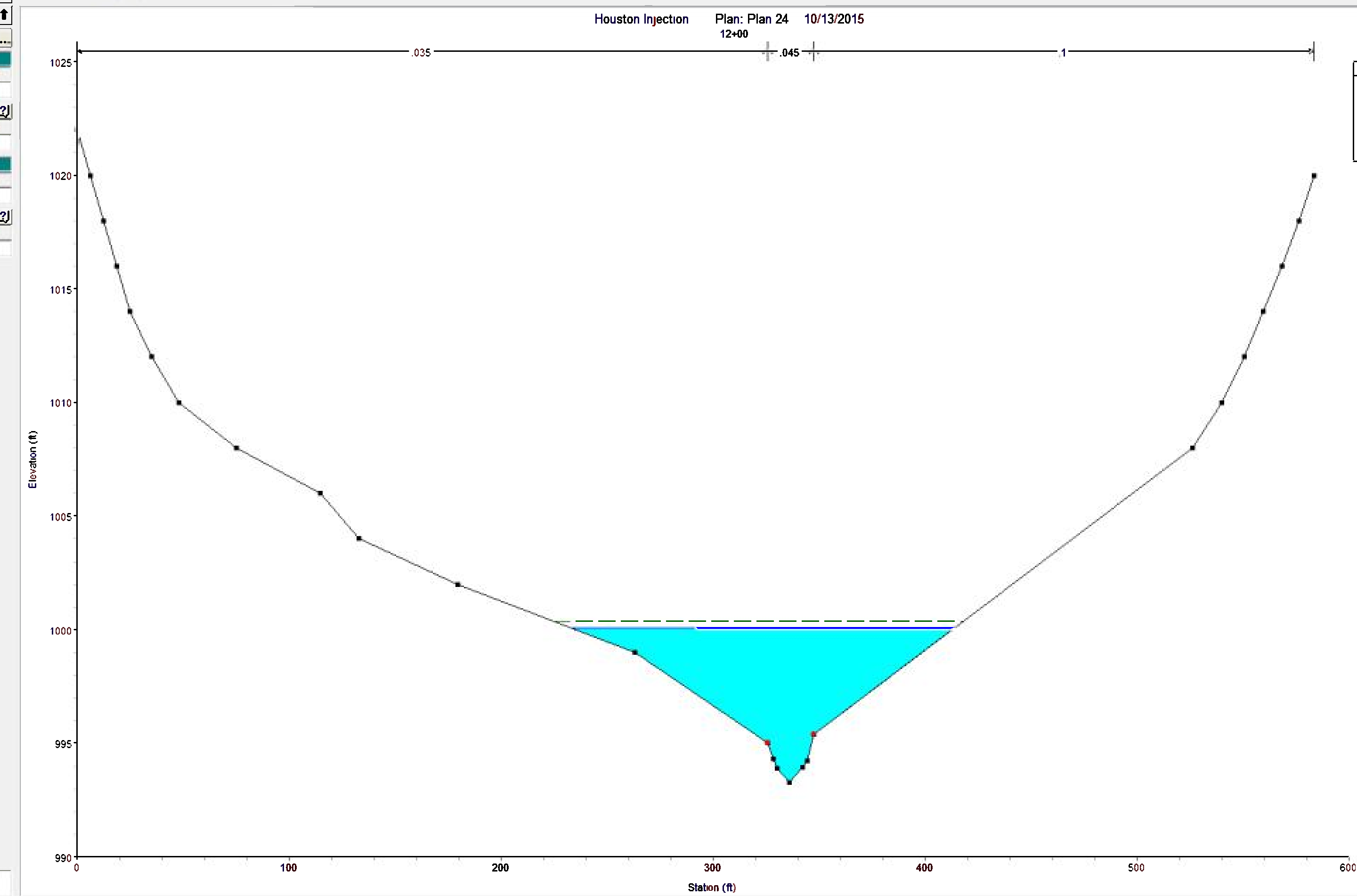
LOB	Channel	ROB
0.035	0.045	0.1

Main Channel Bank Stations

Left Bank	Right Bank
325.95	347.57

Cont/Exp Coefficient (Steady Flow)

Contraction	Expansion
0.1	0.3



River: Apply Data Keep Prev XS Plots

Reach: River Sta.:

Description:

Plot Options

Houston Injection Plan: Plan 24 10/13/2015
11+00

Del Row Ins Row

Downstream Reach Lengths

Cross Section Coordinates	
Station	Elevation
1	0
2	5.56
3	11.69
4	17.69
5	23.49
6	32.37
7	57
8	90.4
9	102.86
10	141.39
11	252.85
12	324.8
13	376.75
14	407.3
15	410.28
16	410.45
17	424.95
18	435.44
19	436.12
20	441.29
21	481.01
22	541.23
23	557.62
24	570.21
25	577.45
26	584.32
27	591.16
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LOB	Channel	ROB
100	100	100

Manning's n Values

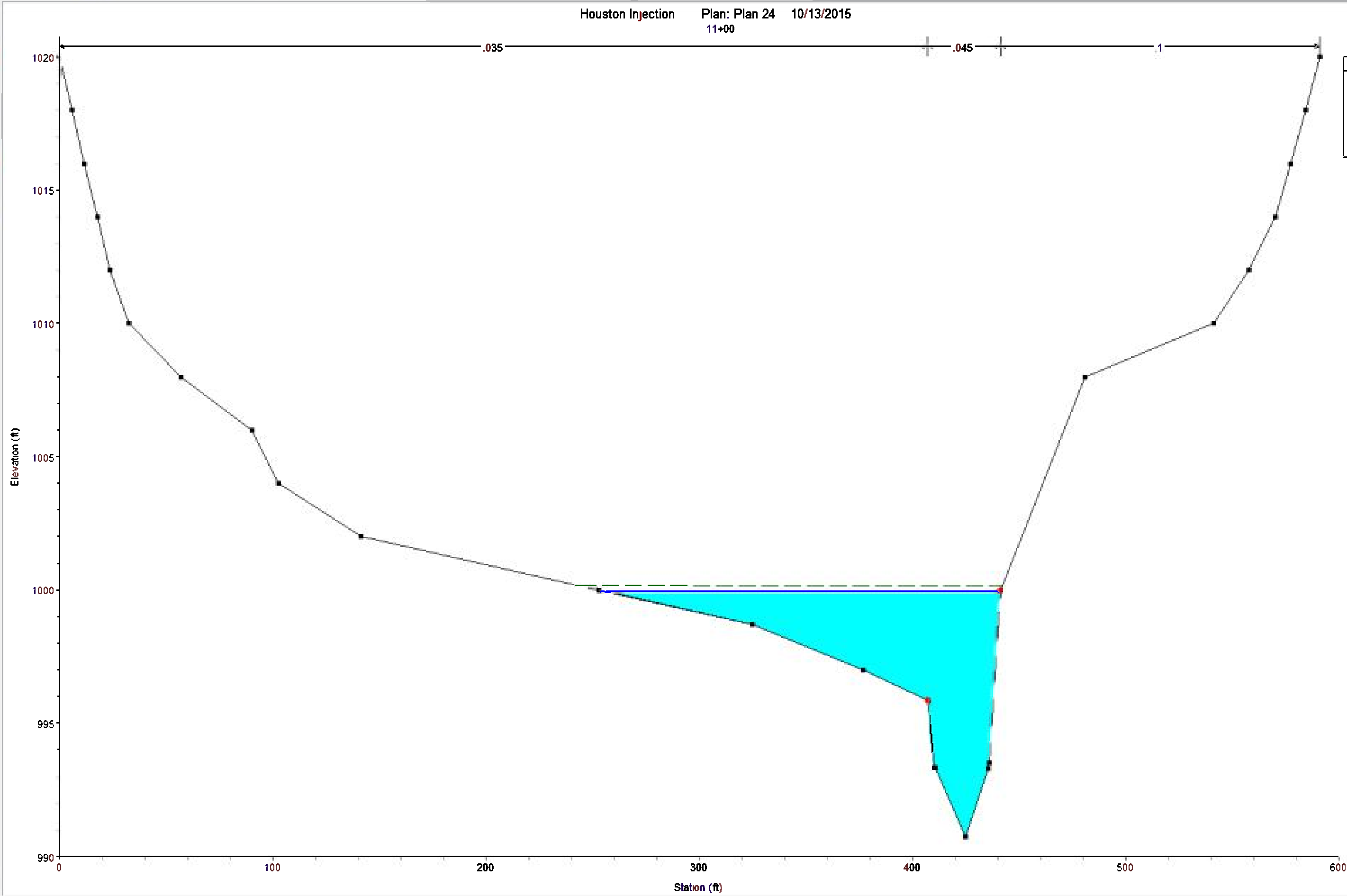
LOB	Channel	ROB
0.035	0.045	0.1

Main Channel Bank Stations

Left Bank	Right Bank
407.3	441.29

Cont/Exp Coefficient (Steady Flow)

Contraction	Expansion
0.1	0.3



Legend

- EG 100yr Storm
- WS 100yr Storm
- Ground
- Bank Sta

Select river station for cross section editing.

River: Charters Run

Reach: 2 River Sta.: 1000

Description: 10+00

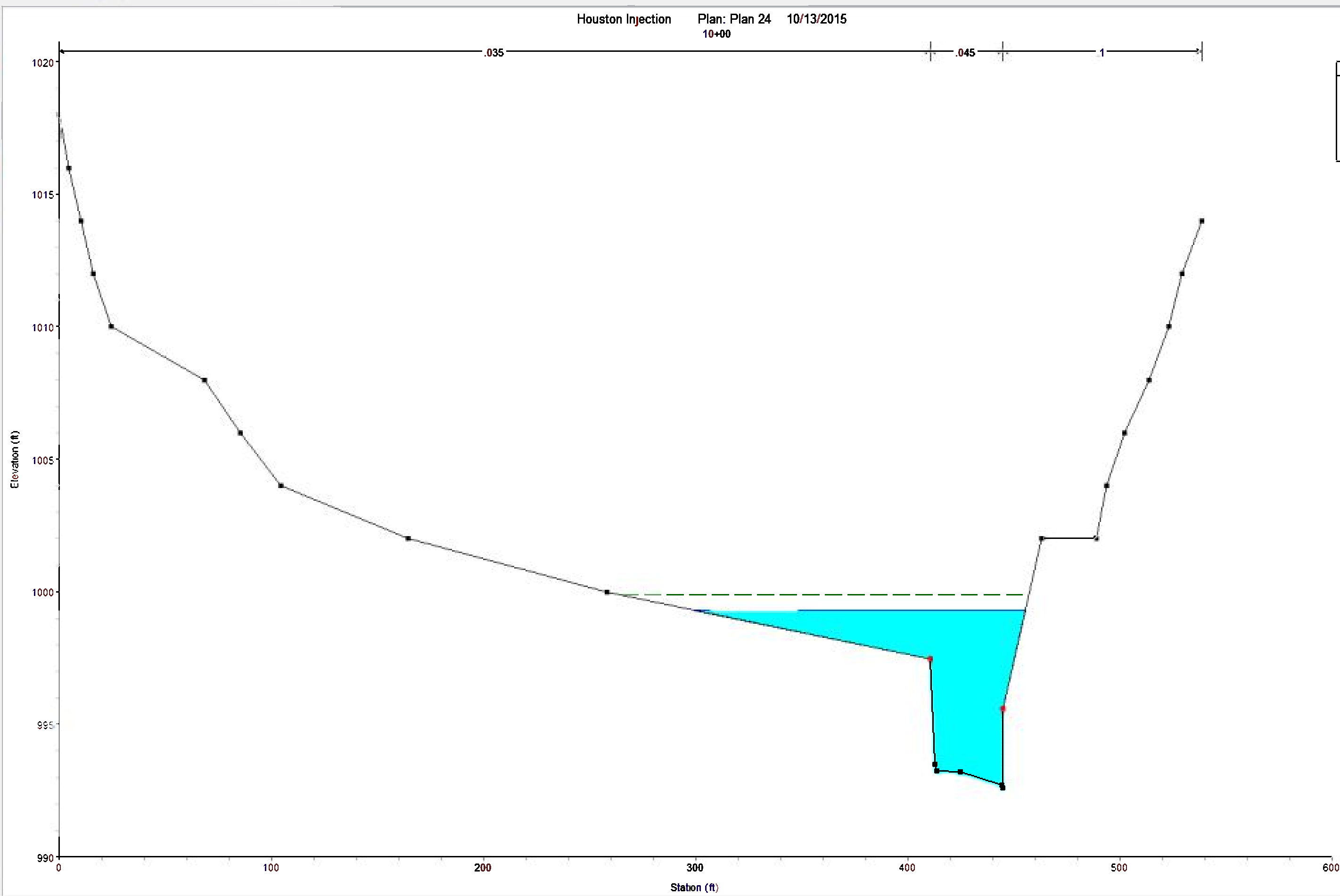
Del Row	Ins Row	Station	Elevation
1	0	0	1018
2	4.56	4.56	1016
3	10.03	10.03	1014
4	16.12	16.12	1012
5	24.25	24.25	1010
6	68.33	68.33	1008
7	85.19	85.19	1006
8	104.4	104.4	1004
9	164.4	164.4	1002
10	258.05	258.05	1000
11	410.45	410.45	997.45
12	412.99	412.99	993.5
13	413.63	413.63	993.25
14	424.72	424.72	993.2
15	444.4	444.4	992.71
16	444.68	444.68	992.61
17	444.8	444.8	995.57
18	463.16	463.16	1002
19	488.84	488.84	1002
20	493.82	493.82	1004
21	502.09	502.09	1006
22	513.73	513.73	1008
23	523.1	523.1	1010
24	529.27	529.27	1012
25	538.81	538.81	1014
26			
27			
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Downstream Reach Lengths		
LOB	Channel	ROB
100	100	100

Manning's n Values		
LOB	Channel	ROB
0.035	0.045	0.1

Main Channel Bank Stations	
Left Bank	Right Bank
410.45	444.8

Cont/Exp Coefficient (Steady Flow)	
Contraction	Expansion
0.1	0.3



Legend	
EG 100yr Storm	(Green dashed line)
WS 100yr Storm	(Blue solid line)
Ground	(Black line with dots)
Bank Sta	(Red diamond)

Select river station for cross section editing.

River: **Chartiers Run** Apply Data Plot Options Keep Prev XS Plots Clear Prev

Reach: **2** River Sta.: **900**

Description: **9+00**

Del Row	Ins Row	Station	Elevation
	1	0	1018
	2	5.23	1016
	3	10.73	1014
	4	17.6	1012
	5	32.87	1010
	6	63.06	1009.01
	7	98.76	1008
	8	125.63	1006
	9	219.27	1004
	10	260.04	1002
	11	318.57	1000
	12	386.21	998
	13	449.32	996.78
	14	455.58	992.73
	15	456.44	992.36
	16	463.97	991.03
	17	472.18	992.35
	18	472.73	992.49
	19	474	993.9
	20	542.58	997
	21	561.7	1000
	22	566.33	1002
	23	570.19	1004
	24	574.97	1006
	25	581.02	1008
	26	587.22	1010
	27	593.8	1012
	28	600.84	1014
	29		
	30		
	31		
	32		
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	51		

Downstream Reach Lengths

LOB	Channel	ROB
100	100	100

Manning's n Values ?

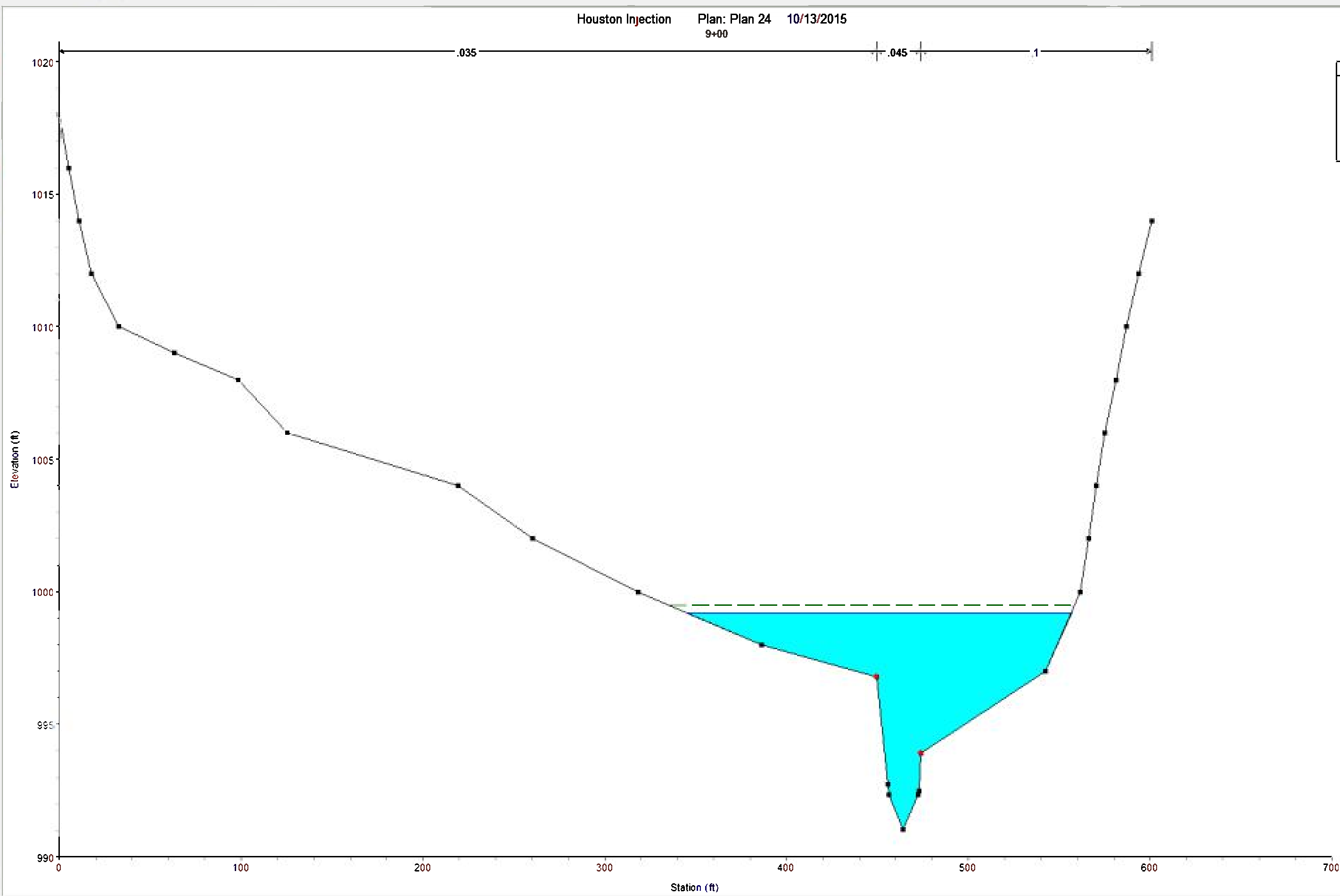
LOB	Channel	ROB
0.035	0.045	0.1

Main Channel Bank Stations

Left Bank	Right Bank
449.32	474

Cont/Exp Coefficient (Steady Flow) ?

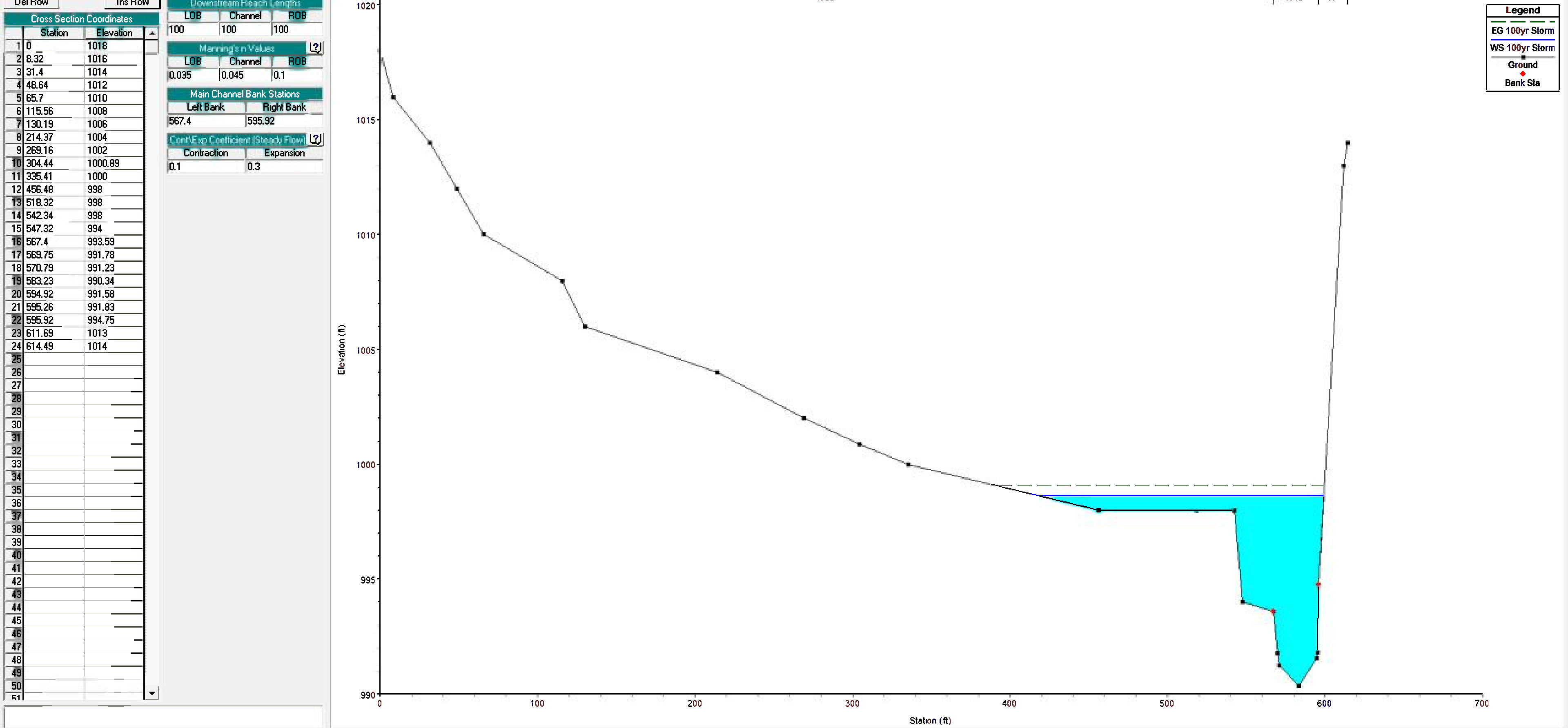
Contraction	Expansion
0.1	0.3



Legend

- EG 100yr Storm
- WS 100yr Storm
- Ground
- Bank Sta

Select river station for cross section editing.



Cross Section Coordinates	
Station	Elevation
1	0
2	8.32
3	31.4
4	48.64
5	65.7
6	115.56
7	130.19
8	214.37
9	269.16
10	304.44
11	335.41
12	456.48
13	518.32
14	542.34
15	547.32
16	567.4
17	569.75
18	570.79
19	583.23
20	594.92
21	595.26
22	595.92
23	611.69
24	614.49
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Downstream Reach Lengths		
LOB	Channel	ROB
100	100	100
Manning's n Values		
LOB	Channel	ROB
0.035	0.045	0.1
Main Channel Bank Stations		
Left Bank	Right Bank	
567.4	595.92	
Cont/Exp Coefficient (Steady Flow)		
Contraction	Expansion	
0.1	0.3	

Legend	
EG 100yr Storm	
WS 100yr Storm	
Ground	
Bank Sta	

River:

Reach: River Sta.:

Description:

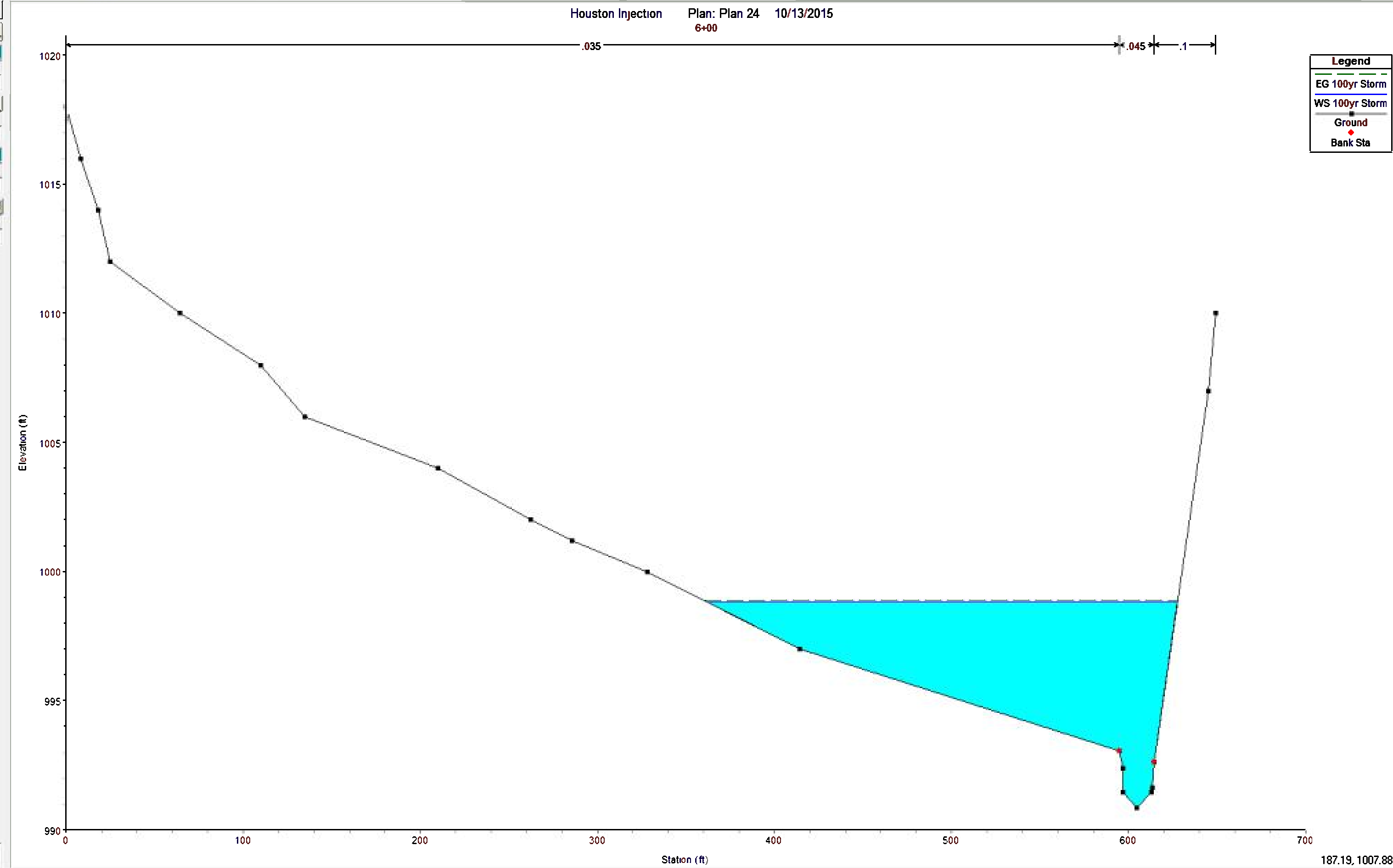
Del Row	Ins Row	Station	Elevation
1		0	1018
2		8.28	1016
3		17.93	1014
4		24.97	1012
5		64.42	1010
6		109.73	1008
7		134.72	1006
8		209.95	1004
9		262.21	1002
10		285.57	1001.19
11		328.45	1000
12		414.43	997
13		594.77	993.07
14		596.71	992.38
15		596.94	991.44
16		604.59	990.85
17		612.65	991.44
18		613.49	991.63
19		614.48	992.64
20		644.96	1007
21		649.16	1010
22			
23			
24			
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Downstream Reach Lengths		
LOB	Channel	ROB
100	100	100

Manning's n Values		
LOB	Channel	ROB
0.035	0.045	0.1

Main Channel Bank Stations	
Left Bank	Right Bank
594.77	614.48

Cont/Exp Coefficient (Steady Flow)	
Contraction	Expansion
0.1	0.3



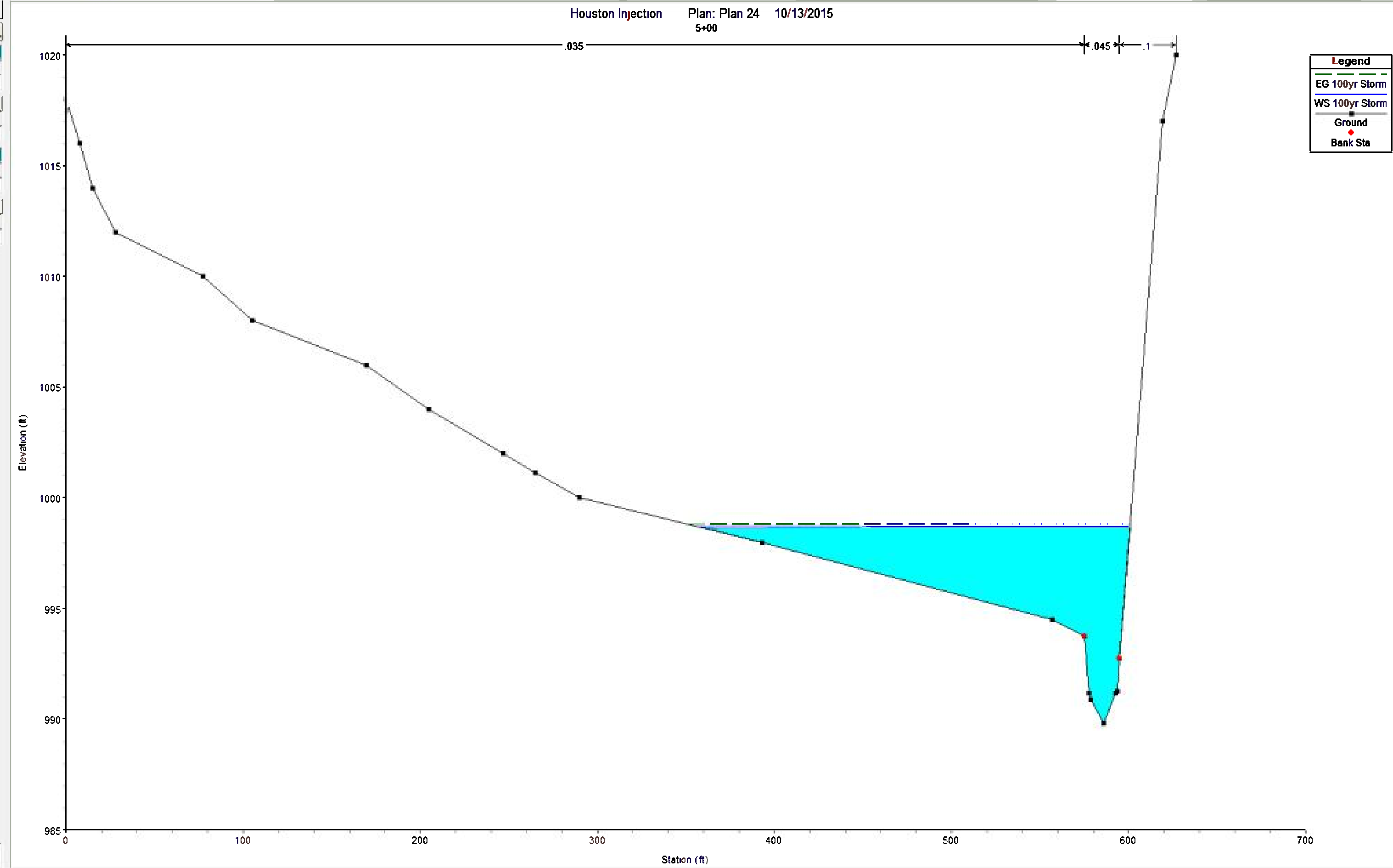
Select river station for cross section editing.

River: Chartiers Run
 Reach: 2 River Sta.: 500
 Description: 5+00

Plot Options Keep Prev XS Plots Clear Prev

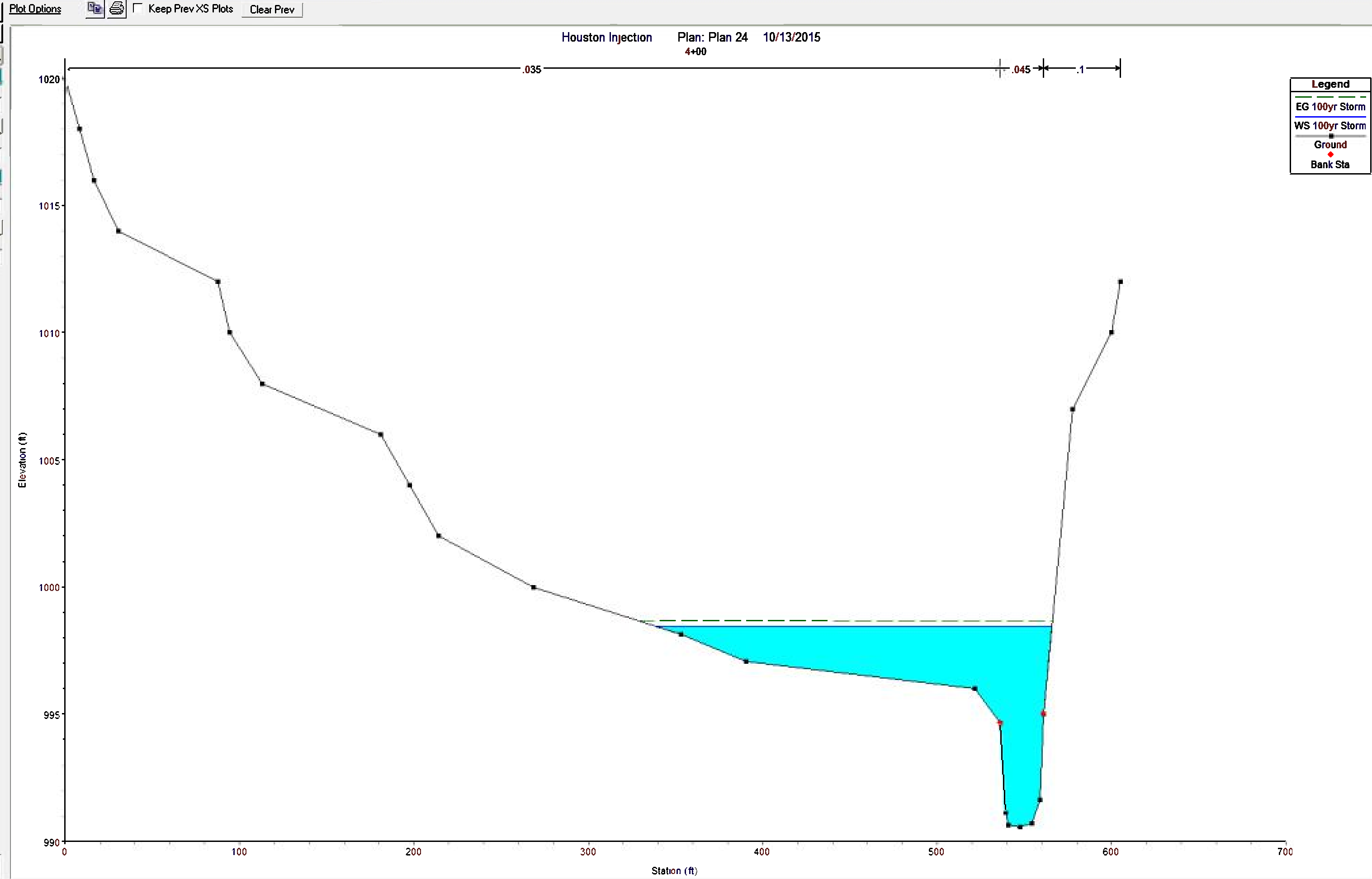
Del Row	Ins Row	Station	Elevation
		0	1018
		7.61	1016
		14.82	1014
		28.12	1012
		77.14	1010
		105.48	1008
		169.46	1006
		204.58	1004
		246.73	1002
		265.12	1001.15
		289.81	1000
		393.16	998
		556.64	994.5
		574.81	993.73
		577.67	991.19
		578.9	990.88
		585.96	989.8
		592.87	991.16
		593.94	991.28
		594.81	992.76
		619.22	1017
		626.63	1020

Downstream Reach Lengths		
LOB	Channel	ROB
100	100	100
Manning's n Values		
LOB	Channel	ROB
0.035	0.045	0.1
Main Channel Bank Stations		
Left Bank	Right Bank	
574.81	594.81	
Contn/Exp Coefficient (Steady Flow)		
Contraction	Expansion	
0.1	0.3	



Legend	
—	EG 100yr Storm
- - -	WS 100yr Storm
▲	Ground
◆	Bank Sta

River: **Chartiers Run** Apply Data Plot Options
 Reach: **2** River Sta.: **400**
 Description: **4+00**



Cross Section Coordinates		
Station	Elevation	
1	0	1020
2	8.4	1018
3	16.74	1016
4	30.8	1014
5	87.62	1012
6	94.14	1010
7	112.83	1008
8	180.85	1006
9	197.47	1004
10	214.14	1002
11	268.8	1000
12	352.86	998.14
13	390.23	997.06
14	521.56	996
15	536.02	994.67
16	539.35	991.14
17	540.71	990.65
18	547.75	990.57
19	554.17	990.7
20	559.04	991.62
21	561.11	995.02
22	577.68	1007
23	599.84	1010
24	605.13	1012
25		
26		
27		
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Select river station for cross section editing.

River: **Chartiers Run**
 Reach: **2** River Sta.: **300**
 Description: **3+00**

Plot Options Keep Prev XS Plots

Houston Injection Plan: Plan 24 10/13/2015
 3+00

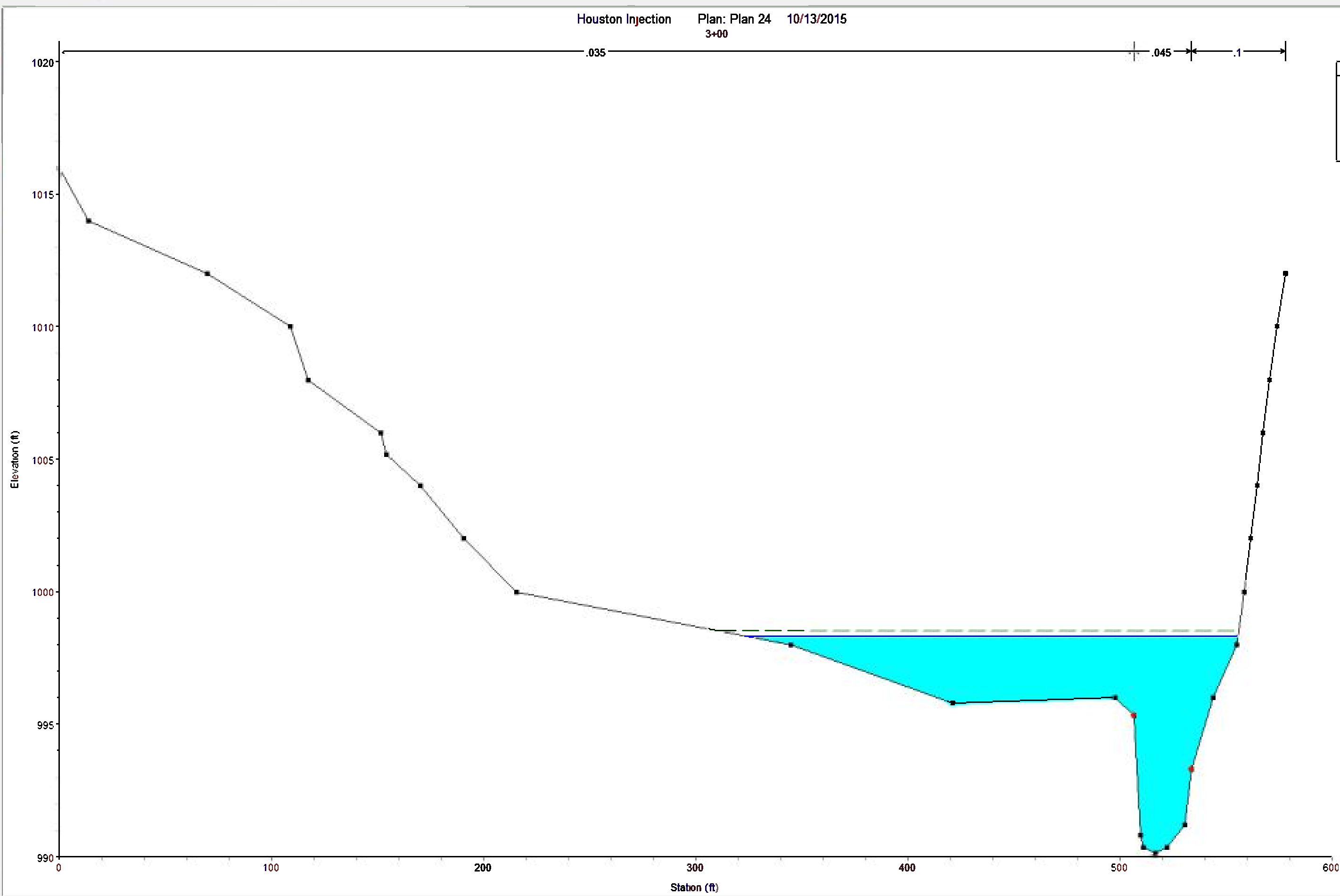
Cross Section Coordinates	
Station	Elevation
1	0
2	13.91
3	69.69
4	108.77
5	117.37
6	151.47
7	154.28
8	170.01
9	190.52
10	215.39
11	344.83
12	421.22
13	497.59
14	506.88
15	509.96
16	510.96
17	517.04
18	522.36
19	530.74
20	533.86
21	543.96
22	554.93
23	558.65
24	561.82
25	564.69
26	567.54
27	570.49
28	574.04
29	578.12
30	
31	
32	
33	
34	
35	
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Downstream Reach Lengths		
LOB	Channel	ROB
100	100	100

Manning's n Values		
LOB	Channel	ROB
0.035	0.045	0.1

Main Channel Bank Stations	
Left Bank	Right Bank
506.88	533.86

Cont/Exp Coefficient (Steady Flow)	
Contraction	Expansion
0.1	0.3



Legend

- EG 100yr Storm
- WS 100yr Storm
- Ground
- Bank Sta

Select river station for cross section editing.

River: Keep Prev XS Plots

Reach: River Sta.:

Description

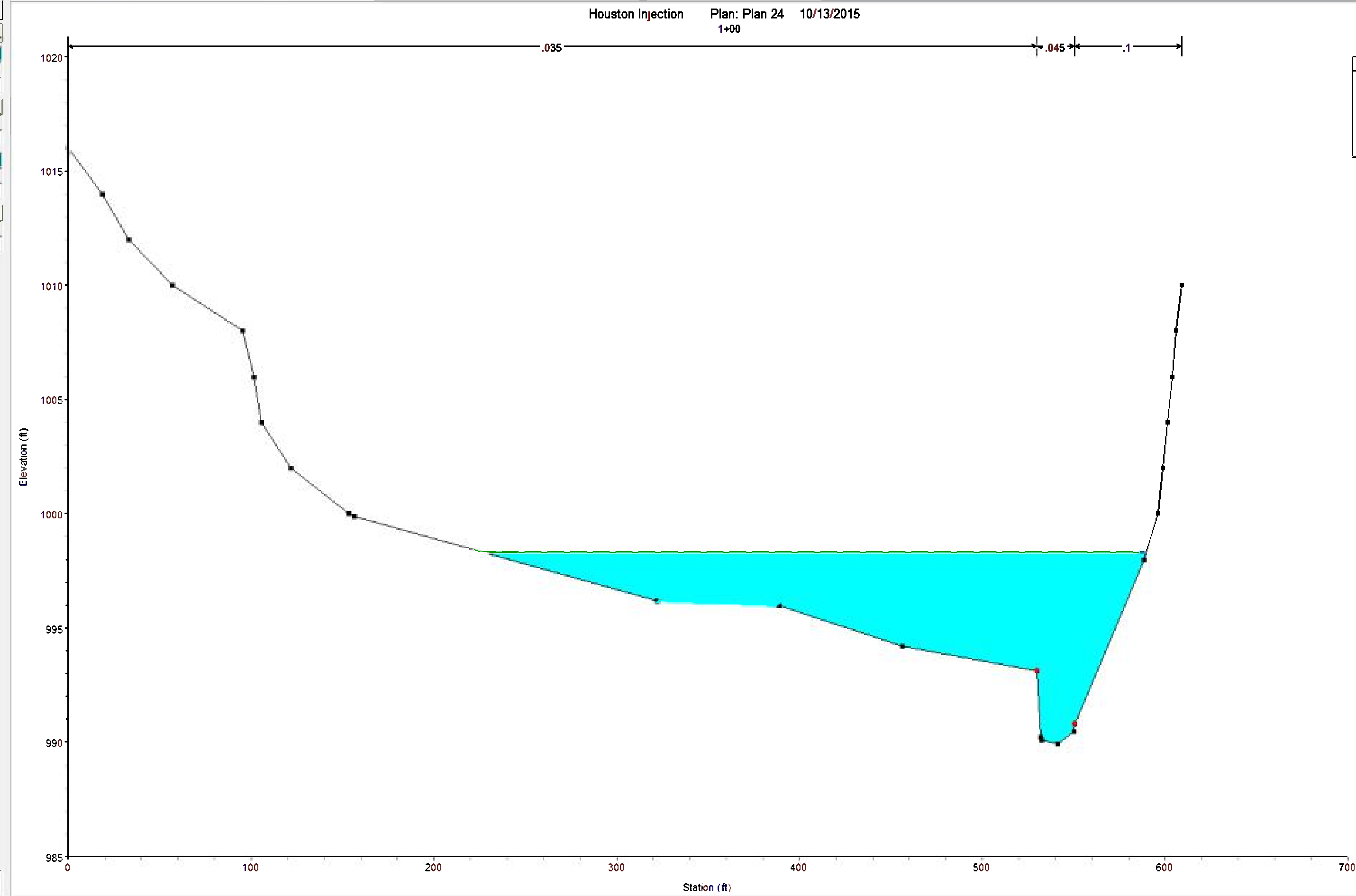
Del Row	Ins Row	Cross Section Coordinates	
		Station	Elevation
1		0	1016
2		18.49	1014
3		33	1012
4		57.1	1010
5		95.37	1008
6		101.51	1006
7		105.78	1004
8		121.71	1002
9		153.3	1000
10		156.48	999.9
11		321.97	996.18
12		388.78	996
13		456.12	994.2
14		530.11	993.13
15		531.92	990.21
16		532.37	990.09
17		541.57	989.94
18		550.34	990.46
19		550.61	990.82
20		588.39	998
21		596.38	1000
22		599.1	1002
23		601.43	1004
24		603.89	1006
25		606.39	1008
26		609.02	1010
27			
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Downstream Reach Lengths		
LOB	Channel	ROB
100	100	100

Manning's n Values		
LOB	Channel	ROB
0.035	0.045	0.1

Main Channel Bank Stations	
Left Bank	Right Bank
530.11	550.61

Cont/Exp Coefficient (Steady Flow)	
Contraction	Expansion
0.1	0.3



River: **Chartiers Run**
 Reach: **2** River Sta.: **000**
 Description: **0+00**

Plot Options Keep Prev XS Plots

Houston Injection Plan: Plan 24 10/13/2015
 0+00

Del Row Ins Row

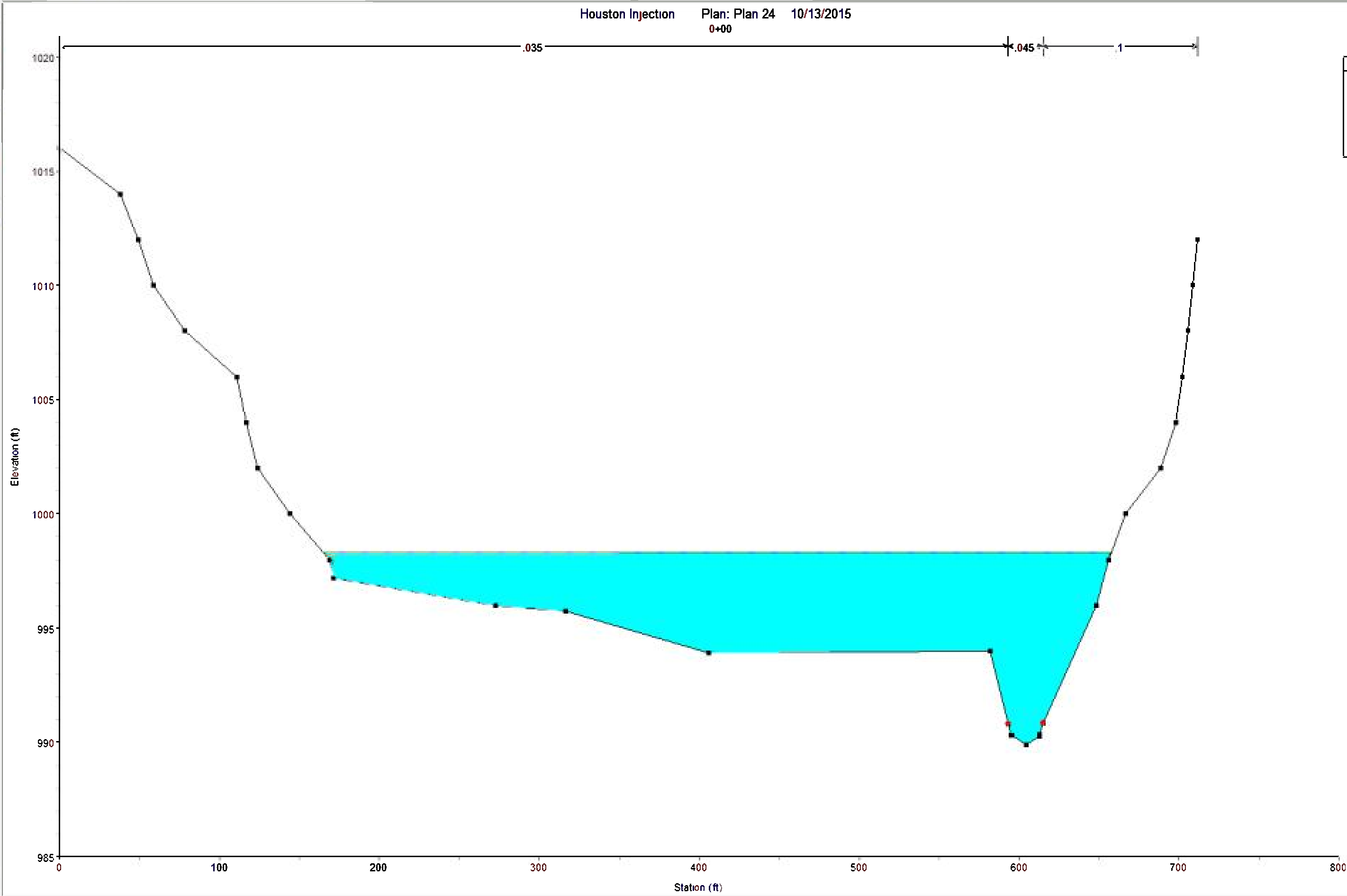
Cross Section Coordinates	
Station	Elevation
1	0
2	38.1
3	49.42
4	58.9
5	78.48
6	110.64
7	116.83
8	123.89
9	144.04
10	168.76
11	171.2
12	272.4
13	316.29
14	405.94
15	582.13
16	593.22
17	594.99
18	595.58
19	604.62
20	612.46
21	613.01
22	615.31
23	648.51
24	655.74
25	666.41
26	688.85
27	697.85
28	702.06
29	705.65
30	708.85
31	711.9
32	
33	
34	
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Downstream Reach Lengths		
LOB	Channel	ROB

Manning's n Values		
LOB	Channel	ROB
0.035	0.045	0.1

Main Channel Bank Stations	
Left Bank	Right Bank
593.22	615.31

Cont/Exp Coefficient (Steady Flow)	
Contraction	Expansion
0.1	0.3



Legend

- EG 100yr Storm
- WS 100yr Storm
- Ground
- Bank Sta

Select river station for cross section editing.

Del Row Ins Row

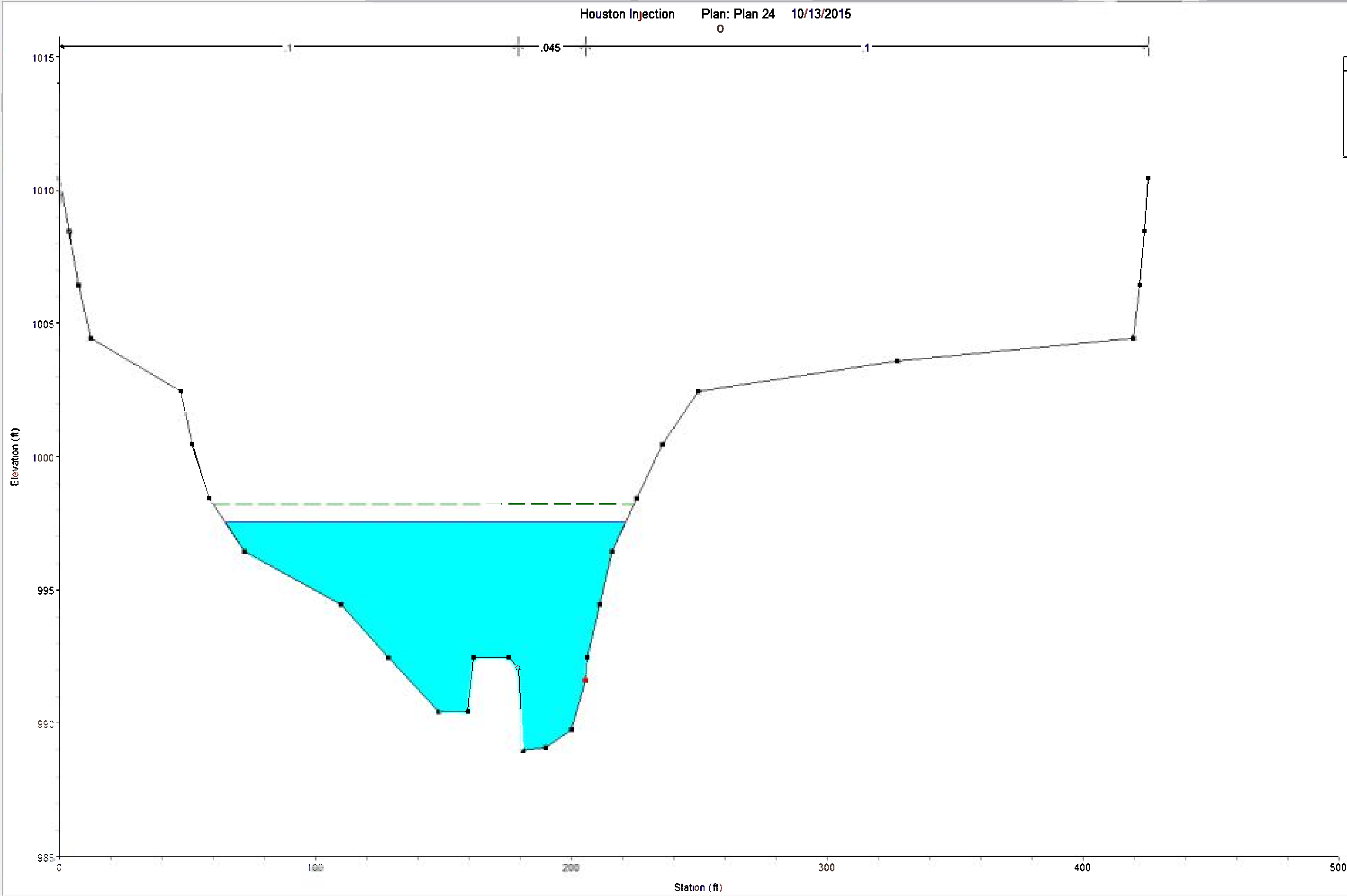
Cross Section Coordinates	
Station	Elevation
1	0
2	3.83
3	7.56
4	12.24
5	47.44
6	51.87
7	58.45
8	72.21
9	109.85
10	128.4
11	147.98
12	159.7
13	161.79
14	175.45
15	179.32
16	180.95
17	181.24
18	190.12
19	200.05
20	205.48
21	206.48
22	210.98
23	215.83
24	225.48
25	235.58
26	249.66
27	327.39
28	419.76
29	422.29
30	424.19
31	425.67
32	
33	
34	
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Downstream Reach Lengths		
LOB	Channel	ROB
690	690	690

Manning's n Values		
LOB	Channel	ROB
0.1	0.045	0.1

Main Channel Bank Stations	
Left Bank	Right Bank
179.32	205.48

Contn/Exp Coefficient (Steady Flow)	
Contraction	Expansion
0.1	0.3



Legend

- EG 100yr Storm
- WS 100yr Storm
- Ground
- Bank Sta

Select river station for cross section editing.

River: Apply Data Keep Prev XS Plots Clear Prev

Reach: River Sta.:

Description:

Del Row	Ins Row	Station	Elevation
1		1715	1006.3
2		1725	1000.4
3		1773	1000.4
4		1782	1001.8
5		1793	1001.8
6		1808	1001.4
7		1832	999.9
8		1850	993.4
9		1866	993.3
10		1901	992.3
11		1970	990.6
12		1987	986.7
13		1997	986.2
14		2000	985.9
15		2005	985.7
16		2006	986.2
17		2013	990.8
18		2038	990.3
19		2084	991.9
20		2098	998.9
21		2145	999.3
22		2222	1007
23			
24			
25			
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Downstream Reach Lengths

LOB	Channel	ROB
100	100	100

Manning's n Values

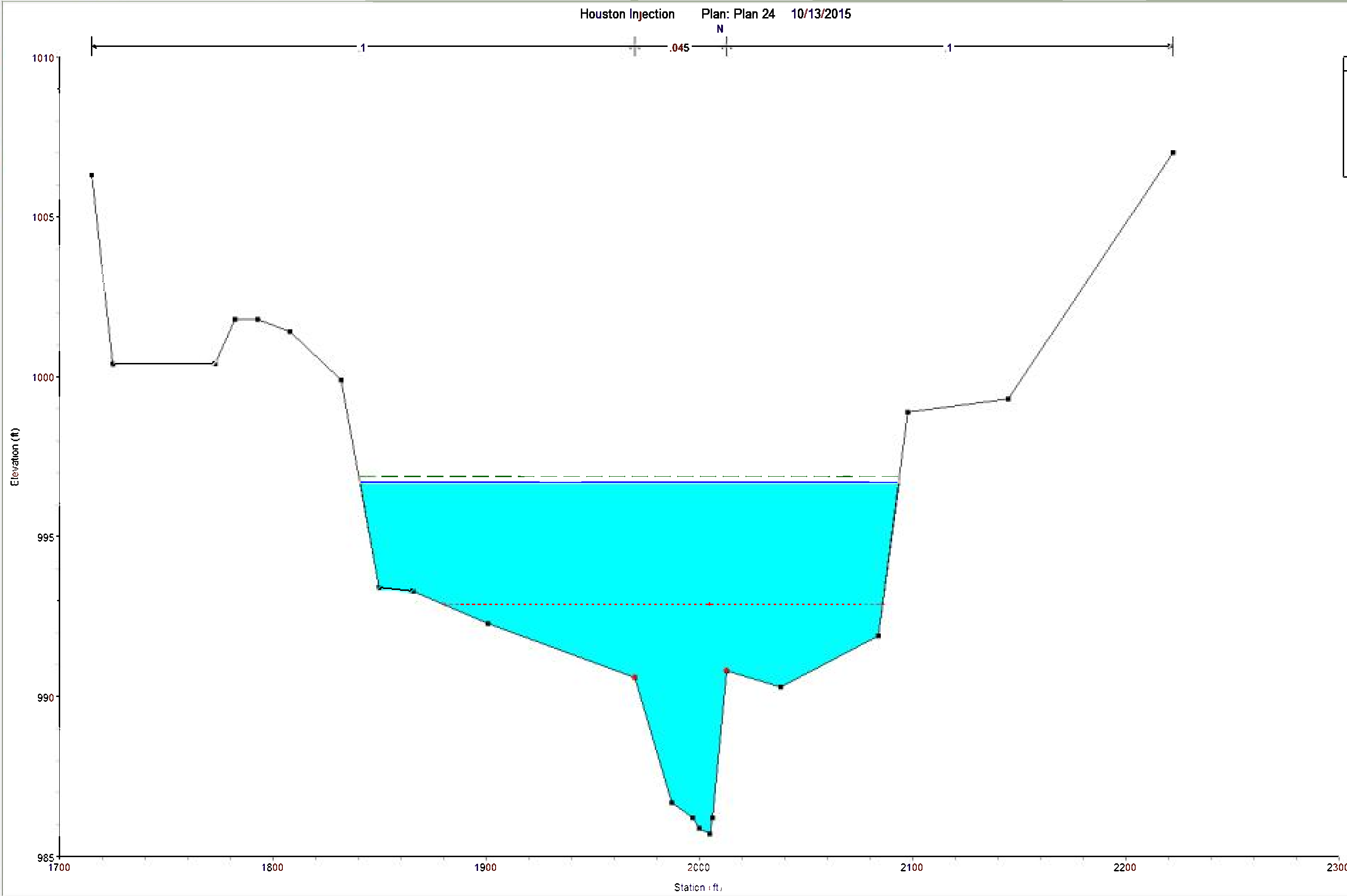
LOB	Channel	ROB
0.1	0.045	0.1

Main Channel Bank Stations

Left Bank	Right Bank
1970	2013

Cont/Exp Coefficient (Steady Flow)

Contraction	Expansion
0.1	0.3



Legend

- EG 100yr Storm
- WS 100yr Storm
- Crit 100yr Storm
- Ground
- Bank Sta

Select river station for cross section editing.

River: Westland Run

Reach: 3 River Sta.: 700

Description: 7+00

Del Row Ins Row

Cross Section Coordinates

Station	Elevation
1	0
2	19.55
3	32.84
4	45.16
5	60.48
6	83.63
7	105
8	199.77
9	215.09
10	216.25
11	216.84
12	221.96
13	226.8
14	234.82
15	239.2
16	241.34
17	244.65
18	271.7
19	295.52
20	303.77
21	335.24
22	401.57
23	429.04
24	434.97
25	437.76
26	440.58
27	443.43
28	445.83
29	448.43
30	451.05
31	453.67
32	
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Downstream Reach Lengths

LOB	Channel	ROB
100	100	100

Manning's n Values

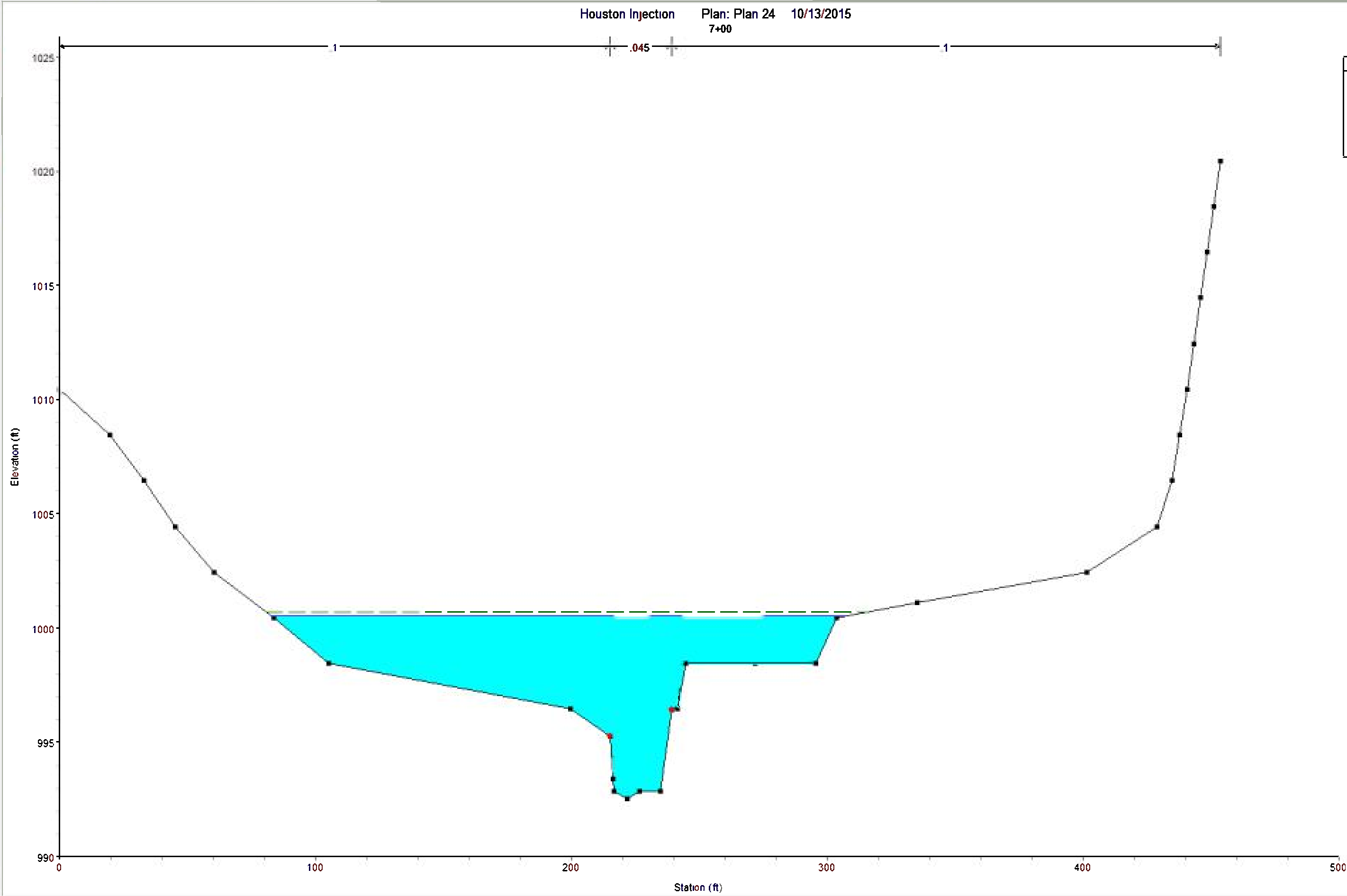
LOB	Channel	ROB
0.1	0.045	0.1

Main Channel Bank Stations

Left Bank	Right Bank
215.09	239.2

Contr/Exp Coefficient (Steady Flow)

Contraction	Expansion
0.1	0.3



Select river for cross section editing

River: Westland Run
 Reach: 3 River Sta.: 600
 Description: 6+00

Plot Options Keep Prev XS Plots

Houston Injection Plan: Plan 24 10/13/2015
 6+00

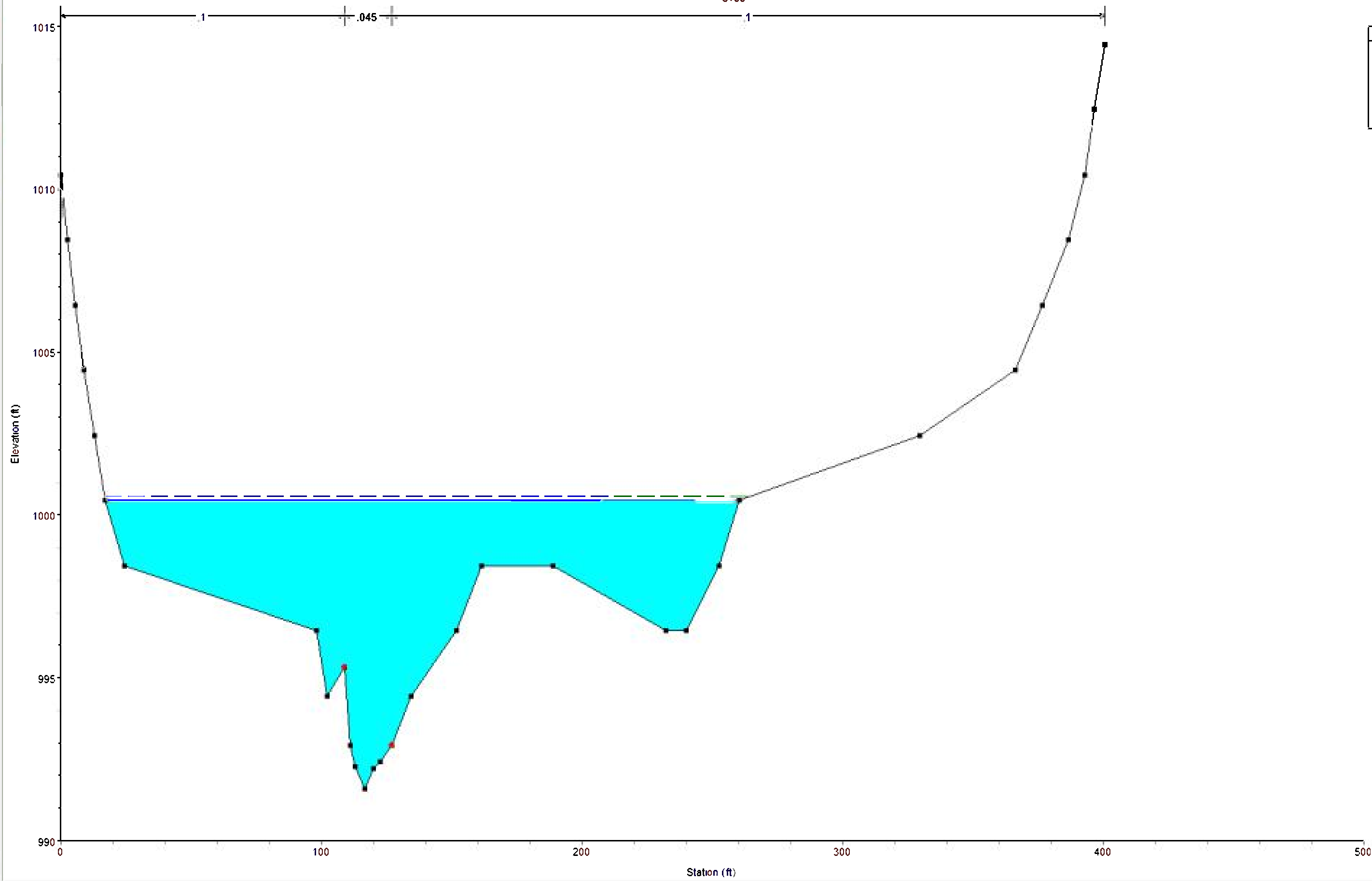
Cross Section Coordinates	
Station	Elevation
1	0
2	2.65
3	5.6
4	9.02
5	12.9
6	17.22
7	24.53
8	98.22
9	102.18
10	108.86
11	111.12
12	112.83
13	116.79
14	120.05
15	122.46
16	126.95
17	134.4
18	151.84
19	161.39
20	188.75
21	232.09
22	239.86
23	252.57
24	260.19
25	329.76
26	366.35
27	376.68
28	386.51
29	392.81
30	396.78
31	400.8
32	
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Downstream Reach Lengths		
LOB	Channel	ROB
100	100	100

Manning's n Values		
LOB	Channel	ROB
0.1	0.045	0.1

Main Channel Bank Stations	
Left Bank	Right Bank
108.86	126.95

Contr. Exp. Coefficient (Steady Flow)	
Contraction	Expansion
0.1	0.3



Legend

- EG 100yr Storm (Green dashed line)
- WS 100yr Storm (Blue dashed line)
- Ground (Black line with dots)
- Bank Sta (Red diamond)

Select river station for cross section editing.

River: Westland Run
 Reach: 3 River Sta.: 500
 Description: 5+00

Plot Options Keep Prev XS Plots Clear Prev

Houston Injection Plan: Plan 24 10/13/2015
 5+00

Del Row Ins Row

Cross Section Coordinates	
Station	Elevation
1	0
2	3.08
3	6.16
4	9.23
5	12.31
6	15.44
7	19.05
8	22.08
9	30.35
10	144.22
11	145.87
12	146.95
13	148.02
14	157.18
15	166.49
16	166.94
17	167.24
18	172.62
19	178.98
20	184.49
21	194.71
22	356.68
23	369.21
24	379.49
25	382.9
26	
27	
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Downstream Reach Lengths

LOB	Channel	ROB
100	100	100

Manning's n Values

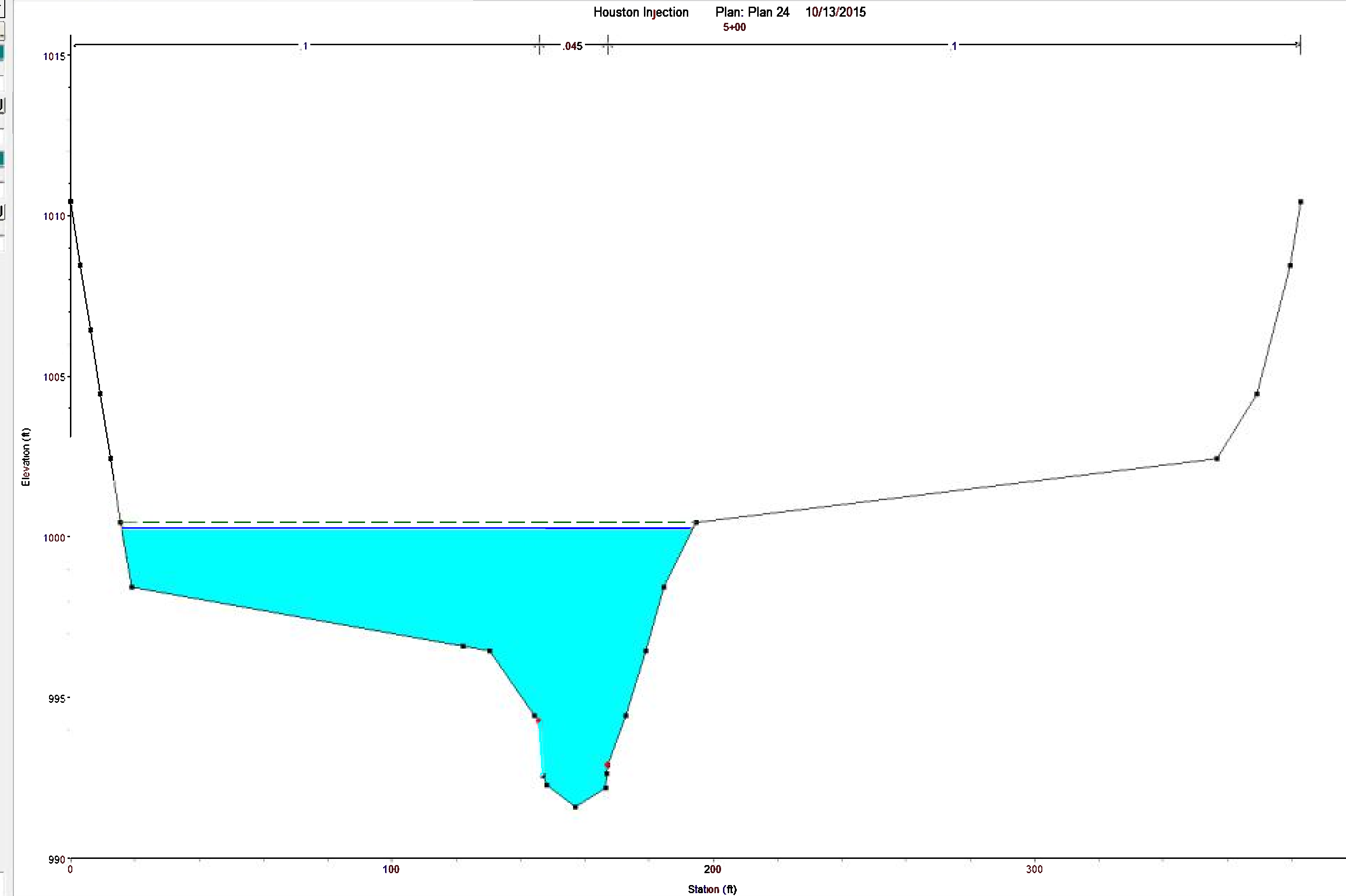
LOB	Channel	ROB
0.1	0.045	0.1

Main Channel Bank Stations

Left Bank	Right Bank
145.87	167.24

Contr/Exp Coefficient (Steady Flow)

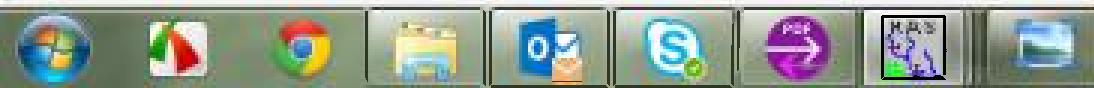
Contraction	Expansion
0.1	0.3



Legend

- EG 100yr Storm
- WS 100yr Storm
- Ground
- Bank Sta

Select river station for cross section editing.



River: Westland Run
 Reach: 3 River Sta.: 400
 Description: 4+00

Plot Options Keep Prev XS Plots

Houston Injection Plan: Plan 24 10/13/2015
 4+00

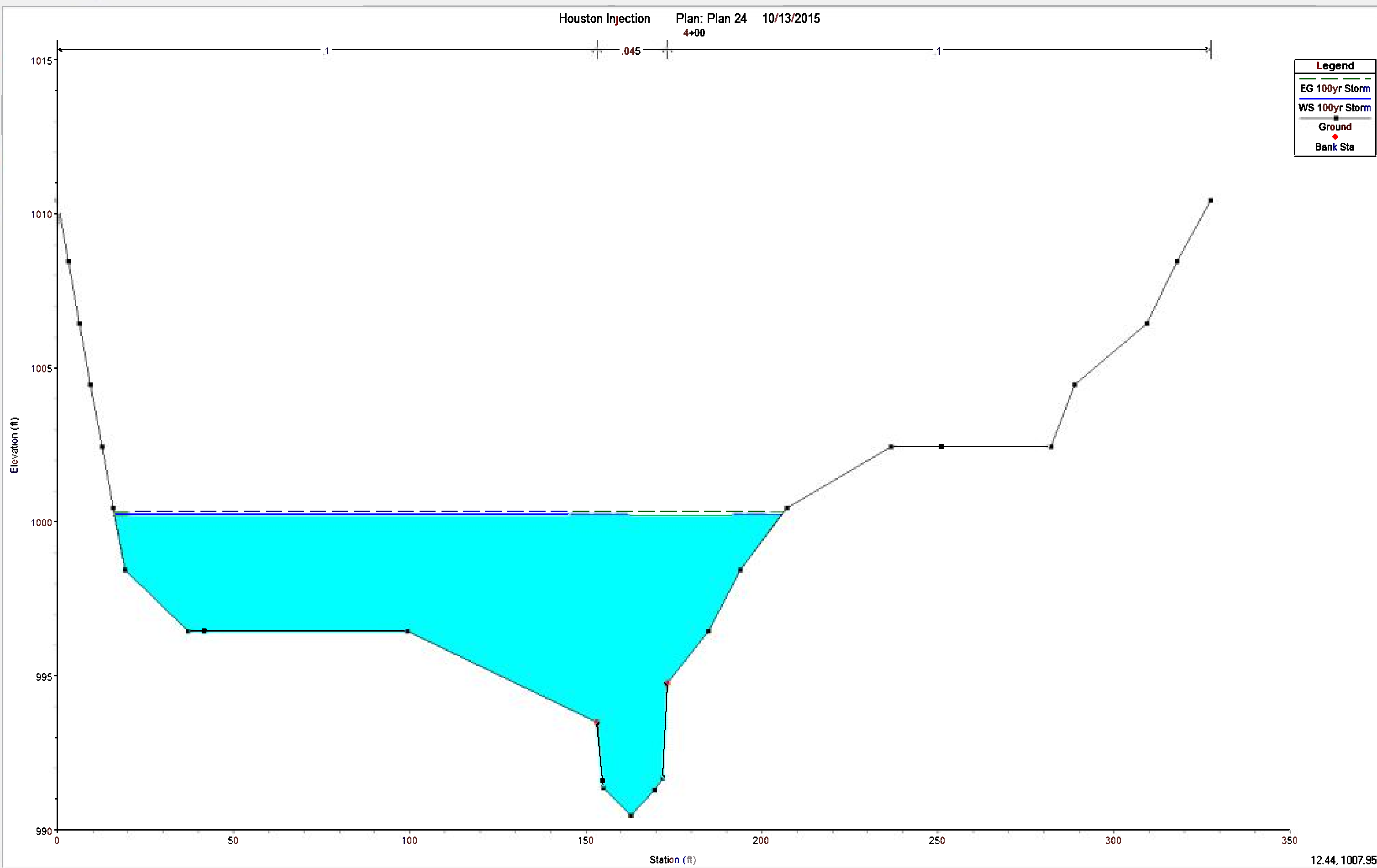
Del Row	Ins Row	Station	Elevation
		0	1010.45
		3.11	1008.45
		6.28	1006.45
		9.45	1004.45
		12.61	1002.45
		15.72	1000.45
		19.21	998.45
		36.98	996.45
		41.65	996.45
		99.21	996.45
		153.1	993.51
		154.68	991.6
		154.95	991.35
		162.85	990.47
		169.62	991.31
		171.8	991.69
		173.25	994.78
		184.83	996.45
		193.92	998.45
		207.07	1000.45
		236.59	1002.45
		250.86	1002.45
		282.12	1002.45
		288.86	1004.45
		309.36	1006.45
		317.96	1008.45
		327.35	1010.45

Downstream Reach Lengths		
LOB	Channel	ROB
100	100	100

Manning's n Values		
LOB	Channel	ROB
0.1	0.045	0.1

Main Channel Bank Stations	
Left Bank	Right Bank
153.1	173.25

Cont/Exp Coefficient (Steady Flow)	
Contraction	Expansion
0.1	0.3



Select river station for cross section editing.

12.44, 1007.95

River: Westland Run
Reach: 3 River Sta.: 300
Description: 3+00

Houston Injection Plan: Plan 24 10/13/2015
3+00

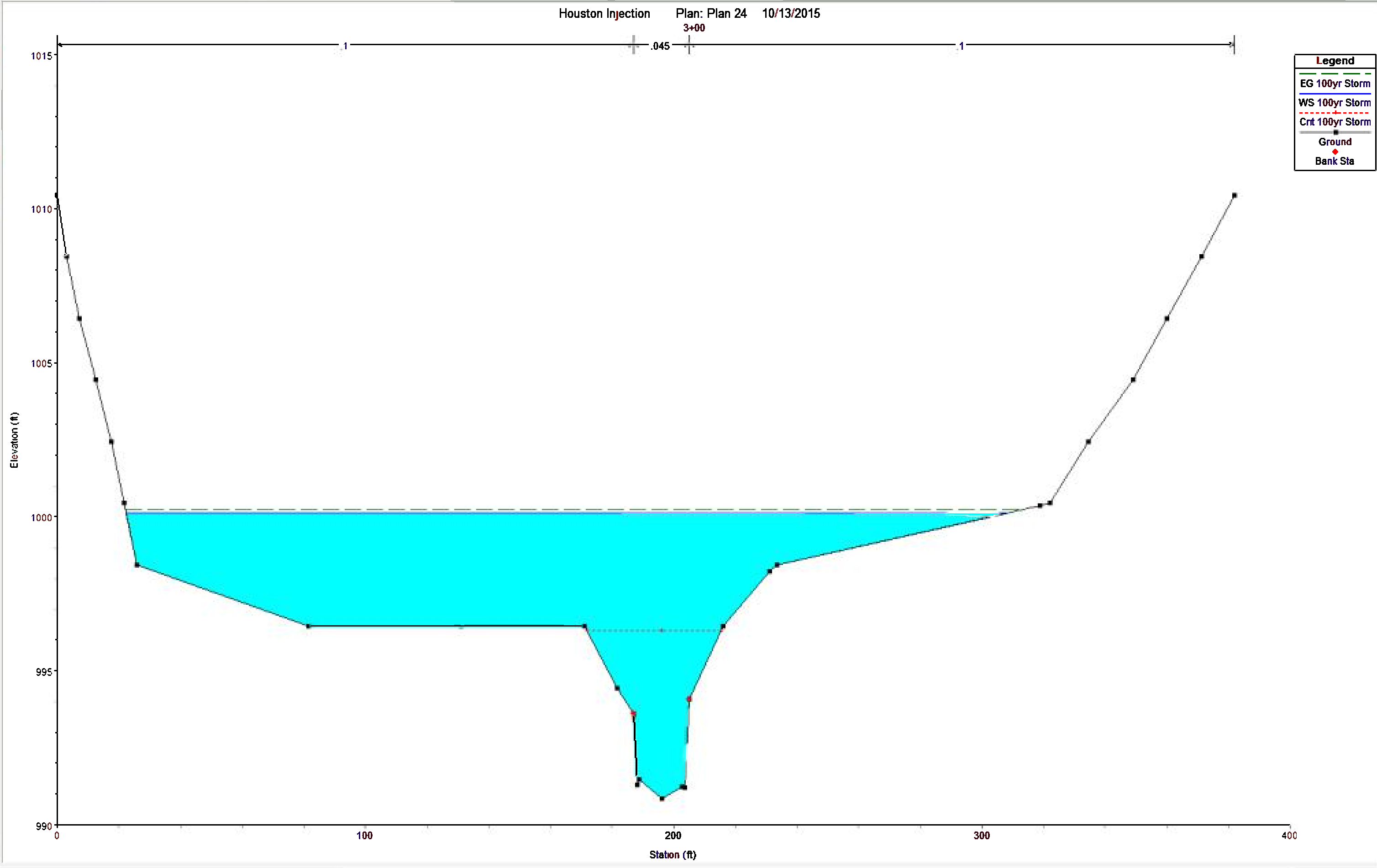
Cross Section Coordinates		
Station	Elevation	
1	0	1010.45
2	3	1008.45
3	6.97	1006.45
4	12.45	1004.45
5	17.34	1002.45
6	21.7	1000.45
7	25.86	998.45
8	31.48	996.45
9	37.06	996.45
10	42.03	996.45
11	47.03	994.45
12	52.03	993.61
13	57.03	991.3
14	62.03	991.47
15	67.03	990.85
16	72.03	991.23
17	77.03	991.2
18	82.03	994.1
19	87.03	996.45
20	92.03	998.23
21	97.03	998.45
22	102.03	1000.37
23	107.03	1000.45
24	112.03	1002.45
25	117.03	1004.45
26	122.03	1006.45
27	127.03	1008.45
28	132.03	1010.45
29		
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Downstream Reach Lengths		
LOB	Channel	ROB
25	25	25

Manning's n Values		
LOB	Channel	ROB
0.1	0.045	0.1

Main Channel Bank Stations	
Left Bank	Right Bank
186.94	205.07

Contn Exp Coefficient (Steady Flow)	
Contraction	Expansion
0.1	0.3



River: Westland Run

Reach: 3 River Sta.: 275

Description

Del Row Ins Row

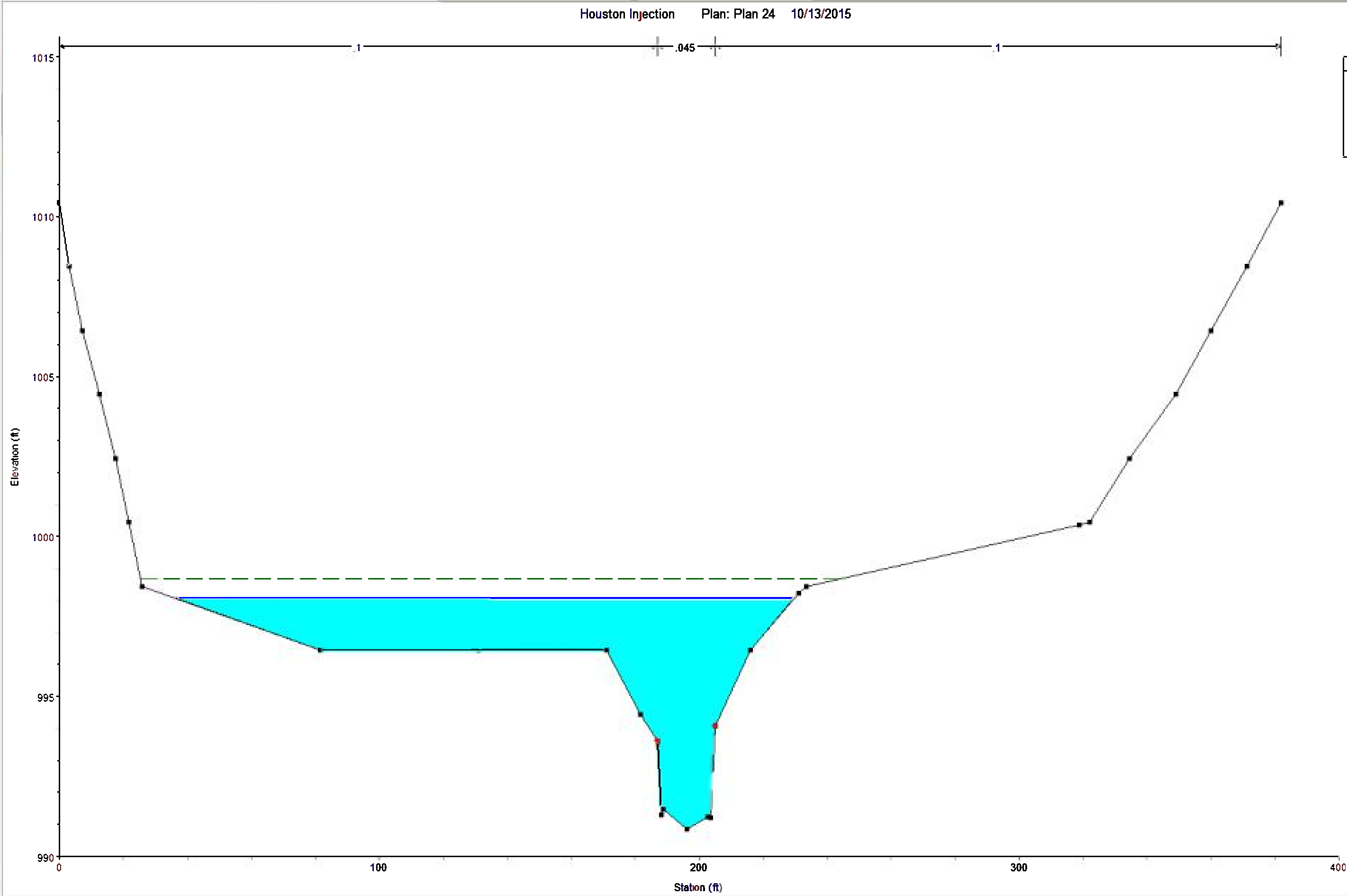
Cross Section Coordinates	
Station	Elevation
1	0
2	3
3	6.97
4	12.45
5	17.34
6	21.7
7	25.86
8	81.48
9	131.06
10	171.03
11	181.63
12	186.94
13	188.03
14	188.87
15	196.07
16	202.62
17	203.61
18	205.07
19	216.1
20	231
21	233.34
22	318.93
23	321.99
24	334.41
25	349.12
26	360.12
27	371.36
28	382.06
29	
30	
31	
32	
33	
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Downstream Reach Lengths		
LOB	Channel	ROB
75	75	75

Manning's n Values		
LOB	Channel	ROB
0.1	0.045	0.1

Main Channel Bank Stations	
Left Bank	Right Bank
186.94	205.07

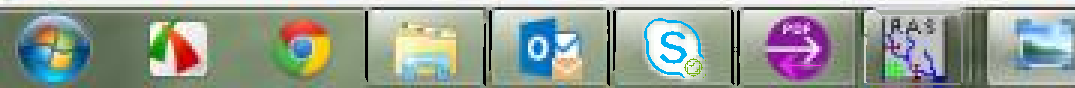
Contn Exp Coefficient (Steady Flow)	
Contraction	Expansion
0.1	0.3



Legend

- EG 100yr Storm (Green dashed line)
- WS 100yr Storm (Blue solid line)
- Ground (Black line with dots)
- Bank Sta (Red diamond)

Select river station for cross section editing.



River: Westland Run

Apply Data



Plot Options

Keep Prev XS Plots

Reach: 3

River Sta.: 200

Houston Injection Plan: Plan 24 10/13/2015
2+00

Description 2+00

Del Row Ins Row

Cross Section Coordinates	
Station	Elevation
1	0
2	3.65
3	6.15
4	8.35
5	10.72
6	14.43
7	18.13
8	86.3
9	114.76
10	156.3
11	184.6
12	188.13
13	189.66
14	196.34
15	202.93
16	204.23
17	207.82
18	213.02
19	269.55
20	318.58
21	393.56
22	424.45
23	433.17
24	446.7
25	459.07
26	467.71
27	
28	
29	
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51	

Downstream Reach Lengths

LOB	Channel	ROB
100	100	100

Manning's n Values

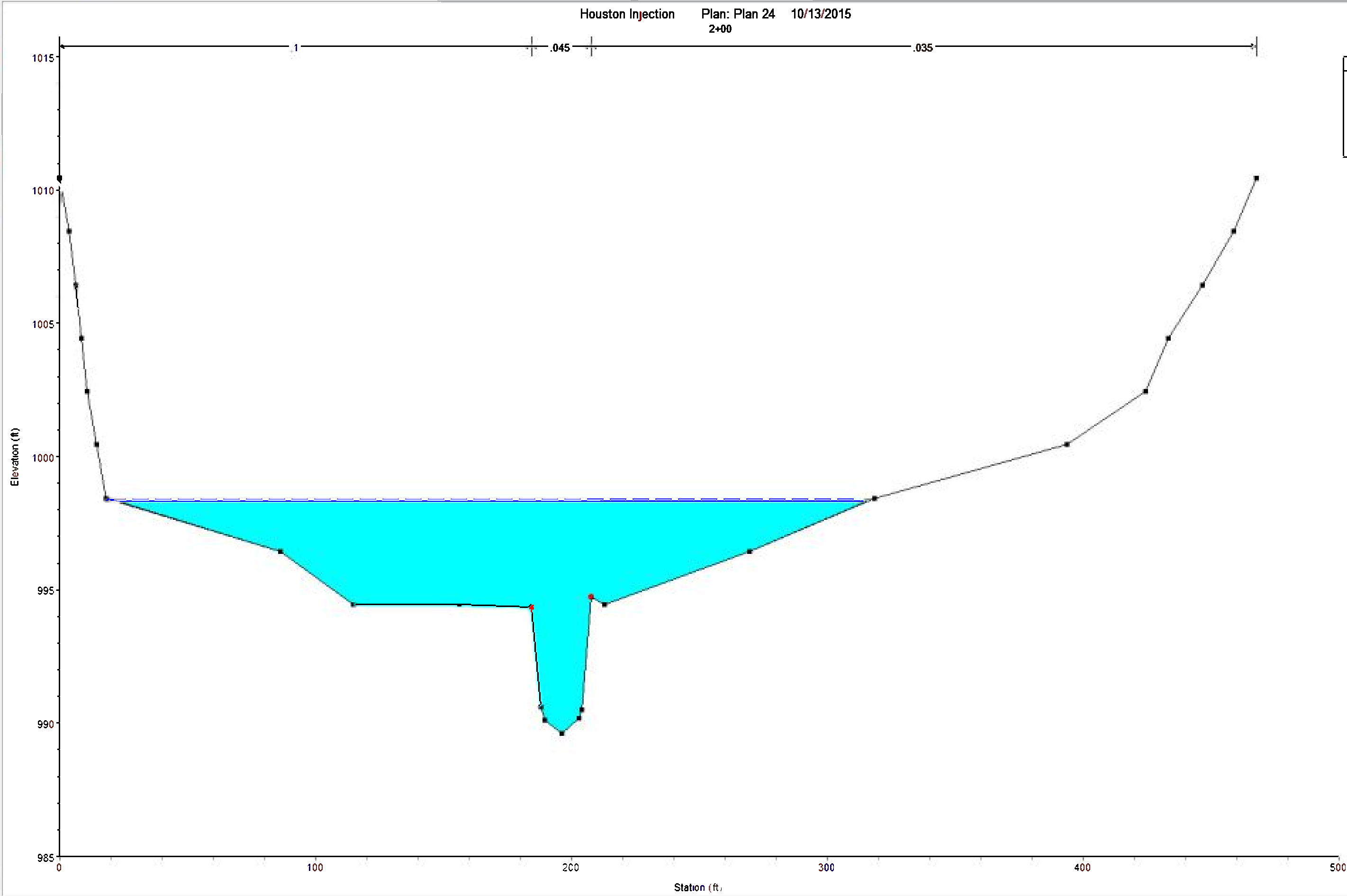
LOB	Channel	ROB
0.1	0.045	0.035

Main Channel Bank Stations

Left Bank	Right Bank
184.6	207.82

Contr/Exp Coefficient (Steady Flow)

Contraction	Expansion
0.1	0.3



Legend

- EG 100yr Storm (Black line with dots)
- WS 100yr Storm (Blue line)
- Ground (Black line with dots)
- Bank Sta (Red diamond)

Select river station for cross section editing.

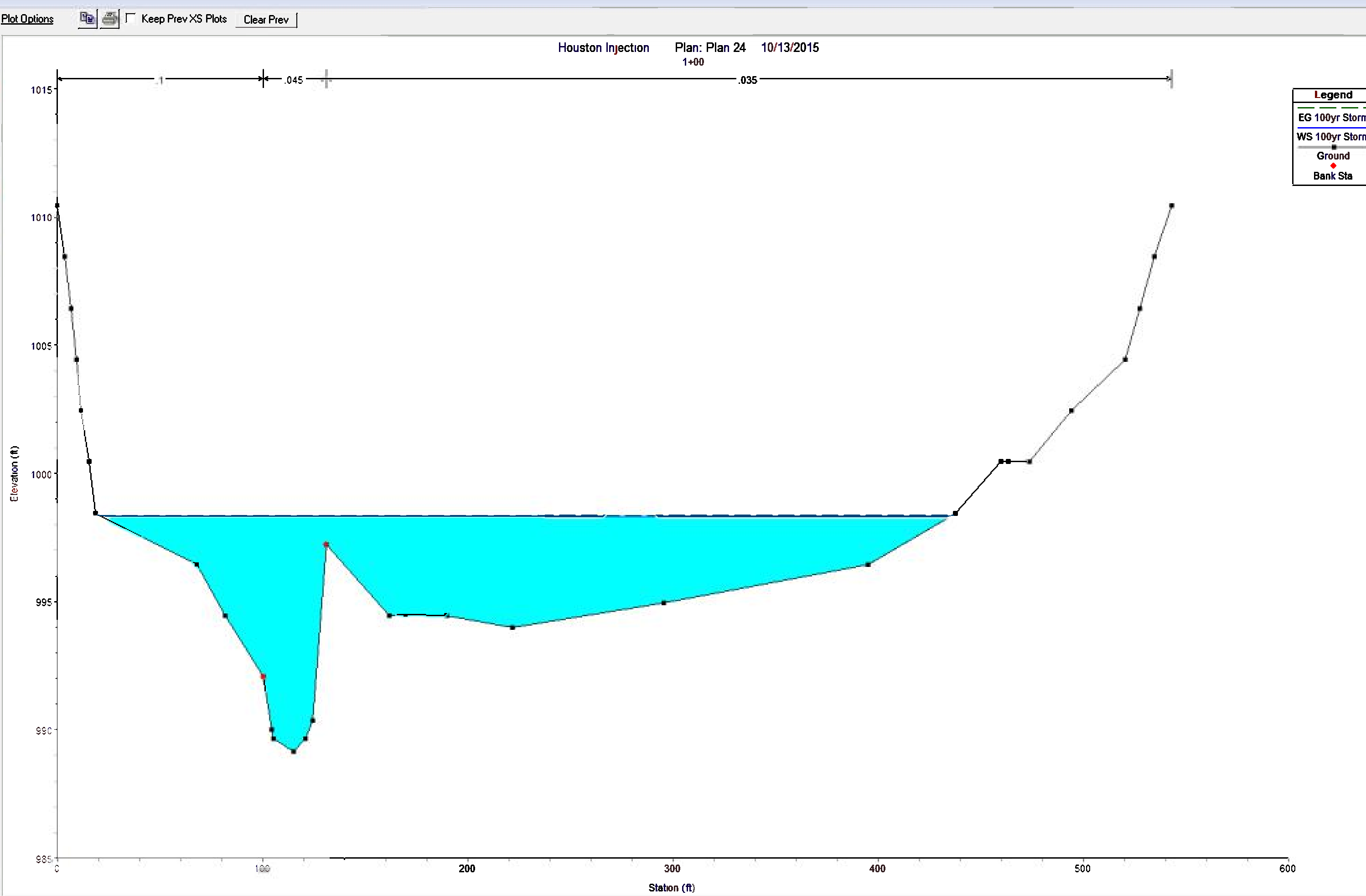
Cross Section Coordinates	
Station	Elevation
1	0
2	3.34
3	6.55
4	9.27
5	11.61
6	15.5
7	18.5
8	67.97
9	81.85
10	100.64
11	104.5
12	105.55
13	114.96
14	121.1
15	124.43
16	130.94
17	161.66
18	169.6
19	189.96
20	221.79
21	295.39
22	395.01
23	437.81
24	460.09
25	463.45
26	473.66
27	494.19
28	520.57
29	527.43
30	534.56
31	543.23
32	
33	
34	
35	
36	
37	
38	
39	
40	
41	
42	
43	
44	
45	
46	
47	
48	
49	
50	
51	

Downstream Reach Lengths		
LOB	Channel	ROB
100	100	100

Manning's n Values		
LOB	Channel	ROB
0.1	0.045	0.035

Main Channel Bank Stations	
Left Bank	Right Bank
100.64	130.94

Cont/Exp Coefficient (Steady Flow)	
Contraction	Expansion
0.1	0.3



River: Westland Run
 Reach: 3 River Sta.: 000
 Description: 0+00

Plot Options [Keep Prev XS Plots] [Clear Prev]

Houston Injection Plan: Plan 24 10/13/2015
 0+00

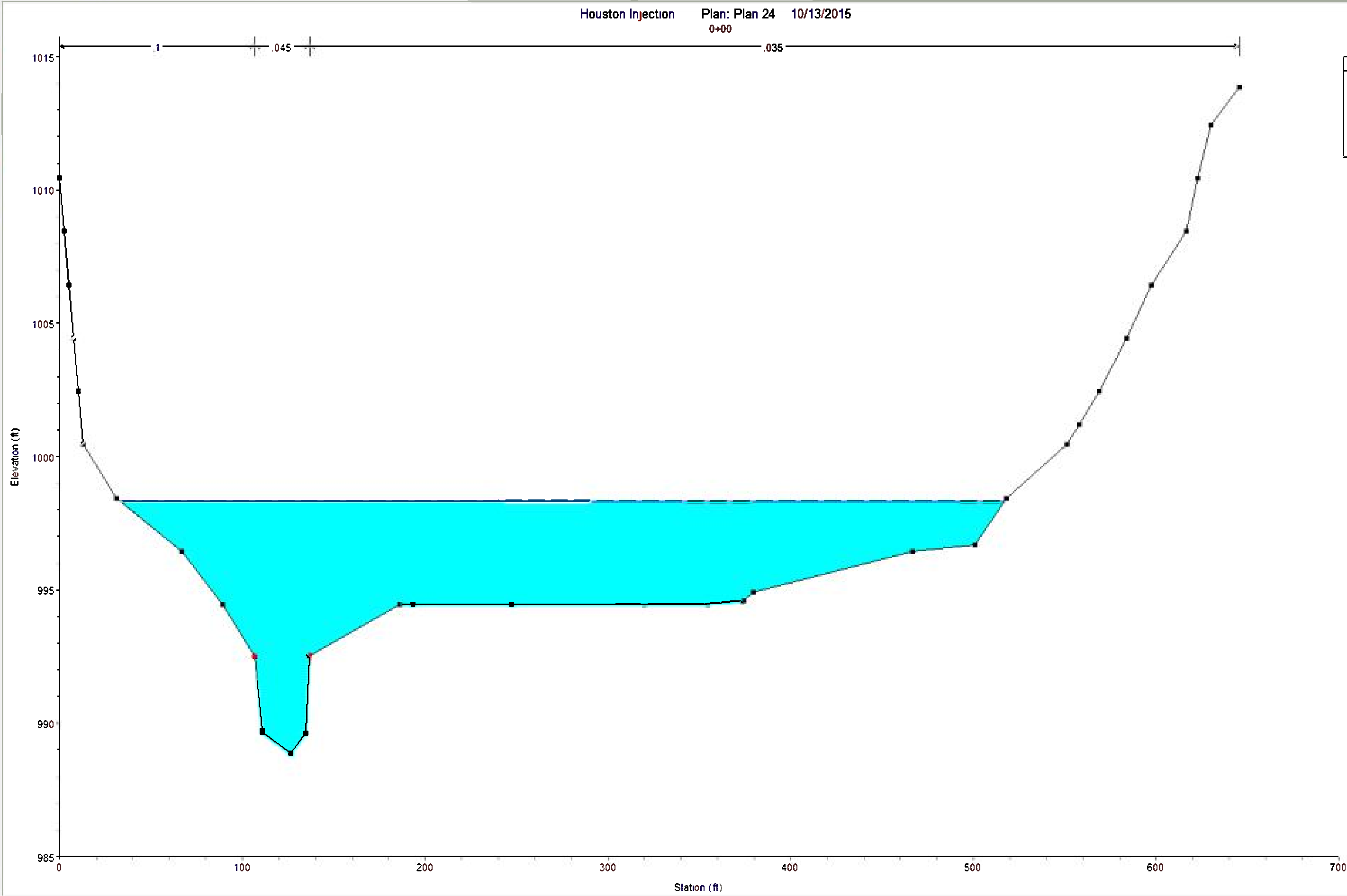
Cross Section Coordinates	
Station	Elevation
1	0
2	2.62
3	5.23
4	7.84
5	10.47
6	13.09
7	30.96
8	67.11
9	89.34
10	106.61
11	110.75
12	110.96
13	126.33
14	134.71
15	136.89
16	186.09
17	193.64
18	247.36
19	320
20	354.52
21	374.47
22	379.63
23	466.64
24	500.95
25	517.8
26	551.34
27	557.73
28	568.93
29	583.64
30	597.42
31	616.28
32	622.68
33	630.2
34	645.48
35	
36	
37	
38	
39	
40	
41	
42	
43	
44	
45	
46	
47	
48	
49	
50	
51	

Downstream Reach Lengths		
LOB	Channel	ROB

Manning's n Values		
LOB	Channel	ROB
0.1	0.045	0.035

Main Channel Bank Stations	
Left Bank	Right Bank
106.61	136.89

Cont/Exp Coefficient (Steady Flow)	
Contraction	Expansion
0.1	0.3



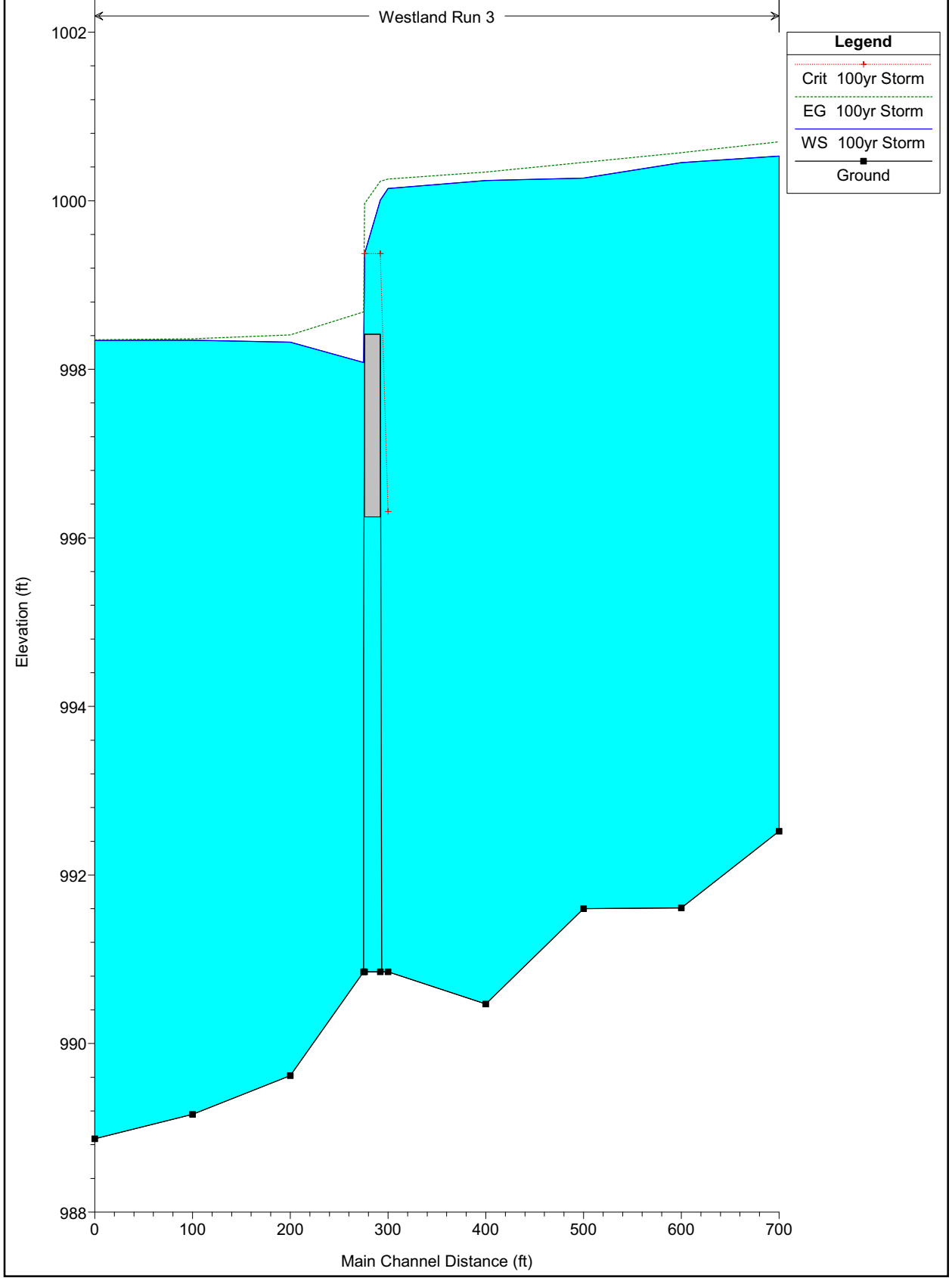
Legend

- EG 100yr Storm
- WS 100yr Storm
- Ground
- Bank Sta

114.07, 1005.79

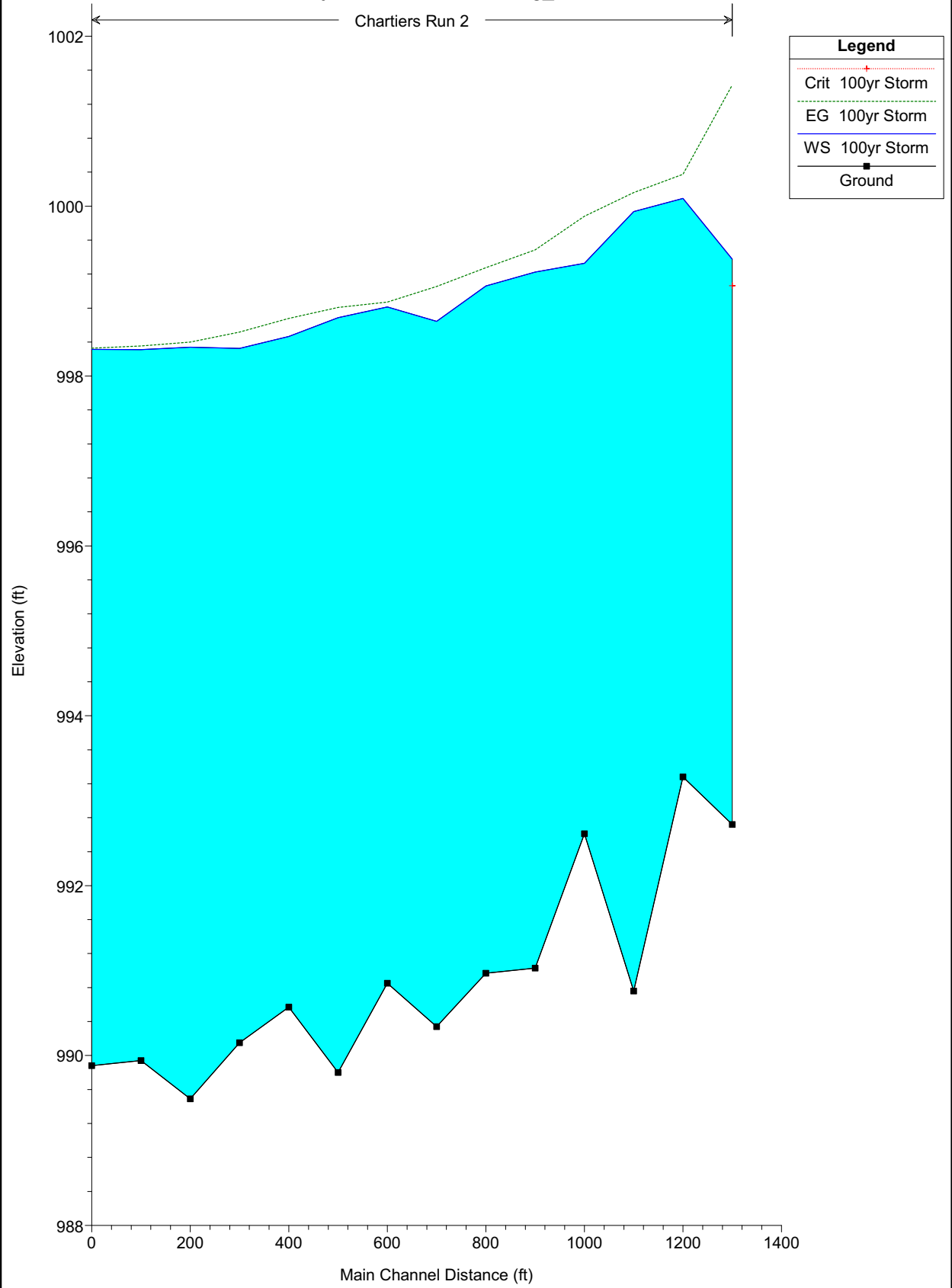
Select river station for cross section editing.

Houston Injection Plan: Existing_Final 10/16/2015



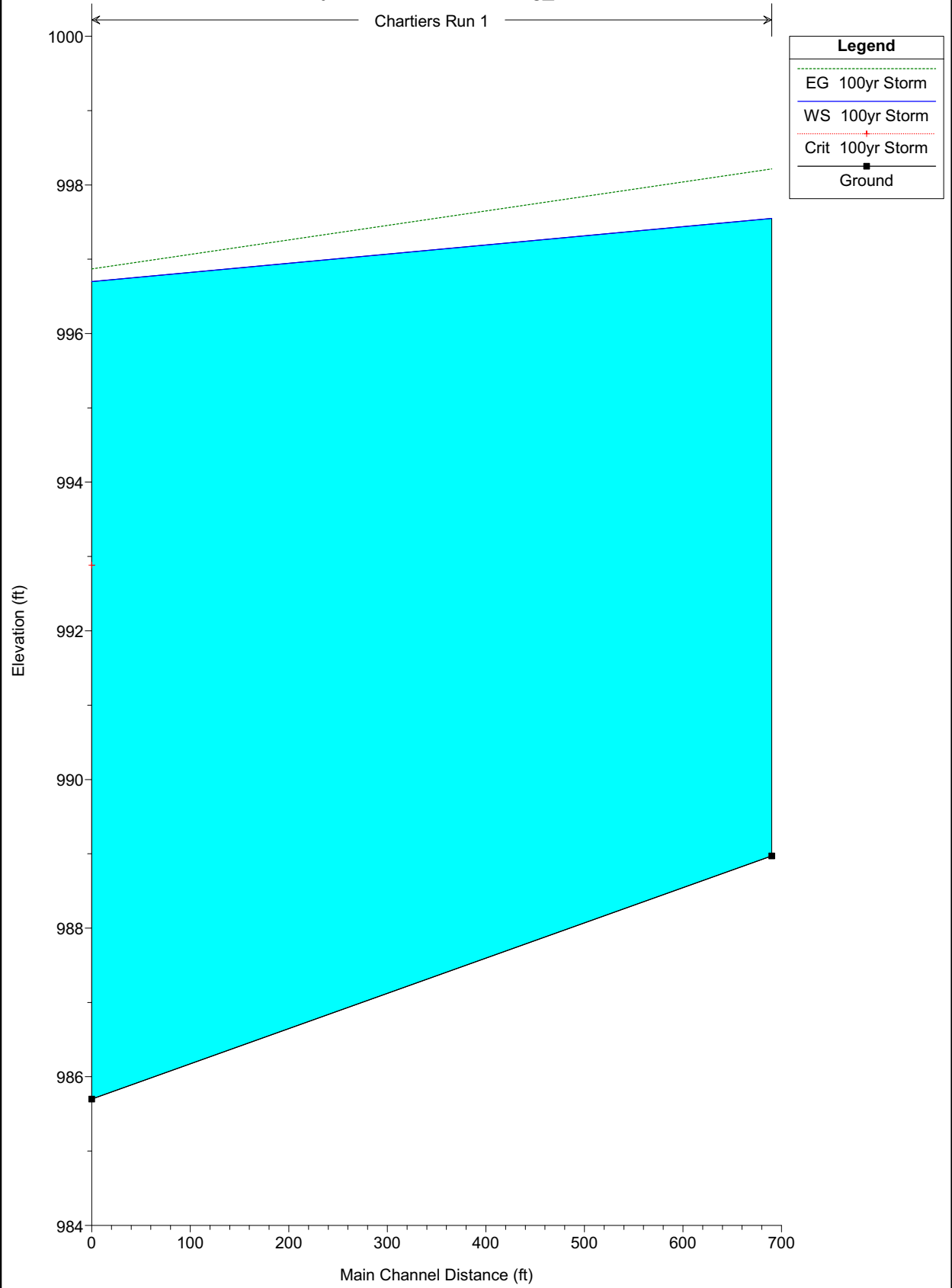
Houston Injection Plan: Existing_Final 10/16/2015

Chartiers Run 2



Houston Injection Plan: Existing_Final 10/16/2015

Chartiers Run 1



C-2 HEC-RAS PROPOSED CONDITIONS MODEL DATA

HoustonInjection.rep

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```

X      X  XXXXXX      XXXX      XXXX      XX      XXXX
X      X  X          X      X      X      X      X
X      X  X          X          X      X      X      X
XXXXXXXX XXXX      X          XXX XXXX      XXXXXX      XXXX
X      X  X          X          X      X      X          X
X      X  X          X      X      X      X      X
X      X  XXXXXX      XXXX      X      X      X      X      XXXXX

```

PROJECT DATA

Project Title: Houston Injection
Project File : HoustonInjection.prj
Run Date and Time: 1/17/2017 1:38:31 PM

Project in English units

PLAN DATA

Plan Title: Plan 36
Plan File : C:\Users\lydia.karlheim\Desktop\Houston Injection
HEC-RAS_011617\HoustonInjection.p36

Geometry Title: Houston Injection X-Sections Proposed R6
Geometry File : C:\Users\lydia.karlheim\Desktop\Houston Injection
HEC-RAS_011617\HoustonInjection.g12

Flow Title : 100yr Storm R4
Flow File : C:\Users\lydia.karlheim\Desktop\Houston Injection
HEC-RAS_011617\HoustonInjection.f04

Plan Summary Information:

Number of: Cross Sections	=	25	Multiple Openings	=	0
Culverts	=	0	Inline Structures	=	0
Bridges	=	1	Lateral Structures	=	0

Computational Information

Water surface calculation tolerance	=	0.01
Critical depth calculation tolerance	=	0.01
Maximum number of iterations	=	20
Maximum difference tolerance	=	0.3
Flow tolerance factor	=	0.001

Computation Options

Critical depth computed only where necessary	
Conveyance Calculation Method:	At breaks in n values only
Friction Slope Method:	Average Conveyance
Computational Flow Regime:	Subcritical Flow

HoustonInjection.rep

FLOW DATA

Flow Title: 100yr Storm R4
 Flow File : C:\Users\lydia.karlheim\Desktop\Houston Injection
 HEC-RAS_011617\HoustonInjection.f04

Flow Data (cfs)

```
*****
* River      Reach      RS      *      100yr Storm *
* Chartiers Run 2      1300   *      1666.75 *
* Chartiers Run 1      690    *      2950 *
* Westland Run 3      700    *      1283.25 *
*****
```

Boundary Conditions

```
*****
*****
* River      Reach      Profile      *      Upstream
* Downstream *
*****
* Chartiers Run 2      100yr Storm *      Normal S = 0.006588
*              *
* Chartiers Run 1      100yr Storm *
* Known WS = 996.7 *
* Westland Run 3      100yr Storm *      Normal S = 0.001774
*              *
*****
*****
```

GEOMETRY DATA

Geometry Title: Houston Injection X-Sections Proposed R6
 Geometry File : C:\Users\lydia.karlheim\Desktop\Houston Injection
 HEC-RAS_011617\HoustonInjection.g12

Reach Connection Table

```
*****
* River      Reach      * Upstream Boundary * Downstream Boundary *
*****
* Chartiers Run 2      *      * 1      *
* Chartiers Run 1      * 1      *      *
* Westland Run 3      *      * 1      *
*****
```

JUNCTION INFORMATION

Name: 1
 Description: Junction 1
 Energy computation Method

Length across Junction River	Junction Reach	Tributary River	Reach	Length	Angle
Chartiers Run	2	to Chartiers Run	1	100	
Westland Run	3	to Chartiers Run	1	170	

CROSS SECTION

RIVER: Chartiers Run
 REACH: 2 RS: 1300

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INPUT

Description: 13+00

Station Elevation Data									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1022	11.07	1020	20.94	1018	31.74	1016	49.99	1014
61.77	1012	97.91	1010	114.36	1008	125.87	1006	150.8	1004
164.76	1003.7	209.44	1002	220.48	1000	241.86	999.64	248.2	994.3
248.83	994.03	257.48	992.72	266.49	994.07	269.08	994.26	273.78	1002.86
310.1	1004	365.51	1004	382.39	1004	468.73	1006	483.56	1008
492.69	1010	501.23	1012	505.96	1014	510.6	1016	516.34	1018
522.21	1020								

Manning's n Values					
Sta	n Val	Sta	n Val	Sta	n Val
0	.1	241.86	.045	273.78	.1

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	241.86	273.78		100	100	100		.1	.3

CROSS SECTION

RIVER: Chartiers Run

REACH: 2 RS: 1200

INPUT

Description: 12+00

Station Elevation Data									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1022	6.34	1020	12.32	1018	18.56	1016	24.82	1014
34.91	1012	47.96	1010	74.92	1008	114.68	1006	133.11	1004
179.65	1002	263.05	999	325.95	995	328.64	994.32	330.02	993.89
335.85	993.28	342.23	993.95	344.59	994.23	347.57	995.41	526.28	1008
539.84	1010	550.59	1012	559.5	1014	568.23	1016	576.34	1018
583.58	1020								

Manning's n Values					
Sta	n Val	Sta	n Val	Sta	n Val
0	.035	325.95	.045	347.57	.1

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	325.95	347.57		100	100	100		.1	.3

CROSS SECTION

RIVER: Chartiers Run

REACH: 2 RS: 1100

INPUT

Description: 11+00

Station Elevation Data									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1020	5.56	1018	11.69	1016	17.69	1014	23.49	1012
32.37	1010	57	1008	90.4	1006	102.86	1004	141.39	1002
252.85	1000	324.8	998.7	376.75	997	407.3	995.87	410.28	993.33
410.45	993.34	424.95	990.76	435.44	993.29	436.12	993.53	441.29	999.99

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481.01 1008 541.23 1010 557.62 1012 570.21 1014 577.45 1016
 584.32 1018 591.16 1020

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 0 .035 407.3 .045 441.29 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 407.3 441.29 100 100 100 .1 .3

CROSS SECTION

RIVER: Chartiers Run
 REACH: 2 RS: 1000

INPUT

Description: 10+00

Station Elevation Data num= 25
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

 0 1018 4.56 1016 10.03 1014 16.12 1012 24.25 1010
 68.33 1008 85.19 1006 104.4 1004 164.4 1002 258.05 1000
 410.45 997.45 412.99 993.5 413.63 993.25 424.72 993.2 444.4 992.71
 444.68 992.61 444.8 995.57 463.16 1002 488.84 1002 493.82 1004
 502.09 1006 513.73 1008 523.1 1010 529.27 1012 538.81 1014

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 0 .035 410.45 .045 444.8 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 410.45 444.8 100 100 100 .1 .3

CROSS SECTION

RIVER: Chartiers Run
 REACH: 2 RS: 900

INPUT

Description: 9+00

Station Elevation Data num= 28
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

 0 1018 5.23 1016 10.73 1014 17.6 1012 32.87 1010
 63.06 1009.01 98.76 1008 125.63 1006 219.27 1004 260.04 1002
 318.57 1000 386.21 998 449.32 996.78 455.58 992.73 456.44 992.36
 463.97 991.03 472.18 992.35 472.73 992.49 474 993.9 542.58 997
 561.7 1000 566.33 1002 570.19 1004 574.97 1006 581.02 1008
 587.22 1010 593.8 1012 600.84 1014

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 0 .035 449.32 .045 474 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 449.32 474 100 100 100 .1 .3

CROSS SECTION

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RIVER: Chartiers Run
 REACH: 2 RS: 800

INPUT

Description: 8+00

Station Elevation Data		num= 31		Sta Elev		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1020	19.45	1018	26.39	1016	31.97	1014	37.47	1012		
48.15	1010	129.59	1008	168.44	1006	245.01	1004	291.83	1002		
340.73	1000	426.05	998	496.92	996	504.12	996.79	508.56	992.47		
509.61	991.92	517.95	990.97	526.71	991.92	530.58	992.42	532.68	993.34		
540.9	994	578.32	996	584.86	998	589.05	1000	593.45	1002		
599.36	1002.6	620.86	1004	632.98	1006	638.18	1008	640.47	1010		
642.81	1012										

Manning's n Values		num= 3		Sta n Val	
Sta	n Val	Sta	n Val	Sta	n Val
0	.035	504.12	.045	532.68	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 504.12 532.68 100 100 100 .1 .3

CROSS SECTION

RIVER: Chartiers Run
 REACH: 2 RS: 700

INPUT

Description: 7+00

Station Elevation Data		num= 24		Sta Elev		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1018	8.32	1016	31.4	1014	48.64	1012	65.7	1010		
115.56	1008	130.19	1006	214.37	1004	269.16	1002	304.44	1000.89		
335.41	1000	456.48	998	518.32	998	542.34	998	547.32	994		
567.4	993.59	569.75	991.78	570.79	991.23	583.23	990.34	594.92	991.58		
595.26	991.83	595.92	994.75	611.69	1013	614.49	1014				

Manning's n Values		num= 3		Sta n Val	
Sta	n Val	Sta	n Val	Sta	n Val
0	.035	567.4	.045	595.92	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 567.4 595.92 100 100 100 .1 .3

CROSS SECTION

RIVER: Chartiers Run
 REACH: 2 RS: 600

INPUT

Description: 6+00

Station Elevation Data		num= 21		Sta Elev		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1018	8.28	1016	17.93	1014	24.97	1012	64.42	1010		

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109.73	1008	134.72	1006	209.95	1004	262.21	1002	285.57	1001.19
328.45	1000	414.43	997	594.77	993.07	596.71	992.38	596.94	991.44
604.59	990.85	612.65	991.44	613.49	991.63	614.48	992.64	644.96	1007
649.16	1010								

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 0 .035 594.77 .045 614.48 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 594.77 614.48 100 100 100 .1 .3

CROSS SECTION

RIVER: Chartiers Run
 REACH: 2 RS: 500

INPUT

Description: 5+00

Station Elevation Data num= 22
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

 0 1018 7.61 1016 14.82 1014 28.12 1012 77.14 1010
 105.48 1008 169.46 1006 204.58 1004 246.73 1002 265.12 1001.15
 289.81 1000 393.16 998 556.64 994.5 574.81 993.73 577.67 991.19
 578.9 990.88 585.96 989.8 592.87 991.16 593.94 991.28 594.81 992.76
 619.22 1017 626.63 1020

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 0 .035 574.81 .045 594.81 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 574.81 594.81 100 100 100 .1 .3

CROSS SECTION

RIVER: Chartiers Run
 REACH: 2 RS: 400

INPUT

Description: 4+00

Station Elevation Data num= 26
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

 0 1020 8.4 1018 16.74 1016 30.8 1014 87.62 1012
 94.14 1010 112.83 1008 180.85 1006 197.47 1004 214.14 1002
 268.8 1000 324.88 998 332.79 996 352.86 996.56 390.23 997.06
 521.56 996 536.02 994.67 539.35 991.14 540.71 990.65 547.75 990.57
 554.17 990.7 559.04 991.62 561.11 995.02 577.68 1007 599.84 1010
 605.13 1012

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 0 .035 536.02 .045 561.11 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 536.02 561.11 100 100 100 .1 .3

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536.02 561.11 100 100 100 .1 .3

CROSS SECTION

RIVER: Chartiers Run
REACH: 2 RS: 300

INPUT
Description: 3+00
3+00

Table with 11 columns: Station, Elevation, Data, num=, Sta, Elev, Sta, Elev, Sta, Elev, Sta, Elev. Contains 11 rows of data points.

Manning's n Values table with 6 columns: Sta, n Val, Sta, n Val, Sta, n Val. Contains 1 row of data.

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
506.88 533.86 100 100 100 .1 .3

CROSS SECTION

RIVER: Chartiers Run
REACH: 2 RS: 200

INPUT
Description: 2+00

Table with 11 columns: Station, Elevation, Data, num=, Sta, Elev, Sta, Elev, Sta, Elev, Sta, Elev. Contains 11 rows of data points.

Manning's n Values table with 6 columns: Sta, n Val, Sta, n Val, Sta, n Val. Contains 1 row of data.

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
512.46 532.92 100 100 100 .1 .3

CROSS SECTION

RIVER: Chartiers Run
REACH: 2 RS: 100

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INPUT

Description: 1+00

Station		Elevation Data		num= 29		Sta		Elev		Sta		Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1016	18.49	1014	33	1012	57.1	1010	95.37	1008				
101.51	1006	105.78	1004	121.71	1002	153.3	1000	156.48	999.9				
181.48	998.88	216.34	998.65	251.28	997.64	292.32	994.97	332.22	994.44				
456.12	994.2	530.11	993.13	531.92	990.21	532.37	990.09	541.57	989.94				
550.34	990.46	550.61	990.82	588.39	998	596.38	1000	599.1	1002				
601.43	1004	603.89	1006	606.39	1008	609.02	1010						

Manning's n Values

Sta		n Val		num= 3		Sta		n Val	
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.035	530.11	.045	550.61	.1				

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	530.11	550.61		100	100	100		.1	.3

CROSS SECTION

RIVER: Chartiers Run

REACH: 2 RS: 000

INPUT

Description: 0+00

0+00

Station		Elevation Data		num= 34		Sta		Elev		Sta		Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1016	38.1	1014	49.42	1012	58.9	1010	78.48	1008				
110.64	1006	116.83	1004	123.89	1002	144.04	1000	168.76	998				
171.2	997.18	199.55	997.13	234.47	995.71	275.65	995.12	317.06	994.56				
368.67	994.07	405.94	993.92	581.95	994	593.22	990.81	594.99	990.31				
595.58	990.32	604.62	989.88	612.46	990.26	613.01	990.33	615.31	990.86				
648.51	996	655.74	998	666.41	1000	688.85	1002	697.85	1004				
702.06	1006	705.65	1008	708.85	1010	711.9	1012						

Manning's n Values

Sta		n Val		num= 3		Sta		n Val	
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.035	593.22	.045	615.31	.1				

Bank Sta:	Left	Right	Coeff	Contr.	Expan.
	593.22	615.31		.1	.3

CROSS SECTION

RIVER: Chartiers Run

REACH: 1 RS: 690

INPUT

Description: 0

Station		Elevation Data		num= 32		Sta		Elev		Sta		Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1010.45	3.834	1008.45	7.558	1006.45	12.239	1004.45	47.435	1002.45				
51.871	1000.45	58.454	998.45	72.214	996.45	109.854	994.45	128.396	992.45				
147.977	990.45	159.696	990.45	161.791	992.45	175.445	992.45	179.32	992.089				
179.321	992.089	180.955	988.976	181.24	988.965	190.122	989.095	200.046	989.75				

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205.477 991.618 206.483 992.45 210.978 994.45 215.831 996.45 225.482 998.45
 235.577 1000.45 249.658 1002.45 327.388 1003.59 419.755 1004.45 422.291 1006.45
 424.189 1008.45 425.672 1010.45

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 0 .1 179.32 .045 205.477 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 179.32 205.477 690 690 690 .1 .3

CROSS SECTION

RIVER: Chartiers Run
 REACH: 1 RS: 000

INPUT

Description: N
 Station Elevation Data num= 22
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

 1715 1006.3 1725 1000.4 1773 1000.4 1782 1001.8 1793 1001.8
 1808 1001.4 1832 999.9 1850 993.4 1866 993.3 1901 992.3
 1970 990.6 1987 986.7 1997 986.2 2000 985.9 2005 985.7
 2006 986.2 2013 990.8 2038 990.3 2084 991.9 2098 998.9
 2145 999.3 2222 1007

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 1715 .1 1970 .045 2013 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 1970 2013 100 100 100 .1 .3

CROSS SECTION

RIVER: Westland Run
 REACH: 3 RS: 700

INPUT

Description: 7+00
 Station Elevation Data num= 31
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

 0 1010.45 19.55 1008.45 32.84 1006.45 45.16 1004.45 60.48 1002.45
 83.63 1000.45 105 998.45 199.77 996.45 215.09 995.25 216.25 993.4
 216.84 992.88 221.96 992.52 226.8 992.87 234.82 992.86 239.2 996.42
 241.34 996.45 244.65 998.45 271.7 998.45 295.52 998.45 303.77 1000.45
 335.24 1001.1 401.57 1002.45 429.04 1004.45 434.97 1006.45 437.76 1008.45
 440.58 1010.45 443.43 1012.45 445.83 1014.45 448.43 1016.45 451.05 1018.45
 453.67 1020.45

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 0 .1 215.09 .045 239.2 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 215.09 239.2 100 100 100 .1 .3

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CROSS SECTION

RIVER: Westland Run
 REACH: 3 RS: 600

INPUT

Description: 6+00

Station Elevation Data num= 31									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1010.45	2.65	1008.45	5.6	1006.45	9.02	1004.45	12.9	1002.45
17.22	1000.45	24.53	998.45	98.22	996.45	102.18	994.45	108.86	995.33
111.12	992.92	112.83	992.29	116.79	991.61	120.05	992.21	122.46	992.44
126.95	992.92	134.4	994.45	151.84	996.45	161.39	998.45	188.75	998.45
232.09	996.45	239.86	996.45	252.57	998.45	260.19	1000.45	329.76	1002.45
366.35	1004.45	376.68	1006.45	386.51	1008.45	392.81	1010.45	396.78	1012.45
400.8	1014.45								

Manning's n Values num= 3					
Sta	n Val	Sta	n Val	Sta	n Val
0	.1	108.86	.045	126.95	.1

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	108.86	126.95		100	100	100		.1	.3

CROSS SECTION

RIVER: Westland Run
 REACH: 3 RS: 500

INPUT

Description: 5+00

Station Elevation Data num= 25									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1010.45	3.08	1008.45	6.16	1006.45	9.23	1004.45	12.31	1002.45
15.44	1000.45	19.05	998.45	122.08	996.6	130.35	996.45	144.22	994.45
145.87	994.28	146.95	992.58	148.02	992.28	157.18	991.6	166.49	992.18
166.94	992.63	167.24	992.91	172.62	994.45	178.98	996.45	184.49	998.45
194.71	1000.45	356.68	1002.45	369.21	1004.45	379.49	1008.45	382.9	1010.45

Manning's n Values num= 3					
Sta	n Val	Sta	n Val	Sta	n Val
0	.1	145.87	.045	167.24	.1

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	145.87	167.24		100	100	100		.1	.3

CROSS SECTION

RIVER: Westland Run
 REACH: 3 RS: 400

INPUT

Description: 4+00

Station Elevation Data num= 27									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev

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```
*****
0 1010.45 3.11 1008.45 6.28 1006.45 9.45 1004.45 12.61 1002.45
15.72 1000.45 19.21 998.45 36.98 996.45 41.65 996.45 99.21 996.45
153.1 993.51 154.68 991.6 154.95 991.35 162.85 990.47 169.62 991.31
171.8 991.69 173.25 994.78 184.83 996.45 193.92 998.45 207.07 1000.45
236.59 1002.45 250.86 1002.45 282.12 1002.45 288.86 1004.45 309.36 1006.45
317.96 1008.45 327.35 1010.45
```

```
Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
*****
0 .1 153.1 .045 173.25 .1
```

```
Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
153.1 173.25 100 100 100 .1 .3
```

CROSS SECTION

RIVER: Westland Run
REACH: 3 RS: 300

INPUT

Description: 3+00

```
Station Elevation Data num= 28
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
*****
0 1010.45 3 1008.45 6.97 1006.45 12.45 1004.45 17.34 1002.45
21.7 1000.45 25.86 998.45 81.48 996.45 131.06 996.45 171.03 996.45
181.63 994.45 186.94 993.61 188.03 991.3 188.87 991.47 196.07 990.85
202.62 991.23 203.61 991.2 205.07 994.1 216.1 996.45 231 998.23
233.34 998.45 318.93 1000.37 321.99 1000.45 334.41 1002.45 349.12 1004.45
360.12 1006.45 371.36 1008.45 382.06 1010.45
```

```
Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
*****
0 .1 186.94 .045 205.07 .1
```

```
Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
186.94 205.07 25 25 25 .1 .3
```

BRIDGE

RIVER: Westland Run
REACH: 3 RS: 292

INPUT

Description:

Distance from Upstream XS = 8
Deck/Roadway width = 16
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates

```
num= 28
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
*****
0 998.416 996.249 3 998.416 996.249 6.97 998.416 996.249
12.45 998.416 996.249 17.34 998.416 996.249 21.7 998.416 996.249
25.86 998.416 996.249 81.48 998.416 996.249 131.06 998.416 996.249
171.03 998.416 996.249 181.63 998.416 996.249 186.94 998.416 996.249
188.03 998.416 996.249 188.87 998.416 996.249 196.07 998.416 996.249
202.62 998.416 996.249 203.61 998.416 996.249 205.07 998.416 996.249
```

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216.1	998.416	996.249	231	998.416	996.249	233.34	998.416	996.249
318.93	998.416	996.249	321.99	998.416	996.249	334.41	998.416	996.249
349.12	998.416	996.249	360.12	998.416	996.249	371.36	998.416	996.249
382.06	998.416	996.249						

Upstream Bridge Cross Section Data

Station Elevation Data num= 28

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1010.45	3	1008.45	6.97	1006.45	12.45	1004.45	17.34	1002.45
21.7	1000.45	25.86	998.45	81.48	996.45	131.06	996.45	171.03	996.45
181.63	994.45	186.94	993.61	188.03	991.3	188.87	991.47	196.07	990.85
202.62	991.23	203.61	991.2	205.07	994.1	216.1	996.45	231	998.23
233.34	998.45	318.93	1000.37	321.99	1000.45	334.41	1002.45	349.12	1004.45
360.12	1006.45	371.36	1008.45	382.06	1010.45				

Manning's n Values

num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	186.94	.045	205.07	.1

Bank Sta:	Left	Right	Coeff	Contr.	Expan.
	186.94	205.07		.1	.3

Downstream Deck/Roadway Coordinates

num= 28

Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord
0	998.416	996.249	3	998.416	996.249	6.97	998.416	996.249						
12.45	998.416	996.249	17.34	998.416	996.249	21.7	998.416	996.249						
25.86	998.416	996.249	81.48	998.416	996.249	131.06	998.416	996.249						
171.03	998.416	996.249	181.63	998.416	996.249	186.94	998.416	996.249						
188.03	998.416	996.249	188.87	998.416	996.249	196.07	998.416	996.249						
202.62	998.416	996.249	203.61	998.416	996.249	205.07	998.416	996.249						
216.1	998.416	996.249	231	998.416	996.249	233.34	998.416	996.249						
318.93	998.416	996.249	321.99	998.416	996.249	334.41	998.416	996.249						
349.12	998.416	996.249	360.12	998.416	996.249	371.36	998.416	996.249						
382.06	998.416	996.249												

Downstream Bridge Cross Section Data

Station Elevation Data num= 28

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1010.45	3	1008.45	6.97	1006.45	12.45	1004.45	17.34	1002.45
21.7	1000.45	25.86	998.45	81.48	996.45	131.06	996.45	171.03	996.45
181.63	994.45	186.94	993.61	188.03	991.3	188.87	991.47	196.07	990.85
202.62	991.23	203.61	991.2	205.07	994.1	216.1	996.45	231	998.23
233.34	998.45	318.93	1000.37	321.99	1000.45	334.41	1002.45	349.12	1004.45
360.12	1006.45	371.36	1008.45	382.06	1010.45				

Manning's n Values

num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	186.94	.045	205.07	.1

Bank Sta:	Left	Right	Coeff	Contr.	Expan.
	186.94	205.07		.1	.3

Upstream Embankment side slope	=	.212	horiz. to 1.0 vertical
Downstream Embankment side slope	=	.258	horiz. to 1.0 vertical
Maximum allowable submergence for weir flow	=	.98	
Elevation at which weir flow begins	=		
Energy head used in spillway design	=		

Spillway height used in design =
 Weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data

Energy
 Selected Low Flow Methods = Highest Energy Answer

High Flow Method
 Energy Only

Additional Bridge Parameters

Add Friction component to Momentum
 Do not add weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION

RIVER: Westland Run
 REACH: 3 RS: 275

INPUT

Description:

Station Elevation Data num= 28

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1010.45	3	1008.45	6.97	1006.45	12.45	1004.45	17.34	1002.45
21.7	1000.45	25.86	998.45	81.48	996.45	131.06	996.45	171.03	996.45
181.63	994.45	186.94	993.61	188.03	991.3	188.87	991.47	196.07	990.85
202.62	991.23	203.61	991.2	205.07	994.1	216.1	996.45	231	998.23
233.34	998.45	318.93	1000.37	321.99	1000.45	334.41	1002.45	349.12	1004.45
360.12	1006.45	371.36	1008.45	382.06	1010.45				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	186.94	.045	205.07	.1

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	186.94	205.07		75	75	75		.1	.3

CROSS SECTION

RIVER: Westland Run
 REACH: 3 RS: 200

INPUT

Description: 2+00

Station Elevation Data num= 26

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1010.45	3.65	1008.45	6.15	1006.45	8.35	1004.45	10.72	1002.45
14.43	1000.45	18.13	998.45	86.3	996.45	114.76	994.45	156.3	994.45
184.6	994.34	188.13	990.61	189.66	990.12	196.34	989.62	202.93	990.18
204.23	990.52	207.82	994.73	213.02	994.45	269.55	996.45	318.58	998.45
393.56	1000.45	424.45	1002.45	433.17	1004.45	446.7	1006.45	459.07	1008.45
467.71	1010.45								

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Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 0 .1 184.6 .045 207.82 .035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 184.6 207.82 100 100 100 .1 .3

CROSS SECTION

RIVER: Westland Run
 REACH: 3 RS: 100

INPUT

Description: 1+00
 Station Elevation Data num= 31
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

 0 1010.45 3.34 1008.45 6.55 1006.45 9.27 1004.45 11.61 1002.45
 15.5 1000.45 18.5 998.45 67.97 996.45 81.85 994.45 100.64 992.06
 104.5 990.01 105.55 989.65 114.96 989.16 121.1 989.65 124.43 990.35
 130.94 997.21 161.66 994.45 169.6 994.48 189.96 994.45 221.79 994
 295.39 994.96 395.01 996.45 437.81 998.45 460.09 1000.45 463.45 1000.45
 473.66 1000.45 494.19 1002.45 520.57 1004.45 527.43 1006.45 534.56 1008.45
 543.23 1010.45

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 0 .1 100.64 .045 130.94 .035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 100.64 130.94 100 100 100 .1 .3

CROSS SECTION

RIVER: Westland Run
 REACH: 3 RS: 000

INPUT

Description: 0+00
 Station Elevation Data num= 34
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

 0 1010.45 2.62 1008.45 5.23 1006.45 7.84 1004.45 10.47 1002.45
 13.09 1000.45 30.96 998.45 67.11 996.45 89.34 994.45 106.61 992.51
 110.75 989.74 110.96 989.64 126.33 988.87 134.71 989.63 136.89 992.53
 186.09 994.45 193.64 994.47 247.36 994.45 320 994.45 354.52 994.45
 374.47 994.6 427.76 995.27 468.24 995.82 500.95 996.69 517.8 998.45
 551.34 1000.45 557.73 1001.22 568.93 1002.45 583.64 1004.45 597.42 1006.45
 616.28 1008.45 622.68 1010.45 630.2 1012.45 645.48 1013.88

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 0 .1 106.61 .045 136.89 .035

Bank Sta: Left Right Coeff Contr. Expan.
 106.61 136.89 .1 .3

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SUMMARY OF MANNING'S N VALUES

River:Chartiers Run

```

*****
* Reach * River Sta. * n1 * n2 * n3 *
*****
*2 * 1300 * .1* .045* .1*
*2 * 1200 * .035* .045* .1*
*2 * 1100 * .035* .045* .1*
*2 * 1000 * .035* .045* .1*
*2 * 900 * .035* .045* .1*
*2 * 800 * .035* .045* .1*
*2 * 700 * .035* .045* .1*
*2 * 600 * .035* .045* .1*
*2 * 500 * .035* .045* .1*
*2 * 400 * .035* .045* .1*
*2 * 300 * .035* .045* .1*
*2 * 200 * .035* .045* .1*
*2 * 100 * .035* .045* .1*
*2 * 000 * .035* .045* .1*
*1 * 690 * .1* .045* .1*
*1 * 000 * .1* .045* .1*
*****
    
```

River:Westland Run

```

*****
* Reach * River Sta. * n1 * n2 * n3 *
*****
*3 * 700 * .1* .045* .1*
*3 * 600 * .1* .045* .1*
*3 * 500 * .1* .045* .1*
*3 * 400 * .1* .045* .1*
*3 * 300 * .1* .045* .1*
*3 * 292 * Bridge * * *
*3 * 275 * .1* .045* .1*
*3 * 200 * .1* .045* .035*
*3 * 100 * .1* .045* .035*
*3 * 000 * .1* .045* .035*
*****
    
```

SUMMARY OF REACH LENGTHS

River: Chartiers Run

```

*****
* Reach * River Sta. * Left * Channel * Right *
*****
*2 * 1300 * 100* 100* 100*
*2 * 1200 * 100* 100* 100*
*2 * 1100 * 100* 100* 100*
*2 * 1000 * 100* 100* 100*
*2 * 900 * 100* 100* 100*
*2 * 800 * 100* 100* 100*
*2 * 700 * 100* 100* 100*
*2 * 600 * 100* 100* 100*
*2 * 500 * 100* 100* 100*
*2 * 400 * 100* 100* 100*
*2 * 300 * 100* 100* 100*
*2 * 200 * 100* 100* 100*
*2 * 100 * 100* 100* 100*
*2 * 000 * * * *
    
```

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```
*1          *    690          *    690*    690*    690*
*1          *    000          *    100*    100*    100*
```

River: Westland Run

```
*****
* Reach      * River Sta. * Left   * Channel * Right *
*****
*3           *    700     *    100*    100*    100*
*3           *    600     *    100*    100*    100*
*3           *    500     *    100*    100*    100*
*3           *    400     *    100*    100*    100*
*3           *    300     *    25*    25*    25*
*3           *    292     * Bridge *      *      *
*3           *    275     *    75*    75*    75*
*3           *    200     *    100*    100*    100*
*3           *    100     *    100*    100*    100*
*3           *    000     *      *      *      *
*****
```

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS

River: Chartiers Run

```
*****
* Reach      * River Sta. * Contr. * Expan. *
*****
*2           *    1300    *    .1*    .3*
*2           *    1200    *    .1*    .3*
*2           *    1100    *    .1*    .3*
*2           *    1000    *    .1*    .3*
*2           *    900     *    .1*    .3*
*2           *    800     *    .1*    .3*
*2           *    700     *    .1*    .3*
*2           *    600     *    .1*    .3*
*2           *    500     *    .1*    .3*
*2           *    400     *    .1*    .3*
*2           *    300     *    .1*    .3*
*2           *    200     *    .1*    .3*
*2           *    100     *    .1*    .3*
*2           *    000     *    .1*    .3*
*1           *    690     *    .1*    .3*
*1           *    000     *    .1*    .3*
```

River: Westland Run

```
*****
* Reach      * River Sta. * Contr. * Expan. *
*****
*3           *    700     *    .1*    .3*
*3           *    600     *    .1*    .3*
*3           *    500     *    .1*    .3*
*3           *    400     *    .1*    .3*
*3           *    300     *    .1*    .3*
*3           *    292     * Bridge *      *
*3           *    275     *    .1*    .3*
*3           *    200     *    .1*    .3*
*3           *    100     *    .1*    .3*
*3           *    000     *    .1*    .3*
```

Plan: Plan 36 Chartiers Run 2 RS: 1300 Profile: 100yr Storm

E.G. Elev (ft)	1001.42	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.07	Wt. n-Val.		0.045	
W.S. Elev (ft)	999.36	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)	999.06	Flow Area (sq ft)		144.43	
E.G. Slope (ft/ft)	0.018310	Area (sq ft)		144.43	
Q Total (cfs)	1666.75	Flow (cfs)		1666.75	
Top Width (ft)	29.67	Top Width (ft)		29.67	
Vel Total (ft/s)	11.54	Avg. Vel. (ft/s)		11.54	
Max Chl Dpth (ft)	6.64	Hydr. Depth (ft)		4.87	
Conv. Total (cfs)	12317.6	Conv. (cfs)		12317.6	
Length Wtd. (ft)	100.00	Wetted Per. (ft)		34.80	
Min Ch EI (ft)	992.72	Shear (lb/sq ft)		4.74	
Alpha	1.00	Stream Power (lb/ft s)	522.21	0.00	0.00
Frctn Loss (ft)	0.53	Cum Volume (acre-ft)	15.03	5.74	2.83
C & E Loss (ft)	0.53	Cum SA (acres)	5.33	0.76	0.80

Plan: Plan 36 Chartiers Run 2 RS: 1200 Profile: 100yr Storm

E.G. Elev (ft)	1000.36	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.29	Wt. n-Val.	0.035	0.045	0.100
W.S. Elev (ft)	1000.07	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	209.23	131.58	154.27
E.G. Slope (ft/ft)	0.002465	Area (sq ft)	209.23	131.58	154.27
Q Total (cfs)	1666.75	Flow (cfs)	757.94	709.05	199.76
Top Width (ft)	180.51	Top Width (ft)	92.71	21.62	66.18
Vel Total (ft/s)	3.37	Avg. Vel. (ft/s)	3.62	5.39	1.29
Max Chl Dpth (ft)	6.79	Hydr. Depth (ft)	2.26	6.09	2.33
Conv. Total (cfs)	33572.7	Conv. (cfs)	15267.0	14282.1	4023.6
Length Wtd. (ft)	100.00	Wetted Per. (ft)	92.86	22.08	66.34
Min Ch EI (ft)	993.28	Shear (lb/sq ft)	0.35	0.92	0.36
Alpha	1.63	Stream Power (lb/ft s)	583.58	0.00	0.00
Frctn Loss (ft)	0.20	Cum Volume (acre-ft)	14.78	5.42	2.66
C & E Loss (ft)	0.02	Cum SA (acres)	5.23	0.70	0.73

Plan: Plan 36 Chartiers Run 2 RS: 1100 Profile: 100yr Storm

E.G. Elev (ft)	1000.14	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.23	Wt. n-Val.	0.035	0.045	
W.S. Elev (ft)	999.92	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	254.51	234.52	
E.G. Slope (ft/ft)	0.001636	Area (sq ft)	254.51	234.52	
Q Total (cfs)	1666.75	Flow (cfs)	622.17	1044.58	
Top Width (ft)	183.70	Top Width (ft)	149.77	33.93	
Vel Total (ft/s)	3.41	Avg. Vel. (ft/s)	2.44	4.45	
Max Chl Dpth (ft)	9.16	Hydr. Depth (ft)	1.70	6.91	
Conv. Total (cfs)	41209.8	Conv. (cfs)	15382.9	25826.9	
Length Wtd. (ft)	100.00	Wetted Per. (ft)	149.83	38.50	
Min Ch EI (ft)	990.76	Shear (lb/sq ft)	0.17	0.62	
Alpha	1.26	Stream Power (lb/ft s)	591.16	0.00	0.00
Frctn Loss (ft)	0.25	Cum Volume (acre-ft)	14.25	5.00	2.48
C & E Loss (ft)	0.04	Cum SA (acres)	4.95	0.64	0.65

Plan: Plan 36 Chartiers Run 2 RS: 1000 Profile: 100yr Storm

E.G. Elev (ft)	999.85	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.58	Wt. n-Val.	0.035	0.045	0.100
W.S. Elev (ft)	999.27	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	99.31	207.31	19.58
E.G. Slope (ft/ft)	0.004414	Area (sq ft)	99.31	207.31	19.58
Q Total (cfs)	1666.75	Flow (cfs)	263.32	1375.39	28.04
Top Width (ft)	153.87	Top Width (ft)	108.95	34.35	10.57
Vel Total (ft/s)	5.11	Avg. Vel. (ft/s)	2.65	6.63	1.43
Max Chl Dpth (ft)	6.66	Hydr. Depth (ft)	0.91	6.04	1.85
Conv. Total (cfs)	25086.4	Conv. (cfs)	3963.2	20701.2	422.0
Length Wtd. (ft)	100.00	Wetted Per. (ft)	108.97	39.42	11.20
Min Ch EI (ft)	992.61	Shear (lb/sq ft)	0.25	1.45	0.48
Alpha	1.44	Stream Power (lb/ft s)	538.81	0.00	0.00
Frctn Loss (ft)	0.32	Cum Volume (acre-ft)	13.85	4.50	2.46
C & E Loss (ft)	0.09	Cum SA (acres)	4.65	0.56	0.64

Plan: Plan 36 Chartiers Run 2 RS: 900 Profile: 100yr Storm

E.G. Elev (ft)	999.44	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.28	Wt. n-Val.	0.035	0.045	0.100
W.S. Elev (ft)	999.16	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	134.51	162.10	269.34
E.G. Slope (ft/ft)	0.002489	Area (sq ft)	134.51	162.10	269.34
Q Total (cfs)	1666.75	Flow (cfs)	341.70	885.99	439.06
Top Width (ft)	209.39	Top Width (ft)	102.36	24.68	82.35
Vel Total (ft/s)	2.95	Avg. Vel. (ft/s)	2.54	5.47	1.63
Max Chl Dpth (ft)	8.13	Hydr. Depth (ft)	1.31	6.57	3.27
Conv. Total (cfs)	33411.1	Conv. (cfs)	6849.6	17760.2	8801.2
Length Wtd. (ft)	100.00	Wetted Per. (ft)	102.39	26.82	82.59
Min Ch EI (ft)	991.03	Shear (lb/sq ft)	0.20	0.94	0.51
Alpha	2.06	Stream Power (lb/ft s)	600.84	0.00	0.00
Frctn Loss (ft)	0.21	Cum Volume (acre-ft)	13.58	4.07	2.12
C & E Loss (ft)	0.02	Cum SA (acres)	4.41	0.49	0.53

Plan: Plan 36 Chartiers Run 2 RS: 800 Profile: 100yr Storm

E.G. Elev (ft)	999.21	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.23	Wt. n-Val.	0.035	0.045	0.100
W.S. Elev (ft)	998.99	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	180.41	194.69	206.98
E.G. Slope (ft/ft)	0.001783	Area (sq ft)	180.41	194.69	206.98
Q Total (cfs)	1666.75	Flow (cfs)	423.68	928.33	314.74
Top Width (ft)	203.04	Top Width (ft)	120.23	28.56	54.25
Vel Total (ft/s)	2.86	Avg. Vel. (ft/s)	2.35	4.77	1.52
Max Chl Dpth (ft)	8.02	Hydr. Depth (ft)	1.50	6.82	3.82
Conv. Total (cfs)	39476.4	Conv. (cfs)	10034.7	21987.1	7454.6
Length Wtd. (ft)	100.00	Wetted Per. (ft)	120.31	30.78	54.85
Min Ch EI (ft)	990.97	Shear (lb/sq ft)	0.17	0.70	0.42
Alpha	1.77	Stream Power (lb/ft s)	642.81	0.00	0.00
Frctn Loss (ft)	0.22	Cum Volume (acre-ft)	13.22	3.66	1.58
C & E Loss (ft)	0.02	Cum SA (acres)	4.15	0.43	0.37

Plan: Plan 36 Chartiers Run 2 RS: 700 Profile: 100yr Storm

E.G. Elev (ft)	998.97	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.46	Wt. n-Val.	0.035	0.045	0.100
W.S. Elev (ft)	998.51	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	158.54	211.03	6.10
E.G. Slope (ft/ft)	0.002726	Area (sq ft)	158.54	211.03	6.10
Q Total (cfs)	1666.75	Flow (cfs)	376.25	1285.07	5.43
Top Width (ft)	173.43	Top Width (ft)	141.66	28.52	3.25
Vel Total (ft/s)	4.44	Avg. Vel. (ft/s)	2.37	6.09	0.89
Max Chl Dpth (ft)	8.17	Hydr. Depth (ft)	1.12	7.40	1.88
Conv. Total (cfs)	31926.1	Conv. (cfs)	7207.0	24615.1	104.0
Length Wtd. (ft)	100.00	Wetted Per. (ft)	143.08	31.79	4.97
Min Ch EI (ft)	990.34	Shear (lb/sq ft)	0.19	1.13	0.21
Alpha	1.52	Stream Power (lb/ft s)	614.49	0.00	0.00
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)	12.83	3.20	1.33
C & E Loss (ft)	0.12	Cum SA (acres)	3.85	0.36	0.31

Plan: Plan 36 Chartiers Run 2 RS: 600 Profile: 100yr Storm

E.G. Elev (ft)	998.76	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.	0.035	0.045	0.100
W.S. Elev (ft)	998.70	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	703.01	144.42	39.01
E.G. Slope (ft/ft)	0.000420	Area (sq ft)	703.01	144.42	39.01
Q Total (cfs)	1666.75	Flow (cfs)	1290.80	352.68	23.27
Top Width (ft)	261.72	Top Width (ft)	229.14	19.71	12.87
Vel Total (ft/s)	1.88	Avg. Vel. (ft/s)	1.84	2.44	0.60
Max Chl Dpth (ft)	7.85	Hydr. Depth (ft)	3.07	7.33	3.03
Conv. Total (cfs)	81352.8	Conv. (cfs)	63003.2	17214.0	1135.7
Length Wtd. (ft)	100.00	Wetted Per. (ft)	229.22	21.06	14.23
Min Ch EI (ft)	990.85	Shear (lb/sq ft)	0.08	0.18	0.07
Alpha	1.10	Stream Power (lb/ft s)	649.16	0.00	0.00
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	11.84	2.79	1.28
C & E Loss (ft)	0.01	Cum SA (acres)	3.43	0.31	0.29

Plan: Plan 36 Chartiers Run 2 RS: 500 Profile: 100yr Storm

E.G. Elev (ft)	998.69	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.13	Wt. n-Val.	0.035	0.045	0.100
W.S. Elev (ft)	998.56	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	467.05	154.16	16.95
E.G. Slope (ft/ft)	0.001000	Area (sq ft)	467.05	154.16	16.95
Q Total (cfs)	1666.75	Flow (cfs)	1065.68	588.18	12.89
Top Width (ft)	236.56	Top Width (ft)	210.72	20.00	5.84
Vel Total (ft/s)	2.61	Avg. Vel. (ft/s)	2.28	3.82	0.76
Max Chl Dpth (ft)	8.76	Hydr. Depth (ft)	2.22	7.71	2.90
Conv. Total (cfs)	52709.1	Conv. (cfs)	33700.9	18600.5	407.7
Length Wtd. (ft)	100.00	Wetted Per. (ft)	210.78	22.07	8.23
Min Ch EI (ft)	989.80	Shear (lb/sq ft)	0.14	0.44	0.13
Alpha	1.24	Stream Power (lb/ft s)	626.63	0.00	0.00
Frctn Loss (ft)	0.11	Cum Volume (acre-ft)	10.50	2.45	1.22
C & E Loss (ft)	0.00	Cum SA (acres)	2.92	0.26	0.27

Plan: Plan 36 Chartiers Run 2 RS: 400 Profile: 100yr Storm

E.G. Elev (ft)	998.58	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.16	Wt. n-Val.	0.035	0.045	0.100
W.S. Elev (ft)	998.42	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	398.30	179.44	7.99
E.G. Slope (ft/ft)	0.001308	Area (sq ft)	398.30	179.44	7.99
Q Total (cfs)	1666.75	Flow (cfs)	934.05	727.39	5.31
Top Width (ft)	240.51	Top Width (ft)	210.72	25.09	4.70
Vel Total (ft/s)	2.85	Avg. Vel. (ft/s)	2.35	4.05	0.67
Max Chl Dpth (ft)	7.85	Hydr. Depth (ft)	1.89	7.15	1.70
Conv. Total (cfs)	46082.9	Conv. (cfs)	25824.8	20111.1	146.9
Length Wtd. (ft)	100.00	Wetted Per. (ft)	211.04	28.70	5.80
Min Ch EI (ft)	990.57	Shear (lb/sq ft)	0.15	0.51	0.11
Alpha	1.27	Stream Power (lb/ft s)	605.13	0.00	0.00
Frctn Loss (ft)	0.11	Cum Volume (acre-ft)	9.50	2.06	1.19
C & E Loss (ft)	0.01	Cum SA (acres)	2.44	0.21	0.26

Plan: Plan 36 Chartiers Run 2 RS: 300 Profile: 100yr Storm

E.G. Elev (ft)	998.46	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.13	Wt. n-Val.	0.035	0.045	0.100
W.S. Elev (ft)	998.32	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	408.76	197.89	51.65
E.G. Slope (ft/ft)	0.001016	Area (sq ft)	408.76	197.89	51.65
Q Total (cfs)	1666.75	Flow (cfs)	893.87	730.04	42.84
Top Width (ft)	247.24	Top Width (ft)	198.59	26.98	21.67
Vel Total (ft/s)	2.53	Avg. Vel. (ft/s)	2.19	3.69	0.83
Max Chl Dpth (ft)	8.17	Hydr. Depth (ft)	2.06	7.33	2.38
Conv. Total (cfs)	52299.1	Conv. (cfs)	28047.9	22907.1	1344.1
Length Wtd. (ft)	100.00	Wetted Per. (ft)	198.93	30.15	22.28
Min Ch EI (ft)	990.15	Shear (lb/sq ft)	0.13	0.42	0.15
Alpha	1.33	Stream Power (lb/ft s)	578.12	0.00	0.00
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	8.58	1.63	1.12
C & E Loss (ft)	0.02	Cum SA (acres)	1.97	0.15	0.23

Plan: Plan 36 Chartiers Run 2 RS: 200 Profile: 100yr Storm

E.G. Elev (ft)	998.37	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.	0.035	0.045	0.100
W.S. Elev (ft)	998.31	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	665.29	162.59	124.12
E.G. Slope (ft/ft)	0.000431	Area (sq ft)	665.29	162.59	124.12
Q Total (cfs)	1666.75	Flow (cfs)	1150.24	415.51	101.01
Top Width (ft)	290.08	Top Width (ft)	242.00	20.46	27.62
Vel Total (ft/s)	1.75	Avg. Vel. (ft/s)	1.73	2.56	0.81
Max Chl Dpth (ft)	8.82	Hydr. Depth (ft)	2.75	7.95	4.49
Conv. Total (cfs)	80289.2	Conv. (cfs)	55408.1	20015.5	4865.5
Length Wtd. (ft)	100.00	Wetted Per. (ft)	242.13	22.59	28.97
Min Ch EI (ft)	989.49	Shear (lb/sq ft)	0.07	0.19	0.12
Alpha	1.22	Stream Power (lb/ft s)	581.57	0.00	0.00
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	7.34	1.22	0.92
C & E Loss (ft)	0.01	Cum SA (acres)	1.46	0.10	0.17

Plan: Plan 36 Chartiers Run 2 RS: 100 Profile: 100yr Storm

E.G. Elev (ft)	998.34	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.	0.035	0.045	0.100
W.S. Elev (ft)	998.31	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	1071.71	165.18	147.51
E.G. Slope (ft/ft)	0.000160	Area (sq ft)	1071.71	165.18	147.51
Q Total (cfs)	1666.75	Flow (cfs)	1338.46	261.83	66.46
Top Width (ft)	361.50	Top Width (ft)	301.98	20.50	39.02
Vel Total (ft/s)	1.20	Avg. Vel. (ft/s)	1.25	1.59	0.45
Max Chl Dpth (ft)	8.37	Hydr. Depth (ft)	3.55	8.06	3.78
Conv. Total (cfs)	131794.3	Conv. (cfs)	105835.8	20703.2	5255.3
Length Wtd. (ft)	100.00	Wetted Per. (ft)	302.09	22.34	39.73
Min Ch EI (ft)	989.94	Shear (lb/sq ft)	0.04	0.07	0.04
Alpha	1.14	Stream Power (lb/ft s)	609.02	0.00	0.00
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	5.35	0.84	0.61
C & E Loss (ft)	0.00	Cum SA (acres)	0.84	0.05	0.09

Plan: Plan 36 Chartiers Run 2 RS: 000 Profile: 100yr Storm

E.G. Elev (ft)	998.32	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.035	0.045	0.100
W.S. Elev (ft)	998.31	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	1561.94	179.34	171.62
E.G. Slope (ft/ft)	0.000079	Area (sq ft)	1561.94	179.34	171.62
Q Total (cfs)	1666.75	Flow (cfs)	1397.43	211.98	57.33
Top Width (ft)	492.41	Top Width (ft)	428.26	22.09	42.07
Vel Total (ft/s)	0.87	Avg. Vel. (ft/s)	0.89	1.18	0.33
Max Chl Dpth (ft)	8.43	Hydr. Depth (ft)	3.65	8.12	4.08
Conv. Total (cfs)	187218.4	Conv. (cfs)	156967.2	23811.1	6440.1
Length Wtd. (ft)	100.00	Wetted Per. (ft)	428.88	22.24	42.76
Min Ch EI (ft)	989.88	Shear (lb/sq ft)	0.02	0.04	0.02
Alpha	1.12	Stream Power (lb/ft s)	711.90	0.00	0.00
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)	2.33	0.44	0.24
C & E Loss (ft)	0.07	Cum SA (acres)			

Plan: Plan 36 Chartiers Run 1 RS: 690 Profile: 100yr Storm

E.G. Elev (ft)	998.22	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.67	Wt. n-Val.	0.100	0.045	0.100
W.S. Elev (ft)	997.55	Reach Len. (ft)	690.00	690.00	690.00
Crit W.S. (ft)		Flow Area (sq ft)	464.74	207.54	37.09
E.G. Slope (ft/ft)	0.004457	Area (sq ft)	464.74	207.54	37.09
Q Total (cfs)	2950.00	Flow (cfs)	1164.02	1723.84	62.14
Top Width (ft)	156.49	Top Width (ft)	114.67	26.16	15.66
Vel Total (ft/s)	4.16	Avg. Vel. (ft/s)	2.50	8.31	1.68
Max Chl Dpth (ft)	8.58	Hydr. Depth (ft)	4.05	7.93	2.37
Conv. Total (cfs)	44189.1	Conv. (cfs)	17436.3	25822.0	930.8
Length Wtd. (ft)	690.00	Wetted Per. (ft)	115.83	28.37	16.89
Min Ch EI (ft)	988.97	Shear (lb/sq ft)	1.12	2.04	0.61
Alpha	2.48	Stream Power (lb/ft s)	425.67	0.00	0.00
Frctn Loss (ft)	1.20	Cum Volume (acre-ft)	8.17	4.76	3.73
C & E Loss (ft)	0.15	Cum SA (acres)	1.93	0.55	0.76

Plan: Plan 36 Chartiers Run 1 RS: 000 Profile: 100yr Storm

E.G. Elev (ft)	996.87	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.17	Wt. n-Val.	0.100	0.045	0.100
W.S. Elev (ft)	996.70	Reach Len. (ft)			
Crit W.S. (ft)	992.88	Flow Area (sq ft)	567.43	393.95	434.39
E.G. Slope (ft/ft)	0.000916	Area (sq ft)	567.43	393.95	434.39
Q Total (cfs)	2950.00	Flow (cfs)	682.34	1672.94	594.71
Top Width (ft)	252.74	Top Width (ft)	129.14	43.00	80.60
Vel Total (ft/s)	2.11	Avg. Vel. (ft/s)	1.20	4.25	1.37
Max Chl Dpth (ft)	11.00	Hydr. Depth (ft)	4.39	9.16	5.39
Conv. Total (cfs)	97482.9	Conv. (cfs)	22548.1	55282.5	19652.3
Length Wtd. (ft)		Wetted Per. (ft)	129.75	44.97	81.77
Min Ch El (ft)	985.70	Shear (lb/sq ft)	0.25	0.50	0.30
Alpha	2.45	Stream Power (lb/ft s)	2222.00	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Plan: Plan 36 Westland Run 3 RS: 700 Profile: 100yr Storm

E.G. Elev (ft)	1000.70	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.17	Wt. n-Val.	0.100	0.045	0.100
W.S. Elev (ft)	1000.53	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	386.70	176.84	133.83
E.G. Slope (ft/ft)	0.001310	Area (sq ft)	386.70	176.84	133.83
Q Total (cfs)	1283.25	Flow (cfs)	424.64	746.92	111.69
Top Width (ft)	224.94	Top Width (ft)	132.39	24.11	68.44
Vel Total (ft/s)	1.84	Avg. Vel. (ft/s)	1.10	4.22	0.83
Max Chl Dpth (ft)	8.01	Hydr. Depth (ft)	2.92	7.33	1.96
Conv. Total (cfs)	35453.0	Conv. (cfs)	11731.8	20635.5	3085.7
Length Wtd. (ft)	100.00	Wetted Per. (ft)	132.55	26.62	69.24
Min Ch El (ft)	992.52	Shear (lb/sq ft)	0.24	0.54	0.16
Alpha	3.20	Stream Power (lb/ft s)	453.67	0.00	0.00
Frctn Loss (ft)	0.11	Cum Volume (acre-ft)	7.04	3.82	8.59
C & E Loss (ft)	0.02	Cum SA (acres)	1.98	0.36	2.06

Plan: Plan 36 Westland Run 3 RS: 600 Profile: 100yr Storm

E.G. Elev (ft)	1000.57	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.12	Wt. n-Val.	0.100	0.045	0.100
W.S. Elev (ft)	1000.45	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	285.67	143.75	428.32
E.G. Slope (ft/ft)	0.000988	Area (sq ft)	285.67	143.75	428.32
Q Total (cfs)	1283.25	Flow (cfs)	282.92	567.00	433.33
Top Width (ft)	243.11	Top Width (ft)	91.65	18.09	133.37
Vel Total (ft/s)	1.50	Avg. Vel. (ft/s)	0.99	3.94	1.01
Max Chl Dpth (ft)	8.84	Hydr. Depth (ft)	3.12	7.95	3.21
Conv. Total (cfs)	40835.9	Conv. (cfs)	9003.3	18043.2	13789.4
Length Wtd. (ft)	100.00	Wetted Per. (ft)	92.48	19.40	134.31
Min Ch El (ft)	991.61	Shear (lb/sq ft)	0.19	0.46	0.20
Alpha	3.32	Stream Power (lb/ft s)	400.80	0.00	0.00
Frctn Loss (ft)	0.11	Cum Volume (acre-ft)	6.27	3.45	7.94
C & E Loss (ft)	0.01	Cum SA (acres)	1.72	0.31	1.83

Plan: Plan 36 Westland Run 3 RS: 500 Profile: 100yr Storm

E.G. Elev (ft)	1000.46	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.19	Wt. n-Val.	0.100	0.045	0.100
W.S. Elev (ft)	1000.27	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	393.35	175.88	90.11
E.G. Slope (ft/ft)	0.001148	Area (sq ft)	393.35	175.88	90.11
Q Total (cfs)	1283.25	Flow (cfs)	412.67	770.75	99.82
Top Width (ft)	178.02	Top Width (ft)	130.10	21.37	26.55
Vel Total (ft/s)	1.95	Avg. Vel. (ft/s)	1.05	4.38	1.11
Max Chl Dpth (ft)	8.67	Hydr. Depth (ft)	3.02	8.23	3.39
Conv. Total (cfs)	37878.0	Conv. (cfs)	12181.0	22750.5	2946.5
Length Wtd. (ft)	100.00	Wetted Per. (ft)	130.75	22.69	27.60
Min Ch El (ft)	991.60	Shear (lb/sq ft)	0.22	0.56	0.23
Alpha	3.16	Stream Power (lb/ft s)	382.90	0.00	0.00
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)	5.49	3.08	7.35
C & E Loss (ft)	0.03	Cum SA (acres)	1.47	0.27	1.65

Plan: Plan 36 Westland Run 3 RS: 400 Profile: 100yr Storm

E.G. Elev (ft)	1000.34	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.10	Wt. n-Val.	0.100	0.045	0.100
W.S. Elev (ft)	1000.24	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	571.85	180.75	89.49
E.G. Slope (ft/ft)	0.000716	Area (sq ft)	571.85	180.75	89.49
Q Total (cfs)	1283.25	Flow (cfs)	587.31	626.66	69.29
Top Width (ft)	189.61	Top Width (ft)	137.02	20.15	32.45
Vel Total (ft/s)	1.52	Avg. Vel. (ft/s)	1.03	3.47	0.77
Max Chl Dpth (ft)	9.77	Hydr. Depth (ft)	4.17	8.97	2.76
Conv. Total (cfs)	47972.3	Conv. (cfs)	21955.5	23426.7	2590.1
Length Wtd. (ft)	100.00	Wetted Per. (ft)	137.68	23.24	32.92
Min Ch El (ft)	990.47	Shear (lb/sq ft)	0.19	0.35	0.12
Alpha	2.75	Stream Power (lb/ft s)	327.35	0.00	0.00
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	4.38	2.67	7.14
C & E Loss (ft)	0.00	Cum SA (acres)	1.16	0.22	1.58

Plan: Plan 36 Westland Run 3 RS: 300 Profile: 100yr Storm

E.G. Elev (ft)	1000.26	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.11	Wt. n-Val.	0.100	0.045	0.100
W.S. Elev (ft)	1000.14	Reach Len. (ft)	8.00	8.00	8.00
Crit W.S. (ft)	996.31	Flow Area (sq ft)	565.91	159.84	163.71
E.G. Slope (ft/ft)	0.000910	Area (sq ft)	565.91	159.84	163.71
Q Total (cfs)	1283.25	Flow (cfs)	576.30	607.76	99.19
Top Width (ft)	286.54	Top Width (ft)	164.60	18.13	103.80
Vel Total (ft/s)	1.44	Avg. Vel. (ft/s)	1.02	3.80	0.61
Max Chl Dpth (ft)	9.29	Hydr. Depth (ft)	3.44	8.82	1.58
Conv. Total (cfs)	42535.9	Conv. (cfs)	19102.7	20145.4	3287.8
Length Wtd. (ft)	8.00	Wetted Per. (ft)	165.28	21.44	104.19
Min Ch El (ft)	990.85	Shear (lb/sq ft)	0.19	0.42	0.09
Alpha	3.53	Stream Power (lb/ft s)	382.06	0.00	0.00
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	3.07	2.28	6.85
C & E Loss (ft)	0.01	Cum SA (acres)	0.82	0.18	1.42

Plan: Plan 36 Westland Run 3 RS: 292 BR U Profile: 100yr Storm

E.G. Elev (ft)	1000.23	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.22	Wt. n-Val.	0.100	0.045	0.100
W.S. Elev (ft)	1000.01	Reach Len. (ft)	16.00	16.00	16.00
Crit W.S. (ft)	999.37	Flow Area (sq ft)	279.38	118.09	109.99
E.G. Slope (ft/ft)	0.009425	Area (sq ft)	279.38	118.09	109.99
Q Total (cfs)	1283.25	Flow (cfs)	521.63	610.28	151.34
Top Width (ft)	280.20	Top Width (ft)	164.32	18.13	97.74
Vel Total (ft/s)	2.53	Avg. Vel. (ft/s)	1.87	5.17	1.38
Max Chl Dpth (ft)	9.16	Hydr. Depth (ft)	1.70	6.51	1.13
Conv. Total (cfs)	13217.9	Conv. (cfs)	5373.0	6286.1	1558.9
Length Wtd. (ft)	16.00	Wetted Per. (ft)	194.60	57.70	118.16
Min Ch EI (ft)	990.85	Shear (lb/sq ft)	0.84	1.20	0.55
Alpha	2.24	Stream Power (lb/ft s)	382.06	0.00	0.00
Frctn Loss (ft)	0.23	Cum Volume (acre-ft)	2.99	2.26	6.83
C & E Loss (ft)	0.04	Cum SA (acres)	0.79	0.17	1.40

Plan: Plan 36 Westland Run 3 RS: 292 BR D Profile: 100yr Storm

E.G. Elev (ft)	999.97	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.59	Wt. n-Val.	0.100	0.045	0.100
W.S. Elev (ft)	999.37	Reach Len. (ft)	1.00	1.00	1.00
Crit W.S. (ft)	999.37	Flow Area (sq ft)	175.43	106.58	56.89
E.G. Slope (ft/ft)	0.023470	Area (sq ft)	175.43	106.58	56.89
Q Total (cfs)	1283.25	Flow (cfs)	375.98	811.66	95.62
Top Width (ft)	250.56	Top Width (ft)	163.00	18.13	69.43
Vel Total (ft/s)	3.79	Avg. Vel. (ft/s)	2.14	7.62	1.68
Max Chl Dpth (ft)	8.52	Hydr. Depth (ft)	1.08	5.88	0.82
Conv. Total (cfs)	8376.3	Conv. (cfs)	2454.2	5298.0	624.1
Length Wtd. (ft)	1.00	Wetted Per. (ft)	193.14	57.70	89.84
Min Ch EI (ft)	990.85	Shear (lb/sq ft)	1.33	2.71	0.93
Alpha	2.67	Stream Power (lb/ft s)	382.06	0.00	0.00
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	2.91	2.22	6.80
C & E Loss (ft)	0.00	Cum SA (acres)	0.73	0.17	1.37

Plan: Plan 36 Westland Run 3 RS: 275 Profile: 100yr Storm

E.G. Elev (ft)	998.68	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.60	Wt. n-Val.	0.100	0.045	0.100
W.S. Elev (ft)	998.07	Reach Len. (ft)	75.00	75.00	75.00
Crit W.S. (ft)		Flow Area (sq ft)	231.25	122.29	41.89
E.G. Slope (ft/ft)	0.004896	Area (sq ft)	231.25	122.29	41.89
Q Total (cfs)	1283.25	Flow (cfs)	319.62	902.13	61.51
Top Width (ft)	193.34	Top Width (ft)	150.60	18.13	24.62
Vel Total (ft/s)	3.25	Avg. Vel. (ft/s)	1.38	7.38	1.47
Max Chl Dpth (ft)	7.22	Hydr. Depth (ft)	1.54	6.75	1.70
Conv. Total (cfs)	18339.2	Conv. (cfs)	4567.7	12892.4	879.0
Length Wtd. (ft)	75.00	Wetted Per. (ft)	150.88	21.44	24.96
Min Ch EI (ft)	990.85	Shear (lb/sq ft)	0.47	1.74	0.51
Alpha	3.69	Stream Power (lb/ft s)	382.06	0.00	0.00
Frctn Loss (ft)	0.12	Cum Volume (acre-ft)	2.91	2.21	6.79
C & E Loss (ft)	0.16	Cum SA (acres)	0.72	0.17	1.37

Plan: Plan 36 Westland Run 3 RS: 200 Profile: 100yr Storm

E.G. Elev (ft)	998.40	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.09	Wt. n-Val.	0.100	0.045	0.035
W.S. Elev (ft)	998.32	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	412.73	175.49	224.24
E.G. Slope (ft/ft)	0.000740	Area (sq ft)	412.73	175.49	224.24
Q Total (cfs)	1283.25	Flow (cfs)	311.04	549.78	422.43
Top Width (ft)	292.69	Top Width (ft)	161.96	23.22	107.51
Vel Total (ft/s)	1.58	Avg. Vel. (ft/s)	0.75	3.13	1.88
Max Chl Dpth (ft)	8.70	Hydr. Depth (ft)	2.55	7.56	2.09
Conv. Total (cfs)	47186.7	Conv. (cfs)	11437.3	20216.0	15533.4
Length Wtd. (ft)	100.00	Wetted Per. (ft)	162.06	26.93	107.60
Min Ch EI (ft)	989.62	Shear (lb/sq ft)	0.12	0.30	0.10
Alpha	2.21	Stream Power (lb/ft s)	467.71	0.00	0.00
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)	2.35	1.96	6.57
C & E Loss (ft)	0.02	Cum SA (acres)	0.45	0.13	1.26

Plan: Plan 36 Westland Run 3 RS: 100 Profile: 100yr Storm

E.G. Elev (ft)	998.36	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.100	0.045	0.035
W.S. Elev (ft)	998.34	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	179.70	233.48	902.03
E.G. Slope (ft/ft)	0.000133	Area (sq ft)	179.70	233.48	902.03
Q Total (cfs)	1283.25	Flow (cfs)	52.86	321.20	909.19
Top Width (ft)	414.15	Top Width (ft)	79.38	30.30	304.48
Vel Total (ft/s)	0.98	Avg. Vel. (ft/s)	0.29	1.38	1.01
Max Chl Dpth (ft)	9.18	Hydr. Depth (ft)	2.26	7.71	2.96
Conv. Total (cfs)	111447.2	Conv. (cfs)	4590.9	27895.1	78961.2
Length Wtd. (ft)	100.00	Wetted Per. (ft)	79.71	33.92	304.67
Min Ch EI (ft)	989.16	Shear (lb/sq ft)	0.02	0.06	0.02
Alpha	1.26	Stream Power (lb/ft s)	543.23	0.00	0.00
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	1.67	1.49	5.27
C & E Loss (ft)	0.00	Cum SA (acres)	0.18	0.07	0.79

Plan: Plan 36 Westland Run 3 RS: 000 Profile: 100yr Storm

E.G. Elev (ft)	998.35	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.100	0.045	0.035
W.S. Elev (ft)	998.34	Reach Len. (ft)	170.00	170.00	170.00
Crit W.S. (ft)		Flow Area (sq ft)	180.20	263.22	1343.78
E.G. Slope (ft/ft)	0.000056	Area (sq ft)	180.20	263.22	1343.78
Q Total (cfs)	1283.25	Flow (cfs)	36.16	260.39	986.70
Top Width (ft)	483.70	Top Width (ft)	73.60	30.28	379.82
Vel Total (ft/s)	0.72	Avg. Vel. (ft/s)	0.20	0.99	0.73
Max Chl Dpth (ft)	9.47	Hydr. Depth (ft)	2.45	8.69	3.54
Conv. Total (cfs)	172227.5	Conv. (cfs)	4853.0	34947.8	132426.7
Length Wtd. (ft)	170.00	Wetted Per. (ft)	73.85	32.65	379.97
Min Ch EI (ft)	988.87	Shear (lb/sq ft)	0.01	0.03	0.01
Alpha	1.19	Stream Power (lb/ft s)	645.48	0.00	0.00
Frctn Loss (ft)	0.07	Cum Volume (acre-ft)	1.26	0.92	2.69
C & E Loss (ft)	0.07	Cum SA (acres)			

River: Apply Data

Reach: River Sta.:

Description:

Plot Options Keep Prev XS Plots

Houston Injection Plan: Plan 36 1/17/2017
13+00

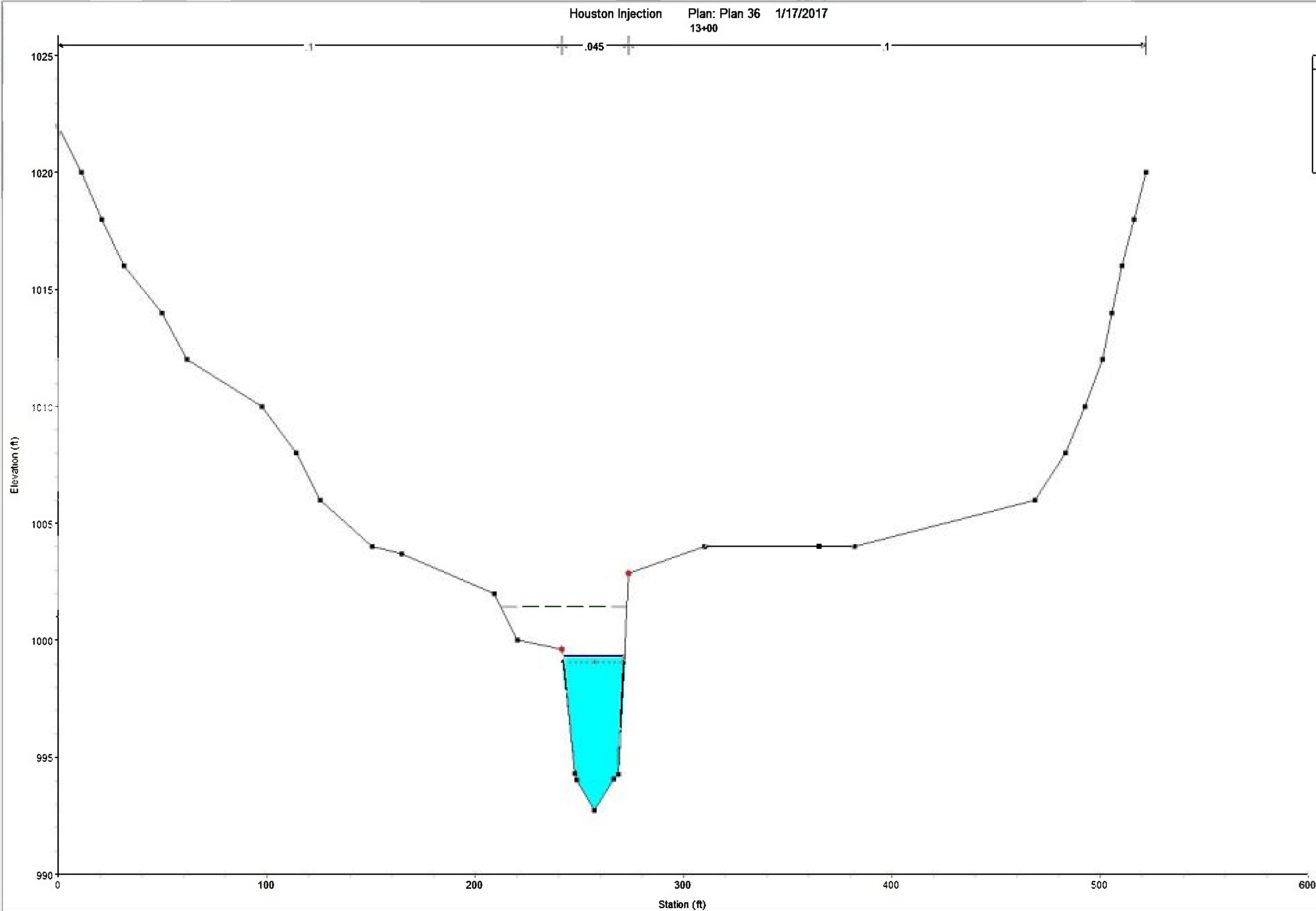
Del Row	Ins Row	Station	Elevation
1	0	1022	
2	11.07	1020	
3	20.94	1018	
4	31.74	1016	
5	49.99	1014	
6	61.77	1012	
7	97.91	1010	
8	114.36	1008	
9	125.87	1006	
10	150.8	1004	
11	164.76	1003.7	
12	209.44	1002	
13	220.48	1000	
14	241.86	999.64	
15	248.2	994.3	
16	248.83	994.03	
17	257.48	992.72	
18	266.49	994.07	
19	269.08	994.26	
20	273.78	1002.86	
21	310.1	1004	
22	365.51	1004	
23	382.39	1004	
24	468.73	1006	
25	483.56	1008	
26	492.69	1010	
27	501.23	1012	
28	505.96	1014	
29	510.6	1016	
30	516.34	1018	
31	522.21	1020	
32			
33			
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53			

Downstream Reach Lengths		
LOB	Channel	ROB
100	100	100

Manning's n Values		
LOB	Channel	ROB
0.1	0.045	0.1

Main Channel Bank Stations	
Left Bank	Right Bank
241.86	273.78

Contr/Exp. Coefficient (Steady Flow)	
Contraction	Expansion
0.1	0.3



Legend

- EG 100yr Storm
- WS 100yr Storm
- Crit 100yr Storm
- Ground
- Bank Sta

River: Apply Data **Plot Options**

Reach: River Sta.:

Description:

Del Row	Ins Row	Station	Elevation
1	0	0	1022
2	6.34	6.34	1020
3	12.32	12.32	1018
4	18.56	18.56	1016
5	24.82	24.82	1014
6	34.91	34.91	1012
7	47.96	47.96	1010
8	74.92	74.92	1008
9	114.68	114.68	1006
10	133.11	133.11	1004
11	179.65	179.65	1002
12	263.05	263.05	999
13	325.95	325.95	995
14	328.64	328.64	994.32
15	330.02	330.02	993.89
16	335.85	335.85	993.28
17	342.23	342.23	993.95
18	344.59	344.59	994.23
19	347.57	347.57	995.41
20	526.28	526.28	1008
21	539.84	539.84	1010
22	550.59	550.59	1012
23	559.5	559.5	1014
24	568.23	568.23	1016
25	576.34	576.34	1018
26	583.58	583.58	1020
27			
28			
29			
30			
31			
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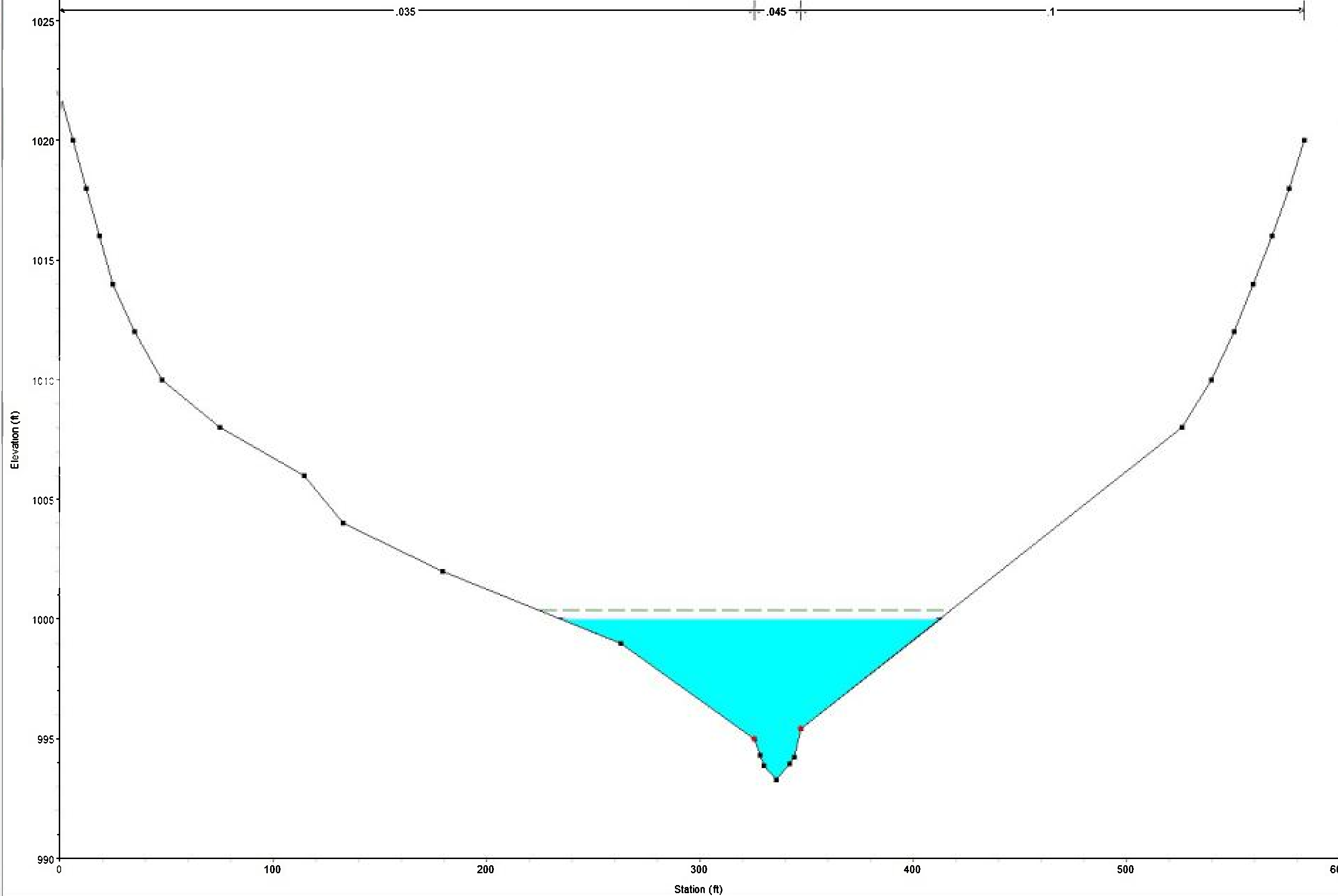
Downstream Reach Lengths		
LOB	Channel	ROB
100	100	100

Manning's n Values		
LOB	Channel	ROB
0.035	0.045	0.1

Main Channel Bank Stations	
Left Bank	Right Bank
325.95	347.57

ContnEx - Coefficient (Steady Flow)	
Contraction	Expansion
0.1	0.3

Houston Injection Plan: Plan 36 1/17/2017
12+00



Legend

- EG 100yr Storm
- WS 100yr Storm
- Ground
- Bank Sta

248.00, 1012.65

River: Apply Data Keep Prev XS Plots

Reach: River Sta.:

Description:

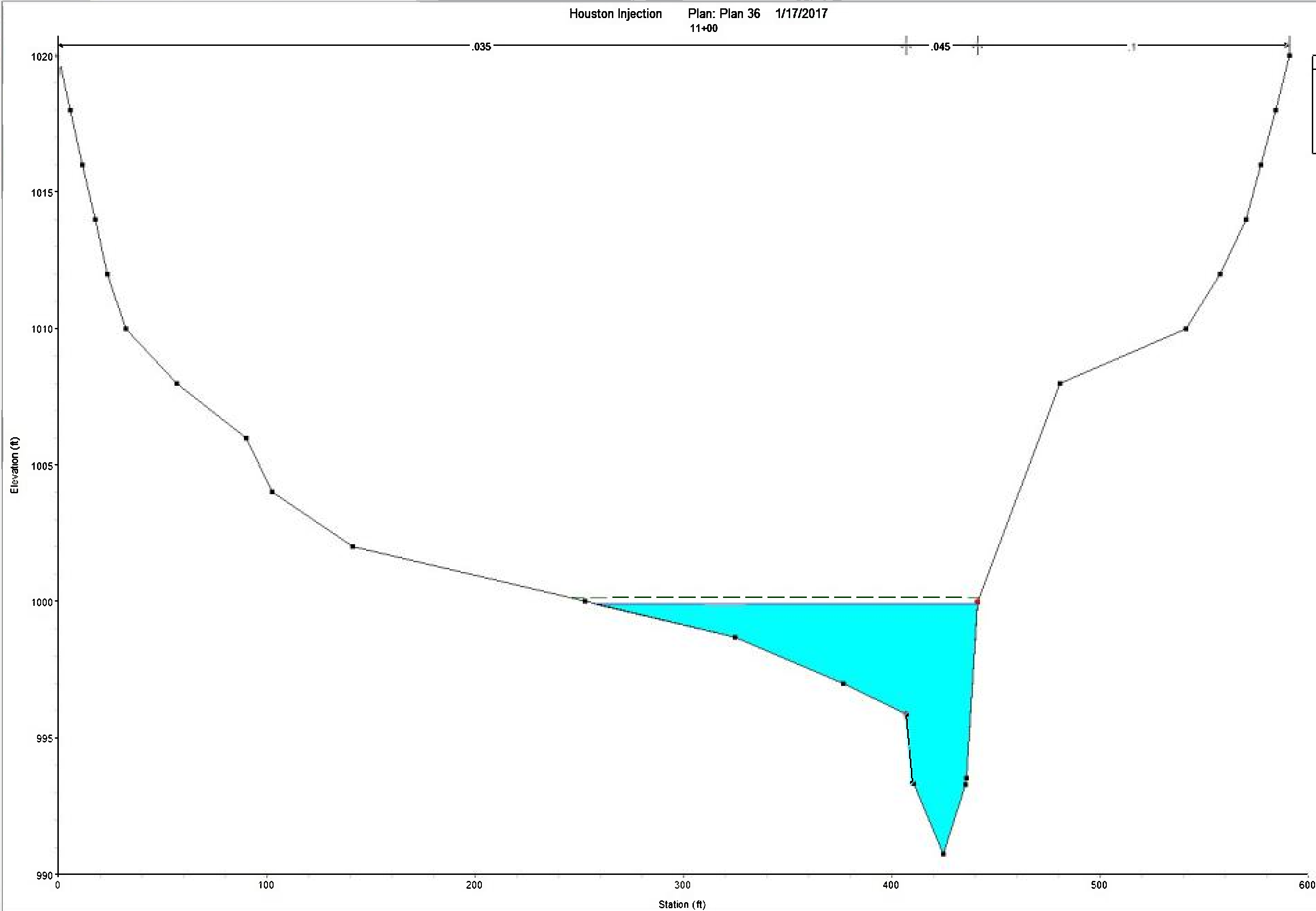
Del Row	Ins Row	Station	Elevation
		0	1020
		5.56	1018
		11.69	1016
		17.69	1014
		23.49	1012
		32.37	1010
		57	1008
		90.4	1006
		102.86	1004
		141.39	1002
		252.85	1000
		324.8	998.7
		376.75	997
		407.3	995.87
		410.28	993.33
		410.45	993.34
		424.95	990.76
		435.44	993.29
		436.12	993.53
		441.29	999.99
		481.01	1008
		541.23	1010
		557.62	1012
		570.21	1014
		577.45	1016
		584.32	1018
		591.16	1020

Downstream Reach Lengths		
LOB	Channel	ROB
100	100	100

Manning's n Values		
LOB	Channel	ROB
0.035	0.045	0.1

Main Channel Bank Stations	
Left Bank	Right Bank
407.3	441.29

Cont/Ex Coefficient (Steady Flow)	
Contraction	Expansion
0.1	0.3



Legend

- EG 100yr Storm (dashed line)
- WS 100yr Storm (solid line)
- Ground (black dots)
- Bank Sta (red diamond)

River: Keep Prev XS Plots

Reach: River Sta.:

Description:

Del Row	Ins Row	Station	Elevation
		0	1018
		5.23	1016
		10.73	1014
		17.6	1012
		32.87	1010
		63.06	1009.01
		98.76	1008
		125.63	1006
		219.27	1004
		260.04	1002
		318.57	1000
		386.21	998
		449.32	996.78
		455.58	992.73
		456.44	992.36
		463.97	991.03
		472.18	992.35
		472.73	992.49
		474	993.9
		542.58	997
		561.7	1000
		566.33	1002
		570.19	1004
		574.97	1006
		581.02	1008
		587.22	1010
		593.8	1012
		600.84	1014
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		30	
		31	
		32	
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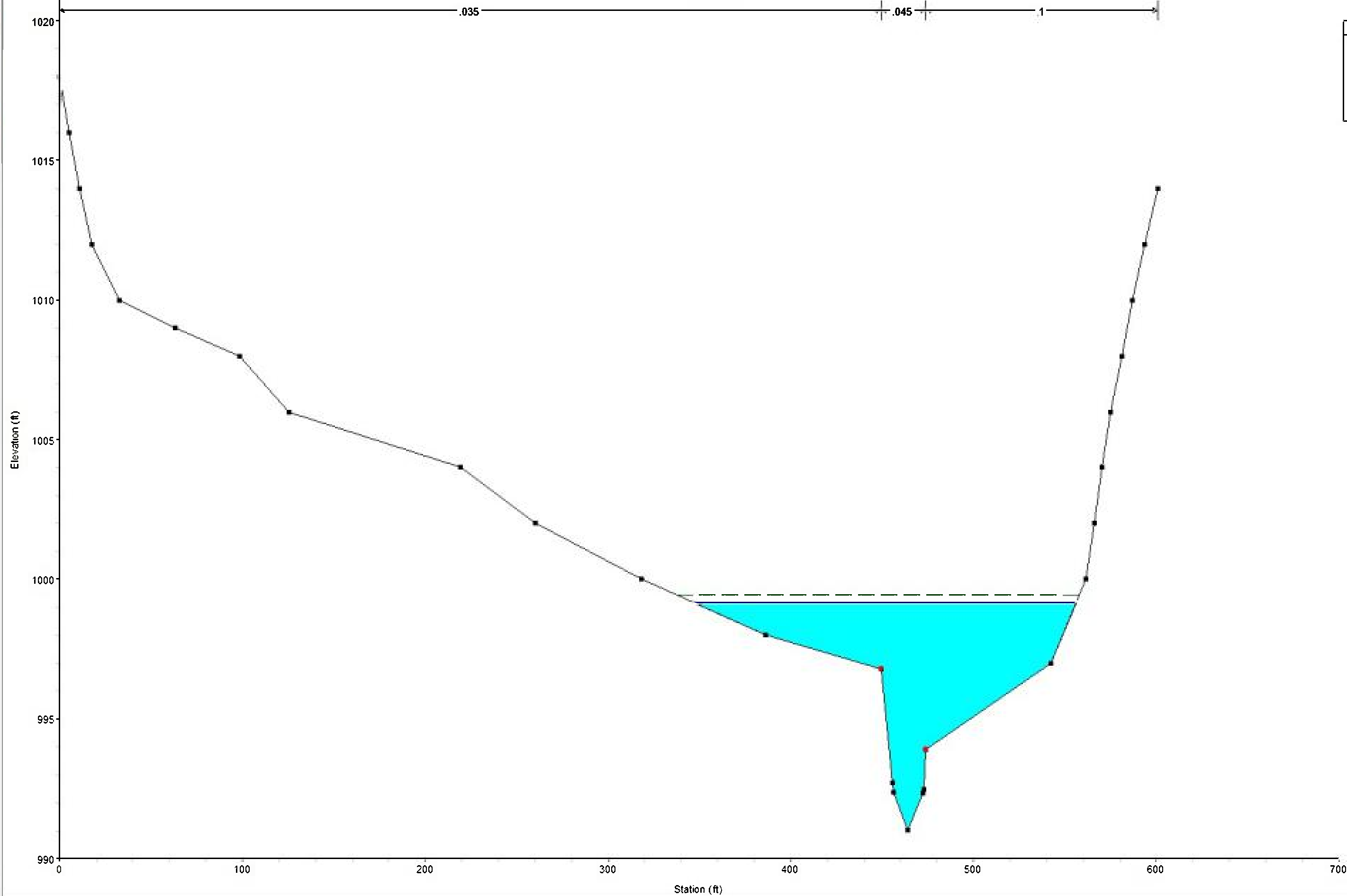
Downstream Reach Lengths		
LOB	Channel	ROB
100	100	100

Manning's n Values		
LOB	Channel	ROB
0.035	0.045	0.1

Main Channel Bank Stations	
Left Bank	Right Bank
449.32	474

Contr/Exp. Coefficient (Steady Flow)	
Contraction	Expansion
0.1	0.3

Houston Injection Plan: Plan 36 1/17/2017
9+00



Legend

- EG 100yr Storm
- WS 100yr Storm
- Ground
- Bank Sta

River: **Chartiers Run**
 Reach: **2** River Sta.: **100**
 Description: **8+00**

Plot Options Keep Prev XS Plots

Houston Injection Plan: Plan 36 1/17/2017
 8+00

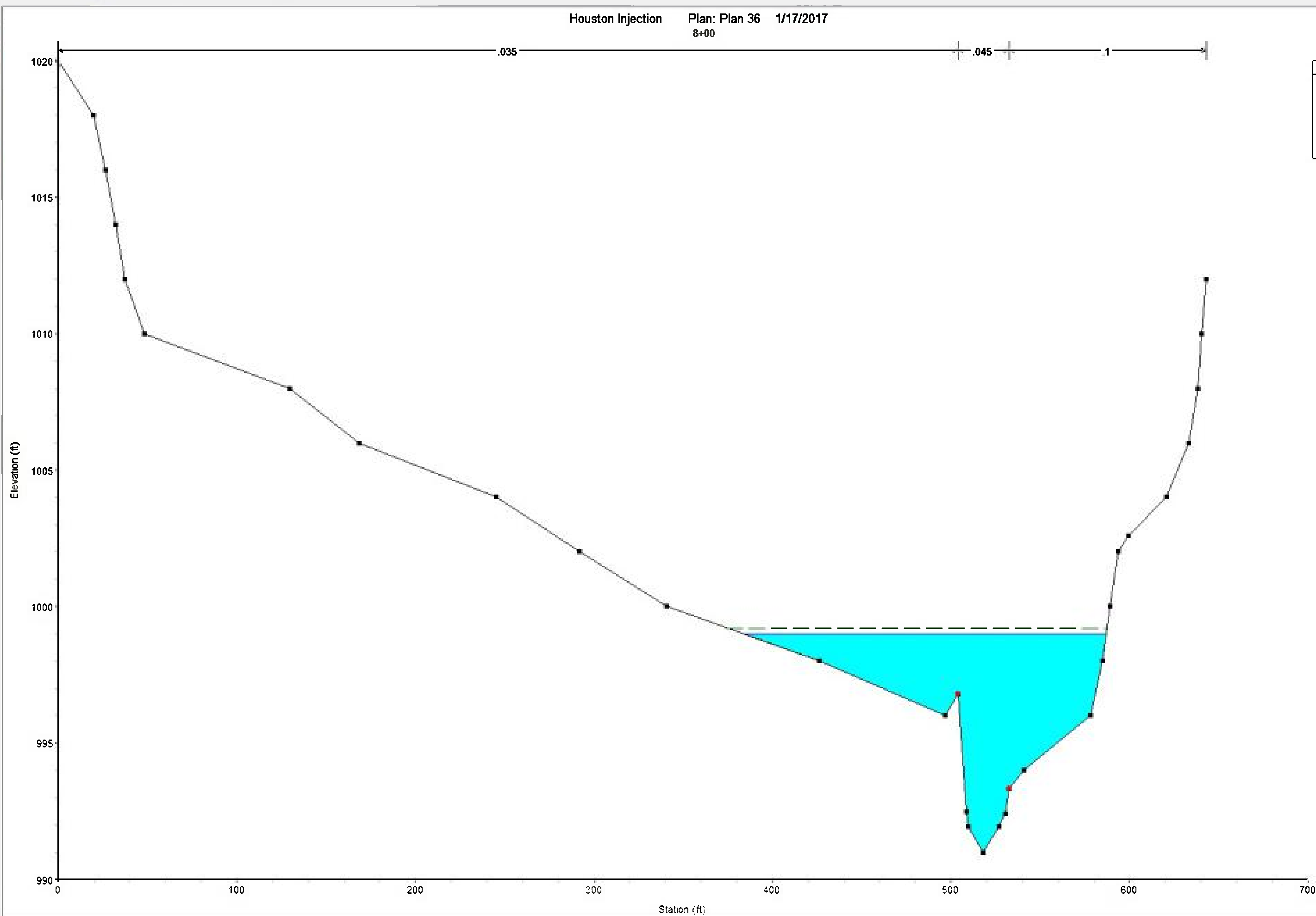
Del Row	Ins Row	Station	Elevation
		0	1020
		19.45	1018
		26.39	1016
		31.97	1014
		37.47	1012
		48.15	1010
		129.59	1008
		168.44	1006
		245.01	1004
		291.83	1002
		340.73	1000
		426.05	998
		496.92	996
		504.12	996.79
		508.56	992.47
		509.61	991.92
		517.95	990.97
		526.71	991.92
		530.58	992.42
		532.68	993.34
		540.9	994
		578.32	996
		584.86	998
		589.05	1000
		593.45	1002
		599.36	1002.6
		620.86	1004
		632.98	1006
		638.18	1008
		640.47	1010
		642.81	1012

Downstream Reach Lengths		
LOB	Channel	ROB
100	100	100

Manning's n Values		
LOB	Channel	ROB
0.035	0.045	0.1

Main Channel Bank Stations	
Left Bank	Right Bank
504.12	532.68

Contr/Exp Coefficient (Steady Flow)	
Contraction	Expansion
0.1	0.3



Legend

- EG 100yr Storm
- WS 100yr Storm
- Ground
- Bank Sta

River: Charliers Run
Reach: 2 River Sta.: 700
Description: 7+00

Plot Options Keep Prev XS Plots Clear Prev

Houston Injection Plan: Plan 36 1/17/2017
7+00

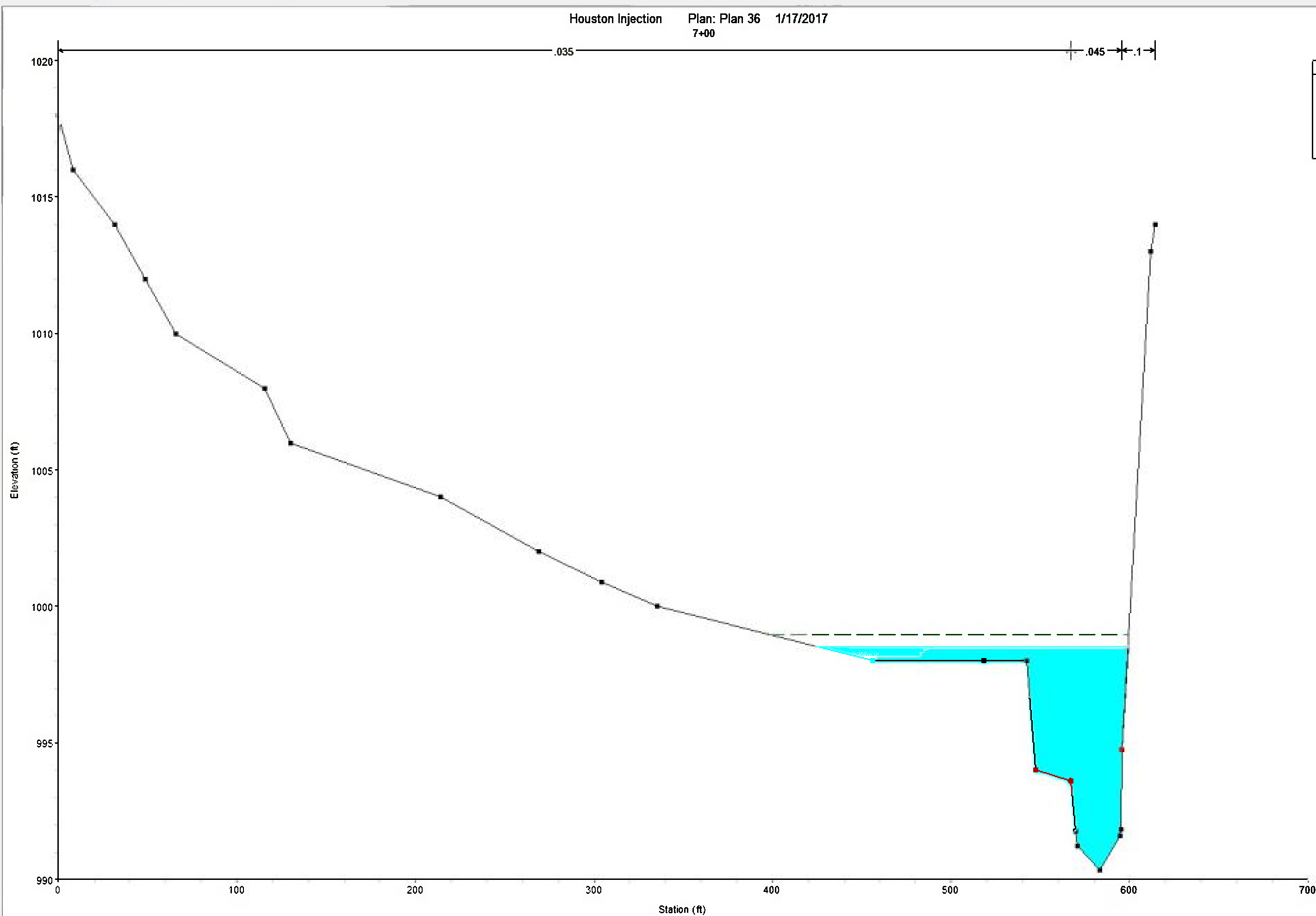
Cross Section Coordinates	
Station	Elevation
1	0
2	8.32
3	31.4
4	48.64
5	65.7
6	115.56
7	130.19
8	214.37
9	269.16
10	304.44
11	335.41
12	456.48
13	518.32
14	542.34
15	547.32
16	567.4
17	569.75
18	570.79
19	583.23
20	594.92
21	595.26
22	595.92
23	611.69
24	614.49
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Downstream Reach Lengths		
LOB	Channel	ROB
100	100	100

Manning's n Values		
LOB	Channel	ROB
0.035	0.045	0.1

Main Channel Bank Stations	
Left Bank	Right Bank
567.4	595.92

Contr/Exp Coefficient (Steady Flow)	
Contraction	Expansion
0.1	0.3



Legend

- EG 100yr Storm
- WS 100yr Storm
- Ground
- Bank Sta

River: Chartiers Run
 Reach: 2 River Sta.:
 Description: 4+00

Plot Options Keep Prev XS Plots

Houston Injection Plan: Plan 36 1/17/2017
 4+00

Del Row Ins Row

Cross Section Coordinates	
Station	Elevation
1	0
2	8.4
3	16.74
4	30.8
5	87.62
6	94.14
7	112.83
8	180.85
9	197.47
10	214.14
11	268.8
12	324.88
13	332.7
14	352.86
15	390.23
16	521.56
17	536.02
18	539.35
19	540.71
20	547.75
21	554.17
22	559.04
23	561.11
24	577.68
25	599.84
26	605.13
27	
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Downstream Reach Lengths

LOB	Channel	ROB
100	100	100

Manning's n Values

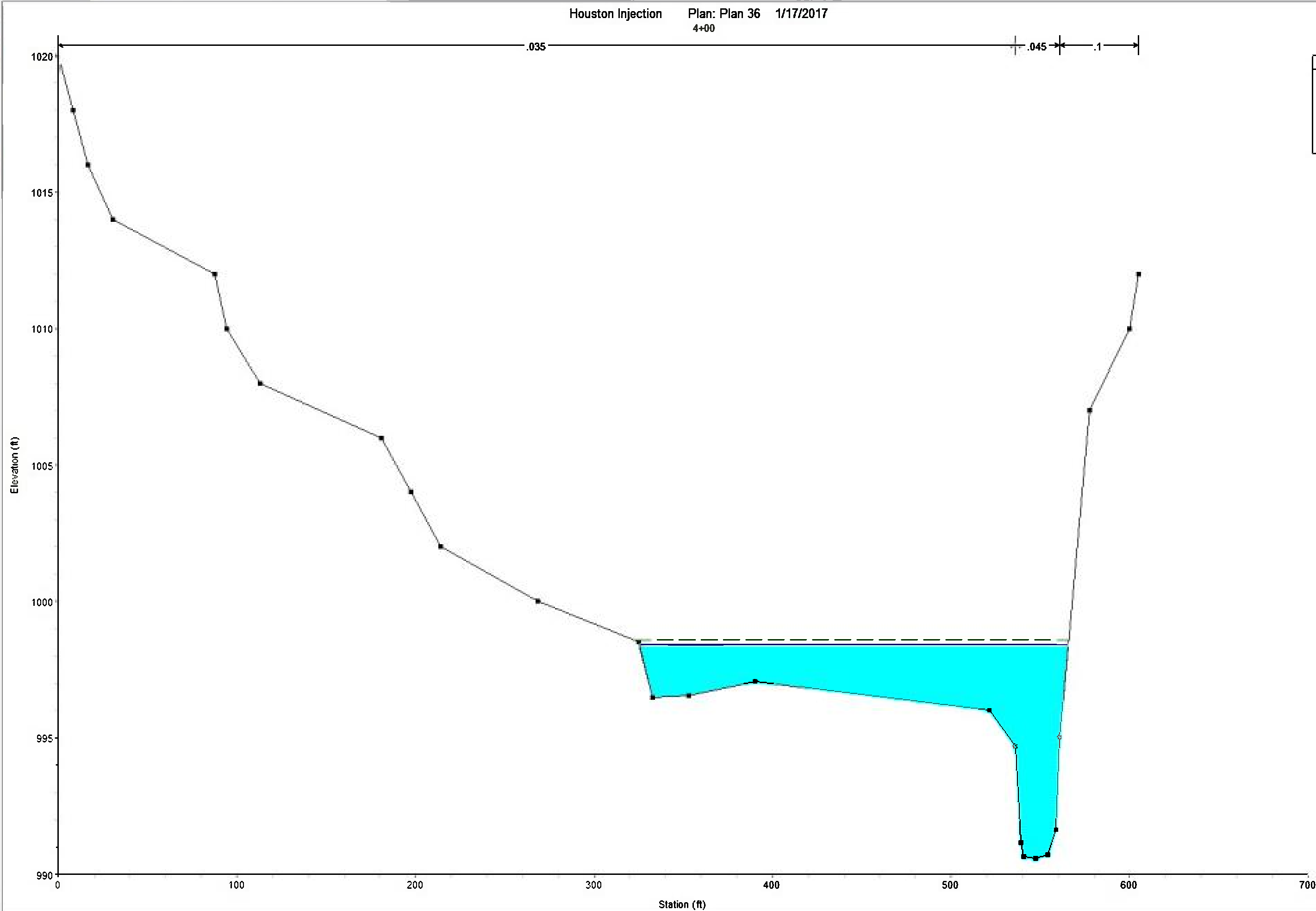
LOB	Channel	ROB
0.035	0.045	0.1

Main Channel Bank Stations

Left Bank	Right Bank
536.02	561.11

Contr/Ex - Coefficient (Steady Flow)

Contraction	Expansion
0.1	0.3



Legend	
---	EG 100yr Storm
---	WS 100yr Storm
■	Ground
◆	Bank Sta

River: Keep Prev XS Plots

Reach: River Sta.:

Description:

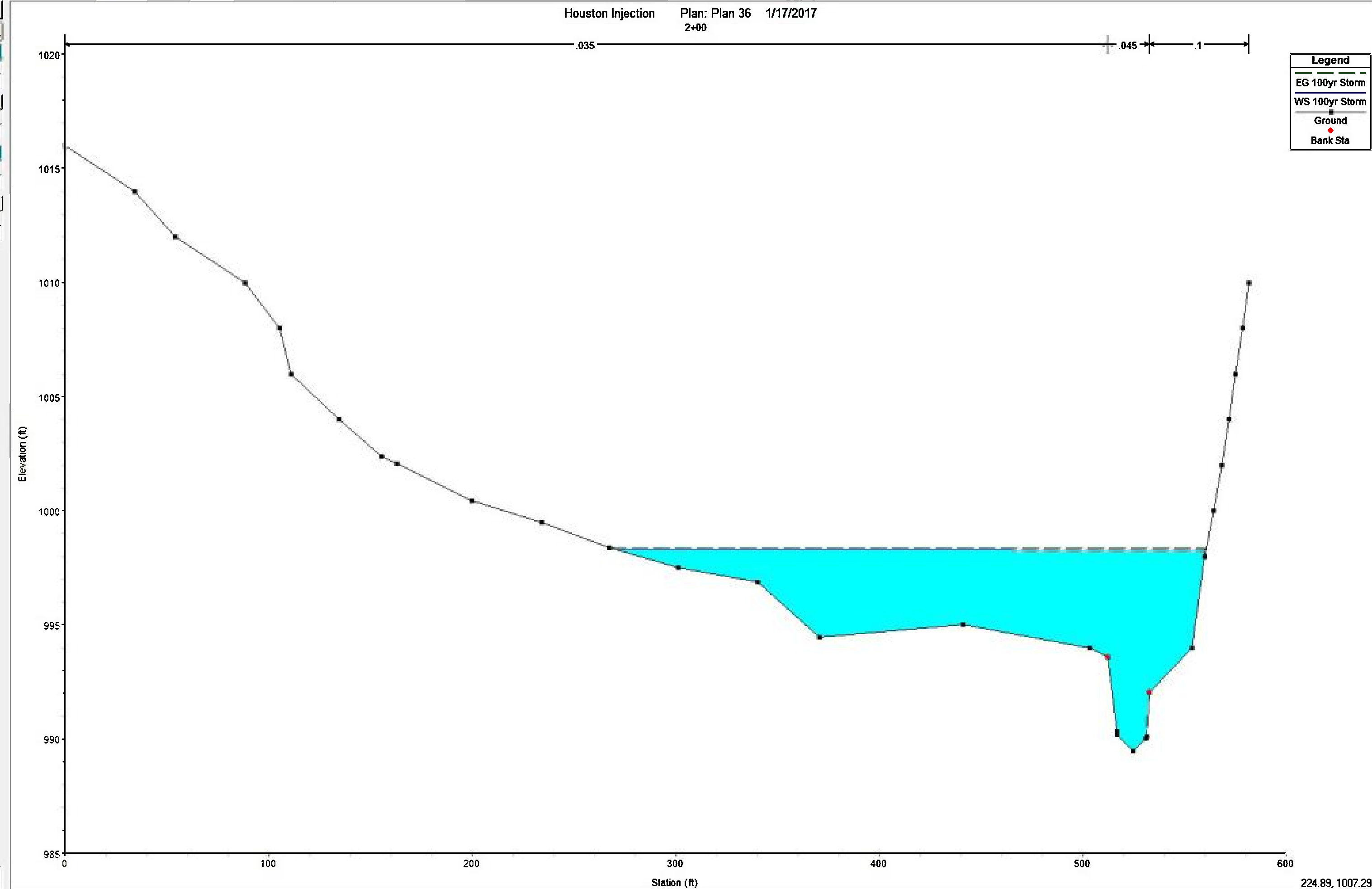
Del Row	Ins Row	Station	Elevation
		0	1016
		34.24	1014
		54.23	1012
		88.6	1010
		105.26	1008
		110.95	1006
		134.75	1004
		155.42	1002.4
		163.09	1002.05
		200.06	1000.43
		234.34	999.48
		267.77	998.38
		301.14	997.53
		340.5	996.86
		370.78	994.4543
		441.46	995.02
		503.4	994
		512.46	993.6
		516.73	990.33
		517.06	990.2
		524.95	989.49
		531.11	990.03
		531.36	990.1
		532.92	992.04
		553.69	994
		559.79	998
		564.6	1000
		568.47	1002
		571.85	1004
		575.03	1006
		578.47	1008
		581.57	1010

Downstream Reach Lengths		
LOB	Channel	ROB
100	100	100

Manning's n Values		
LOB	Channel	ROB
0.035	0.045	0.1

Main Channel Bank Stations	
Left Bank	Right Bank
512.46	532.92

ContEx: Coefficient (Steady Flow)	
Contraction	Expansion
0.1	0.3



Cross Section Coordinates	
Station	Elevation
1	0
2	18.49
3	33
4	57.1
5	95.37
6	101.51
7	105.78
8	121.71
9	153.3
10	156.48
11	181.48
12	216.34
13	251.28
14	292.32
15	332.22
16	456.12
17	530.11
18	531.92
19	532.37
20	541.57
21	550.34
22	550.61
23	588.39
24	596.38
25	599.1
26	601.43
27	603.89
28	606.39
29	609.02
30	
31	
32	
33	
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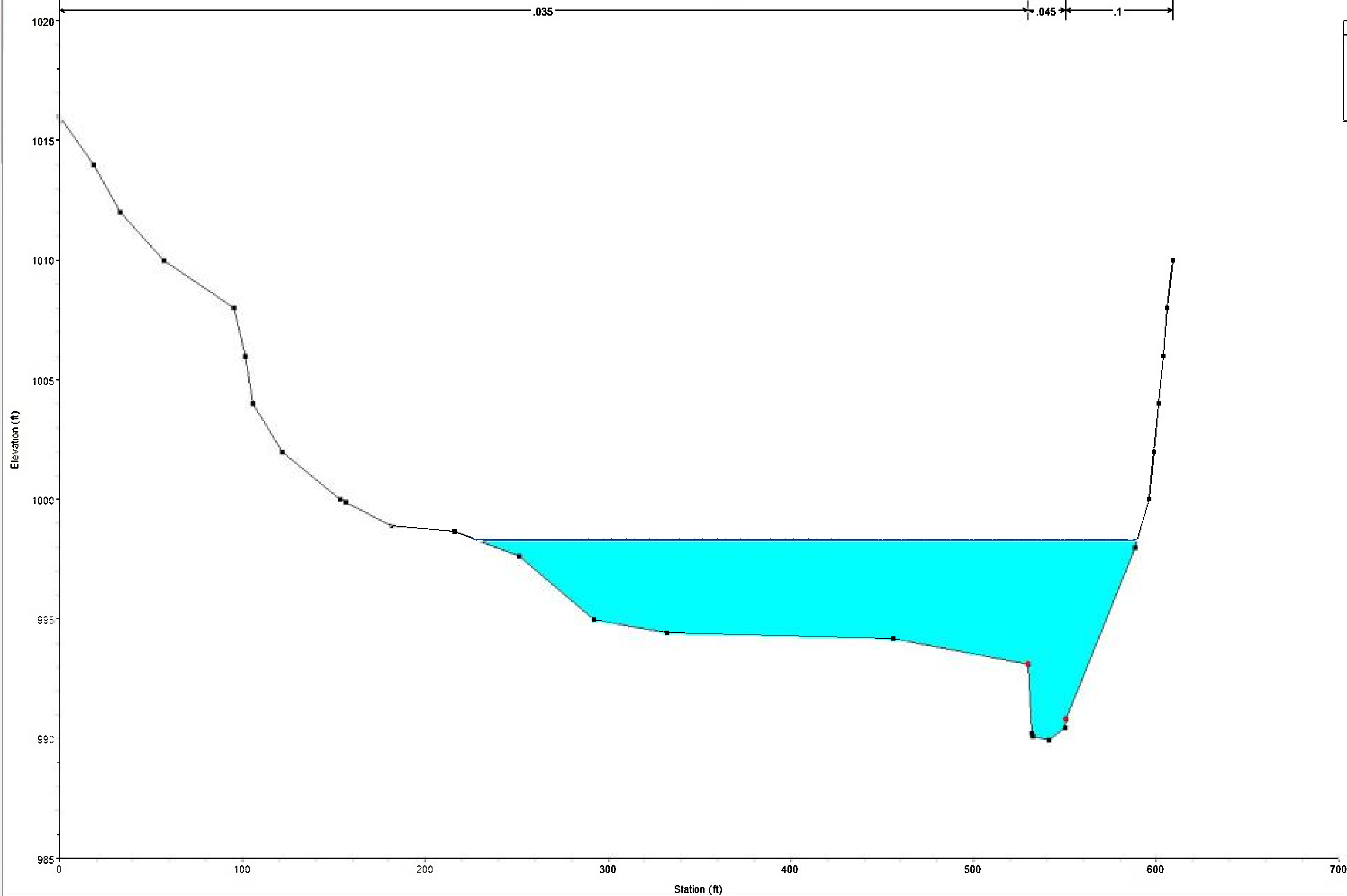
Downstream Reach Lengths		
LOB	Channel	ROB
100	100	100

Manning's n Values		
LOB	Channel	ROB
0.035	0.045	0.1

Main Channel Bank Stations	
Left Bank	Right Bank
530.11	550.61

Cont/Exp Coefficient (Steady Flow)	
Contraction	Expansion
0.1	0.3

Houston Injection Plan: Plan 36 1/17/2017
1+00



Legend	
	EG 100yr Storm
	WS 100yr Storm
	Ground
	Bank Sta

River: Chartiers Run Keep Prev XS Plots

Reach: 2 River Sta.: 000

Description: 0+00

Plot Options

Keep Prev XS Plots

Houston Injection Plan: Plan 36 1/17/2017
0+00

Del Row Ins Row

Downstream Reach Lengths

Cross Section Coordinates		
	Station	Elevation
1	0	1016
2	38.1	1014
3	49.42	1012
4	58.9	1010
5	78.48	1008
6	110.64	1006
7	116.83	1004
8	123.89	1002
9	144.04	1000
10	168.76	998
11	171.2	997.18
12	199.55	997.13
13	234.47	995.71
14	275.65	995.12
15	317.06	994.56
16	368.67	994.07
17	405.94	993.92
18	581.95	994
19	593.22	990.81
20	594.99	990.31
21	595.58	990.32
22	604.62	989.88
23	612.46	990.26
24	613.01	990.33
25	615.31	990.86
26	648.51	996
27	655.74	998
28	666.41	1000
29	688.85	1002
30	697.85	1004
31	702.06	1006
32	705.65	1008
33	708.85	1010
34	711.9	1012
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LOB	Channel	ROB

Manning's n Values [2]

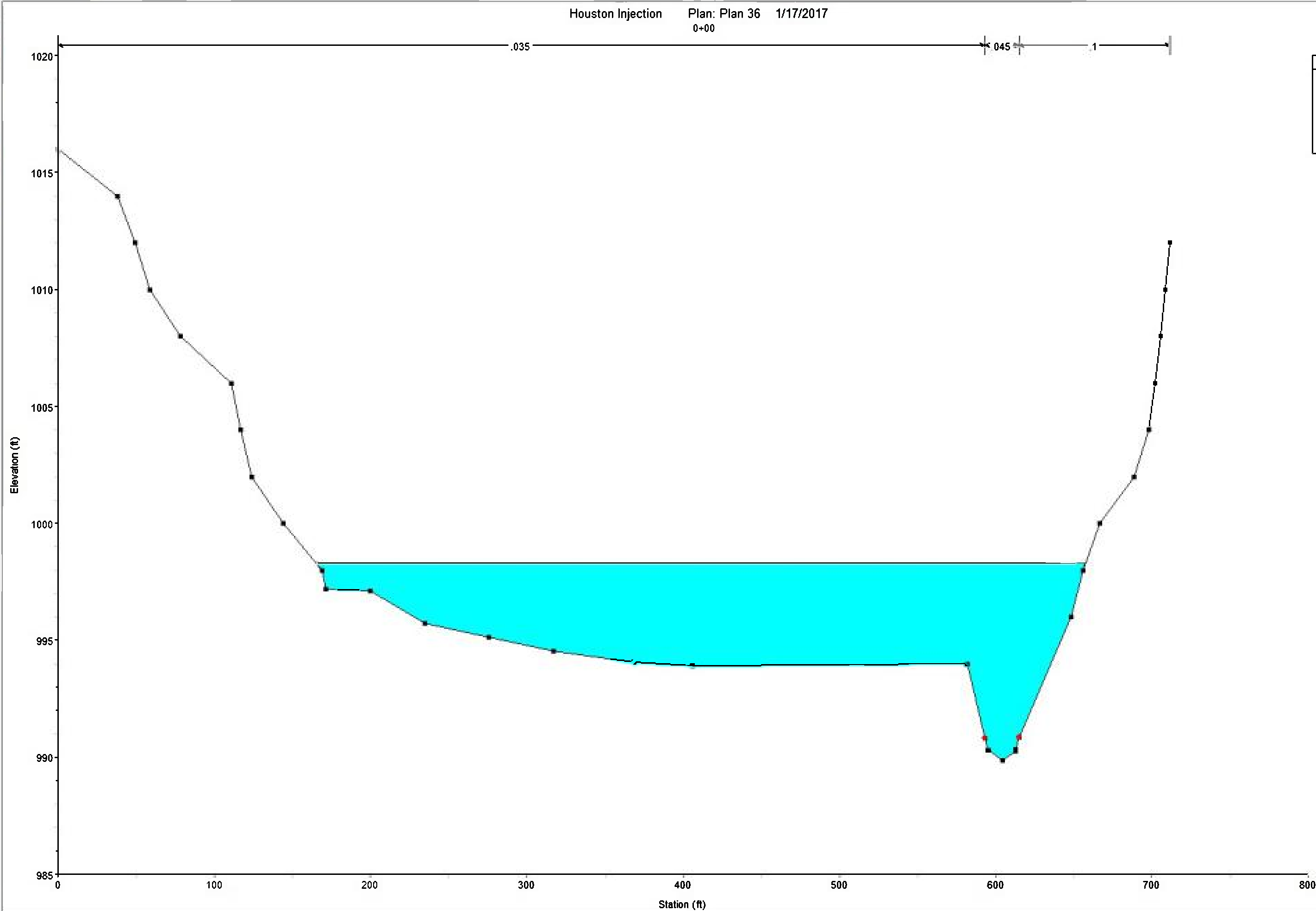
LOB	Channel	ROB
0.035	0.045	0.1

Main Channel Bank Stations

Left Bank	Right Bank
593.22	615.31

Contr/Exp Coefficient (Steady Flow) [2]

Contraction	Expansion
0.1	0.3



Legend

- EG 100yr Storm
- WS 100yr Storm
- Ground
- Bank Sta

River: Keep Prev XS Plots

Reach: River Sta.:

Description:

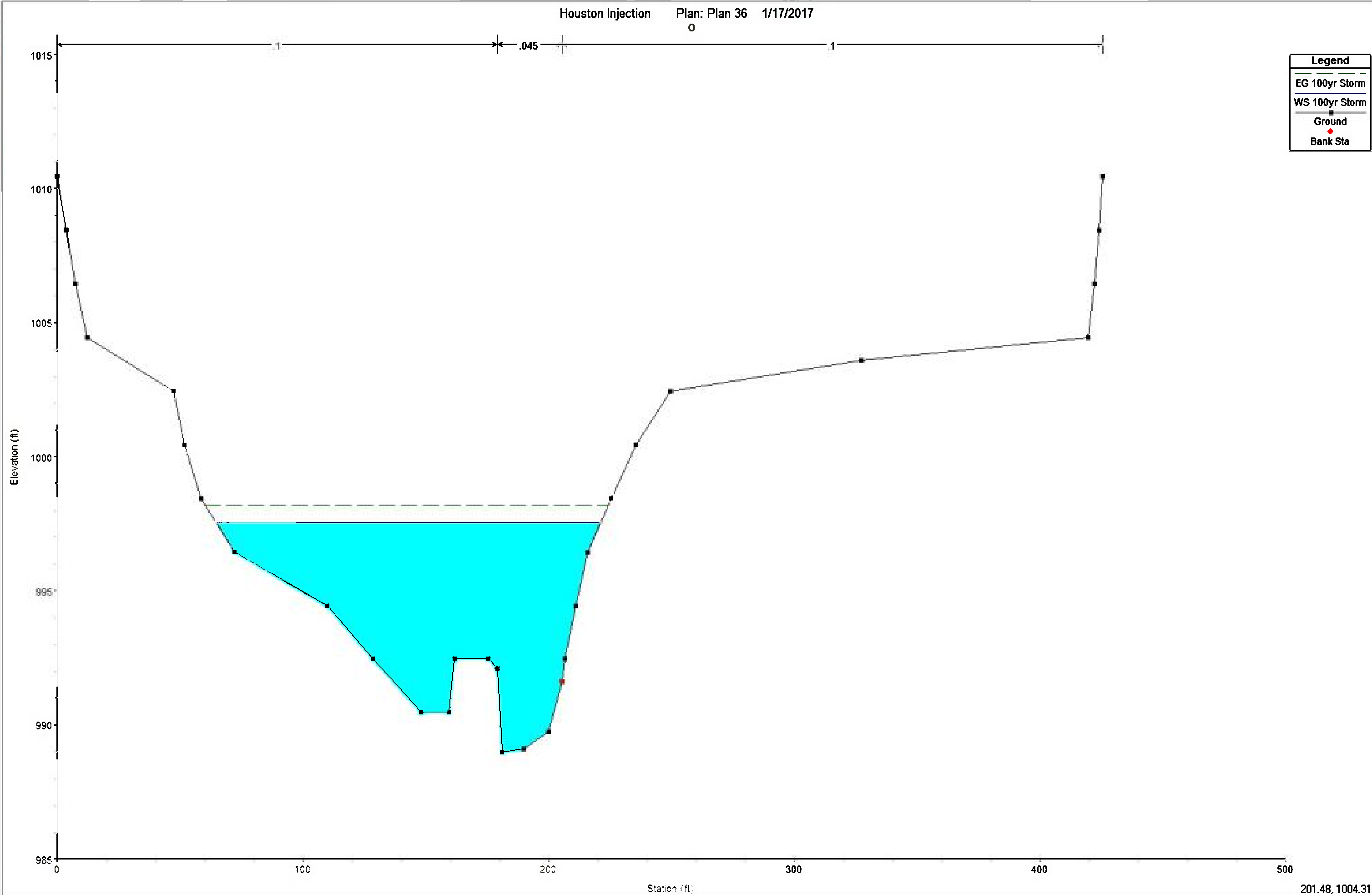
Del Row	Ins Row	Station	Elevation
1	0	0	1010.45
2	3.834	3.834	1008.45
3	7.558	7.558	1006.45
4	12.239	12.239	1004.45
5	47.435	47.435	1002.45
6	51.871	51.871	1000.45
7	58.454	58.454	998.45
8	72.214	72.214	996.45
9	109.854	109.854	994.45
10	128.396	128.396	992.45
11	147.977	147.977	990.45
12	159.696	159.696	990.45
13	161.791	161.791	992.45
14	175.445	175.445	992.45
15	179.32	179.32	992.089
16	179.321	179.321	992.089
17	180.955	180.955	988.976
18	181.24	181.24	988.965
19	190.122	190.122	989.095
20	200.046	200.046	989.75
21	205.477	205.477	991.618
22	206.483	206.483	992.45
23	210.978	210.978	994.45
24	215.831	215.831	996.45
25	225.482	225.482	998.45
26	235.577	235.577	1000.45
27	249.658	249.658	1002.45
28	327.388	327.388	1003.59
29	419.755	419.755	1004.45
30	422.291	422.291	1006.45
31	424.189	424.189	1008.45
32	425.672	425.672	1010.45
33			
34			
35			
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Downstream Reach Lengths		
LOB	Channel	ROB
690	690	690

Manning's n Values		
LOB	Channel	ROB
0.1	0.045	0.1

Main Channel Bank Stations	
Left Bank	Right Bank
179.32	205.477

Cont/Ex - Coefficient (Steady Flow)	
Contraction	Expansion
0.1	0.3



River: **Chartiers Run** Apply Data

Reach: **1** River Sta.: **000**

Description: **N**

Del Row Ins Row

Cross Section Coordinates

	Station	Elevation
1	1715	1006.3
2	1725	1000.4
3	1773	1000.4
4	1782	1001.8
5	1793	1001.8
6	1808	1001.4
7	1832	999.9
8	1850	993.4
9	1866	993.3
10	1901	992.3
11	1970	990.6
12	1987	986.7
13	1997	986.2
14	2000	985.9
15	2005	985.7
16	2006	986.2
17	2013	990.8
18	2038	990.3
19	2084	991.9
20	2098	998.9
21	2145	999.3
22	2222	1007
23		
24		
25		
26		
27		
28		
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Downstream Reach Lengths

LOB	Channel	ROB
100	100	100

Manning's n Values

LOB	Channel	ROB
0.1	0.045	0.1

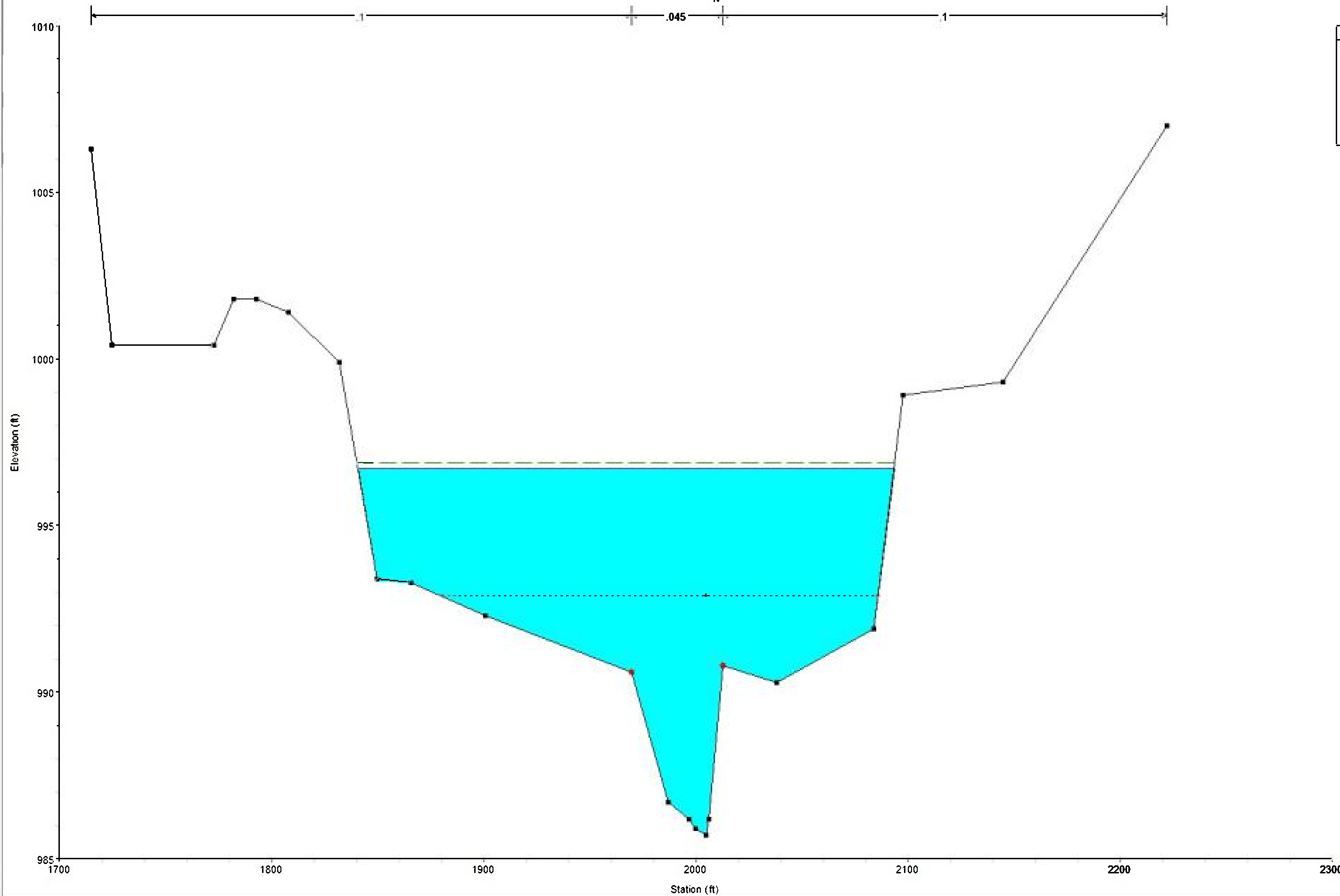
Main Channel Bank Stations

Left Bank	Right Bank
1970	2013

Cont/Exp. Coefficient (Steady Flow)

Contraction	Expansion
0.1	0.3

Houston Injection Plan: Plan 36 1/17/2017



Legend	
	EG 100yr Storm
	WS 100yr Storm
	Crit 100yr Storm
	Ground
	Bank Sta

River: Westland Run
 Reach: 3 River Sta.: 700
 Description: 7+00

Plot Options Keep Prev XS Plots

Houston Injection Plan: Plan 36 1/17/2017
 7+00

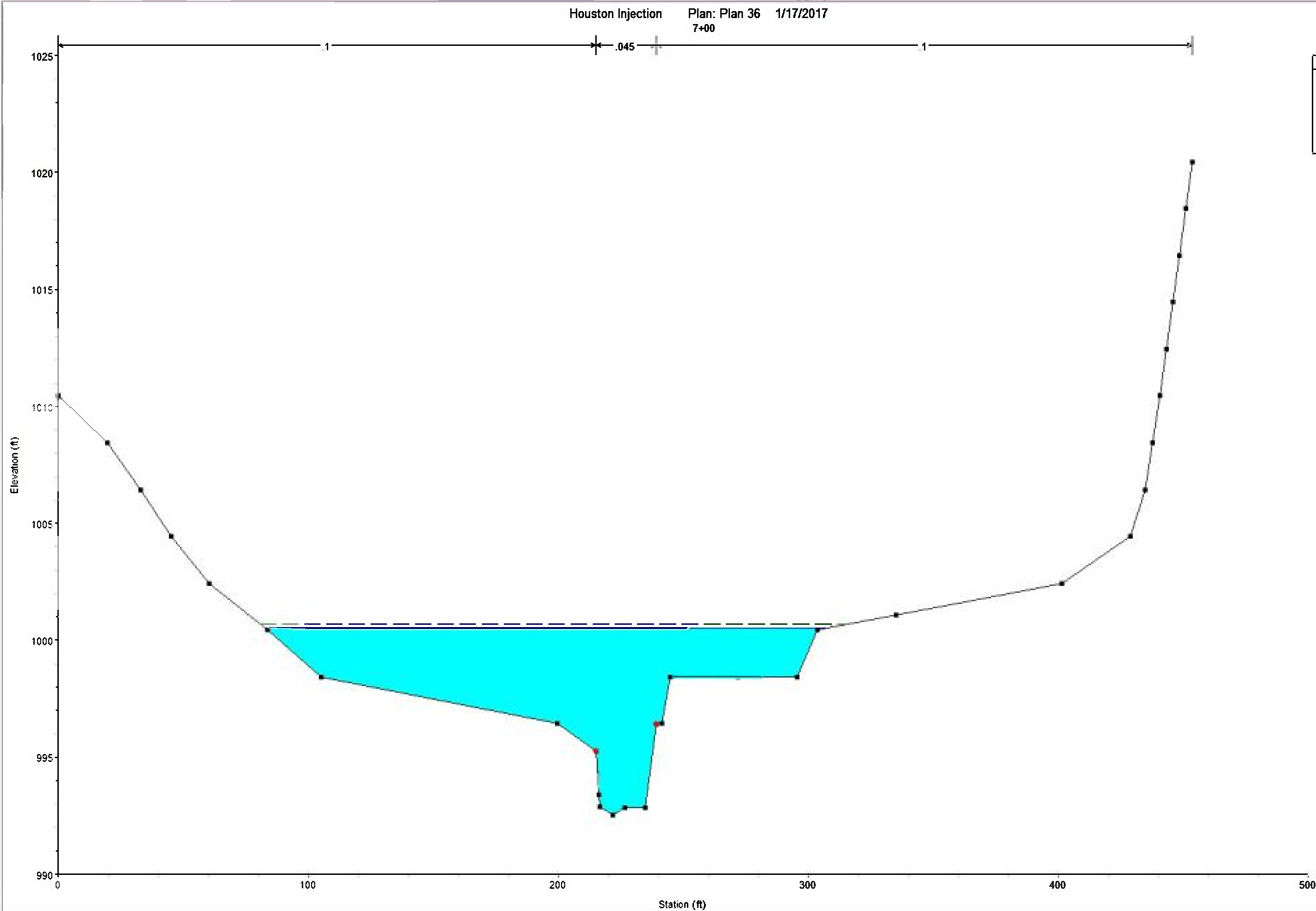
Cross Section Coordinates	
Station	Elevation
1	0
2	19.55
3	32.84
4	45.16
5	60.48
6	83.63
7	105
8	199.77
9	215.09
10	216.25
11	216.84
12	221.96
13	226.8
14	234.82
15	239.2
16	241.34
17	244.65
18	271.7
19	295.52
20	303.77
21	335.24
22	401.57
23	429.04
24	434.97
25	437.76
26	440.58
27	443.43
28	445.83
29	448.43
30	451.05
31	453.67
32	
33	
34	
35	
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Downstream Reach Lengths		
LOB	Channel	ROB
100	100	100

Manning's n Values		
LOB	Channel	ROB
0.1	0.045	0.1

Main Channel Bank Stations	
Left Bank	Right Bank
215.09	239.2

Contr/Exp. Coefficient (Steady Flow)	
Contraction	Expansion
0.1	0.3



Legend

- EG 100yr Storm
- WS 100yr Storm
- Ground
- Bank Sta

River: Westland Run
 Reach: 3 River Sta.: 600
 Description: 6+00

Plot Options Keep Prev XS Plots

Houston Injection Plan: Plan 36 1/17/2017
 6+00

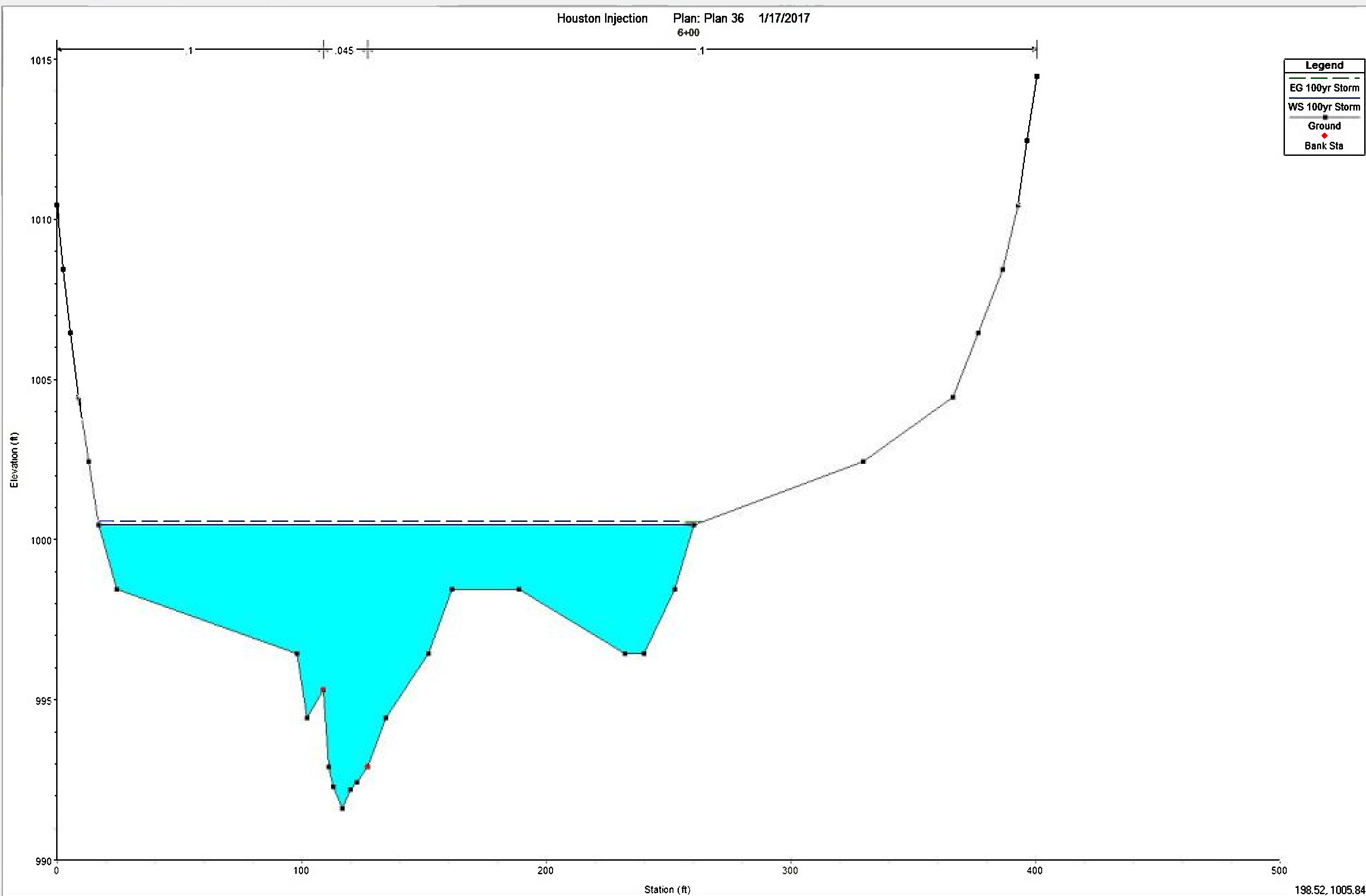
Del Row	Ins Row	Station	Elevation	
		0	1010.45	
		2.65	1008.45	
		5.6	1006.45	
		9.02	1004.45	
		12.9	1002.45	
		17.22	1000.45	
		24.53	998.45	
		8	98.22	996.45
		9	102.18	994.45
		10	108.86	995.33
		11	111.12	992.92
		12	112.83	992.29
		13	116.79	991.61
		14	120.05	992.21
		15	122.46	992.44
		16	126.95	992.92
		17	134.4	994.45
		18	151.84	996.45
		19	161.39	998.45
		20	188.75	998.45
		21	232.09	996.45
		22	239.86	996.45
		23	252.57	998.45
		24	260.19	1000.45
		25	329.76	1002.45
		26	366.35	1004.45
		27	376.68	1006.45
		28	386.51	1008.45
		29	392.81	1010.45
		30	396.78	1012.45
		31	400.8	1014.45
		32		
		33		
		34		
		35		
		36		
		37		
		38		
		39		
		40		
		41		
		42		
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		50		
		51		
		52		
		53		

Downstream Reach Lengths		
LOB	Channel	ROB
100	100	100

Manning's n Values		
LOB	Channel	ROB
0.1	0.045	0.1

Main Channel Bank Stations	
Left Bank	Right Bank
108.86	126.95

Contr/Ex - Coefficient (Steady Flow)	
Contraction	Expansion
0.1	0.3



River: Westland Run

Apply Data

Plot Options

Keep Prev XS Plots

Reach: 3 River Sta.:

Description: 4+00

Del Row Ins Row

Cross Section Coordinates

Station	Elevation
1	0
2	3.11
3	6.28
4	9.45
5	12.61
6	15.72
7	19.21
8	36.98
9	41.65
10	99.21
11	153.1
12	154.68
13	154.95
14	162.85
15	169.62
16	171.8
17	173.25
18	184.83
19	193.92
20	207.07
21	236.59
22	250.86
23	282.12
24	288.86
25	309.36
26	317.96
27	327.35
28	
29	
30	
31	
32	
33	
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Downstream Reach Lengths

LOB	Channel	ROB
100	100	100

Manning's n Values

LOB	Channel	ROB
0.1	0.045	0.1

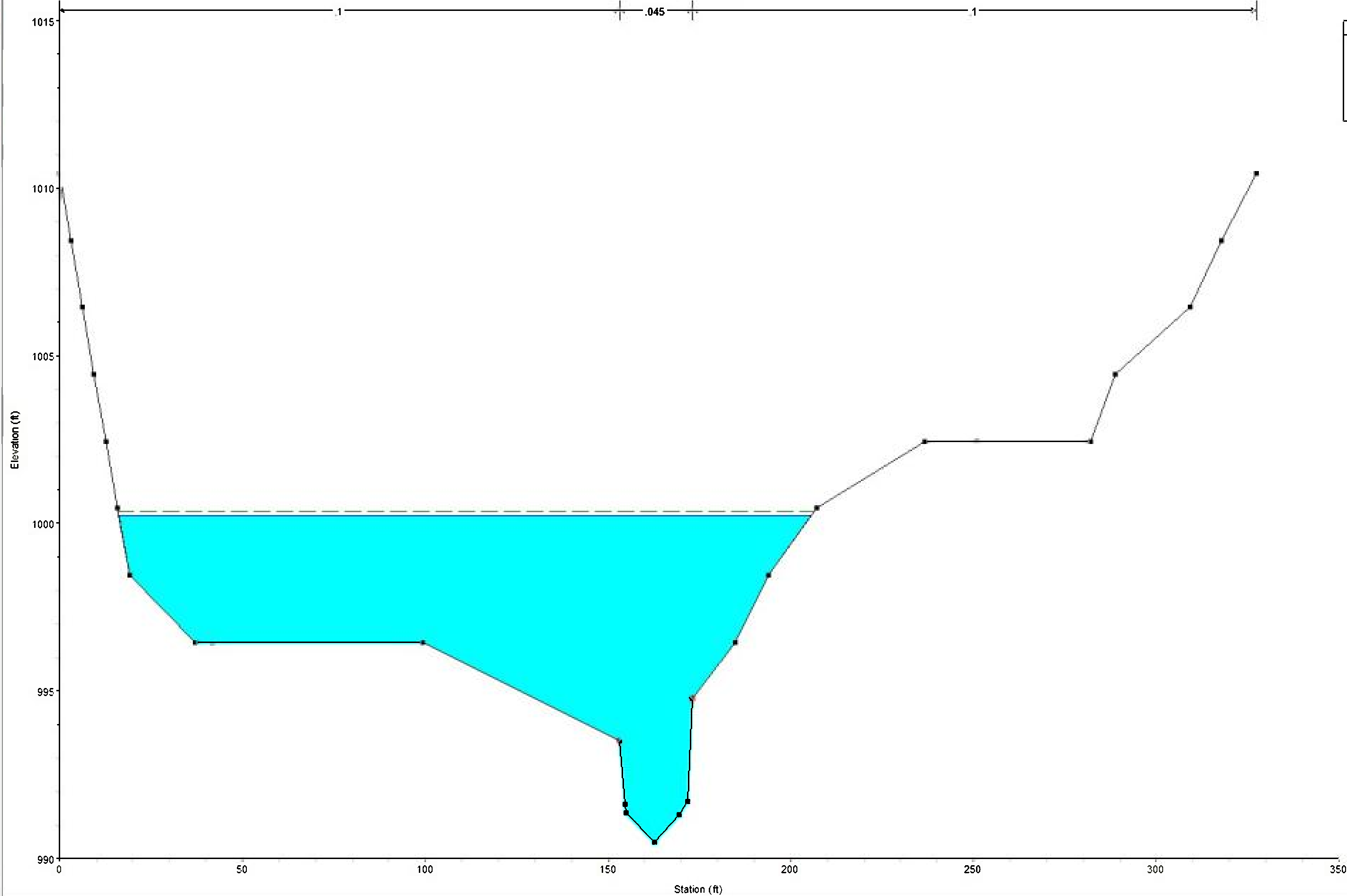
Main Channel Bank Stations

Left Bank	Right Bank
153.1	173.25

ContEx: Coefficient (Steady Flow)

Contraction	Expansion
0.1	0.3

Houston Injection Plan: Plan 36 1/17/2017
4+00



Legend

- EG 100yr Storm
- WS 100yr Storm
- Ground
- Bank Sta

River: Westland Run
 Reach: 3
 Description: 3+00

Plot Options
 Keep Prev XS Plots

Houston Injection Plan: Plan 36 1/17/2017
 3+00

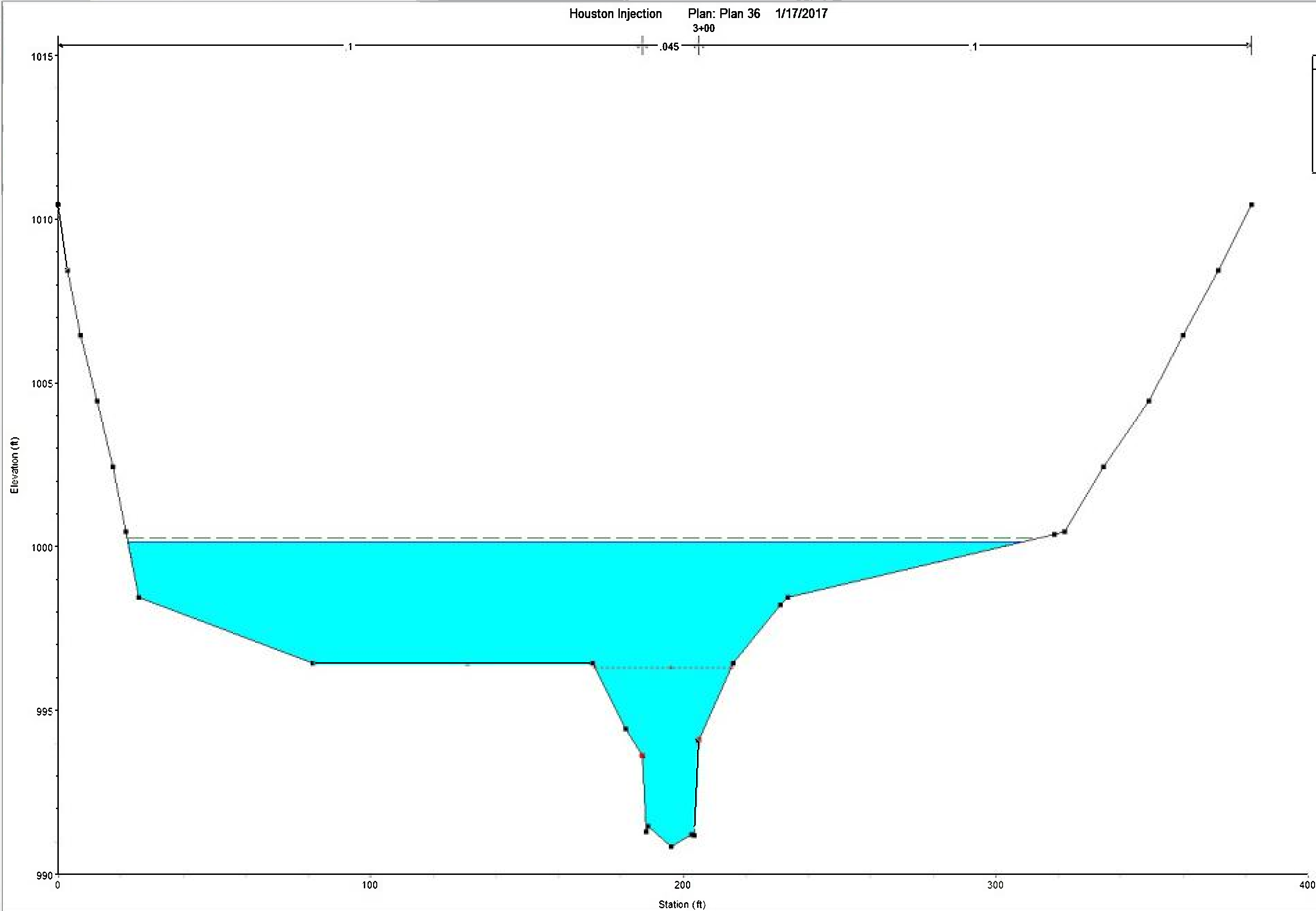
Del Row	Ins Row	Station	Elevation
		0	1010.45
		3	1008.45
		6.97	1006.45
		12.45	1004.45
		17.34	1002.45
		21.7	1000.45
		25.86	998.45
		81.48	996.45
		131.06	996.45
		171.03	996.45
		181.63	994.45
		186.94	993.61
		188.03	991.3
		188.87	991.47
		196.07	990.85
		202.62	991.23
		203.61	991.2
		205.07	994.1
		216.1	996.45
		231	998.23
		233.34	998.45
		318.93	1000.37
		321.99	1000.45
		334.41	1002.45
		349.12	1004.45
		360.12	1006.45
		371.36	1008.45
		382.06	1010.45
		29	
		30	
		31	
		32	
		33	
		34	
		35	
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		52	
		53	

Downstream Reach Lengths		
LOB	Channel	ROB
25	25	25

Manning's n Values		
LOB	Channel	ROB
0.1	0.045	0.1

Main Channel Bank Stations	
Left Bank	Right Bank
186.94	205.07

Contr/Exp Coefficient (Steady Flow)	
Contraction	Expansion
0.1	0.3



Legend

- EG 100yr Storm
- WS 100yr Storm
- Crit 100yr Storm
- Ground
- Bank Sta

River: Westland Run

Reach: 3 River Sta.: 275

Description

Del Row Ins Row

Cross Section Coordinates

Station	Elevation
1	0
2	3
3	6.97
4	12.45
5	17.34
6	21.7
7	25.86
8	81.48
9	131.06
10	171.03
11	181.63
12	186.94
13	188.03
14	188.87
15	196.07
16	202.62
17	203.61
18	205.07
19	216.1
20	231
21	233.34
22	318.93
23	321.99
24	334.41
25	349.12
26	360.12
27	371.36
28	382.06
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Downs eam Reach Lengths

LOB	Channel	ROB
75	75	75

Manning's n Values

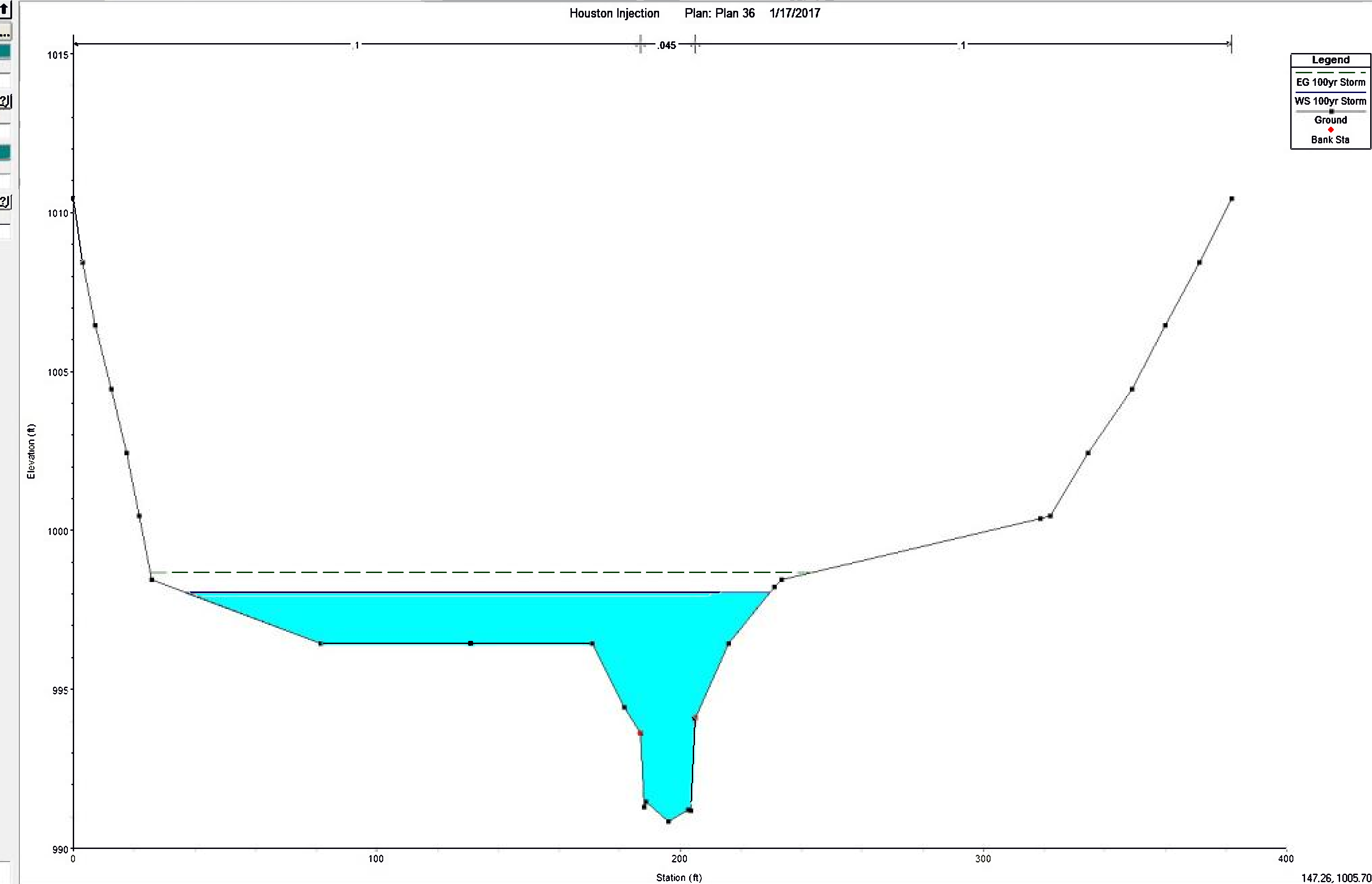
LOB	Channel	ROB
0.1	0.045	0.1

Main Channel Bank Stations

Left Bank	Right Bank
186.94	205.07

ContEx - Coefficient (Steady Flow)

Contraction	Expansion
0.1	0.3



Legend

- EG 100yr Storm
- WS 100yr Storm
- Ground
- Bank Sta

River: Westland Run

Reach: 3 River Sta.: 200

Description: 2+00

Del Row Ins Row

Cross Section Coordinates	
Station	Elevation
1	0
2	3.65
3	6.15
4	8.35
5	10.72
6	14.43
7	18.13
8	86.3
9	114.76
10	156.3
11	184.6
12	188.13
13	189.66
14	196.34
15	202.93
16	204.23
17	207.82
18	213.02
19	269.55
20	318.58
21	393.56
22	424.45
23	433.17
24	446.7
25	459.07
26	467.71
27	
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31	
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Downstream Reach Lengths

LOB	Channel	ROB
100	100	100

Manning's n Values

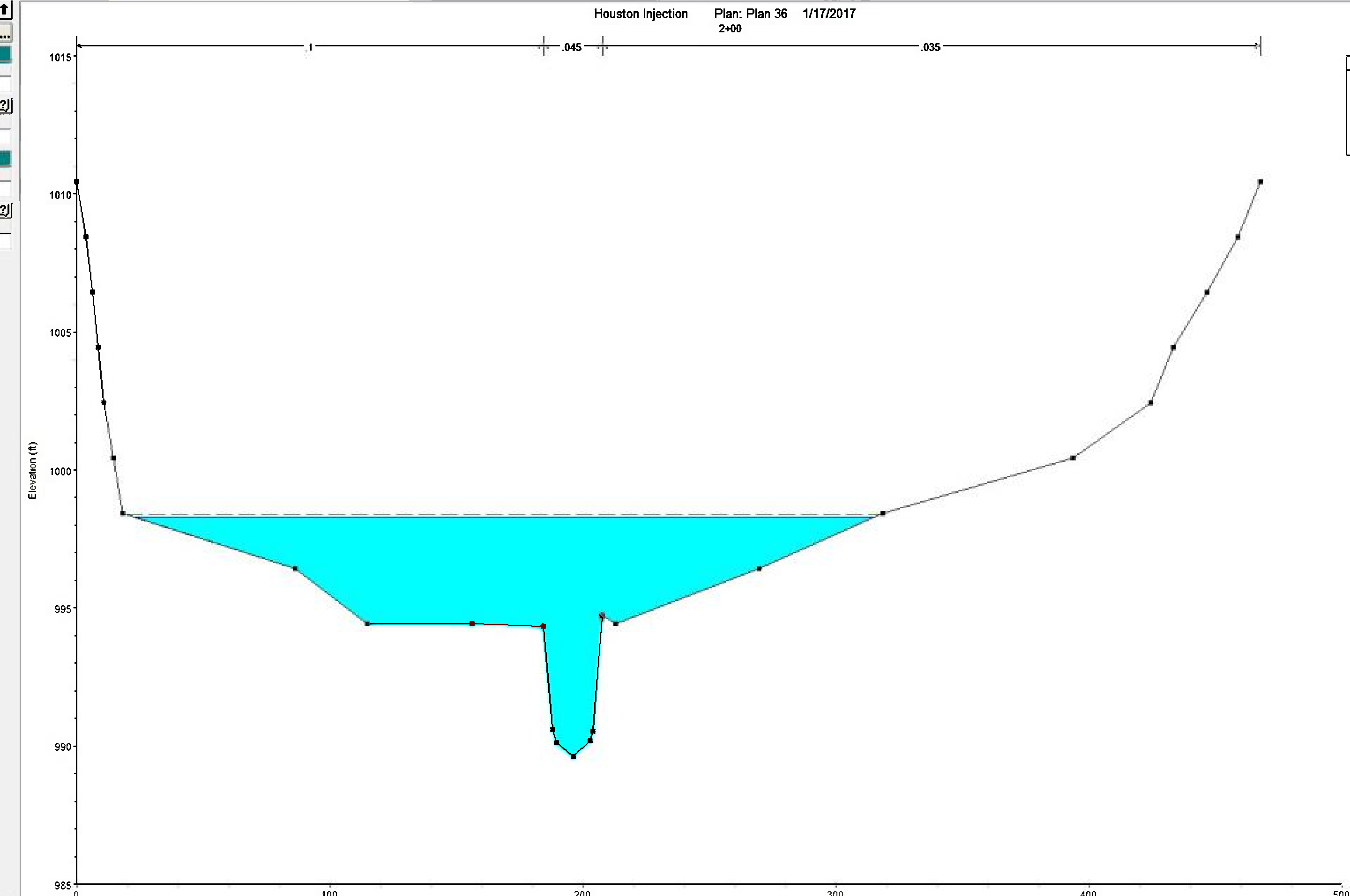
LOB	Channel	ROB
0.1	0.045	0.035

Main Channel Bank Stations

Left Bank	Right Bank
184.6	207.82

ContrEx - Coefficient (Steady Flow)

Contraction	Expansion
0.1	0.3



Legend

- EG 100yr Storm
- WS 100yr Storm
- Ground
- Bank Sta

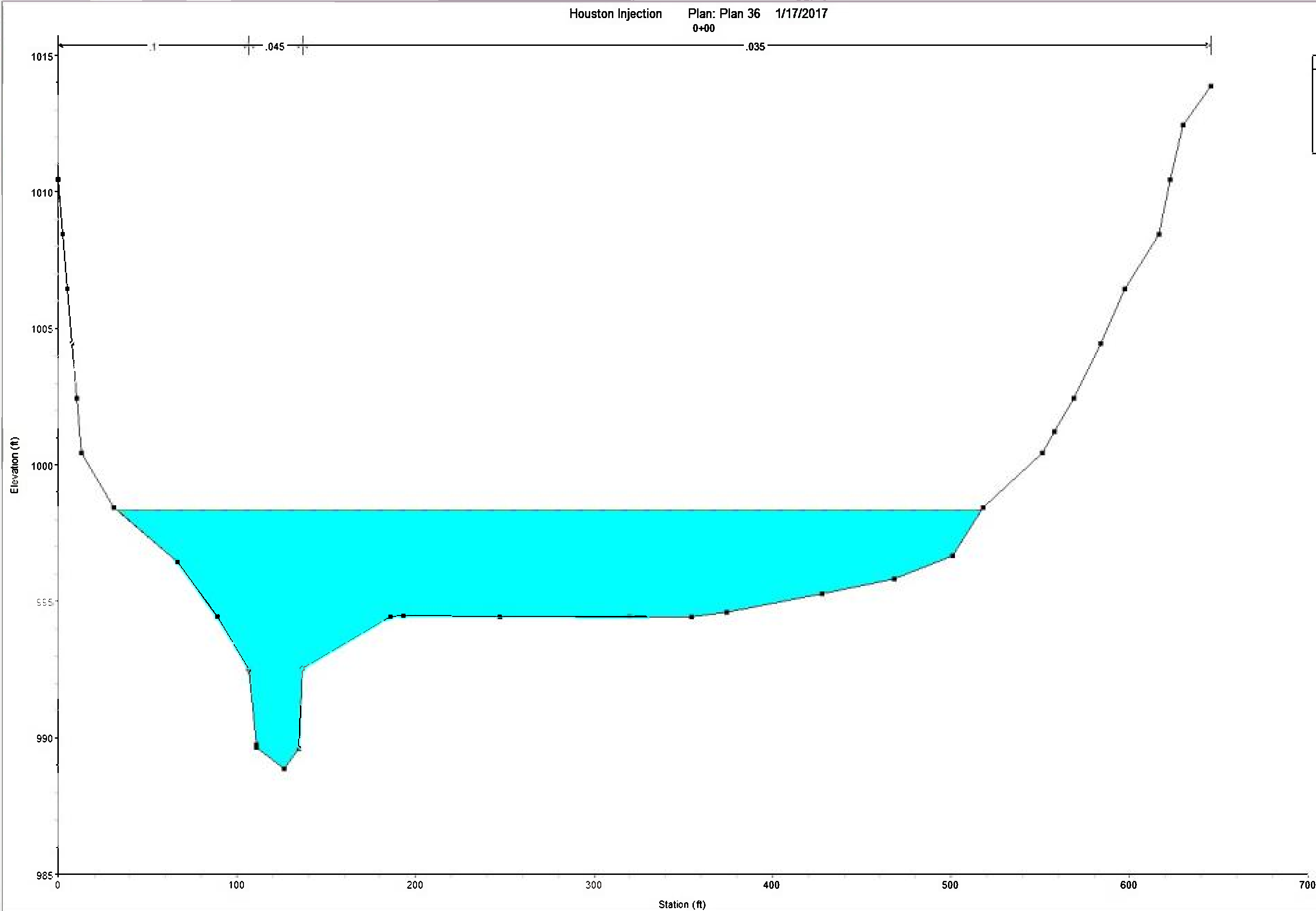
River: Westland Run
 Reach: 3
 River Sta.: 100
 Description: 0+00

Plot Options Keep Prev XS Plots

Houston Injection Plan: Plan 36 1/17/2017
 0+00

Del Row	Ins Row	Station	Elevation
		0	1010.45
		2.62	1008.45
		5.23	1006.45
		7.84	1004.45
		10.47	1002.45
		13.09	1000.45
		30.96	998.45
		67.11	996.45
		89.34	994.45
		106.61	992.51
		110.75	989.74
		110.96	989.64
		126.33	988.87
		134.71	989.63
		136.89	992.53
		186.09	994.45
		193.64	994.47
		247.36	994.45
		320	994.45
		354.52	994.45
		374.47	994.6
		427.76	995.27
		468.24	995.82
		500.95	996.69
		517.8	998.45
		551.34	1000.45
		557.73	1001.22
		568.93	1002.45
		583.64	1004.45
		597.42	1006.45
		616.28	1008.45
		622.68	1010.45
		630.2	1012.45
		645.48	1013.88
		35	
		36	
		37	
		38	
		39	
		40	
		41	
		42	
		43	
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		51	
		52	
		53	

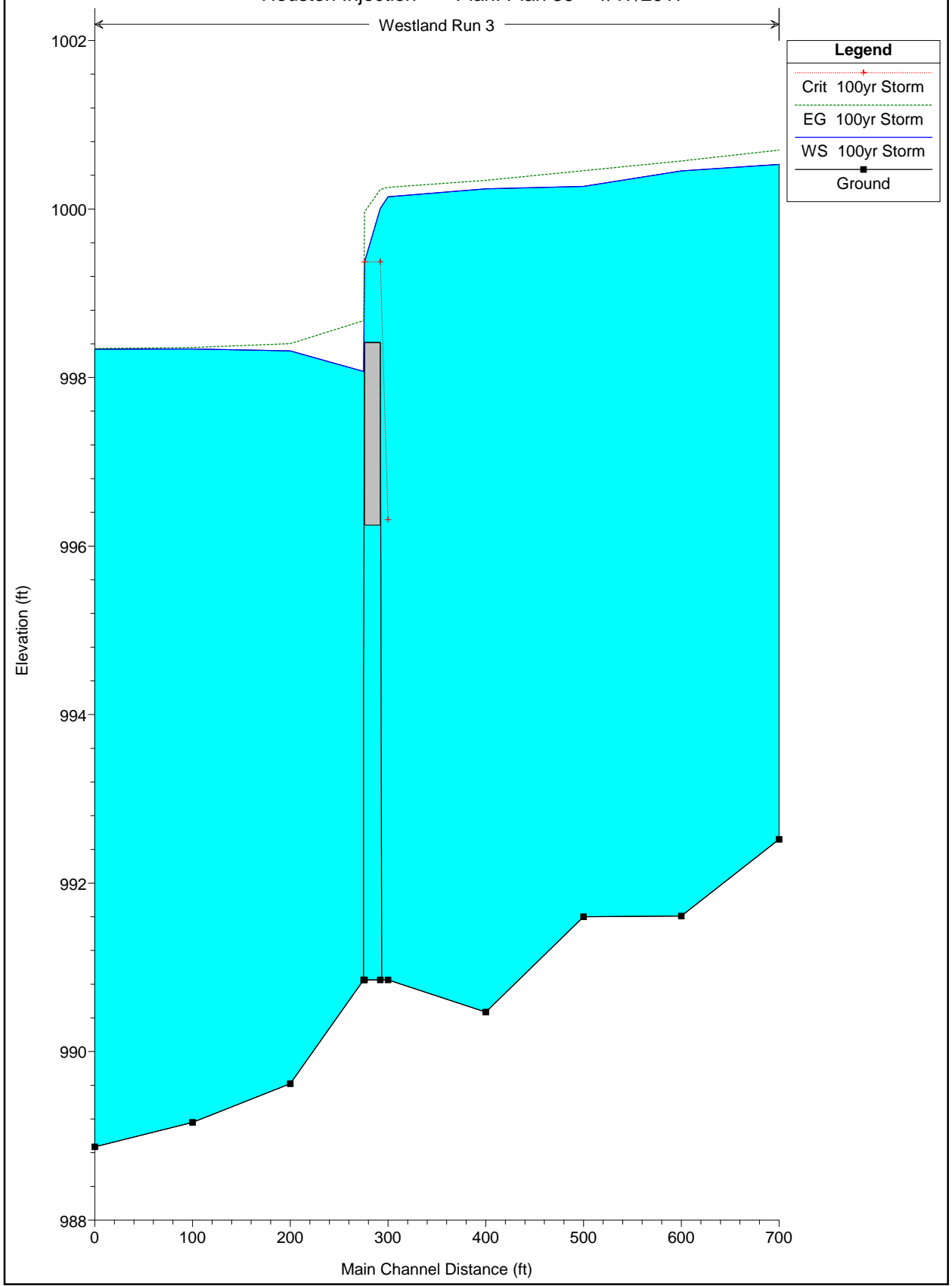
Downs eam Reach Lengths		
LOB	Channel	ROB
Manning's n Values		
LOB	Channel	ROB
0.1	0.045	0.035
Main Channel Bank Stations		
Left Bank	Right Bank	
106.61	136.89	
ContEx: Coefficient (Steady Flow)		
Contraction	Expansion	
0.1	0.3	



Legend

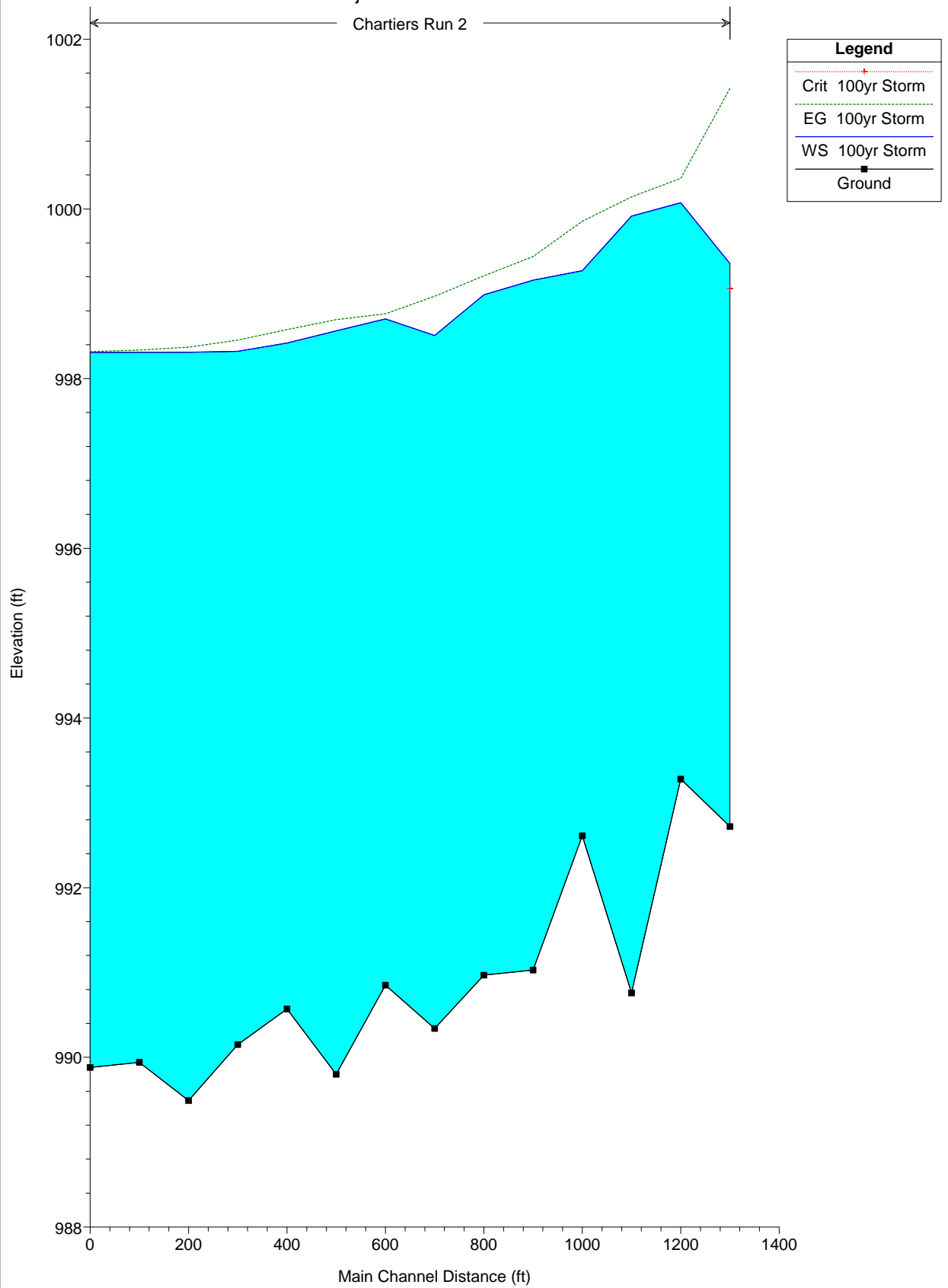
- EG 100yr Storm
- WS 100yr Storm
- Ground
- Bank Sta

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Houston Injection Plan: Plan 36 1/17/2017

Chartiers Run 2



Houston Injection Plan: Plan 36 1/17/2017

Chartiers Run 1

