Saw Mill River Daylighting Analysis

RIVER PARK CENTER PROJECT
CITY OF YONKERS, NY

Prepared for:

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MEG Project No. 106100

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1.0 SCOPE OF REPORT

This Report has been prepared to provide an analysis of the hydrologic and hydraulic conditions of the Saw Mill River within the River Park Center Project and the Larkin Plaza Project located in the City of Yonkers, Westchester County, New York. This Report examines the existing and proposed conditions associated with the uncovering, relocation and public access enhancements for portions of the Saw Mill River within the sections of the project.

2.0 EXISTING RIVER CONDITIONS

2.1 Sawmill River Drainage Basin

The Saw Mill River, formerly known as the Nepperhan River, is a tributary of the Hudson River and is located within Westchester County, New York. The river's headwaters are located the Town of New Castle and it flows south along the Saw Mill River Parkway to the discharge point in the City of Yonkers, NY. The drainage basin is approximately 23 miles long with an average width of 1.4 miles and an average slope of 22 feet/mile. The contributing watershed is approximately 26.5 square miles and encompasses portions of New Castle, North Tarrytown, Tarrytown, Pleasantville, Greenburgh, Mount Pleasant, Elmsford, Irvington, Dobbs Ferry, Ardsley, and Hastings-on Hudson. In the lower reaches of the Saw Mill River, the riverbed is narrow in comparison to the upper reaches and is confined to a narrow valley with steep hills to the east and west. Within the City of Yonkers, these hills are typically between 200 and 300 feet above the riverbed.

Land use throughout the Saw Mill River watershed is comprised of approximately 63% urban use, 36% forested area or public lands and 1% agricultural use. Based on the Flood Insurance Study for the City of Yonkers, dated January 21, 1998, 36.6% of the total land use in the City of Yonkers is comprised of residential space, 23.6% is streets, parkways, and thruways, 8.0% is commercial land, 3.5% is industrial land, 3.0% is aqueducts and railroad rights of ways, and 20.9% is public and institutional land.

The City of Yonkers has a temperate climate. The weather patterns within Yonkers are similar to the entire New York City – Westchester County area. The average annual rainfall over the entire basin is approximately 47.4 inches, and the average annual snowfall is approximately 36 inches. Rainfall distribution is fairly uniform throughout the year though slightly higher amounts of precipitation tend to accumulate during summer months. Snowfall occurs generally between November and April of each year. According to the

National Weather Service Records, December, January, and February are the peak months for snowfall.

The Saw Mill River has been subject to various modifications throughout recent history to accommodate transportation projects and stream-side development. During the last twenty-five years, four (4) flood control projects have been constructed along the length of the river. Within the City of Yonkers, river modifications have included the 1980's Nepera Park and Croton Aqueduct Flood Control projects and the 1920's Army Corps of Engineers construction of a culvert over the final 2000 feet of the river prior to discharge to the Hudson River.

2.2 Saw Mill River and Flume Inspection

During the summer of 2006, the McLaren Engineering Group (MEG) conducted an inspection of the open and culverted sections of the Saw Mill River, beginning at the Hudson River and continuing upstream to the spillway located near Waring Row. The purpose of the inspection was to document the condition of the existing culvert/flume structures (the Flume), prepare a condition survey report which presents the existing conditions, and makes comparisons with the findings provided in the Flume Investigation Report prepared for the City of Yonkers by Cahn Engineers, Inc in December 1978 (prior Flume Report).

The inspection team was comprised of a 4-man, OSHA trained and certified crew. The team was supervised by a registered Professional Engineer/Diver. Three different locations were used as entry points into the culvert/flume from which the inspection team conducted its operations. The inspection of the lower section of the culvert/flume was staged from shore just west of the Metro North Train Station. The entry point for the inspection of the middle section of the culvert/flume is located at the foot of Mill Street. Lastly, the upper section of the culvert/flume was inspected from the upstream fascia of the Ann Street Bridge.

The inspection included a one hundred percent visual inspection of the culvert/flume structures. Any areas of observed structural deficiencies and deteriorated or undermined elements of abutments and retaining wall undermining were documented. In addition, close attention was paid to the areas of significant deterioration noted in the prior Flume Report. Representative photographs of the observed conditions were obtained during the inspection. The report documents the observed conditions within the portions of the Yonkers Culvert/Flume inspected. The areas of deterioration, undermining, etc. noted are based on the visual inspection by MEG personnel.

2.3 Existing River Conditions

Throughout the River Park Center project area, beginning at the down-stream side of the Elm Street Bridge, the Saw Mill River has an open section. The River flows in a southwesterly direction, under the bridge at the John Street extension and enters a culvert at the School Street Bridge. The River proceeds under the Henry Herz parking facility in a westerly direction parallel to Nepperhan Avenue and re-immerges west of Henry Herz Street. The River then turns north and enters the flume at Ann Street. The River falls approximately 13 feet in elevation along this length. The river bottom throughout this area is naturalized, with a cobble/boulder streambed. The open portions of the river have a channel width between 30 and 40 feet and steep sloping or vertical banks stabilized with concrete, stone riprap or masonry walls. The bridges over the river and the culverted sections are aligned with the river and have dimensions greater than or equal to the channel width. The channel walls exhibit varying degrees of undermining and erosion and the channel bottom exhibits scour and/or aggradation and debris accumulation in many locations.

At Ann Street, the River enters the flume and flows in a northerly direction toward Getty Square, under buildings located along North Broadway to Manor House Square and then in a westerly direction south of and parallel to Dock Street under Larkin Plaza and the park area, under Buena Vista Avenue and the Metro North Railroad tracks to the Hudson River. The construction and overall dimensions of the flume varies substantially between Ann Street and Warburton Avenue and is described and photo-documented in detail in the Flume Study. West of Warburton Avenue, the flume was constructed as part of the 1920's Army Corp of Engineers project. This portion of the flume consists of an arch concrete structure with maximum height of 8 feet and a width of 20 feet. The culvert is made of reinforced concrete that is 12 to 15-inch thick. Timber piles varying in length from 28 to 41 feet support the foundation. The arch culvert enters Larkin Plaza to the east at Warburton Avenue and extends to Buena Vista. At Buena Vista, the arch culvert flows into a 29 feet wide by 10 feet high structure that extends under the street and the building to the west to the tidal basin to the Hudson River.

Overall, the flume is generally in fair condition. The Flume Study documents areas where stone masonry footings are undermined, where most of these locations are localized to areas of the flume higher velocities or change in channel alignment. It is recommended that the undermined stone masonry elements be repaired to prevent potential damage to the various building structures upon which they are founded. Cracks, voids, and areas of missing grout in the concrete, and masonry walls should be repaired to prevent further deterioration. Deteriorated roof elements observed are primarily a result of the wet and humid environment and lack of preventive maintenance.

There are many locations where debris has collected within the flume. This ranges from large cobbles and stones to portions of trees and garbage. In order to restore full hydraulic capacity to the flume, it is recommended that that the debris should be cleared from the flume.

The Applicant and the City do not currently have any ownership interest in the portions of the Saw Mill River and the flume that are located within private properties, and will not have any such ownership interest during construction of the Project or after its completion. The Flume Study was prepared by the Applicant's consultants for informational purposes only and is published in this DEIS solely in response to the scoping document adopted by the City Council. No property owner is entitled to rely on the Flume Study, and each property owner is encouraged to perform their own inspection of the portion of the flume within their property to determine what repairs or maintenance, if any, is warranted by current conditions.

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3.0 FLOOD FLOW MODELING

3.1 Design Flow

The base flood flows were obtained from the Army Corps of Engineers report entitled "Saw Mill River Completed Flood Control, Project at Yonkers, NY", dated February 1987 and confirmed against the Federal Emergency Management Agency Flood Insurance Study, last revised January 21, 1998. The FEMA and the ACOE Studies only provided a detailed analysis of the flows within the Saw Mill River prior to the Saw Mill River gauge, which is approximately 3,400 feet upstream of Elm Street. An analysis of the topographic mapping downstream of the limit of the FEMA study determined that the additional drainage area contributing to the Saw Mill River at Palisade Street is 183 acres and at Larkin Plaza is 274 acres (see Fig. 4 – Drainage Area Map). Much of this area drains to the City combined sewers and does not reach the River or the underground flume. However, to provide a conservative design flow for the project area, the entire 274-acre area was assumed to enter the Saw Mill River at Elm Street. This assumption also allows for future separation of the stormwater runoff from the combined sewers and connection of storm discharge to the Saw Mill River.

The additional drainage area downstream of the Sawmill River gauge station was analyzed using Technical Release 55 software (TR-55), watershed analysis software created and distributed by the United States Department of Agriculture. TR-55 calculates storm water run-off from a watershed based on the land-use, soil-type, coverage and ground slope. Due to the urban nature of the site and the steep topography in the general vicinity of the River, a Curve Number (CN) of 91 was assigned to the watershed for the TR-55 analysis (see Appendix A). The calculated peak flows were used to create hydrographs that were then added to the 10- and 100-year flood hydrographs contained in the ACOE Study (see Appendix A). This 100-year hydrograph was added to the ACOE Yonkers Gage 100-year hydrograph (see Appendix A, Figure 4 – Reproduction of the 100 Year Flood at the Yonkers Gage). A peak design flow for the 100-year storm was calculated to be1,540 cfs from this composite hydrograph.

The hydraulics for the existing conditions within the Saw Mill River was analyzed using HEC-RAS software. HEC-RAS is river analysis software produced and distributed by the Army Corps of Engineers. The program uses river sectional geometry, riverbed slope and bank treatment conditions to calculate water surface elevations and flow velocity for given flow conditions. The program is also useful for determining the backwater effects created by bridges and culverts. The existing 10-year and 100-year flood elevations at the Elm Street Bridge were determined to be Elevation 61.28 and Elevation 62.25, respectively. A summary of the base flow, 10-year and 10-year design flow rates, water surface elevations, channel slope and channel velocity with the project area are shown in Table 3-1 below and in Appendices.

Table 3-1
Existing Conditions –Saw Mill River

	Design Flow (CFS)	**Water Surface Elevation**	**Main Channel Slope**	**Main Channel Velocity (CFS)**
75 Feet Upstream of Ann Street -(HEC-RAS Station 205.98)				
Base Flow	30	45.9	1.1%	2.4
10-year	1015	50.3		8.7
100-year	1540	52.7		8.5
72 Feet Upstream of School Street-(HEC-RAS Station 800.98)				
Base Flow	30	54.0	0.9%	4.1
10-year	1015	58.7		12.4
100-Year	1540	60.0		14.5
Downstream of Elm Street Bridge -(HEC-RAS Station 1224.26)				
Base Flow	30	57.8	1.8%	2.0
10-year	1015	62.7		5.9
100-Year	1540	64.3		11.0

The results of the HEC-RAS analysis indicate that the River will remain within the banks during the 100-year design storm. This is consistent with the observations made during the April 2007 Storm. The total 24-hour rainfall during the April 16th storm was approximately 7.5 inches of rainfall (per Westchester Airport NOA records). This rainfall is consistent with a 100-year design rainfall.

3.2 Existing Known Flooding Conditions Around the Project Sites

Various officials from the City of Yonkers, including the City Engineer, City Planner and Commissioner of Public Works were interviewed regarding flooding in the River Park Center area. None of these officials is aware of any current or prior flooding problems within this area.

Additionally, review of various reports confirms that flooding has not occurred in this vicinity in the recent past. Notably, the report entitled "Daylighting Potential for Saw Mill River in Downtown Yonkers", prepared by Han-Padron Associates, LLP and dated March 2004 depicts the ordinary high water elevation and the "180 year" flood elevation at various locations along this portion of the river. None of these locations shows overtopping during the flood event. This information is consistent with the modeling of the existing river under the regulatory flood events.

On April 15th and 16th 2007, a Nor'easter storm impacted the region with over 7 inches of rain within a 24-hour period. This storm resulted in severe flooding conditions within the Saw Mill River Valley. In the Nepera Park section of Yonkers, the Saw Mill River Parkway was completely inundated and many homes were impacted. As the river reached peak elevation during the morning of Monday April 16th, observations were made of the river at the River Park Center site, and revealed that the flood flow was maintained below the top of bank. From Elm Street to Ann Street the adjacent properties were not flooded. This is consistent with prior data collected and with the hydraulic modeling of flood events.

4.0 PROPOSED ACTION/DAYLIGHTING

One of the stated priorities of the proposal is to provide opportunities to daylight and/or naturalize the culverted and re-directed/channelized portions of the Saw Mill River. The proposed development will involve modification to two portions of the Saw Mill River between the Elm Street Bridge and the discharge point at the Hudson River.

4.1 River Park Center

The Saw Mill River currently traverses this portion of the site on a curvilinear path entering east of the intersection of Elm Street and Palisades Avenue, where it flows in a southerly direction to the School Street Bridge. After passing under School Street and the municipal parking lot, it passes within 80 feet of Nepperhan Avenue turns in a more westerly direction. It then goes underground at Anne Street flowing under the Henry Herz parking area and buildings east of Palisades Avenue.

The proposed river improvements at River Park Center will include daylighting and re-alignment of approximately 1,100 linear feet of the River and will include the portions between Elm Street and Palisades Avenue. The existing flume between the Anne Street Bridge and Palisades Avenue will be reconstructed to allow for the construction of building foundations. Realigned portions of the river and flume will have a hydraulic cross sectional area equal to or exceeding the existing river sections.

The river improvements will also include pedestrian walkways, small pedestrian bridges and appropriate riverside landscaping added along the river's edge to enhance the appearance and public access along the river. These improvements will create three different environments referred to as the "Upper River", the "Rapids" and the "Pond". The following is a description of the sections of the proposed river. The specific details will be developed during the permitting phase of the project.

- The "Upper River" portion will generally entail the portion of the River between Elm Street and the vicinity of the existing School Street Bridge. The grades of this portion of the river will be flattened to allow for more placid water flow (1.8 percent existing verses 1.3 percent proposed). However, the proposed cross section provides velocities similar to existing conditions (2 fps vs. 1.7 fps for base flow; 5.9 fps vs. 5.0 fps for 10-year design flow; 6.9 fps vs. 5.7 fps for 100-year design flow). Pedestrian walkways and terraces will flank each side of the river and will be set above the 100-year flood elevation. River bottom and lower banks throughout this portion will be a "naturalized" stone/rip-rap surface, constructed to the 10-year flood elevation. The banks between the 10- and 100-year flood elevations will be stabilized using a combination of "hard-scape", live branch cuttings through boulders/rip-rap/geotextile baskets and live plantings through live fascine bundles, as conditions and access requirements dictate.

- The "Rapids" portion of the river encompasses the portion flowing adjacent to Nepperhan Avenue, extending approximately 350 feet downstream from the "Upper River". The grade separation between this portion of the river and Nepperhan Avenue is in excess of 30 feet, creating a canyon or gorge-like environment which limits direct public interaction with the River. To enhance this area, the improvements will create visual and audible interest by means of rushing water. In many ways, this portion of the river will be similar to the existing river section within the project area. This area will have a naturalized boulder streambed creating rapids and aeration of the water, allowing for a grade change of approximately 8 feet through the area (1.8 percent maximum existing channel slope verses 2.2 percent average proposed slope within rapids). These boulders will also provide resting areas within the flow for fish negotiating the length of the River. The slope will create velocities similar to or less than the existing river (4 fps existing vs. 3.3 fps proposed for base flow; 12.5 fps existing vs. 12.5 fps proposed for 10-year design flow; 15.0 fps existing vs. 14.9 fps proposed for 100-year design flow). The lower velocities throughout the rapids are reflective of the larger cross sectional area of the proposed design. A small pedestrian walkway is being considered along the southern bank of the River. This walkway will be set at or above the 100-year flood elevation and will allow a pedestrian connection between the "Upper River" and the downstream portion of the Project site.

- The "Pond" area of the improvement encompasses the final portion of the river, prior to its return to a culverted condition. The area is generally located in the northeast quadrant of the intersection of New Main Street and Nepperhan Avenue.

The proposed improvements will include a widening of the existing river section and erection of a short dam/spillway to create a still water area. The slope within this area will be flatted to slopes similar to the minimum slope within the existing river (0.9% minimum existing vs. 0.8% proposed). The minimum velocity during the base flow will be approximately 1.3 fps. The area will be bounded to the south and west by an elevated pedestrian arcade and amphitheater and to the east by a shopping arcade. River banks will be stabilized using a combination of "hard-scape", live branch cuttings through boulders/rip-rap/geotextile baskets and live plantings with live fascine bundles, as conditions and access requirements dictate.

Portions of the River may be relocated during construction to allow for "dry" construction of the proposed river relocation. Options currently considered include both open sections within the areas of the existing river or river relocation as well as culverted diversion within the proposed building footprint.

The hydraulics for the proposed improvements was analyzed using HEC-RAS software. All improvements will be designed to pass the low/normal flow, the 10-year and the 100-year flood flow without creating on-site flooding conditions or increasing the flood elevations for the up-stream or down-stream areas adjacent to the site. The results of this analysis are included in Appendix B. The computed 100-year and 10-year flood elevation at the upstream side of the Elm Street bridge for existing and proposed conditions are shown on the Table No. 4-1

Table No. 4-1
River Park Center
Saw Mill River Water Surface Elevations

Design Storm	Existing Flood Elevation	Proposed Flood Elevations
10-year	62.7	61.3
100-year	64.3	62.3

Proposed river bottom and bank improvements were designed to address flow velocities for the various storm events. The computed velocities within the reconstructed channel areas shown in Table 4-2 below.

Table III. 4-2
Proposed Conditions –Saw Mill River

	Design Flow (CFS)	Water Surface Elevation	Main Channel Slope	Main Channel Velocity (CFS)
Within "Pond" Area -(HEC-RAS Station 1037)				
Base Flow	30	47.8	0.8%	1.3
10-year	1015	51.8		5.2
100-year	1540	53.02		5.9
Within the "Rapid" Area -(HEC-RAS Station 1433)				
Base Flow	30	52.3	2.2%	3.3
10-year	1015	54.5		12.5
100-Year	1540	55.1		14.9
Within "Upper River Area -(HEC-RAS Station 1690)				
Base Flow	30	55.4	1.3%	1.7
10-year	1015	59.5		5.0
100-Year	1540	60.9		5.7
Downstream of Elm Street Bridge (HEC-RAS Station 1934)				
Base Flow	30	58.9		2.0
10-year	1015	61.3		15.5
100-Year	1540	62.3		17.8

Although the channel will be designed to safely pass the 100-year storm event, the slope and bed geometry is also designed to allow the normal base flow, ranging between 5 and 60 cfs throughout the year, to pass at depths and velocity similar to the existing conditions. The proposed improvements will provide a "naturalized" cobble and stone river bottom, supplemented with large boulders along narrower portions of the river. As noted above, the riverbanks will be constructed of placed stone, rip-rap or other "hard-scape" surface inter-planted with live-branch cuttings and fascine bundles, as lighting and slope conditions allow. The "hard-scape" bank is preferred due to the flow velocities experienced during the 10- and 100-year storm events. The final design will be consistent with the general condition of the existing stream.

Sediment load transport is largely a function of river velocity, distance from the disturbance, and particulate size. The Saw Mill River watershed is largely developed and does not have significant agricultural land-uses, which will limit the amount of land experiencing seasonal disturbance. River sediment loading, therefore, would largely be a result of smaller soil disturbances, surface pollutants and natural soil erosion throughout the valley. The City of Yonkers is urban in nature, with limited areas for large soil disturbances. The predominant soil type both in the area and in further up-stream is characterized as Urban land with Charlton-type associated soils, which are noted for small grain size. It would thereby be assumed that local runoff would tend to contain sediment with smaller particle size. By maintaining flow velocities during "first flush", or 1 to 2-year storm event, at or greater than one foot per second, aggradation and sedimentation should be at a minimum throughout the improvement. Should minor deposition occur, water velocities from lower frequency storms will re-suspend sediments and transport them down stream during higher storm events.

4.2 Larkin Plaza

As previously noted, the Sawmill River is culverted between Anne Street and the Hudson River. The profile, section and material composition of the culvert vary greatly along this run. The condition of the culvert has been documented in a report prepared by McLaren Engineering Group entitled "Nepperhan/Saw Mill River Culvert/Flume Inspection, Yonkers, New York", dated August 2006.

The proposed improvements for this portion of the site include the day lighting and realignment of the culverted portion of the river in Larkin Plaza, between Warburton Avenue and Buena Vista Avenue. Improvements will include creation of a naturalized section of the River within a linear park, complete with pedestrian bridges and pathways. The design will allow for a natural interface between the tidal/saline Hudson River and the freshwater Saw Mill River. River banks will be stabilized using a combination of "hard-scape", live branch cuttings through boulders/rip-rap/geotextile baskets and live plantings with live fascine bundles, as conditions and access requirements dictate. Appropriate landscape species will be planted in each zone.

Due to this area's proximately to the tidally influenced Hudson River, special considerations have analyzed to address the potential for storm surge compounding the 100-year flood condition. A review of the Flood Insurance Rate Map for the City of Yonkers (Community Panel Number 360936-0010-C), dated January 21, 1988, indicates that the site will be hydraulically connected to Zone AE in the Hudson River, which has a 100-year flood Elevation of 8.0. The HEC-RAS analysis of the improvements determined that the 100-year flood elevation within the section of the River influenced by tidal actions would be approximately Elevation 10. This has been addressed by creating a combination of berms and walls around the park with a top elevation set Elevation 12 or approximately at 2-feet above 100-year flood at flood elevation. This will create an impound area to contain these floodwaters during the flood condition. The HEC-RAS analysis for the Larkin Plaza daylighting is contained in Appendix C

5.0 CONCLUSION

The hydraulics for the proposed improvements was analyzed using HEC-RAS software. All improvements will be designed to pass the base-, the 10-year and the 100-year flood flow without creating on-site flooding conditions or increasing the flood elevations for the up-stream or down-stream areas adjacent to the site.

This report is respectfully submitted in accordance with our contract, and is to the best of our knowledge accurate and complete. Any questions regarding its content may be directed to the undersigned.

Respectfully submitted by,

The Office of
McLaren Engineering Group
M.G. McLAREN, P.C.

Steven L. Grogg, P.E.
Chief – Civil Division

The Office of
McLaren Engineering Group
M.G. McLAREN, P.C.

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Senior Engineer

SLG/EFB/rjk

cc: MEG File No. 106100

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APPENDIX A-

EXISTING CONDITIONS ANALYSIS

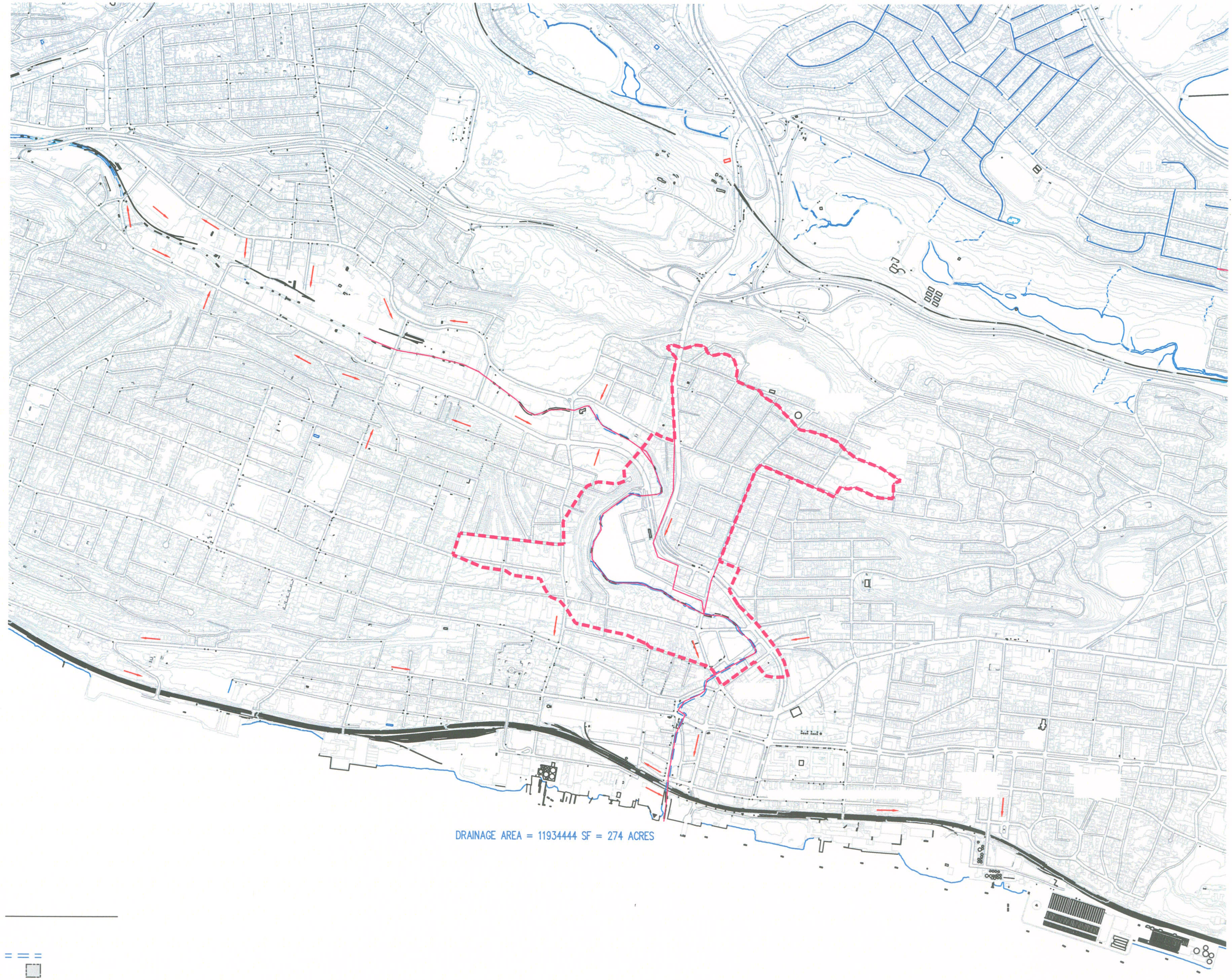


FIG. 4 –
DRAINAGE AREA MAP

EFB

106100
Chicken Island at Peak Flow
Westchester County, New York

Sub-Area Summary Table

Sub-Area Identifier	Drainage Area (ac)	Time of Concentration (hr)	Curve Number	Receiving Reach	Sub-Area Description
Chicken Is	274.40	0.287	91	Outlet	

Total Area: 274.40 (ac)

106100
Chicken Island at Peak Flow
Westchester County, New York

Sub-Area Time of Concentration Details

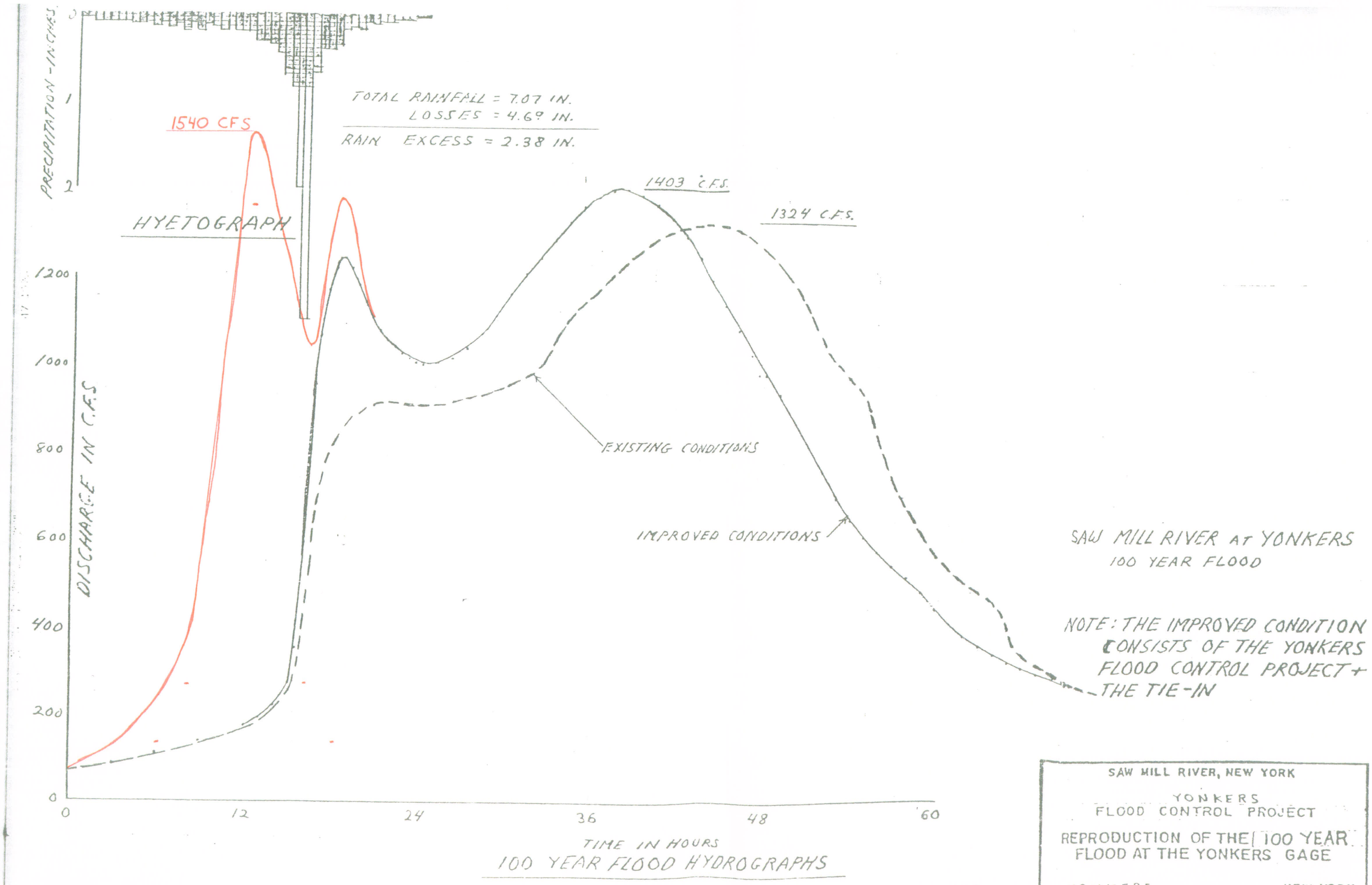
Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
Chicken Is							
SHEET	100	0.0500	0.240				0.158
SHALLOW	800	0.0185	0.050				0.101
CHANNEL	3320	0.0570	0.013	12.57	9.43	32.937	0.028
				Time of Concentration			.287

EFB

106100
Chicken Island at Peak Flow
Westchester County, New York

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use	Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
Chicken Is	CN directly entered by user	-	274.4	91
	Total Area / Weighted Curve Number		274.4	91
			=====	==



TA41

SAW MILL RIVER, NEW YORK

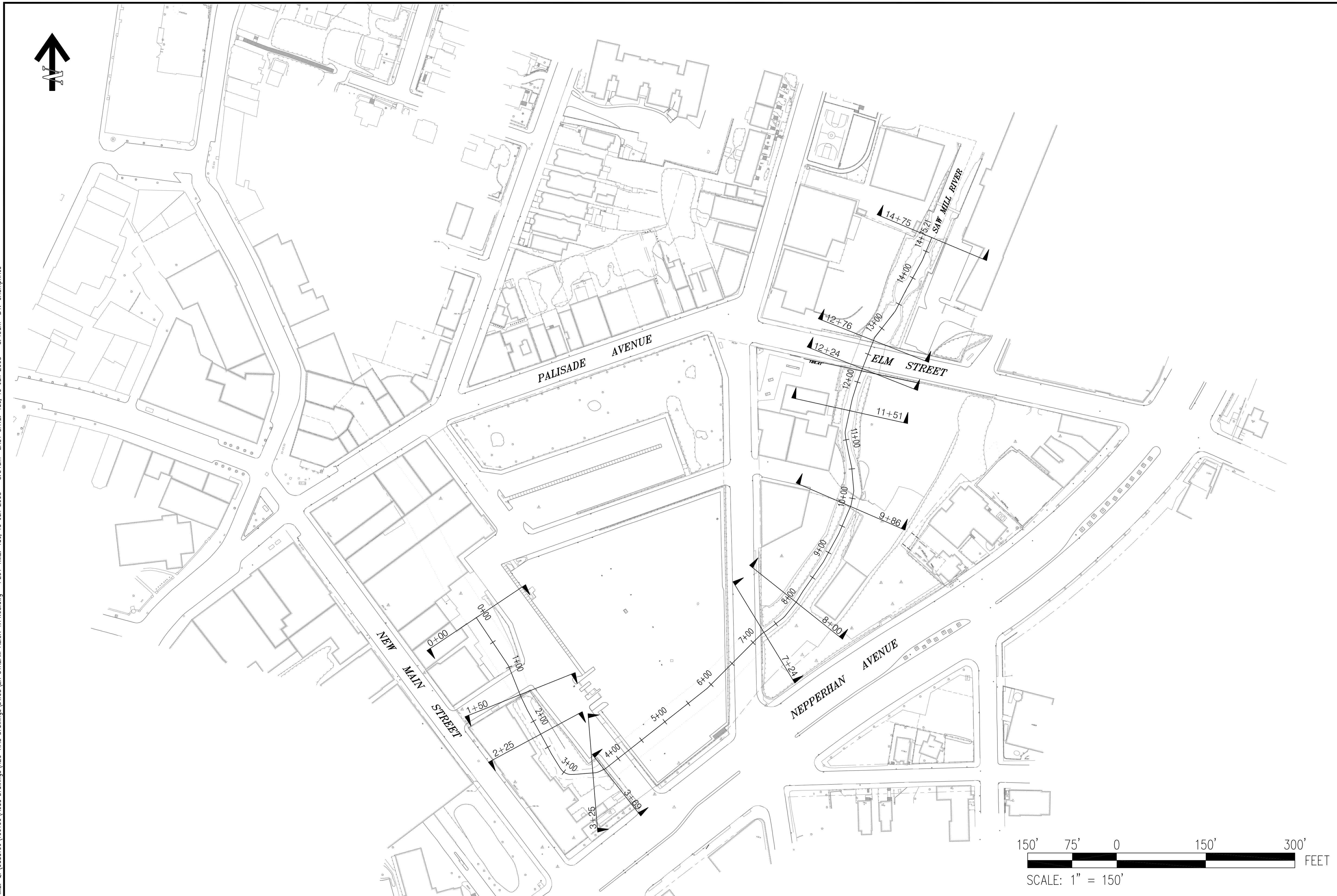
YONKERS
FLOOD CONTROL PROJECT

REPRODUCTION OF THE 100 YEAR FLOOD AT THE YONKERS GAGE

YONKERS NEW YORK

Fig. 3

FILE NAME: Q:\Cadd106\106100\Acad Drawings\HEC-RAS Drawings\DWGS\EX STREAM ALIGN 1.14.08.dwg PLOT TIME: Tue, 15 Jan 2008 - 8:54am LAST SAVE: Tue, 15 Jan 2008 - 8:45am BY: CHumphries



NO.	DATE	REVISION	BY

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PROJECT

RIVER PARK CENTER

YONKERS NEW YORK

SHEET TITLE

HEC-RAS ANALYSIS
STREAM ALIGNMENT
EXISTING CONDITIONS

PROJECT NO.	106100
SCALE	AS NOTED
DATE	1/15/08
DRAWN BY	CMH
CHECKED BY	EFB
DRAWING NO.	1

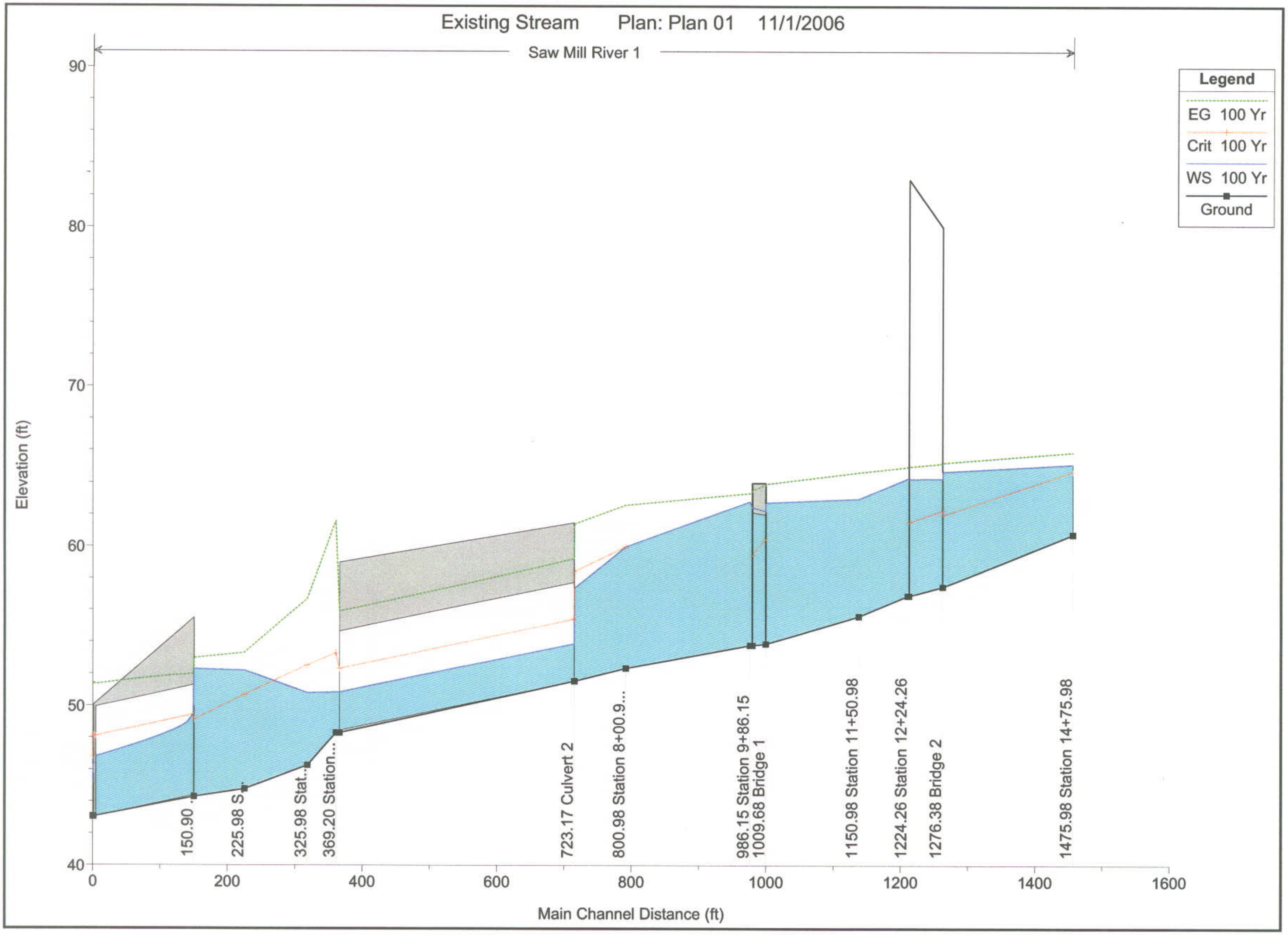
1 OF 1 SHTS

EFB

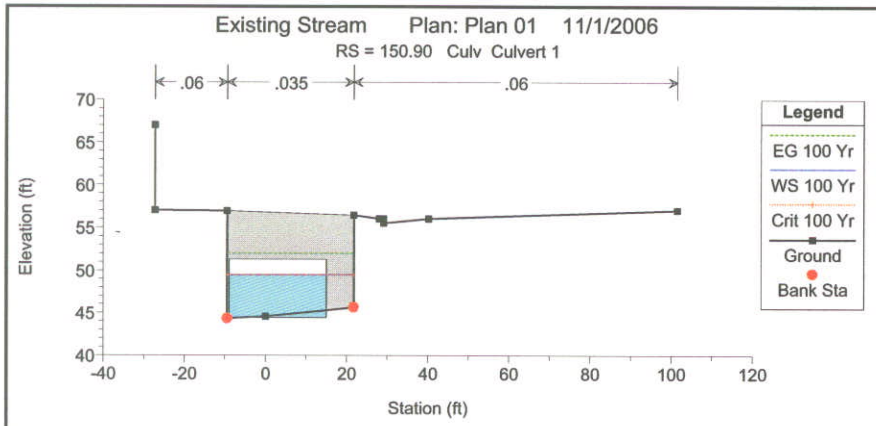
106100
Chicken Island at Peak Flow
Westchester County, New York

Hydrograph Peak/Peak Time Table

Sub-Area or Reach Identifier	Peak Flow and Peak Time (hr) by Rainfall Return Period 2-Yr (cfs) (hr)	5-Yr (cfs) (hr)	10-Yr (cfs) (hr)	25-Yr (cfs) (hr)	50-Yr (cfs) (hr)	100-Yr (cfs) (hr)	1-Yr (cfs) (hr)
SUBAREAS							
Chicken Is	569.83	773.68	874.73	1075.62	1276.33	1375.64	406.84
	12.20	12.19	12.20	12.20	12.19	12.20	12.20
REACHES							
OUTLET	569.83	773.68	874.73	1075.62	1276.33	1375.64	406.84



Existing Stream Plan: Plan 01 11/1/2006
Saw Mill River 1
Legend
EG 100 Yr
Crit 100 Yr
WS 100 Yr
Ground
Elevation (ft)
Main Channel Distance (ft)
150.90
225.98 S
325.98 Stat...
369.20 Station...
723.17 Culvert 2
800.98 Station 8+00.9...
986.15 Station 9+86.15
1009.68 Bridge 1
1150.98 Station 11+50.98
1224.26 Station 12+24.26
1276.38 Bridge 2
1475.98 Station 14+75.98


Existing Stream Plan: Plan 01 11/1/2006
RS = 150.90 Culv Culvert 1
.06
.035
.06
Elevation (ft)
Station (ft)
Legend
EG 100 Yr
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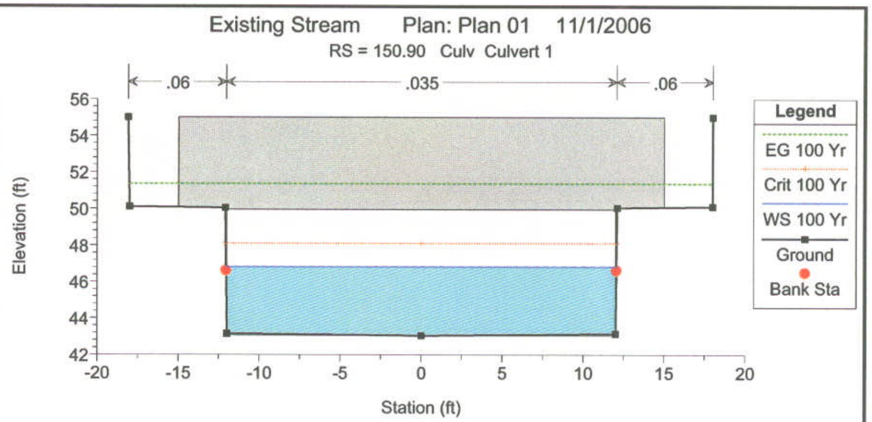
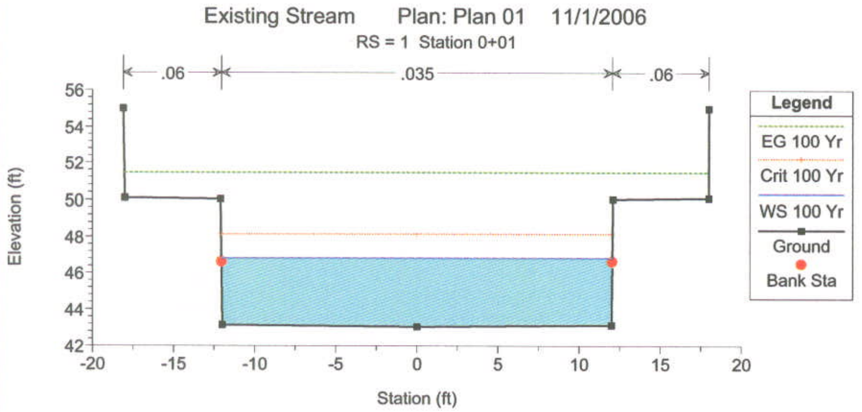
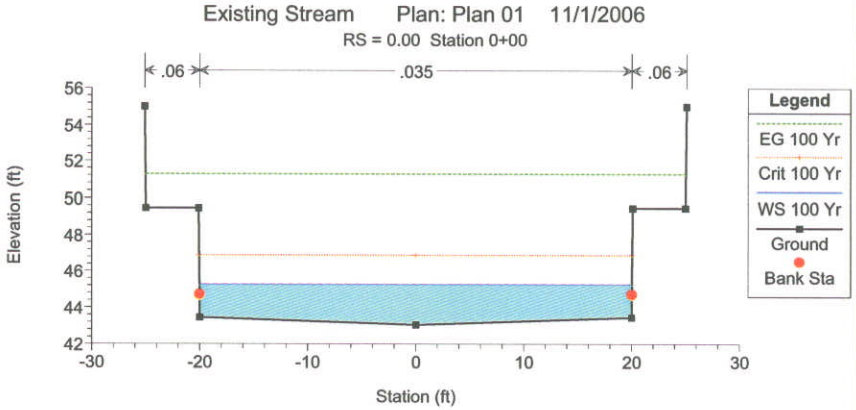
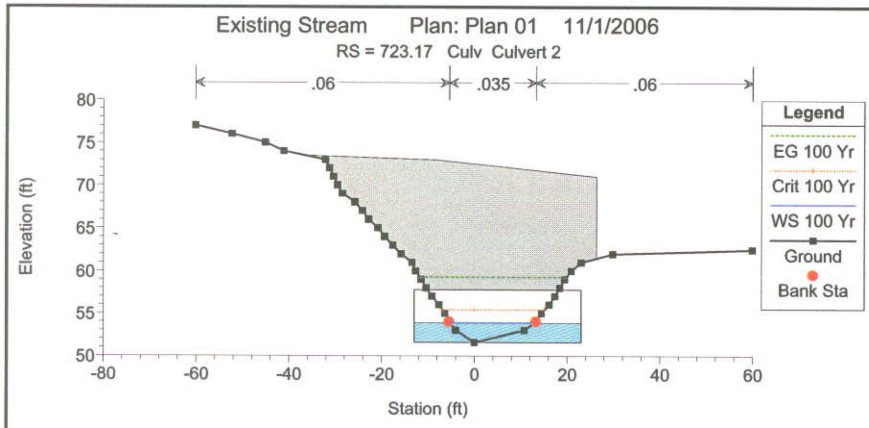
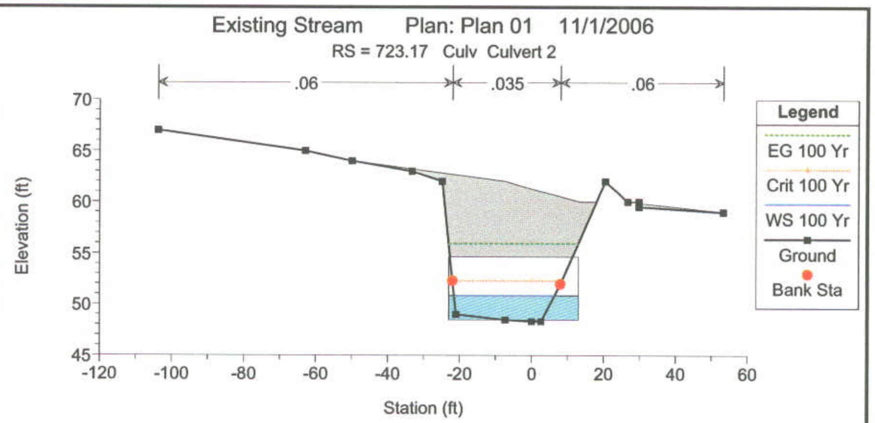
Crit 100 Yr
Ground
Bank Sta

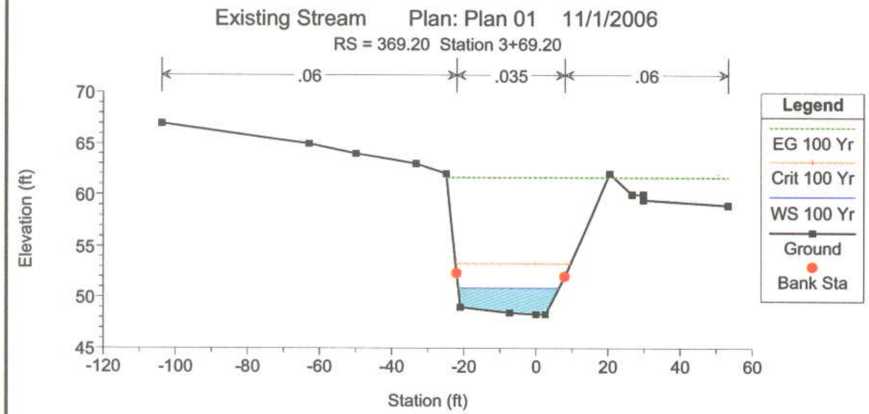

Existing Stream Plan: Plan 01 11/1/2006
RS = 150.90 Culv Culvert 1
.06
.035
.06
Elevation (ft)
Station (ft)
Legend
EG 100 Yr
Crit 100 Yr
WS 100 Yr
Ground
Bank Sta

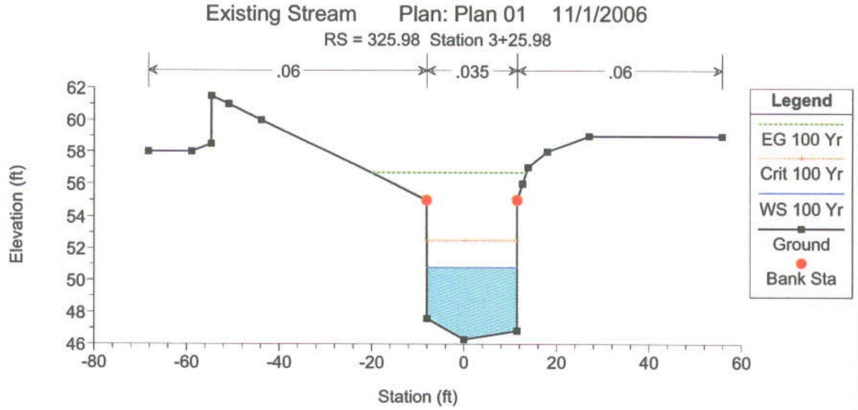

Existing Stream Plan: Plan 01 11/1/2006
RS = 1 Station 0+01
.06
.035
.06
Elevation (ft)
Station (ft)
Legend
EG 100 Yr
Crit 100 Yr
WS 100 Yr
Ground
Bank Sta

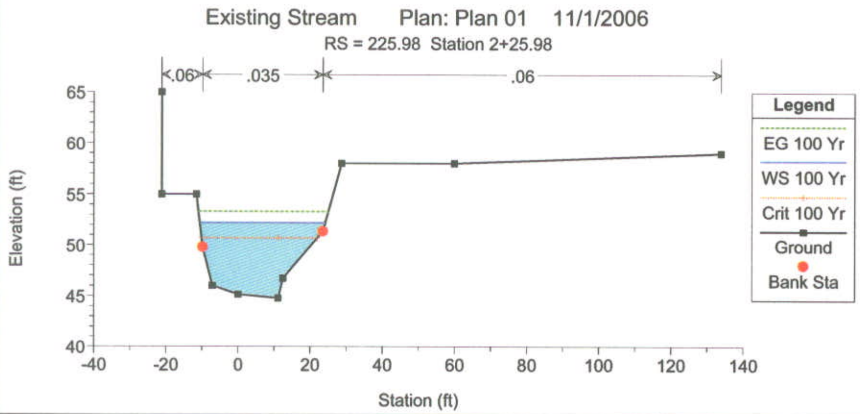

Existing Stream Plan: Plan 01 11/1/2006
RS = 0.00 Station 0+00
.06
.035
.06
Elevation (ft)
Station (ft)
Legend
EG 100 Yr
Crit 100 Yr
WS 100 Yr
Ground
Bank Sta

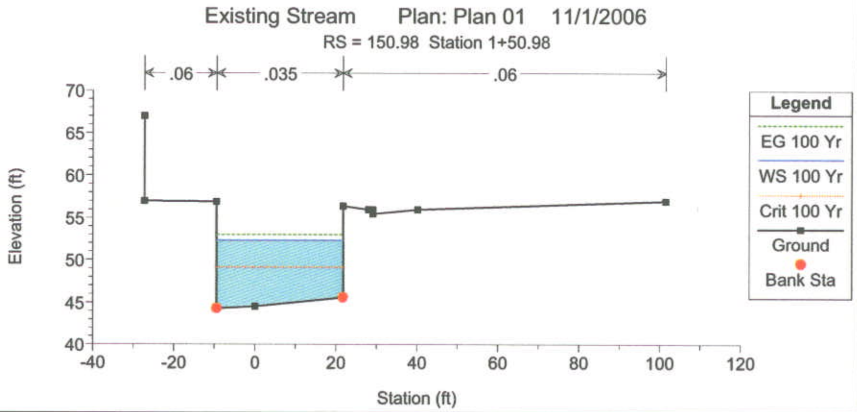

Existing Stream Plan: Plan 01 11/1/2006
RS = 723.17 Culv Culvert 2
.06
.035
.06
Elevation (ft)
Station (ft)
Legend
EG 100 Yr
Crit 100 Yr
WS 100 Yr
Ground
Bank Sta


Existing Stream Plan: Plan 01 11/1/2006
RS = 723.17 Culv Culvert 2
.06
.035
.06
Elevation (ft)
Station (ft)
Legend
EG 100 Yr
Crit 100 Yr
WS 100 Yr
Ground
Bank Sta

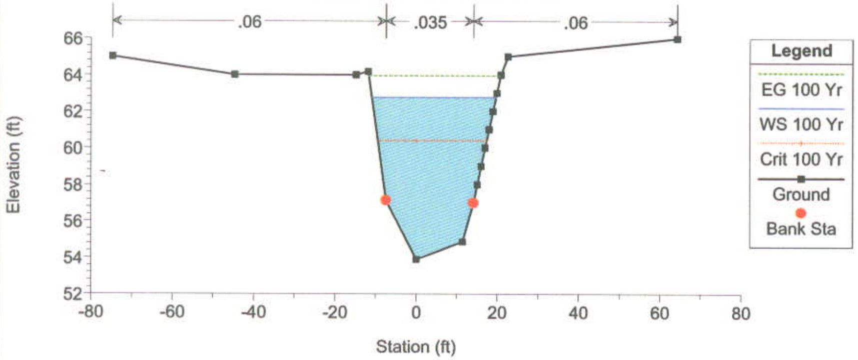

Existing Stream Plan: Plan 01 11/1/2006
RS = 369.20 Station 3+69.20
.06
.035
.06
Elevation (ft)
Station (ft)
Legend
EG 100 Yr
Crit 100 Yr
WS 100 Yr
Ground
Bank Sta


Existing Stream Plan: Plan 01 11/1/2006
RS = 325.98 Station 3+25.98
.06
.035
.06
Elevation (ft)
Station (ft)
Legend
EG 100 Yr
Crit 100 Yr
WS 100 Yr
Ground
Bank Sta

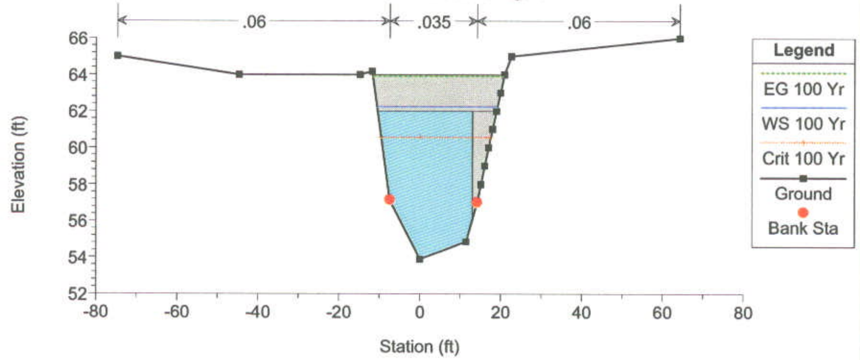

Existing Stream Plan: Plan 01 11/1/2006
RS = 225.98 Station 2+25.98
.06
.035
.06
Elevation (ft)
Station (ft)
Legend
EG 100 Yr
WS 100 Yr
Crit 100 Yr
Ground
Bank Sta


Existing Stream Plan: Plan 01 11/1/2006
RS = 150.98 Station 1+50.98
.06
.035
.06
Elevation (ft)
Station (ft)
Legend
EG 100 Yr
WS 100 Yr
Crit 100 Yr
Ground
Bank Sta

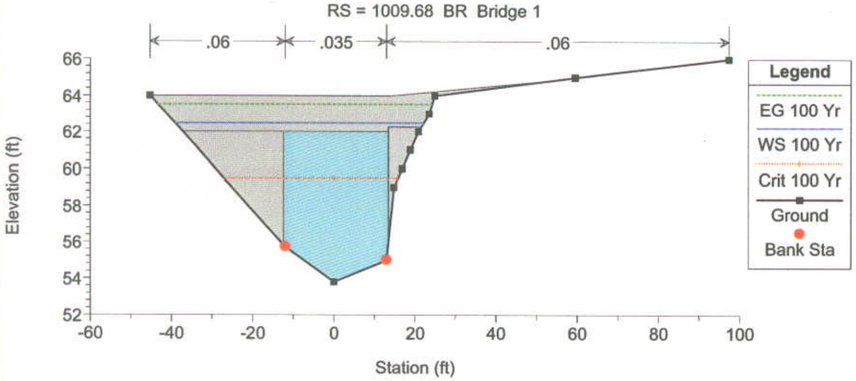
Existing Stream Plan: Plan 01 11/1/2006
RS = 1009.69 Station 10+09.69



Existing Stream Plan: Plan 01 11/1/2006
RS = 1009.68 BR Bridge 1



Existing Stream Plan: Plan 01 11/1/2006
RS = 1009.68 BR Bridge 1



Existing Stream Plan: Plan 01 11/1/2006
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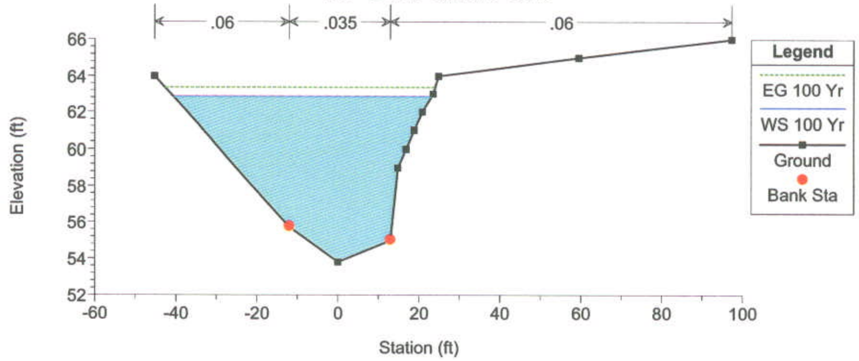

Existing Stream Plan: Plan 01 11/1/2006
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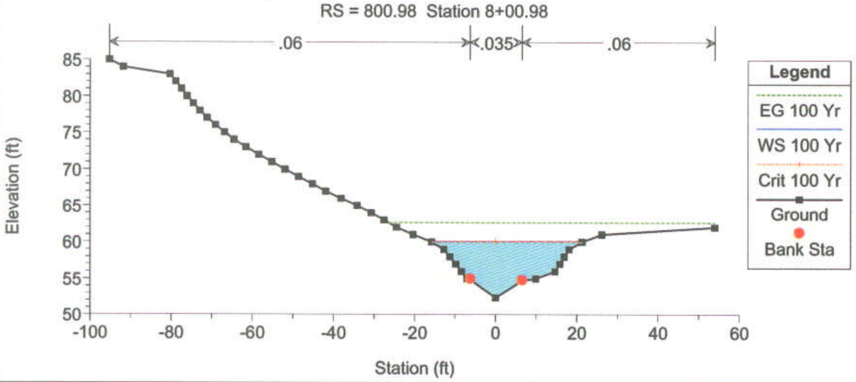

Existing Stream Plan: Plan 01 11/1/2006
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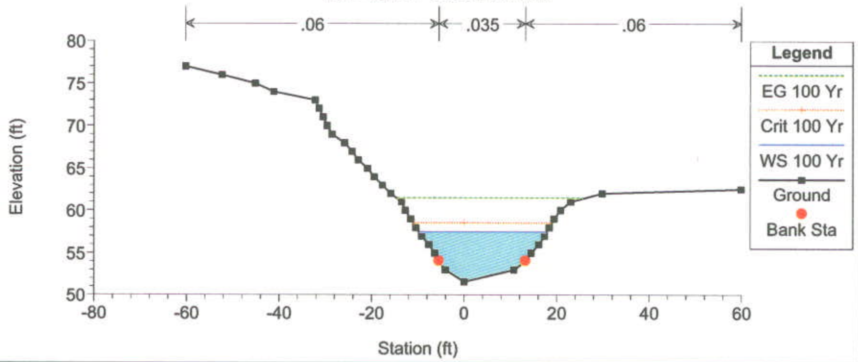

Existing Stream Plan: Plan 01 11/1/2006
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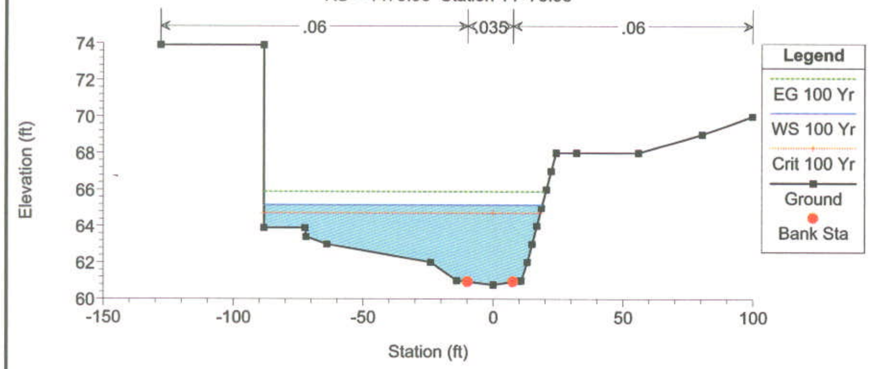
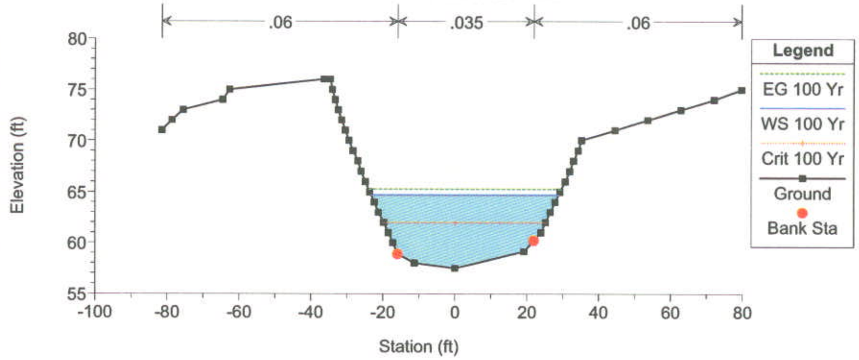


Existing Stream Plan: Plan 01 11/1/2006
RS = 1276.48 Station 12+76.48



Existing Stream Plan: Plan 01 11/1/2006
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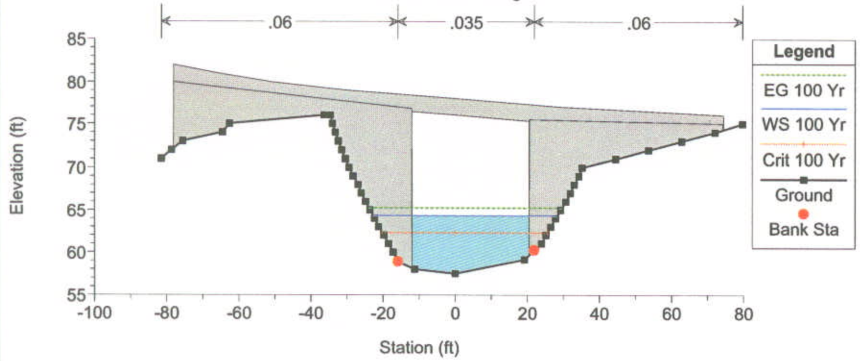
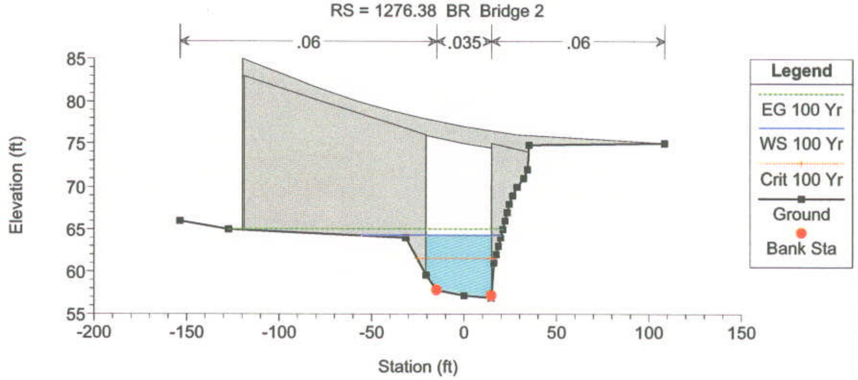


Existing Stream Plan: Plan 01 11/1/2006
RS = 1276.38 BR Bridge 2



Existing Stream Plan: Plan 01 11/1/2006
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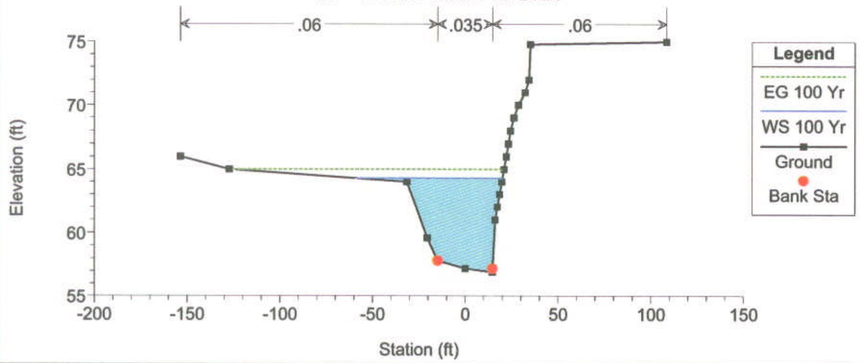

Existing Stream Plan: Plan 01 11/1/2006
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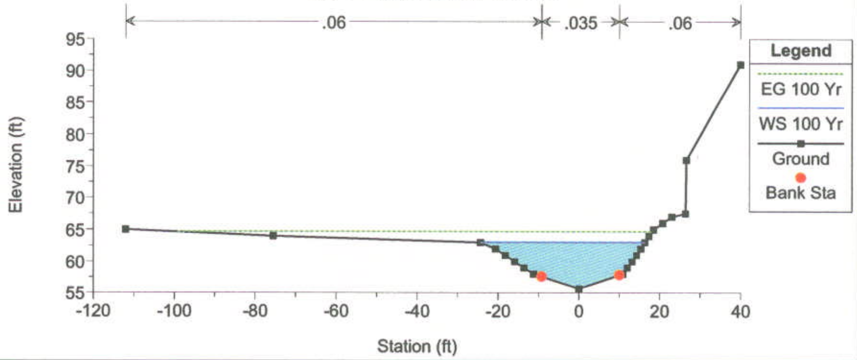
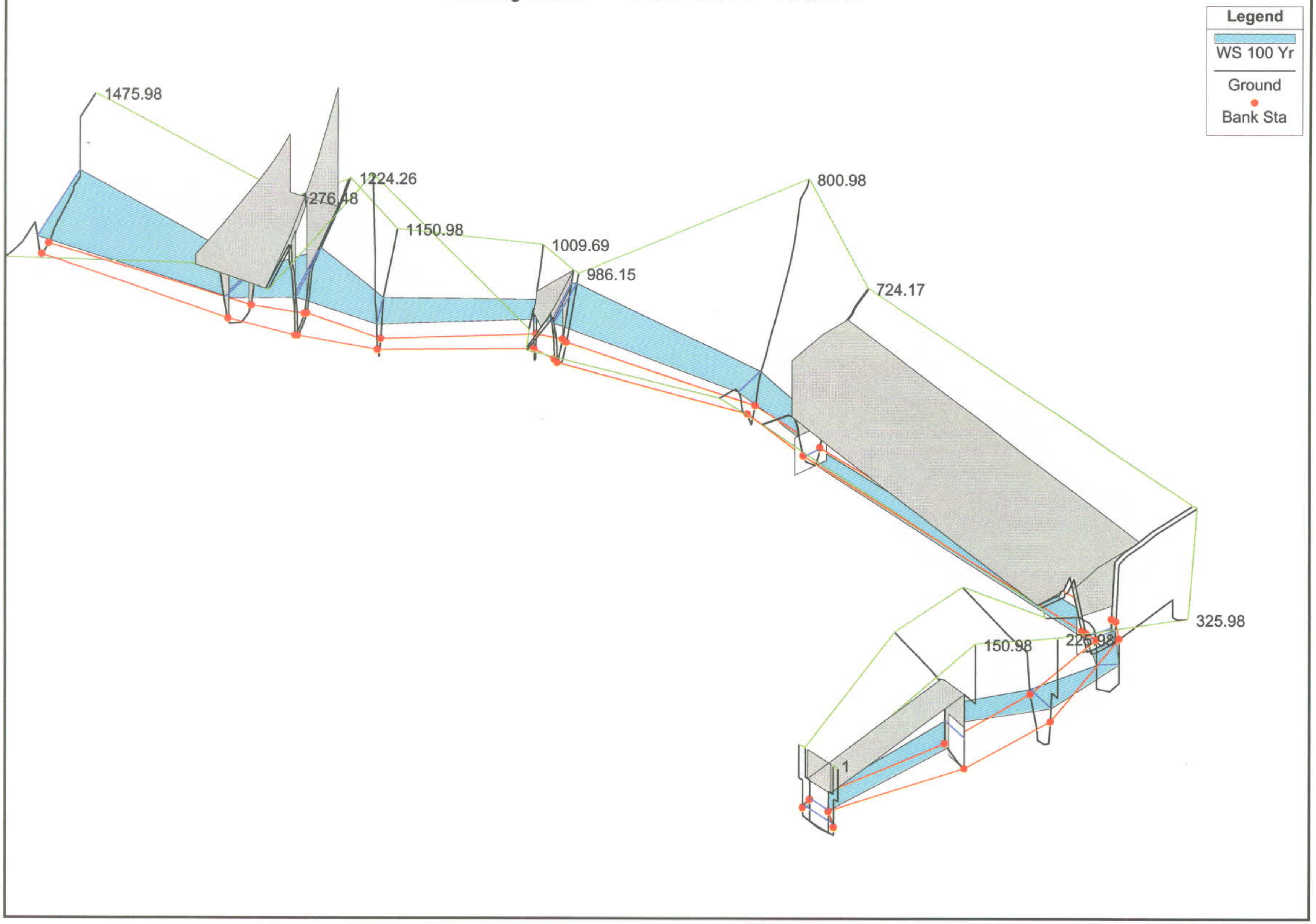
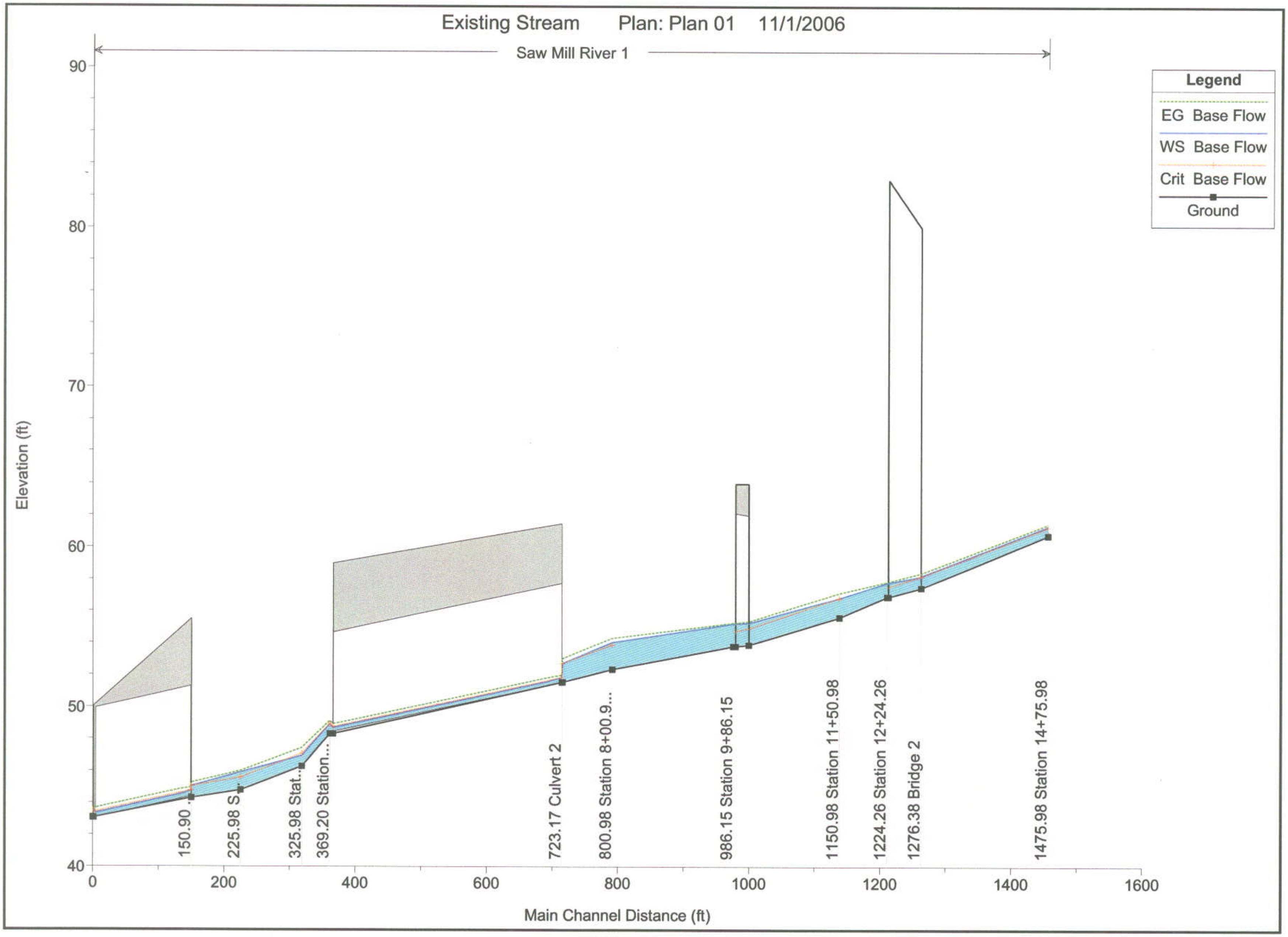


Existing Stream Plan: Plan 01 11/1/2006





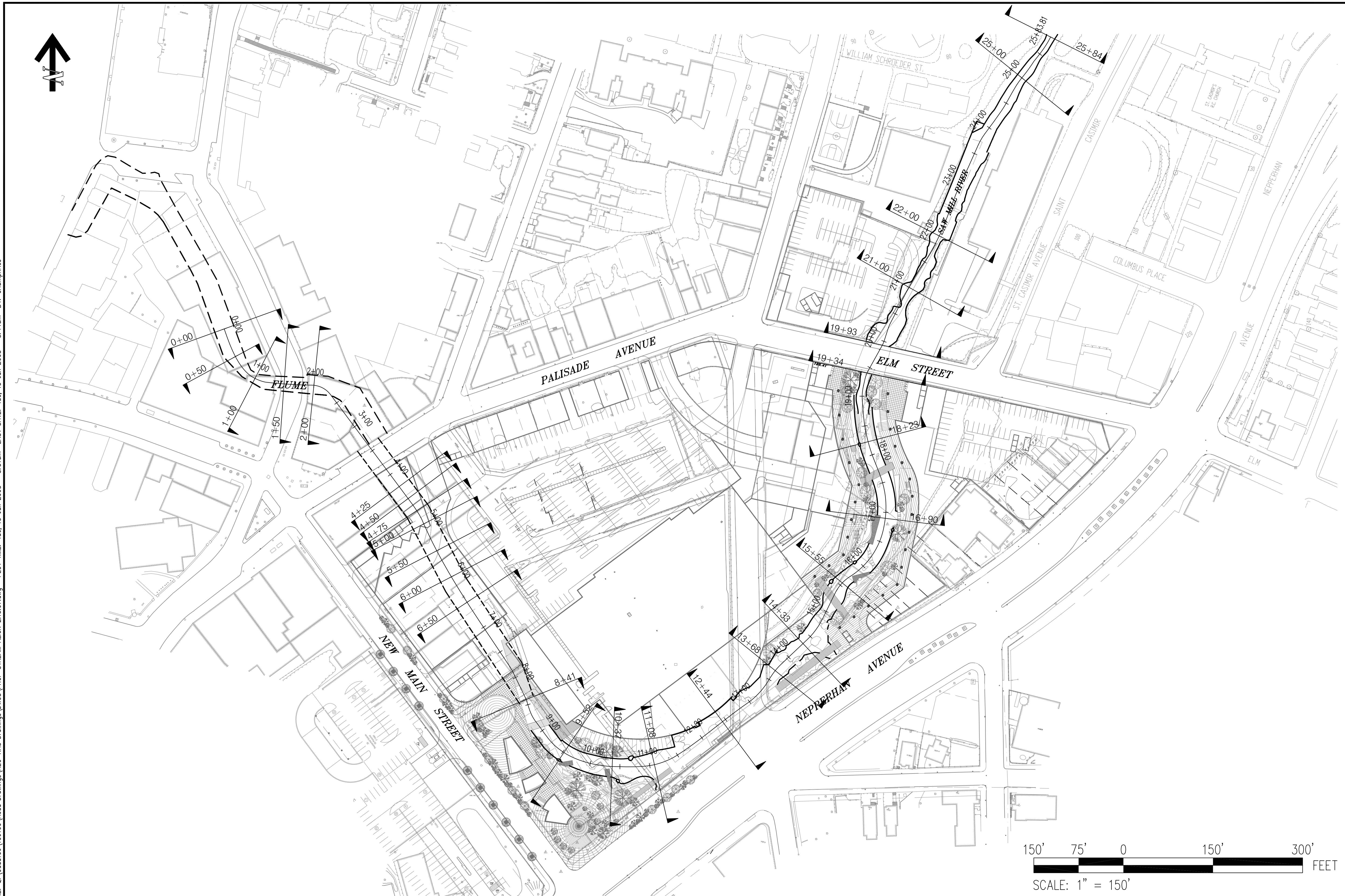
Existing Stream Plan: Plan 01 11/1/2006
Saw Mill River 1
Legend
EG Base Flow
WS Base Flow
Crit Base Flow
Ground
Elevation (ft)
90
80
70
60
50
40
0
200
400
600
800
1000
1200
1400
1600
Main Channel Distance (ft)
150.90
225.98 S
325.98 Stat...
369.20 Station...
723.17 Culvert 2
800.98 Station 8+00.9...
986.15 Station 9+86.15
1150.98 Station 11+50.98
1224.26 Station 12+24.26
1276.38 Bridge 2
1475.98 Station 14+75.98

HEC-RAS Plan: Plan 01 River: Saw Mill River Reach: 1

Reach	River Sta	Profile	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)	
1	0.00	Base Flow	30.00	43.05	43.51	43.51	43.64	0.027718	2.88	10.42	40.00	0.99
1	0.00	10 Yr	1015.00	43.05	44.71	45.95	49.40	0.109170	17.37	58.43	40.04	2.53
1	0.00	100 Yr	1540.00	43.05	45.20	46.82	51.23	0.095207	19.70	78.19	40.06	2.48
1	1	Base Flow	30.00	43.04	43.53		43.65	0.014046	2.85	10.54	24.01	0.76
1	1	10 Yr	1015.00	43.04	45.81	46.89	49.56	0.046190	15.55	65.27	24.08	0.45
1	1	100 Yr	1540.00	43.04	46.80	48.12	51.43	0.040304	17.27	89.16	24.11	0.43
1	150.90		Culvert									
1	150.98	Base Flow	30.00	44.30	45.04	45.04	45.25	0.024445	3.71	8.08	19.32	1.01
1	150.98	10 Yr	1015.00	44.30	50.33	48.08	50.89	0.002070	5.98	169.90	31.20	0.45
1	150.98	100 Yr	1540.00	44.30	52.27	49.11	52.96	0.001727	6.69	230.39	31.21	0.43
1	225.98	Base Flow	30.00	44.80	45.90	45.58	45.98	0.005052	2.35	12.79	18.03	0.49
1	225.98	10 Yr	1015.00	44.80	50.17	49.53	51.35	0.008230	8.72	116.42	30.62	0.79
1	225.98	100 Yr	1540.00	44.80	52.18	50.67	53.29	0.004811	8.47	182.85	34.74	0.64
1	325.98	Base Flow	30.00	46.29	46.93	47.07	47.40	0.068364	5.51	5.44	15.38	1.63
1	325.98	10 Yr	1015.00	46.29	49.87	51.11	54.12	0.045492	16.53	61.39	19.47	1.64
1	325.98	100 Yr	1540.00	46.29	50.79	52.51	56.66	0.049232	19.44	79.20	19.49	1.70
1	369.20	Base Flow	30.00	48.30	48.92	48.92	49.11	0.025488	3.53	8.51	22.48	1.01
1	369.20	10 Yr	1015.00	48.30	50.28	52.20	58.80	0.173893	23.43	43.32	26.88	1.35
1	369.20	100 Yr	1540.00	48.30	50.83	53.28	61.59	0.157765	26.32	58.52	27.86	1.31
1	723.17		Culvert									
1	724.17	Base Flow	30.00	51.56	52.72	52.72	53.01	0.022771	4.38	6.85	11.85	1.01
1	724.17	10 Yr	1015.00	51.56	56.18	57.07	59.45	0.022442	14.62	73.78	24.22	1.35
1	724.17	100 Yr	1540.00	51.56	57.38	58.43	61.39	0.019178	16.34	104.85	27.38	1.31
1	800.98	Base Flow	30.00	52.36	54.04	53.88	54.29	0.012838	4.08	7.35	8.77	0.79
1	800.98	10 Yr	1015.00	52.36	58.71	58.71	60.68	0.010566	12.38	110.39	30.08	0.96
1	800.98	100 Yr	1540.00	52.36	59.96	59.96	62.59	0.010873	14.54	151.93	36.85	1.01
1	986.15	Base Flow	30.00	53.80	55.19		55.25	0.002659	1.82	16.52	21.78	0.37
1	986.15	10 Yr	1015.00	53.80	60.98		61.42	0.001501	5.64	226.73	51.89	0.39
1	986.15	100 Yr	1540.00	53.80	62.82		63.34	0.001332	6.29	332.71	63.51	0.39
1	1009.68		Bridge									
1	1009.69	Base Flow	30.00	53.89	55.24	54.90	55.34	0.004741	2.48	12.09	15.00	0.49
1	1009.69	10 Yr	1015.00	53.89	60.76	59.08	61.73	0.003707	7.98	135.74	27.41	0.58
1	1009.69	100 Yr	1540.00	53.89	62.75	60.38	63.93	0.003092	8.87	193.40	30.59	0.56
1	1150.98	Base Flow	30.00	55.62	56.82	56.82	57.13	0.022324	4.45	6.73	11.19	1.01
1	1150.98	10 Yr	1015.00	55.62	61.00	60.94	62.77	0.010008	11.13	108.25	32.51	0.94
1	1150.98	100 Yr	1540.00	55.62	63.00		64.65	0.005862	10.97	180.92	40.70	0.77
1	1224.26	Base Flow	30.00	56.92	57.80		57.86	0.005279	1.98	15.22	29.49	0.48
1	1224.26	10 Yr	1015.00	56.92	62.69		63.19	0.002038	5.87	200.97	46.43	0.45
1	1224.26	100 Yr	1540.00	56.92	64.29		64.98	0.002005	6.92	283.81	79.14	0.46
1	1276.38		Bridge									
1	1276.48	Base Flow	30.00	57.49	58.24	58.20	58.41	0.019080	3.31	9.08	21.38	0.89
1	1276.48	10 Yr	1015.00	57.49	62.99	61.06	63.45	0.002160	5.52	196.65	47.69	0.45
1	1276.48	100 Yr	1540.00	57.49	64.70	61.97	65.24	0.001715	6.05	281.98	52.04	0.42
1	1475.98	Base Flow	30.00	60.77	61.34	61.26	61.46	0.013246	3.02	11.91	28.98	0.76
1	1475.98	10 Yr	1015.00	60.77	64.15	64.15	64.99	0.010187	9.50	196.01	105.29	0.92
1	1475.98	100 Yr	1540.00	60.77	65.15	64.71	65.87	0.006765	9.24	302.45	107.14	0.78

APPENDIX B-

PROPOSED CONDITIONS ANALYSIS



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NO.	DATE	REVISION	BY

McLaren ENGINEERING GROUP

E-mail: mgmclaren@mgmclaren.com
100 Snake Hill Road, West Nyack, NY 10994
Tel. (845) 353-6400 Fax. (845) 353-6509

PROJECT

RIVER PARK CENTER

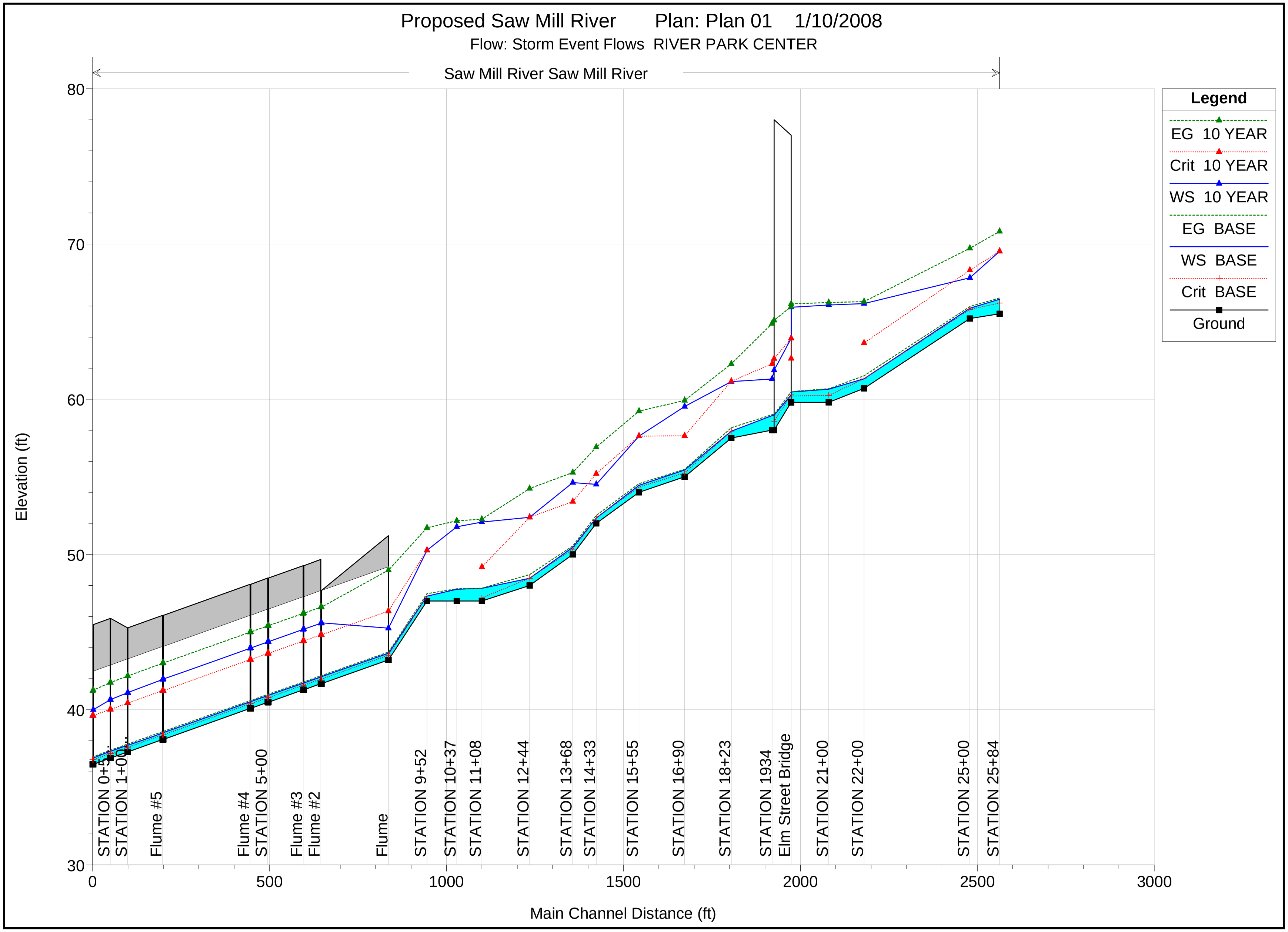
YONKERS NEW YORK

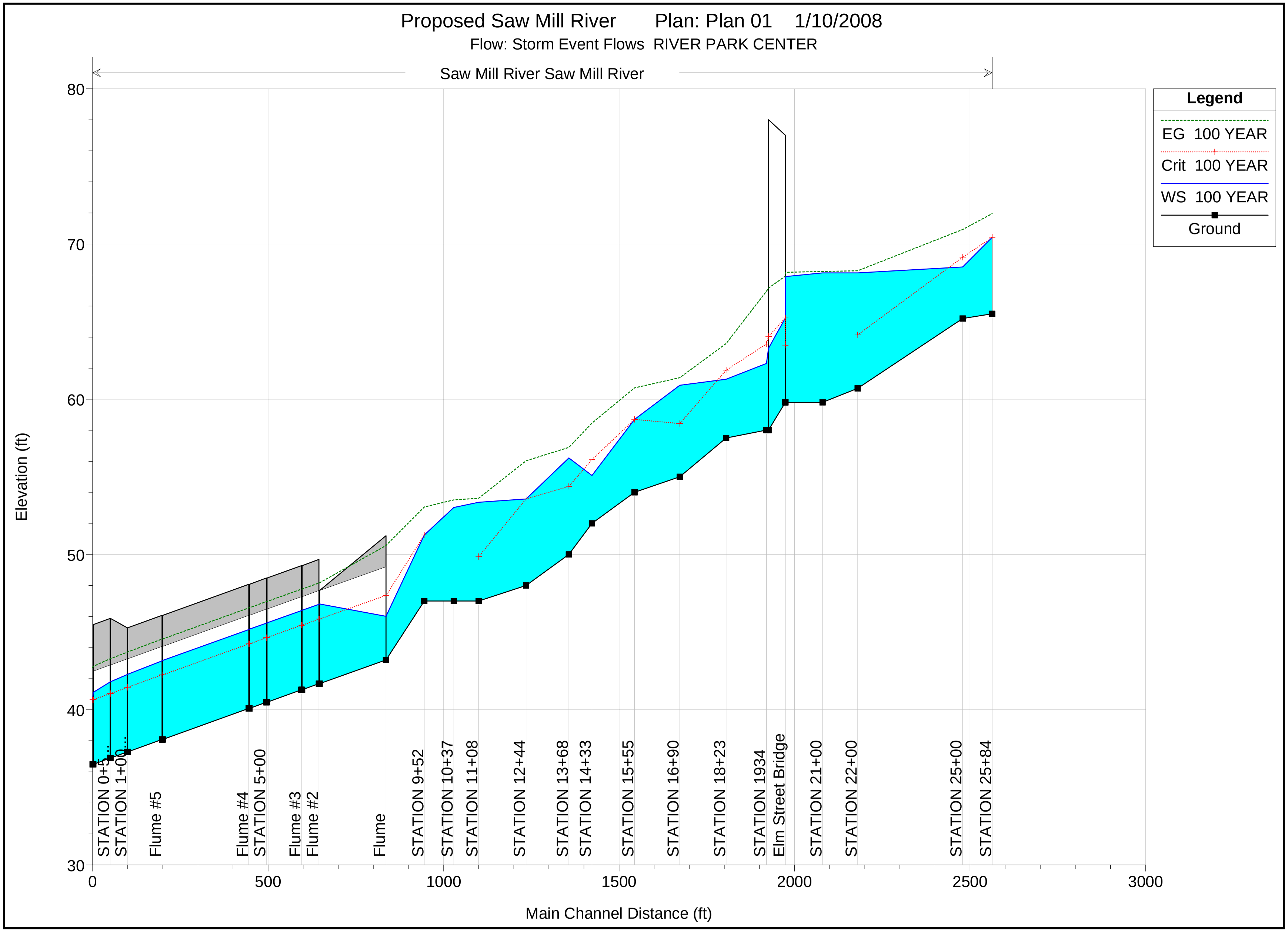
SHEET TITLE

HEC-RAS ANALYSIS
STREAM ALIGNMENT
PROPOSED CONDTIONS

PROJECT NO.	106100
SCALE	AS NOTED
DATE	1/15/08
DRAWN BY	CMH
CHECKED BY	EFB
DRAWING NO.	1

1 OF 1 SHTS


Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows RIVER PARK CENTER
Saw Mill River Saw Mill River
Legend
EG 10 YEAR
Crit 10 YEAR
WS 10 YEAR
EG BASE
WS BASE
Crit BASE
Ground
Elevation (ft)
Main Channel Distance (ft)
STATION 0+5
STATION 1+00
Flume #5
Flume #4
STATION 5+00
Flume #3
Flume #2
Flume
STATION 9+52
STATION 10+37
STATION 11+08
STATION 12+44
STATION 13+68
STATION 14+33
STATION 15+55
STATION 16+90
STATION 18+23
STATION 1934
Elm Street Bridge
STATION 21+00
STATION 22+00
STATION 25+00
STATION 25+84
30
40
50
60
70
80
0
500
1000
1500
2000
2500
3000


Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows RIVER PARK CENTER
Saw Mill River Saw Mill River
Legend
EG 100 YEAR
Crit 100 YEAR
WS 100 YEAR
Ground
Elevation (ft)
Main Channel Distance (ft)
80
70
60
50
40
30
0
500
1000
1500
2000
2500
3000
STATION 0+5
STATION 1+00
Flume #5
Flume #4
STATION 5+00
Flume #3
Flume #2
Flume
STATION 9+52
STATION 10+37
STATION 11+08
STATION 12+44
STATION 13+68
STATION 14+33
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STATION 18+23
STATION 1934
Elm Street Bridge
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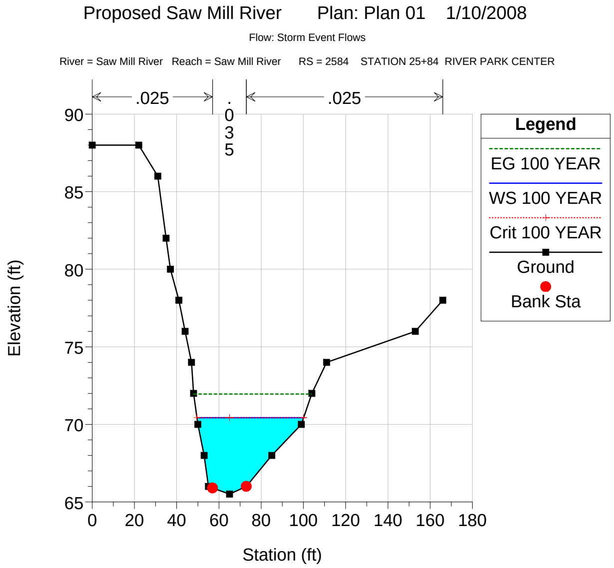
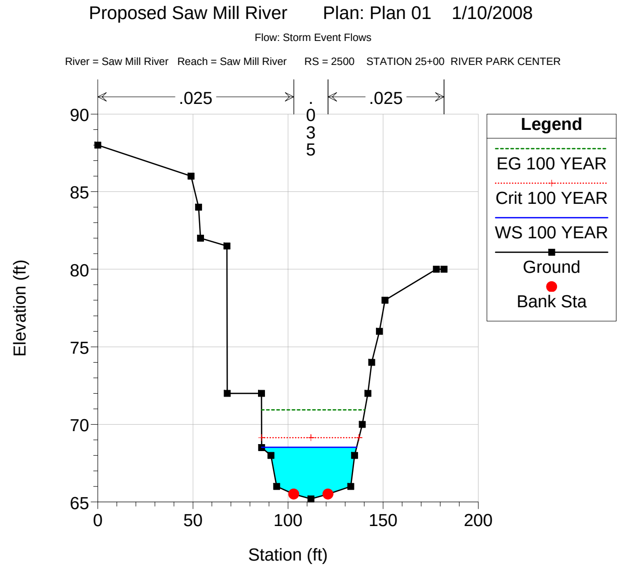
STATION 22+00
STATION 25+00
STATION 25+84


Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 2584 STATION 25+84 RIVER PARK CENTER
.025
.035
.025
Legend
EG 100 YEAR
WS 100 YEAR
Crit 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)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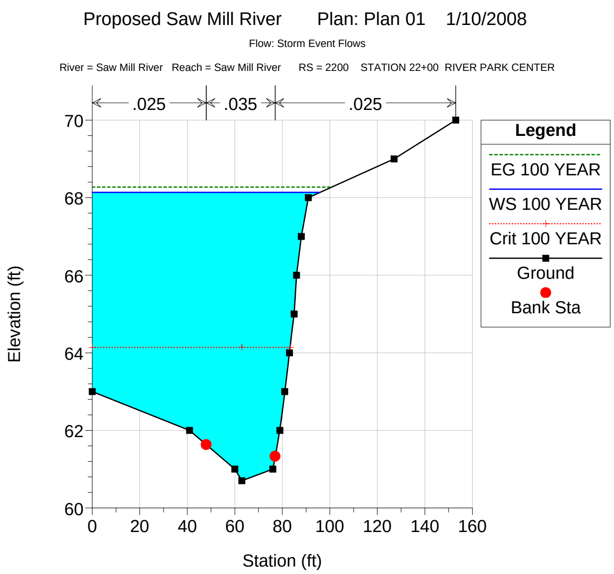
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 2500 STATION 25+00 RIVER PARK CENTER
.025
.035
.025
Legend
EG 100 YEAR
Crit 100 YEAR
WS 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)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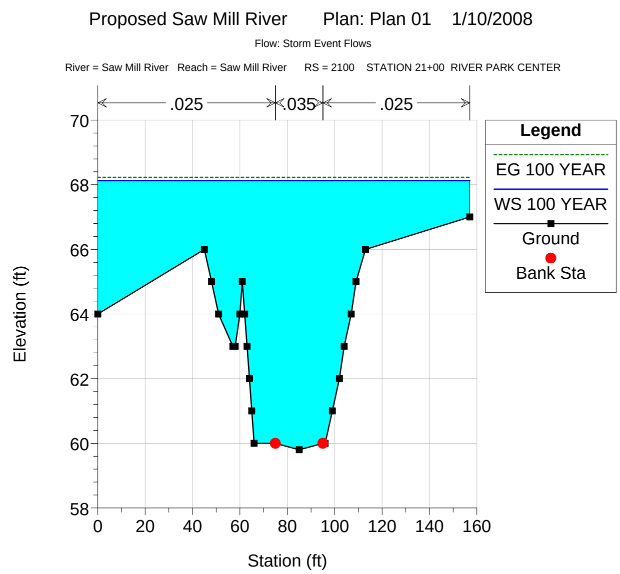
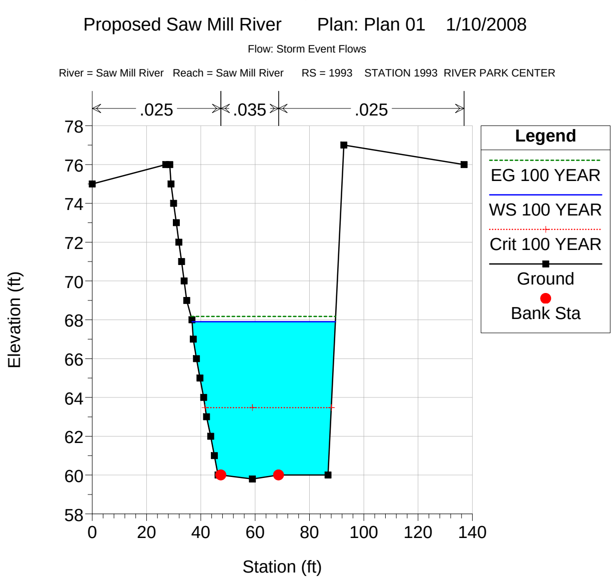
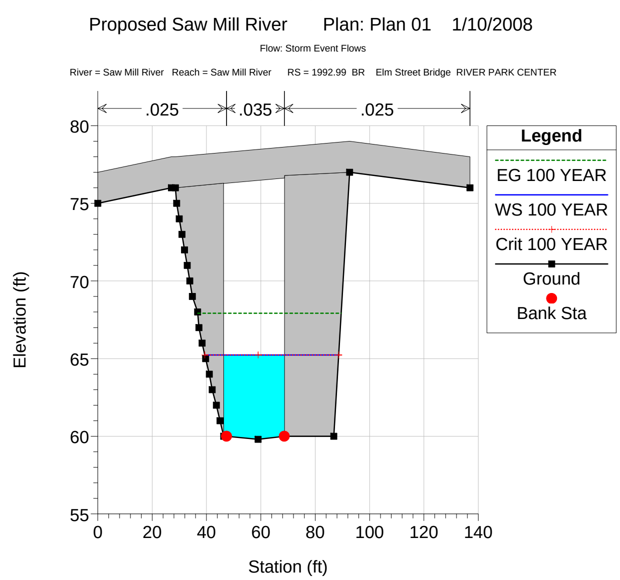
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 2200 STATION 22+00 RIVER PARK CENTER
.025
.035
.025
Legend
EG 100 YEAR
WS 100 YEAR
Crit 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 2100 STATION 21+00 RIVER PARK CENTER
.025
.035
.025
Legend
EG 100 YEAR
WS 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 1993 STATION 1993 RIVER PARK CENTER
.025
.035
.025
Legend
EG 100 YEAR
WS 100 YEAR
Crit 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 1992.99 BR Elm Street Bridge RIVER PARK CENTER
.025
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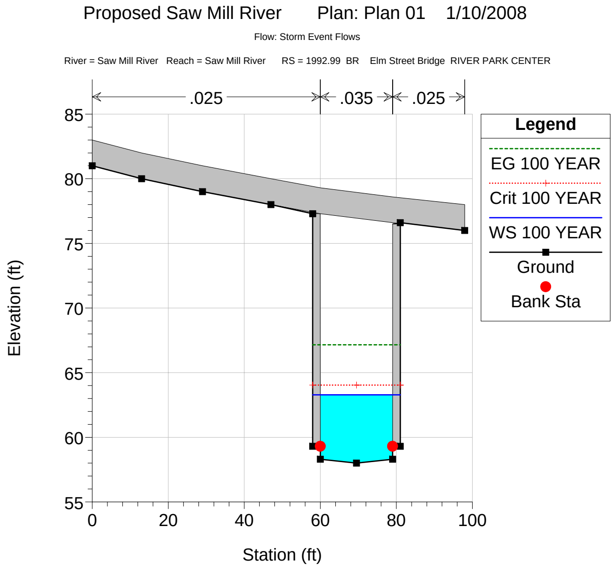
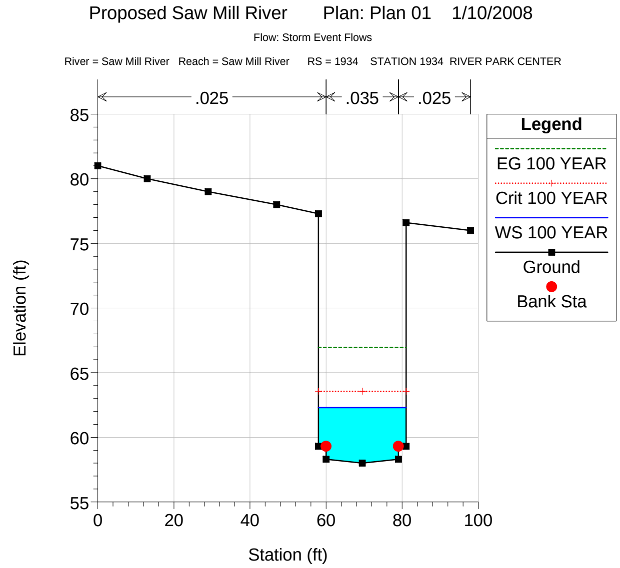
.025
Legend
EG 100 YEAR
WS 100 YEAR
Crit 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 1992.99 BR Elm Street Bridge RIVER PARK CENTER
.025 .035 .025
Legend
EG 100 YEAR
Crit 100 YEAR
WS 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 1934 STATION 1934 RIVER PARK CENTER
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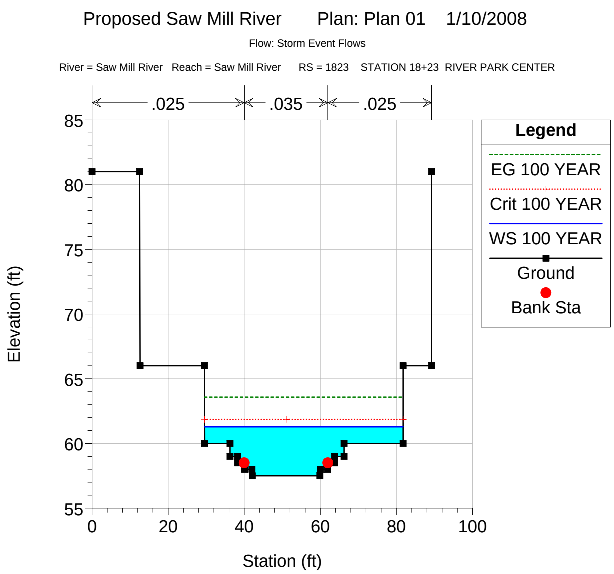
Legend
EG 100 YEAR
Crit 100 YEAR
WS 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 1823 STATION 18+23 RIVER PARK CENTER
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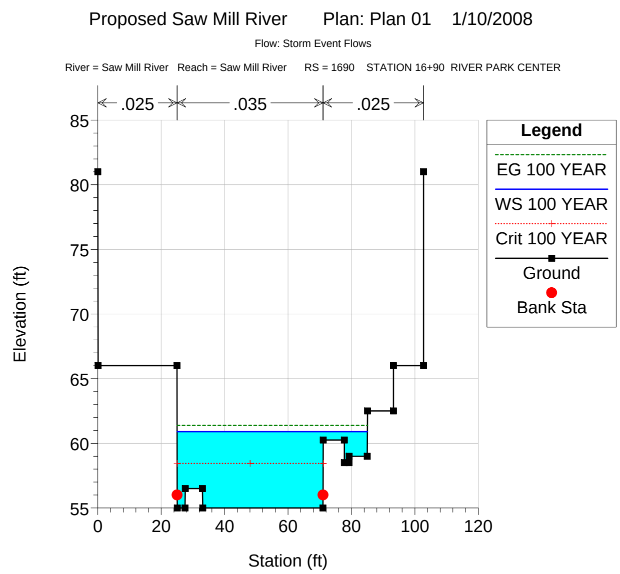
Legend
EG 100 YEAR
Crit 100 YEAR
WS 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 1690 STATION 16+90 RIVER PARK CENTER
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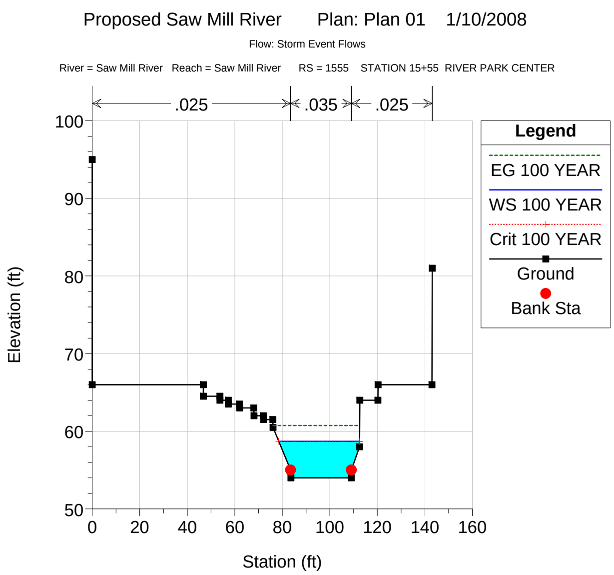
Legend
EG 100 YEAR
WS 100 YEAR
Crit 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 1555 STATION 15+55 RIVER PARK CENTER
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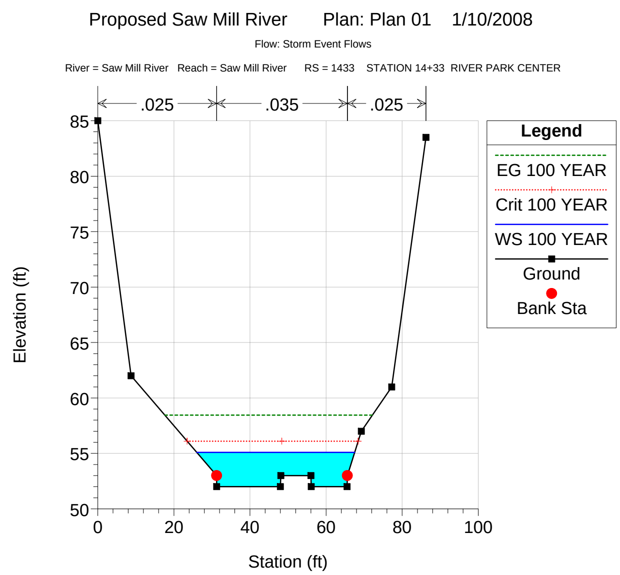
Legend
EG 100 YEAR
WS 100 YEAR
Crit 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 1433 STATION 14+33 RIVER PARK CENTER
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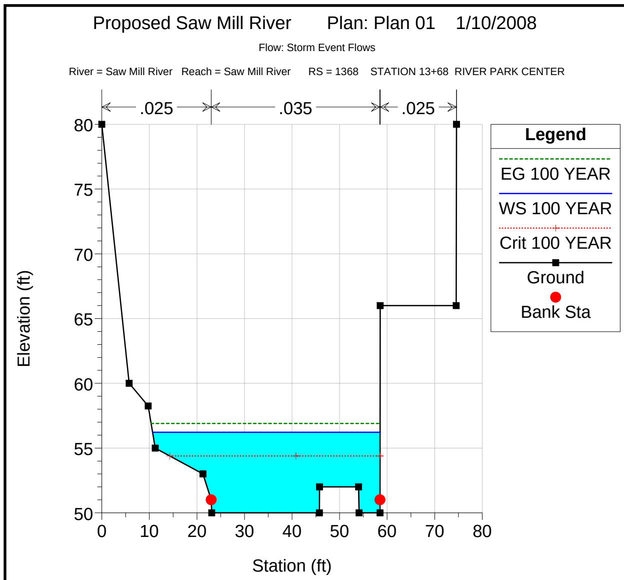
Legend
EG 100 YEAR
Crit 100 YEAR
WS 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 1368 STATION 13+68 RIVER PARK CENTER
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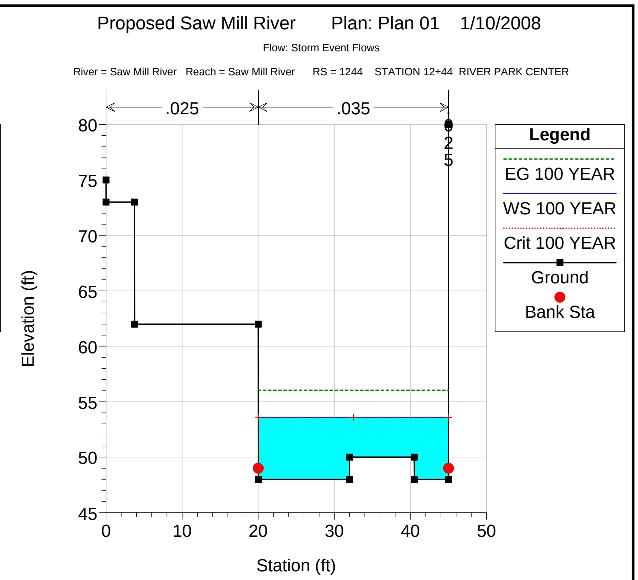
.035
.025
Legend
EG 100 YEAR
WS 100 YEAR
Crit 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 1244 STATION 12+44 RIVER PARK CENTER
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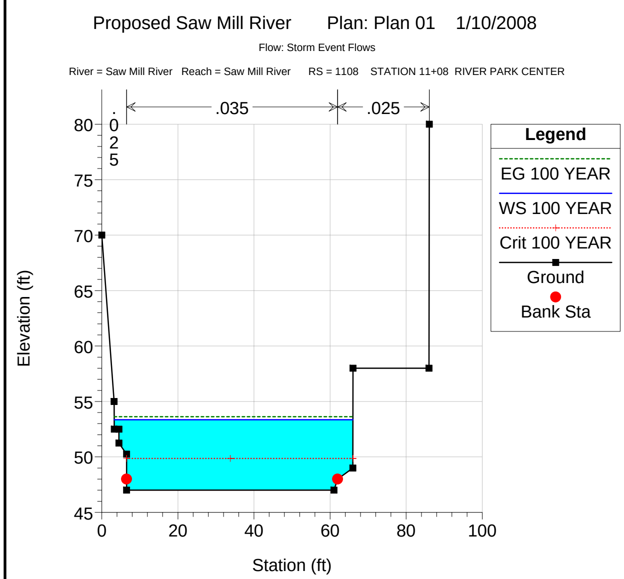
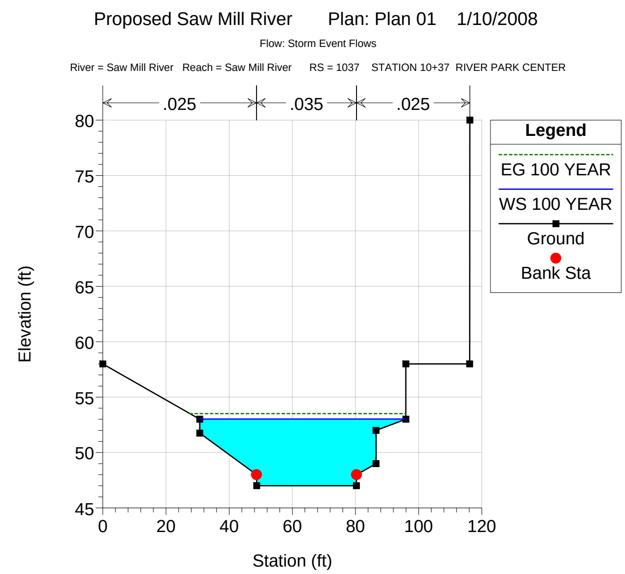
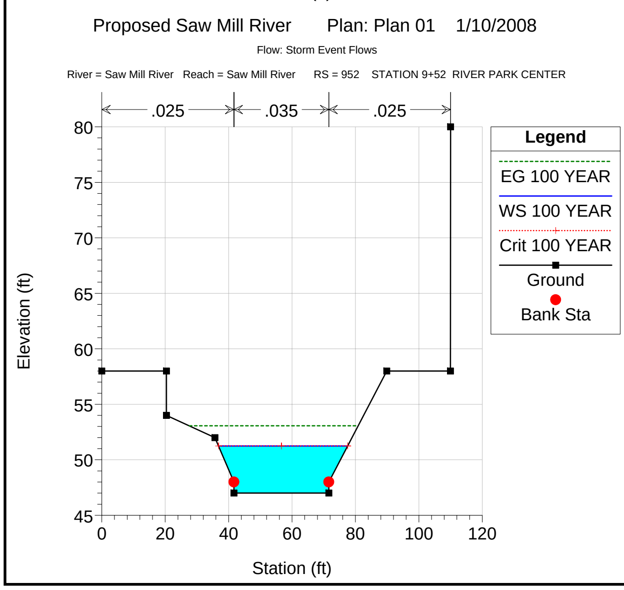
.035
.025
Legend
EG 100 YEAR
WS 100 YEAR
Crit 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 1108 STATION 11+08 RIVER PARK CENTER
.025
.035
.025
Legend
EG 100 YEAR
WS 100 YEAR
Crit 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 1037 STATION 10+37 RIVER PARK CENTER
.025
.035
.025
Legend
EG 100 YEAR
WS 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 952 STATION 9+52 RIVER PARK CENTER
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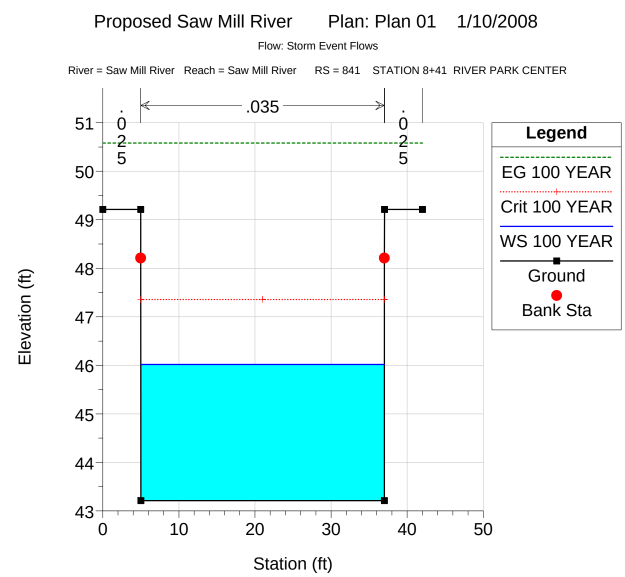
.035
.025
Legend
EG 100 YEAR
WS 100 YEAR
Crit 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 841 STATION 8+41 RIVER PARK CENTER
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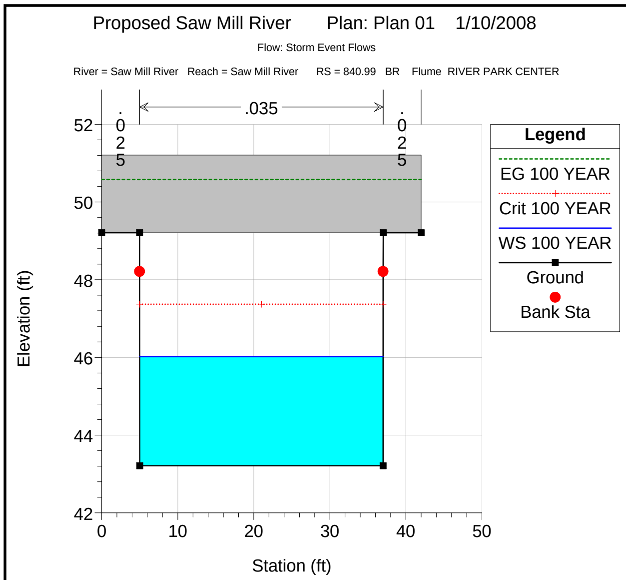
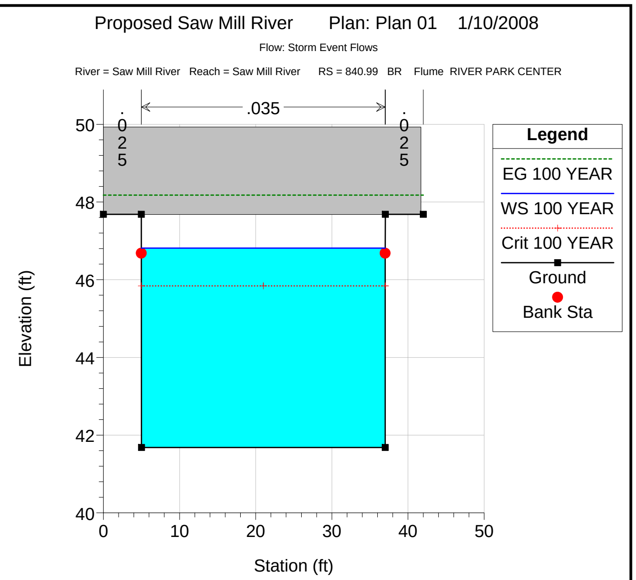
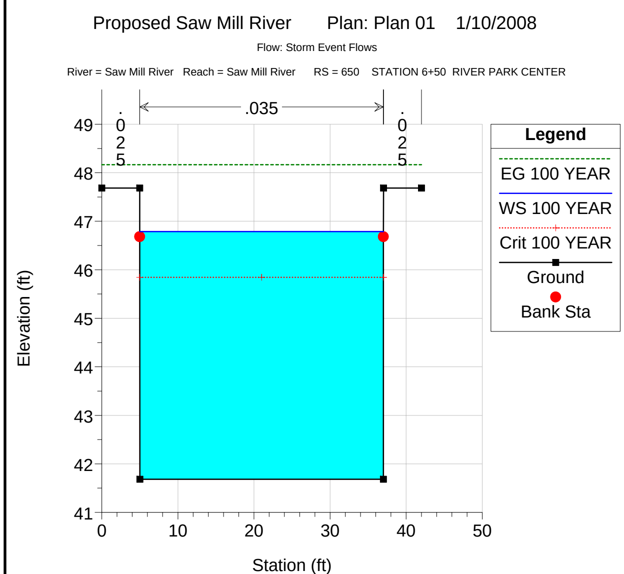
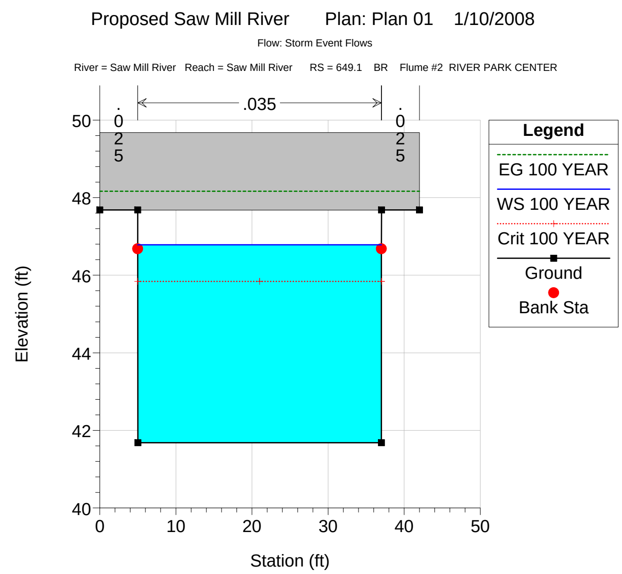
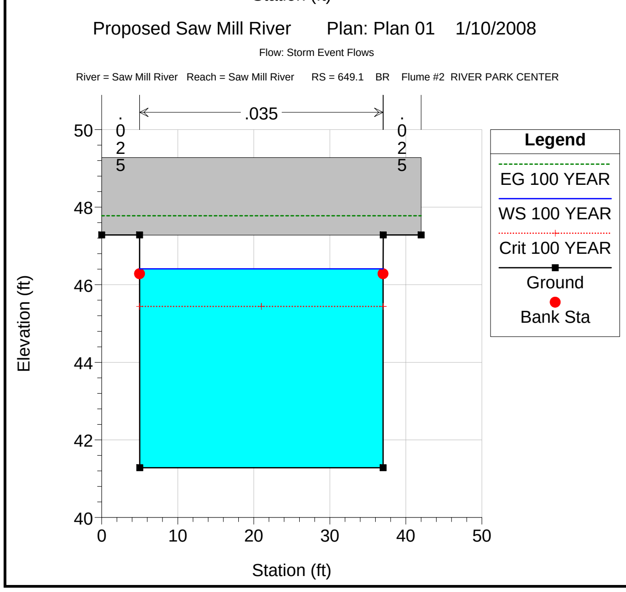
.035
.025
Legend
EG 100 YEAR
Crit 100 YEAR
WS 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)

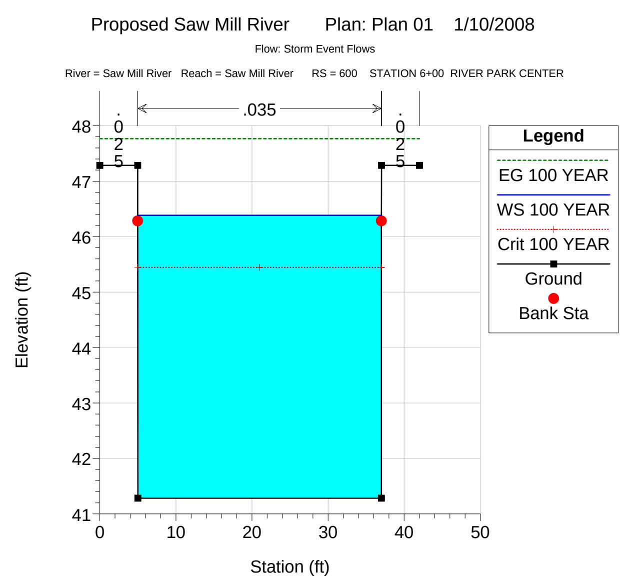

Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 840.99 BR Flume RIVER PARK CENTER
.035
.025
Legend
EG 100 YEAR
Crit 100 YEAR
WS 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 840.99 BR Flume RIVER PARK CENTER
.035
.025
Legend
EG 100 YEAR
WS 100 YEAR
Crit 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)

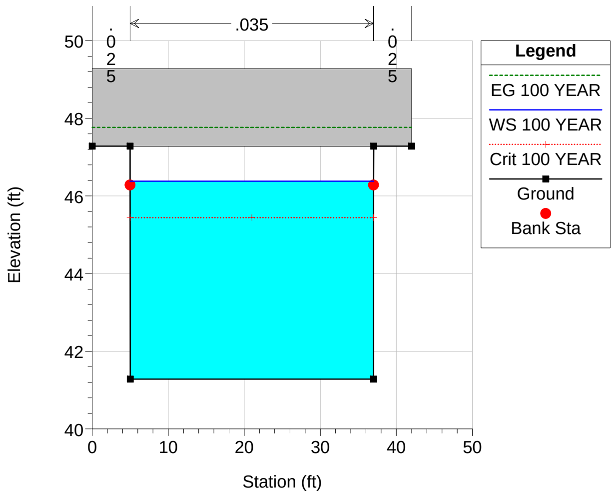

Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 650 STATION 6+50 RIVER PARK CENTER
.035
.025
Legend
EG 100 YEAR
WS 100 YEAR
Crit 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 649.1 BR Flume #2 RIVER PARK CENTER
.035
.025
Legend
EG 100 YEAR
WS 100 YEAR
Crit 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)

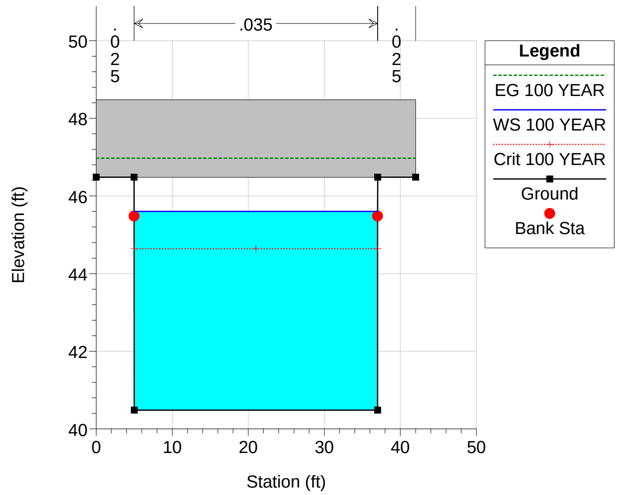

Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 649.1 BR Flume #2 RIVER PARK CENTER
.035
.025
Legend
EG 100 YEAR
WS 100 YEAR
Crit 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 600 STATION 6+00 RIVER PARK CENTER
.035
.025
Legend
EG 100 YEAR
WS 100 YEAR
Crit 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)

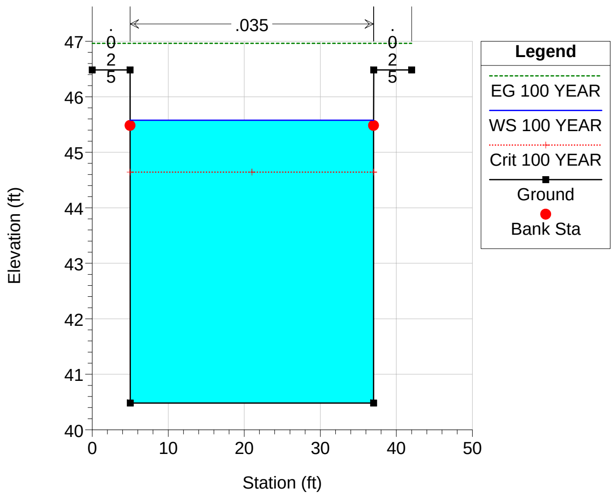
Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 550 BR Flume #3 RIVER PARK CENTER



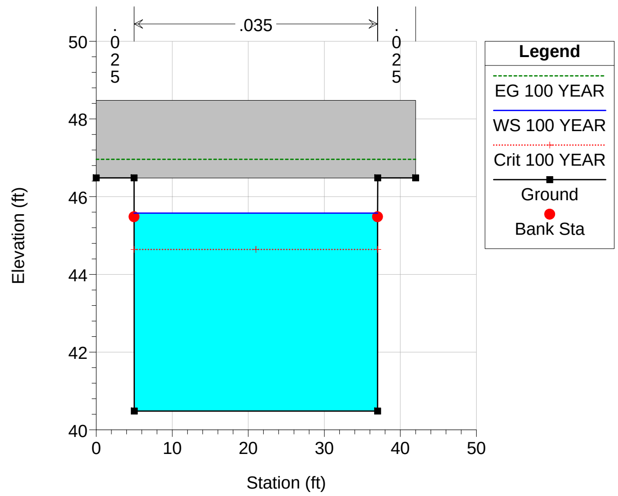
Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 550 BR Flume #3 RIVER PARK CENTER



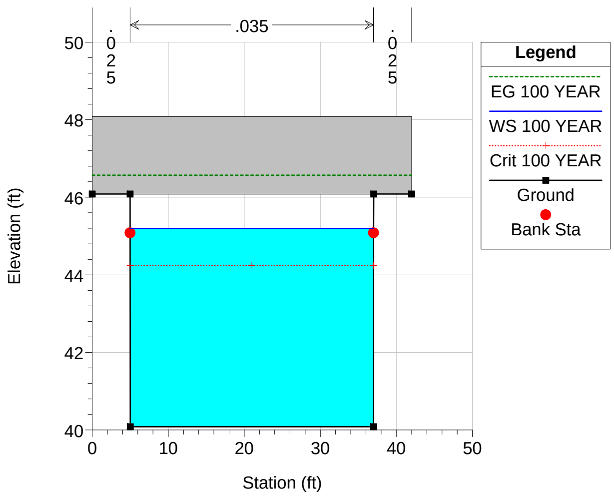
Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 500 STATION 5+00 RIVER PARK CENTER



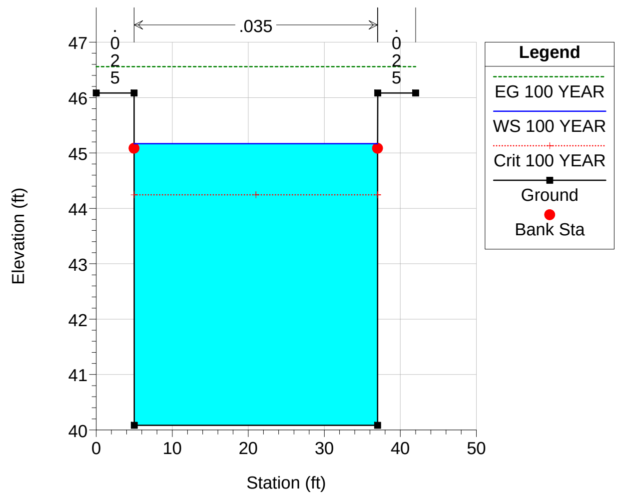
Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 475 BR RIVER PARK CENTER

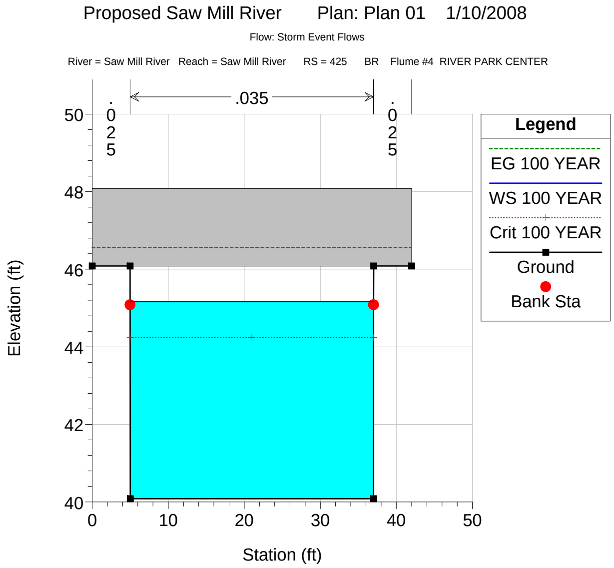


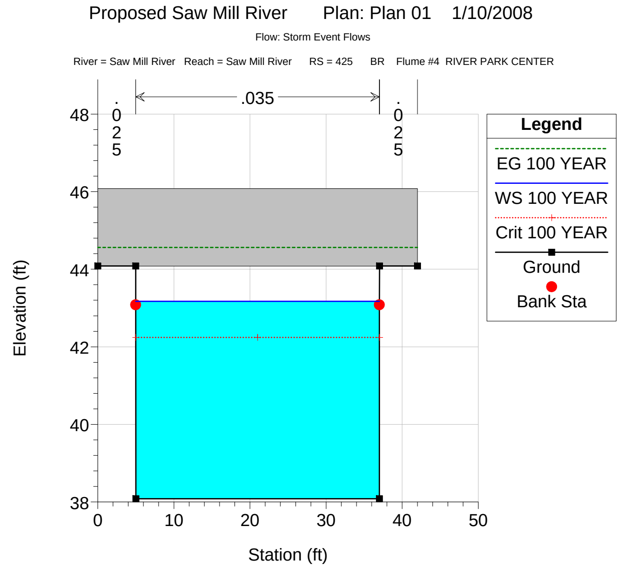
Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 475 BR RIVER PARK CENTER

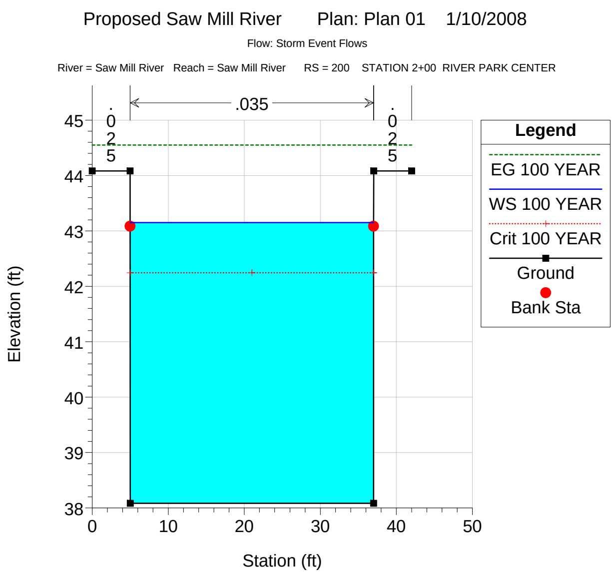


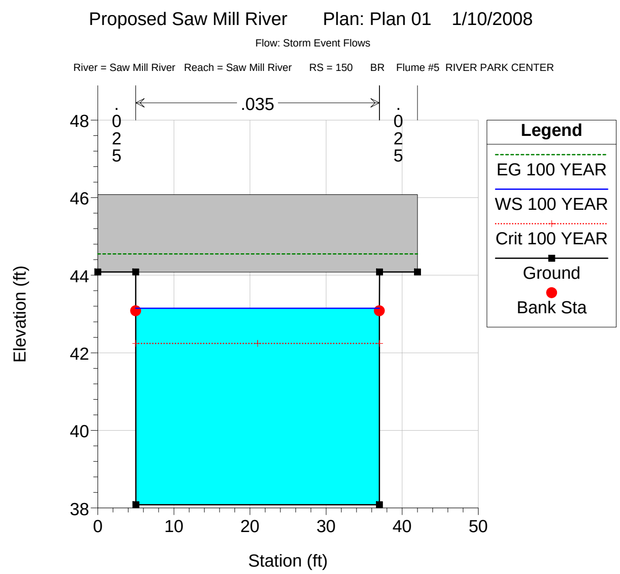
Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 450 STATION 4+50 RIVER PARK CENTER

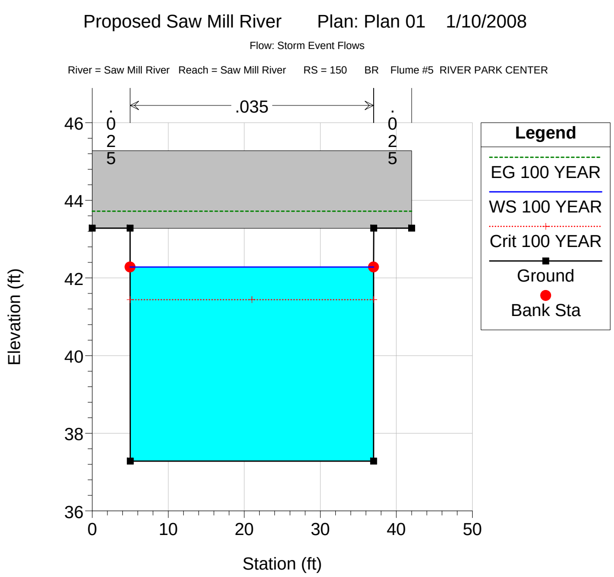


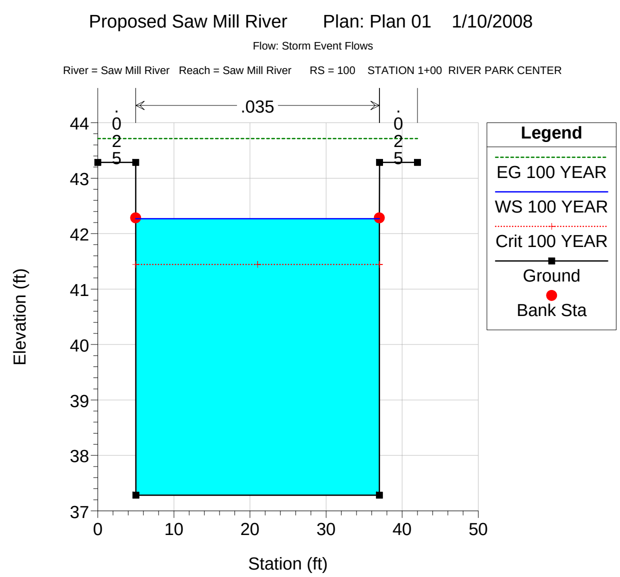

Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 425 BR Flume #4 RIVER PARK CENTER
.035
.025
.025
Legend
EG 100 YEAR
WS 100 YEAR
Crit 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)

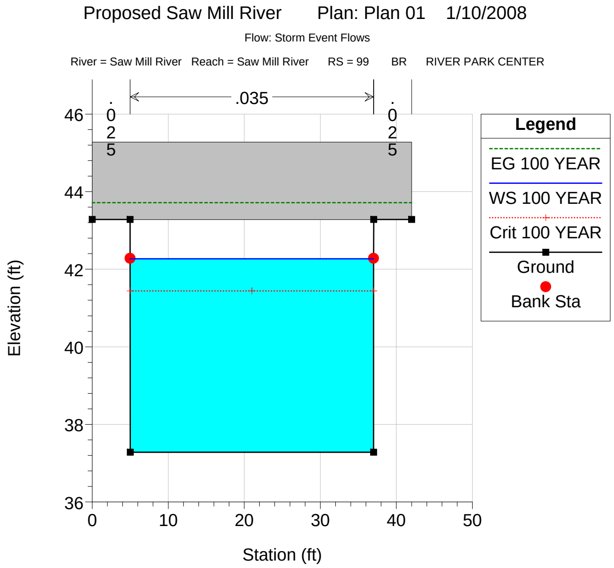

Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 425 BR Flume #4 RIVER PARK CENTER
.035
.025
.025
Legend
EG 100 YEAR
WS 100 YEAR
Crit 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)

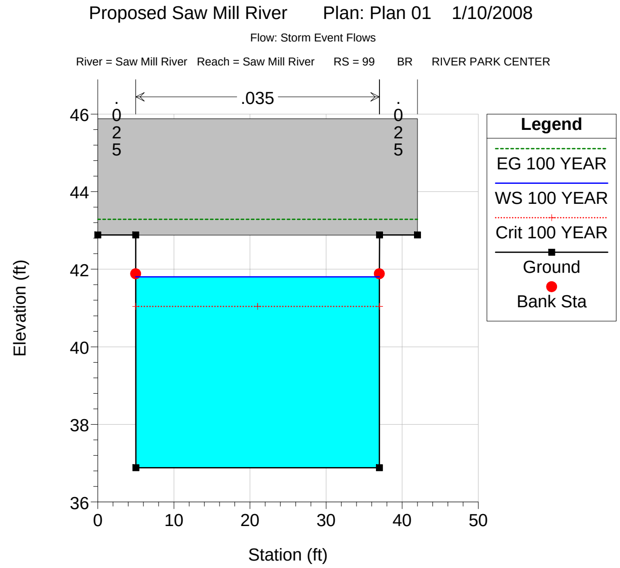

Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 200 STATION 2+00 RIVER PARK CENTER
.035
.025
.025
Legend
EG 100 YEAR
WS 100 YEAR
Crit 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)

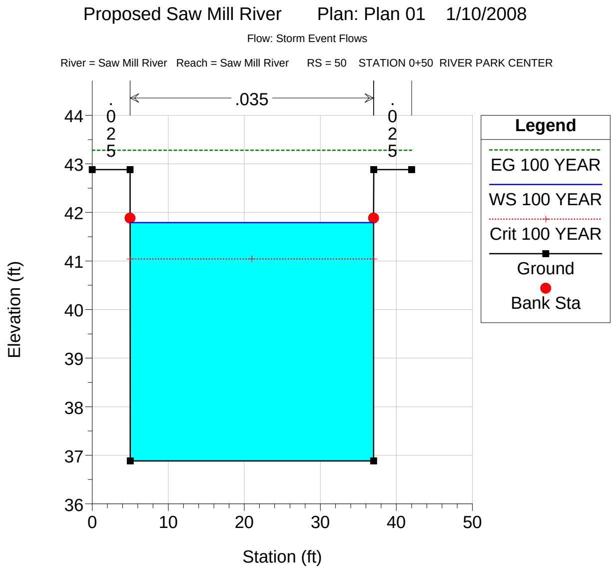

Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 150 BR Flume #5 RIVER PARK CENTER
.035
.025
.025
Legend
EG 100 YEAR
WS 100 YEAR
Crit 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)

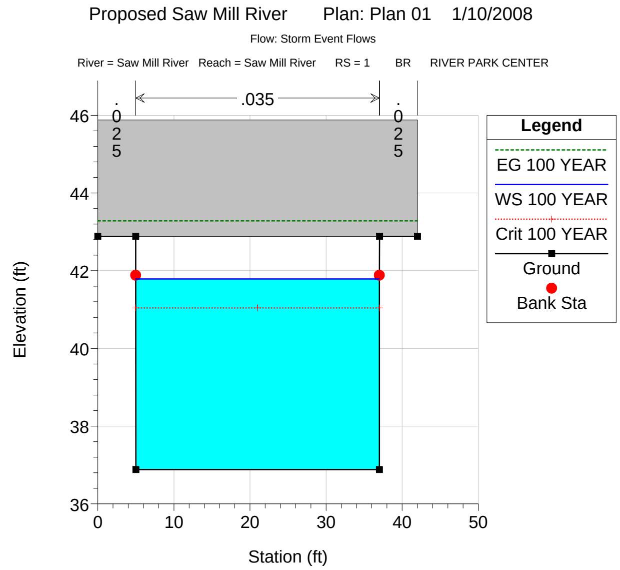

Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 150 BR Flume #5 RIVER PARK CENTER
.035
.025
.025
Legend
EG 100 YEAR
WS 100 YEAR
Crit 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)

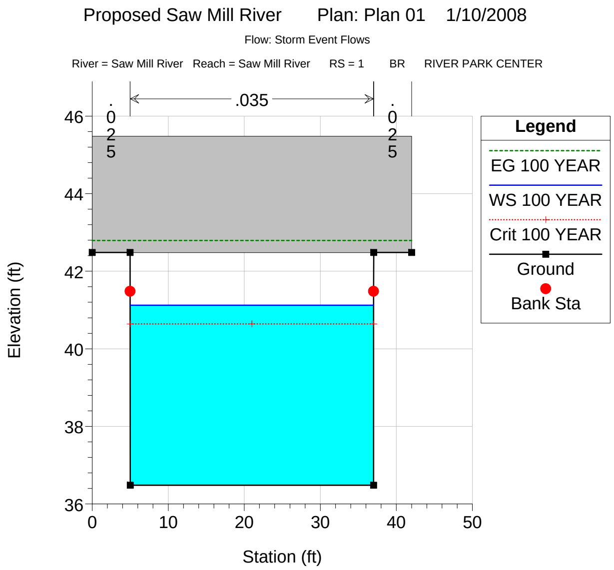

Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 100 STATION 1+00 RIVER PARK CENTER
.035
.025
.025
Legend
EG 100 YEAR
WS 100 YEAR
Crit 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)

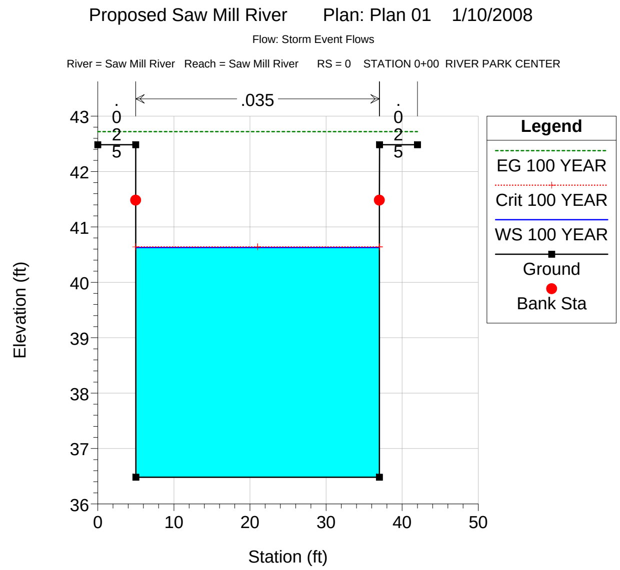

Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 99 BR RIVER PARK CENTER
.035
Legend
EG 100 YEAR
WS 100 YEAR
Crit 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)

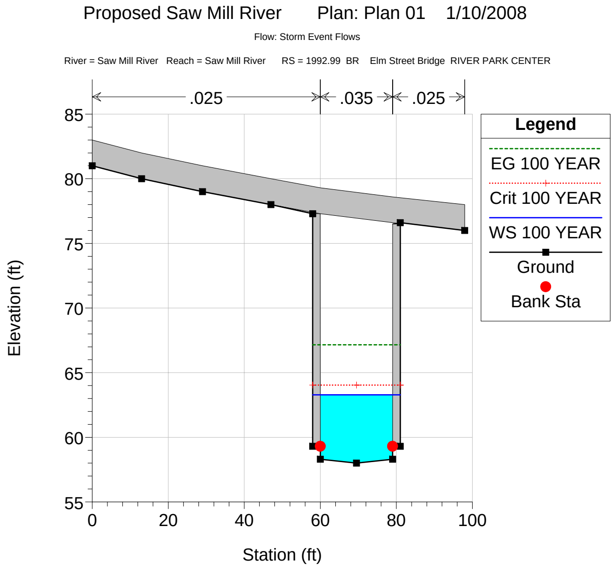

Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 99 BR RIVER PARK CENTER
.035
Legend
EG 100 YEAR
WS 100 YEAR
Crit 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)

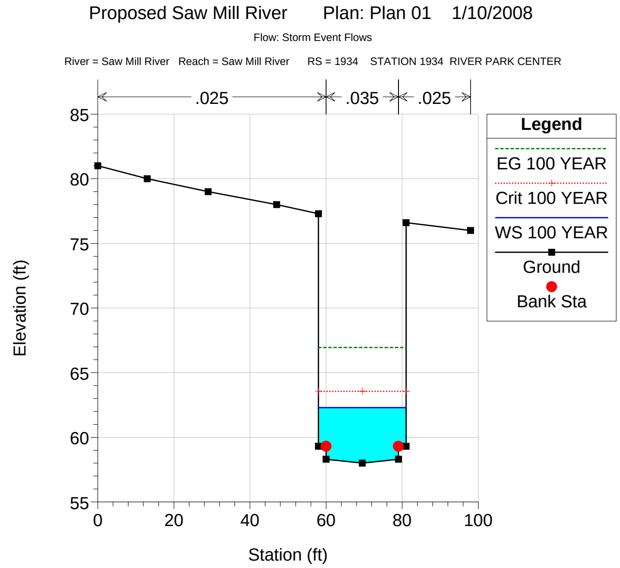

Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 50 STATION 0+50 RIVER PARK CENTER
.035
Legend
EG 100 YEAR
WS 100 YEAR
Crit 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)

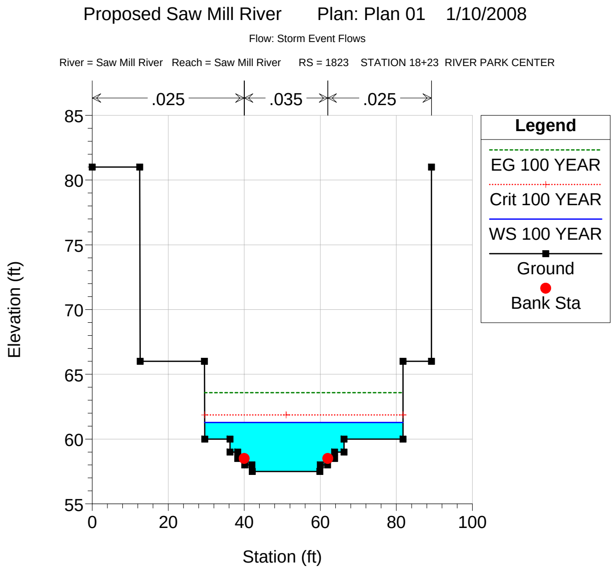

Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 1 BR RIVER PARK CENTER
.035
Legend
EG 100 YEAR
WS 100 YEAR
Crit 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)

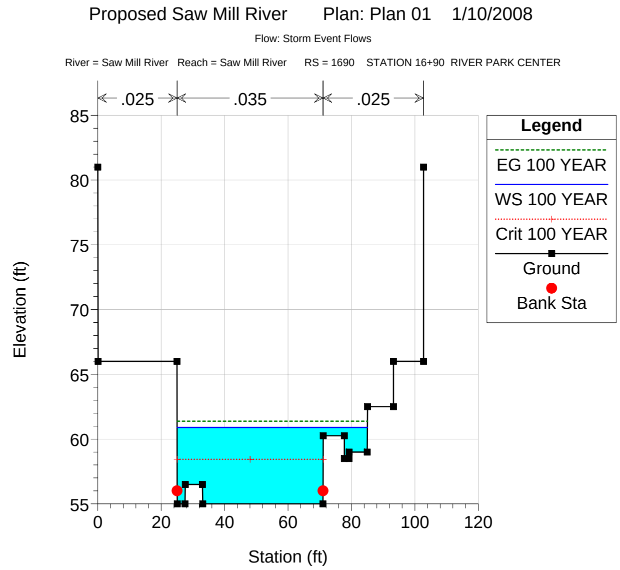

Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 1 BR RIVER PARK CENTER
.035
Legend
EG 100 YEAR
WS 100 YEAR
Crit 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)

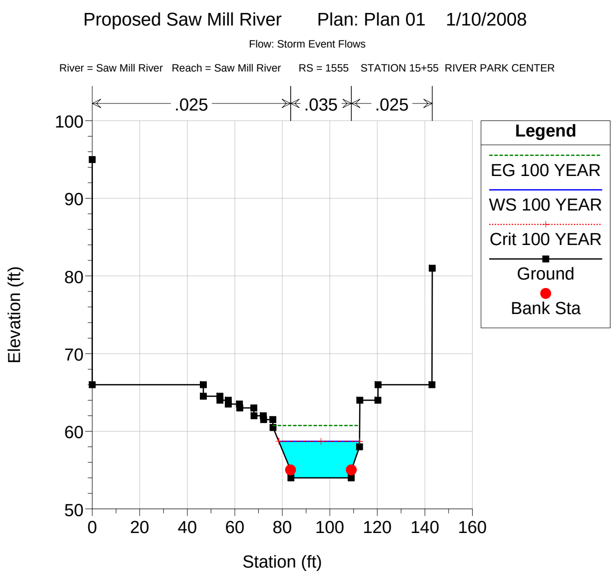

Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 0 STATION 0+00 RIVER PARK CENTER
.035
Legend
EG 100 YEAR
Crit 100 YEAR
WS 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)

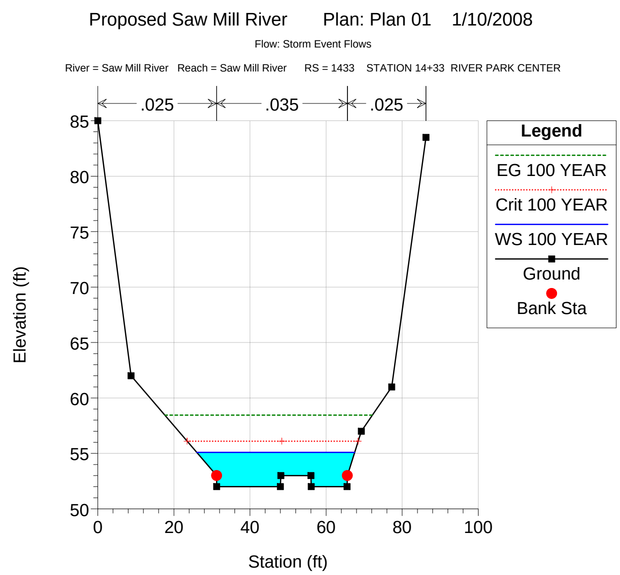

Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 1992.99 BR Elm Street Bridge RIVER PARK CENTER
.025 .035 .025
Legend
EG 100 YEAR
Crit 100 YEAR
WS 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)

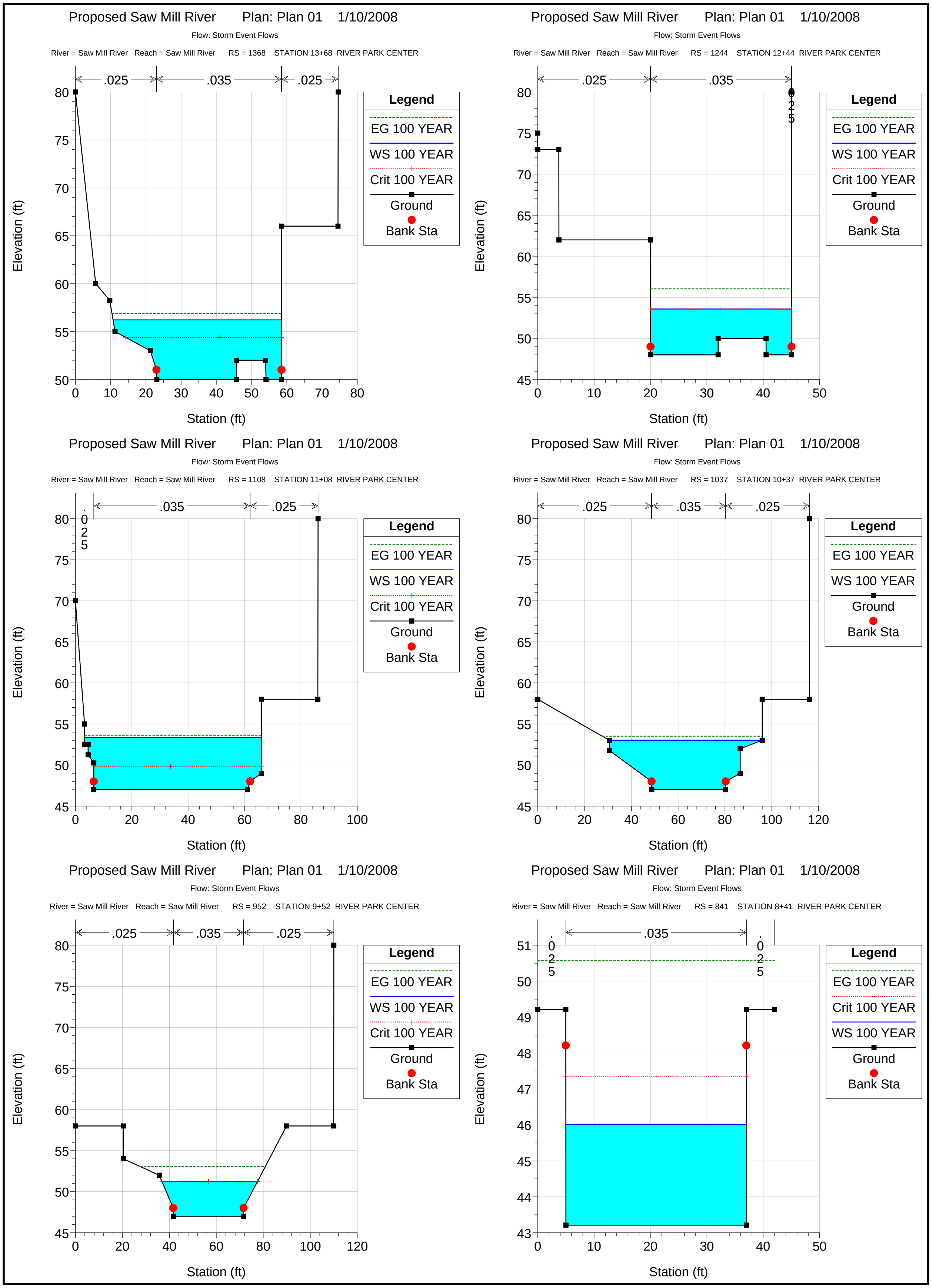

Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 1934 STATION 1934 RIVER PARK CENTER
.025 .035 .025
Legend
EG 100 YEAR
Crit 100 YEAR
WS 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 1823 STATION 18+23 RIVER PARK CENTER
.025 .035 .025
Legend
EG 100 YEAR
Crit 100 YEAR
WS 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 1690 STATION 16+90 RIVER PARK CENTER
.025 .035 .025
Legend
EG 100 YEAR
WS 100 YEAR
Crit 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 1555 STATION 15+55 RIVER PARK CENTER
.025 .035 .025
Legend
EG 100 YEAR
WS 100 YEAR
Crit 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)

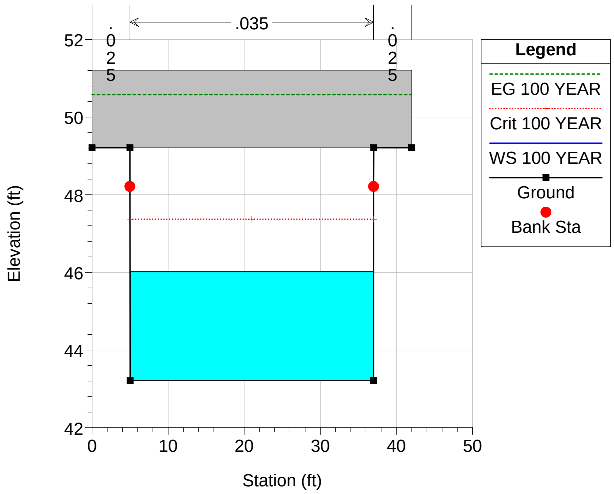

Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 1433 STATION 14+33 RIVER PARK CENTER
.025 .035 .025
Legend
EG 100 YEAR
Crit 100 YEAR
WS 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 1368 STATION 13+68 RIVER PARK CENTER
.025 .035 .025
Legend
EG 100 YEAR
WS 100 YEAR
Crit 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)
Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 1244 STATION 12+44 RIVER PARK CENTER
.025 .035
Legend
EG 100 YEAR
WS 100 YEAR
Crit 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)
Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 1108 STATION 11+08 RIVER PARK CENTER
.035 .025
Legend
EG 100 YEAR
WS 100 YEAR
Crit 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)
Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 1037 STATION 10+37 RIVER PARK CENTER
.025 .035 .025
Legend
EG 100 YEAR
WS 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)
Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 952 STATION 9+52 RIVER PARK CENTER
.025 .035 .025
Legend
EG 100 YEAR
WS 100 YEAR
Crit 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)
Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 841 STATION 8+41 RIVER PARK CENTER
.035
Legend
EG 100 YEAR
Crit 100 YEAR
WS 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)

Proposed Saw Mill River Plan: Plan 01 1/10/2008

Flow: Storm Event Flows

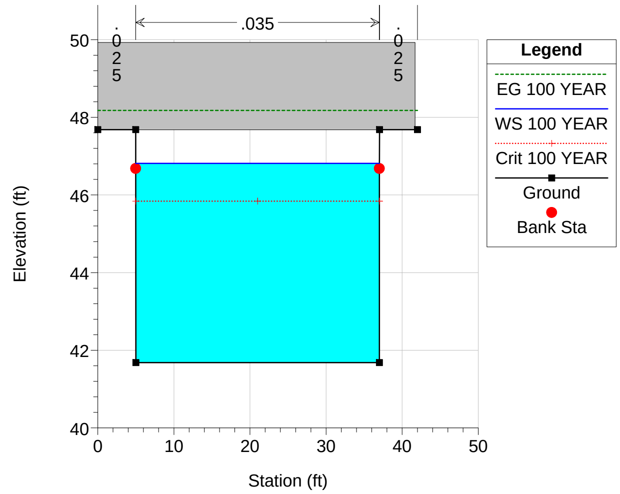
River = Saw Mill River Reach = Saw Mill River RS = 840.99 BR Flume RIVER PARK CENTER



Proposed Saw Mill River Plan: Plan 01 1/10/2008

Flow: Storm Event Flows

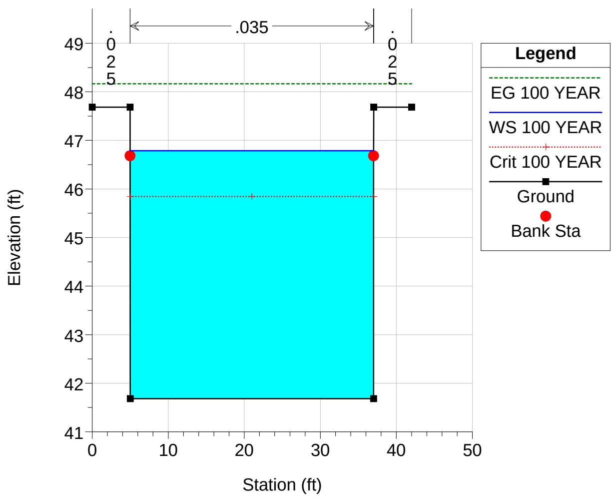
River = Saw Mill River Reach = Saw Mill River RS = 840.99 BR Flume RIVER PARK CENTER



Proposed Saw Mill River Plan: Plan 01 1/10/2008

Flow: Storm Event Flows

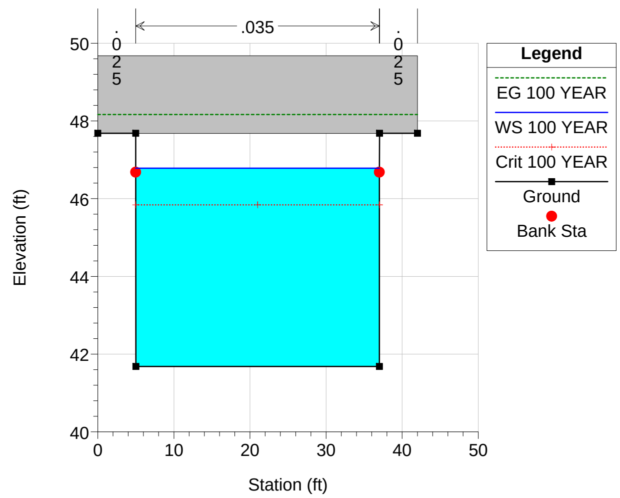
River = Saw Mill River Reach = Saw Mill River RS = 650 STATION 6+50 RIVER PARK CENTER



Proposed Saw Mill River Plan: Plan 01 1/10/2008

Flow: Storm Event Flows

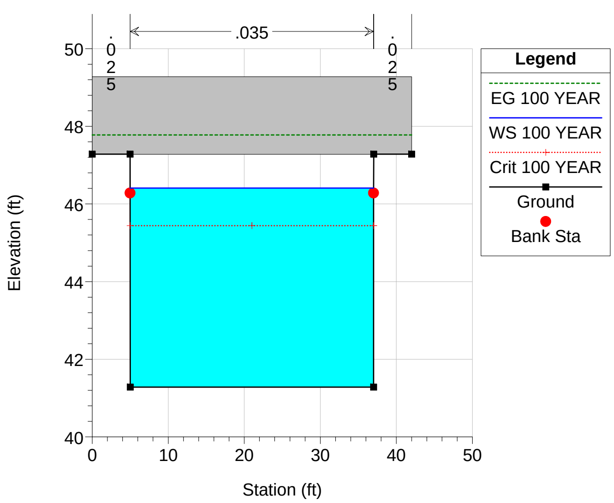
River = Saw Mill River Reach = Saw Mill River RS = 649.1 BR Flume #2 RIVER PARK CENTER



Proposed Saw Mill River Plan: Plan 01 1/10/2008

Flow: Storm Event Flows

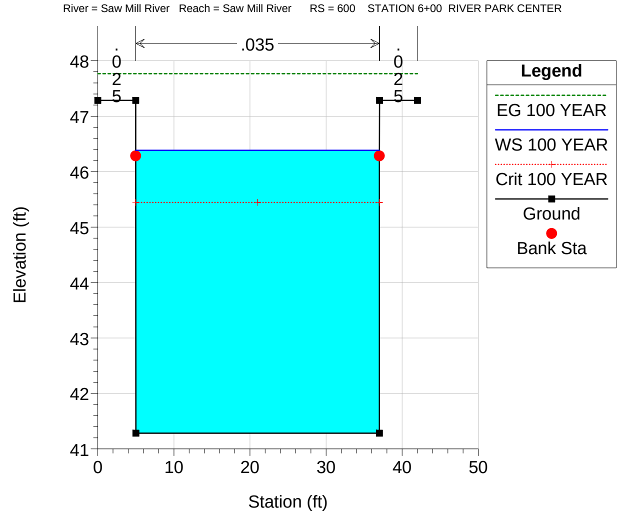
River = Saw Mill River Reach = Saw Mill River RS = 649.1 BR Flume #2 RIVER PARK CENTER



Proposed Saw Mill River Plan: Plan 01 1/10/2008

Flow: Storm Event Flows

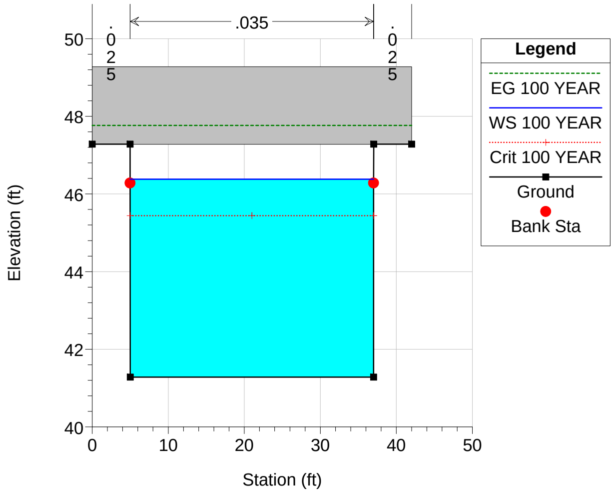
River = Saw Mill River Reach = Saw Mill River RS = 600 STATION 6+00 RIVER PARK CENTER



Proposed Saw Mill River   Plan: Plan 01   1/10/2008

Flow: Storm Event Flows

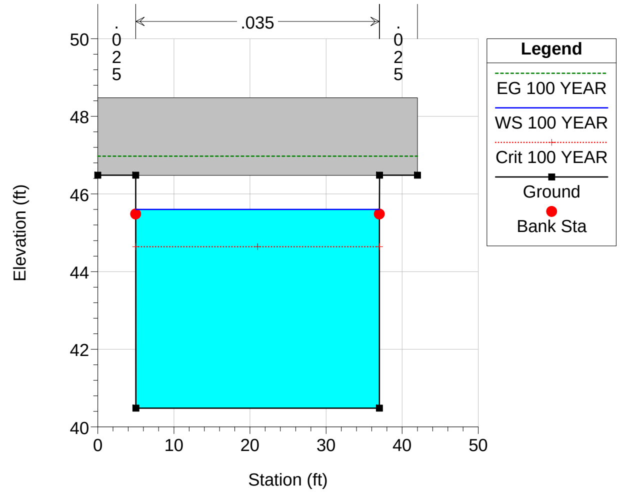
River = Saw Mill River   Reach = Saw Mill River   RS = 550   BR   Flume #3 RIVER PARK CENTER



Proposed Saw Mill River   Plan: Plan 01   1/10/2008

Flow: Storm Event Flows

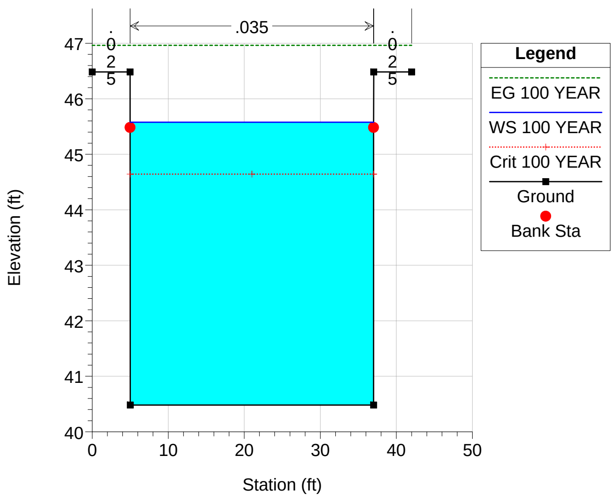
River = Saw Mill River   Reach = Saw Mill River   RS = 550   BR   Flume #3 RIVER PARK CENTER



Proposed Saw Mill River   Plan: Plan 01   1/10/2008

Flow: Storm Event Flows

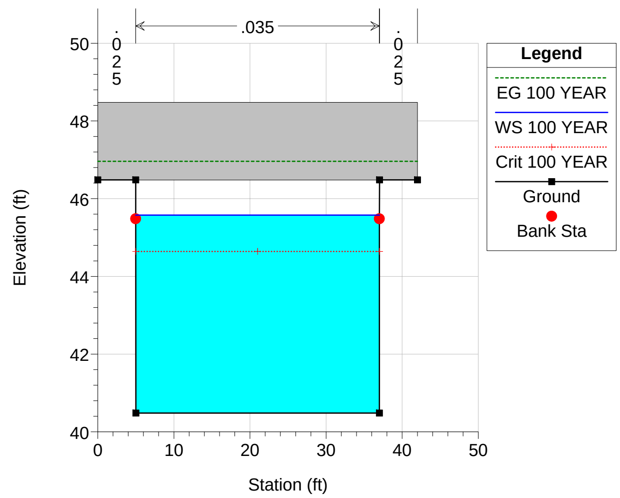
River = Saw Mill River   Reach = Saw Mill River   RS = 500   STATION 5+00 RIVER PARK CENTER



Proposed Saw Mill River   Plan: Plan 01   1/10/2008

Flow: Storm Event Flows

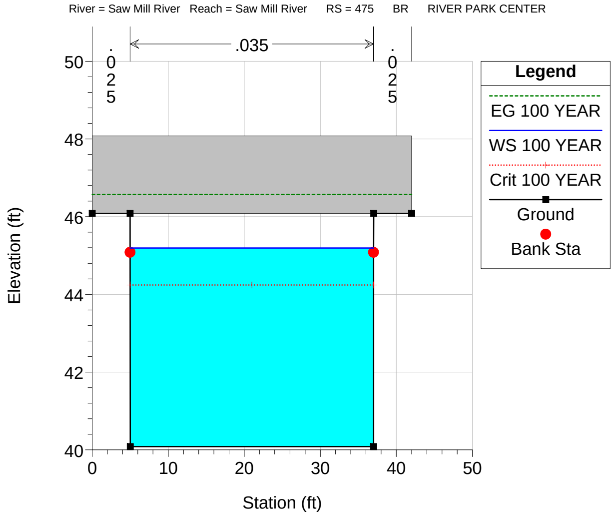
River = Saw Mill River   Reach = Saw Mill River   RS = 475   BR   RIVER PARK CENTER



Proposed Saw Mill River   Plan: Plan 01   1/10/2008

Flow: Storm Event Flows

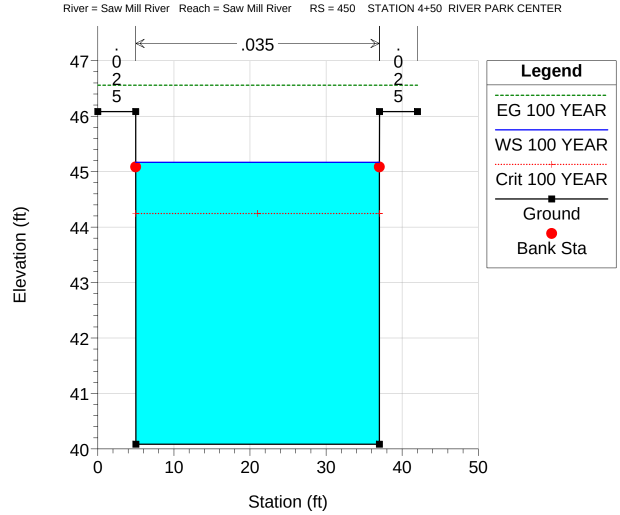
River = Saw Mill River   Reach = Saw Mill River   RS = 475   BR   RIVER PARK CENTER

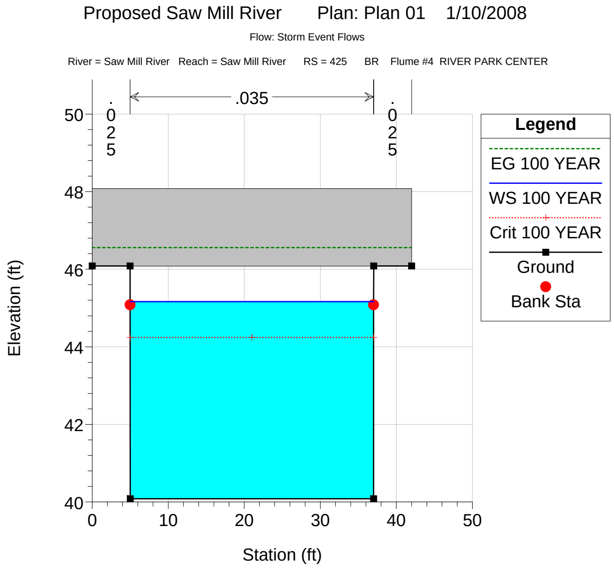


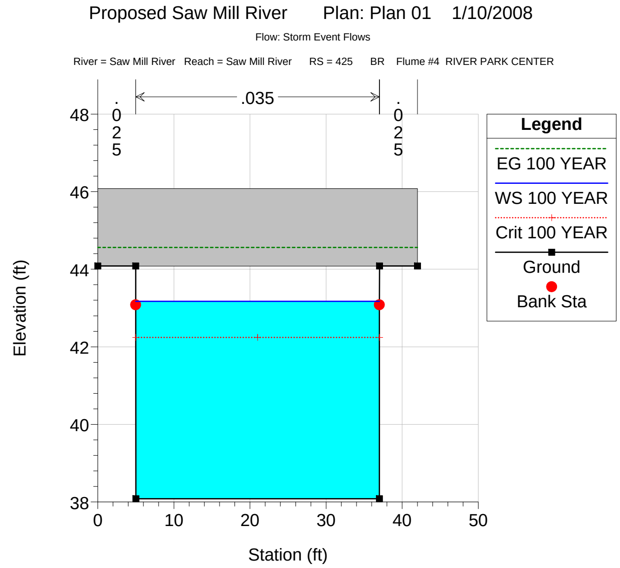
Proposed Saw Mill River   Plan: Plan 01   1/10/2008

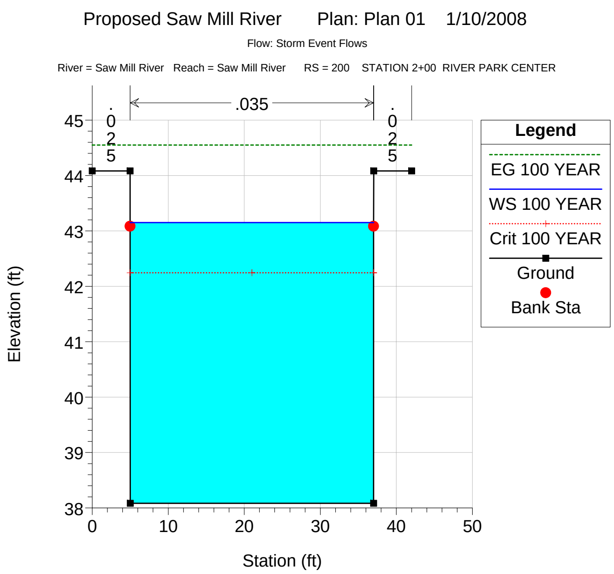
Flow: Storm Event Flows

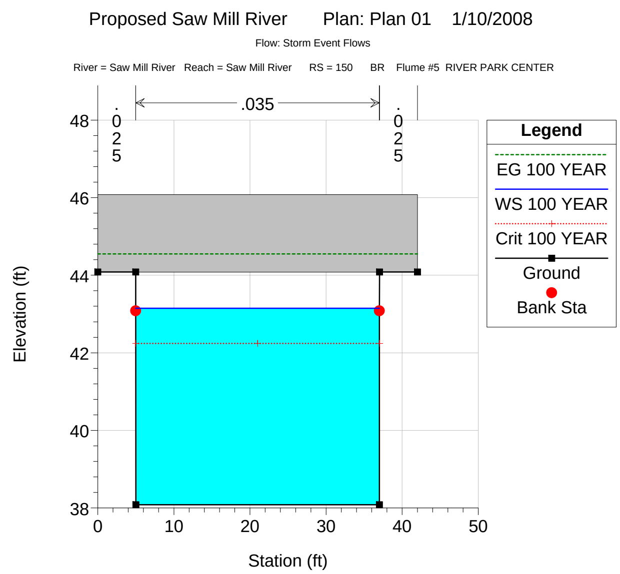
River = Saw Mill River   Reach = Saw Mill River   RS = 450   STATION 4+50 RIVER PARK CENTER

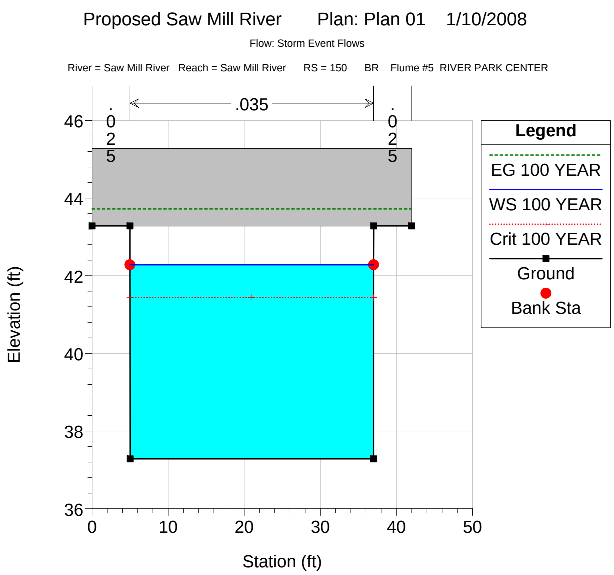


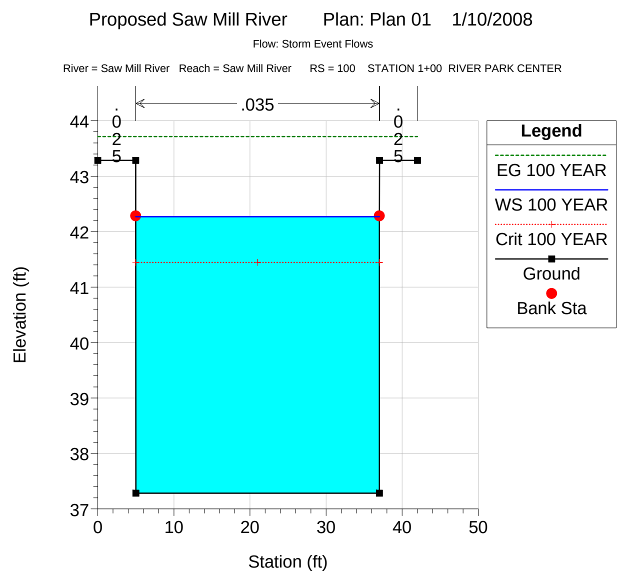

Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 425 BR Flume #4 RIVER PARK CENTER
.035
Legend
EG 100 YEAR
WS 100 YEAR
Crit 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 425 BR Flume #4 RIVER PARK CENTER
.035
Legend
EG 100 YEAR
WS 100 YEAR
Crit 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 200 STATION 2+00 RIVER PARK CENTER
.035
Legend
EG 100 YEAR
WS 100 YEAR
Crit 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 150 BR Flume #5 RIVER PARK CENTER
.035
Legend
EG 100 YEAR
WS 100 YEAR
Crit 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 150 BR Flume #5 RIVER PARK CENTER
.035
Legend
EG 100 YEAR
WS 100 YEAR
Crit 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Proposed Saw Mill River Plan: Plan 01 1/10/2008
Flow: Storm Event Flows
River = Saw Mill River Reach = Saw Mill River RS = 100 STATION 1+00 RIVER PARK CENTER
.035
Legend
EG 100 YEAR
WS 100 YEAR
Crit 100 YEAR
Ground
Bank Sta
Elevation (ft)
Station (ft)

HEC-RAS Plan: Plan 01   River: Saw Mill River   Reach: Saw Mill River

Reach	River Sta	Profile	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)	
Saw Mill River	2584	BASE	30.00	65.50	66.44	66.20	66.52	0.004786	2.34	13.06	21.07	0.49
Saw Mill River	2584	10 YEAR	1015.00	65.50	69.53	69.53	70.81	0.008888	9.74	113.34	44.99	0.88
Saw Mill River	2584	100 YEAR	1540.00	65.50	70.43	70.43	71.95	0.007993	10.64	156.70	50.49	0.86
Saw Mill River	2500	BASE	30.00	65.20	65.86	65.78	65.97	0.009747	2.69	12.00	33.25	0.66
Saw Mill River	2500	10 YEAR	1015.00	65.20	67.82	68.31	69.73	0.017876	10.37	92.06	43.55	1.16
Saw Mill River	2500	100 YEAR	1540.00	65.20	68.52	69.14	70.93	0.017430	12.09	124.47	49.94	1.20
Saw Mill River	2200	BASE	30.00	60.70	61.32	61.32	61.51	0.025487	3.50	8.56	22.96	1.01
Saw Mill River	2200	10 YEAR	1015.00	60.70	66.16	63.63	66.29	0.000482	2.76	354.26	86.32	0.22
Saw Mill River	2200	100 YEAR	1540.00	60.70	68.14	64.14	68.27	0.000319	2.79	529.53	95.87	0.18
Saw Mill River	2100	BASE	30.00	59.80	60.64	60.25	60.67	0.001347	1.28	22.17	32.58	0.26
Saw Mill River	2100	10 YEAR	1015.00	59.80	66.06		66.23	0.000723	3.84	331.69	115.76	0.27
Saw Mill River	2100	100 YEAR	1540.00	59.80	68.13		68.23	0.000287	2.93	637.32	157.00	0.18
Saw Mill River	1993	BASE	30.00	59.80	60.46	60.20	60.49	0.002070	1.32	21.03	41.31	0.31
Saw Mill River	1993	10 YEAR	1015.00	59.80	65.92	62.63	66.15	0.000634	3.54	271.78	50.38	0.25
Saw Mill River	1993	100 YEAR	1540.00	59.80	67.90	63.48	68.17	0.000552	3.99	374.08	52.75	0.25
Saw Mill River	1992.99		Bridge									
Saw Mill River	1934	BASE	30.00	58.01	58.94		59.00	0.003384	2.01	14.91	18.99	0.40
Saw Mill River	1934	10 YEAR	1015.00	58.01	61.30	62.28	64.88	0.033102	15.52	67.83	23.02	1.54
Saw Mill River	1934	100 YEAR	1540.00	58.01	62.30	63.55	66.95	0.030079	17.77	90.78	23.02	1.54
Saw Mill River	1823	BASE	30.00	57.50	57.94	57.94	58.17	0.024707	3.77	7.95	17.98	1.00
Saw Mill River	1823	10 YEAR	1015.00	57.50	61.14	61.15	62.28	0.009611	9.22	121.94	52.16	0.86
Saw Mill River	1823	100 YEAR	1540.00	57.50	61.28	61.87	63.59	0.018339	13.08	129.60	52.16	1.20
Saw Mill River	1690	BASE	30.00	55.00	55.44	55.26	55.49	0.004966	1.69	17.79	40.40	0.45
Saw Mill River	1690	10 YEAR	1015.00	55.00	59.53	57.64	59.92	0.002258	5.04	204.65	53.32	0.43
Saw Mill River	1690	100 YEAR	1540.00	55.00	60.90	58.43	61.39	0.001996	5.68	282.04	60.03	0.42
Saw Mill River	1555	BASE	30.00	54.00	54.45	54.35	54.56	0.011297	2.60	11.53	25.49	0.68
Saw Mill River	1555	10 YEAR	1015.00	54.00	57.62	57.62	59.23	0.011730	10.36	101.17	32.10	0.96
Saw Mill River	1555	100 YEAR	1540.00	54.00	58.70	58.70	60.73	0.010606	11.72	136.92	33.99	0.95
Saw Mill River	1433	BASE	30.00	52.00	52.34	52.34	52.52	0.027465	3.34	8.99	26.25	1.00
Saw Mill River	1433	10 YEAR	1015.00	52.00	54.52	55.21	56.91	0.033268	12.54	82.33	39.53	1.46
Saw Mill River	1433	100 YEAR	1540.00	52.00	55.09	56.11	58.46	0.035024	14.93	105.45	41.47	1.56
Saw Mill River	1368	BASE	30.00	50.00	50.46	50.34	50.55	0.009671	2.39	12.54	27.14	0.62
Saw Mill River	1368	10 YEAR	1015.00	50.00	54.63	53.41	55.28	0.004368	6.57	158.97	45.41	0.57
Saw Mill River	1368	100 YEAR	1540.00	50.00	56.22	54.39	56.90	0.003004	6.76	234.15	47.84	0.50
Saw Mill River	1244	BASE	30.00	48.00	48.47	48.47	48.70	0.026821	3.90	7.70	16.48	1.01
Saw Mill River	1244	10 YEAR	1015.00	48.00	52.39	52.39	54.25	0.015354	10.94	92.81	25.00	1.00
Saw Mill River	1244	100 YEAR	1540.00	48.00	53.58	53.58	56.03	0.014027	12.58	122.47	25.01	1.00
Saw Mill River	1108	BASE	30.00	47.00	47.82	47.21	47.83	0.000330	0.66	45.14	55.31	0.13
Saw Mill River	1108	10 YEAR	1015.00	47.00	52.09	49.19	52.27	0.000784	3.46	299.04	61.50	0.27
Saw Mill River	1108	100 YEAR	1540.00	47.00	53.36	49.86	53.62	0.000851	4.18	378.17	62.75	0.29
Saw Mill River	1037	BASE	30.00	47.00	47.76		47.79	0.001319	1.25	24.07	31.62	0.25
Saw Mill River	1037	10 YEAR	1015.00	47.00	51.78		52.17	0.002008	5.19	205.80	55.81	0.42
Saw Mill River	1037	100 YEAR	1540.00	47.00	53.02		53.51	0.001896	5.88	280.14	65.38	0.42
Saw Mill River	952	BASE	30.00	47.00	47.31	47.31	47.47	0.026985	3.18	9.42	29.93	1.00
Saw Mill River	952	10 YEAR	1015.00	47.00	50.27	50.27	51.72	0.011951	9.80	106.54	37.48	0.95
Saw Mill River	952	100 YEAR	1540.00	47.00	51.25	51.25	53.06	0.010681	11.04	144.91	40.74	0.94
Saw Mill River	841	BASE	30.00	43.21	43.64	43.51	43.71	0.008739	2.21	13.60	32.00	0.60
Saw Mill River	841	10 YEAR	1015.00	43.21	45.26	46.35	48.99	0.060168	15.49	65.51	32.01	1.91
Saw Mill River	841	100 YEAR	1540.00	43.21	46.02	47.36	50.58	0.051111	17.15	89.81	32.01	1.80
Saw Mill River	840.99		Bridge									
Saw Mill River	650	BASE	30.00	41.68	42.11	41.98	42.19	0.008594	2.19	13.67	32.00	0.59
Saw Mill River	650	10 YEAR	1015.00	41.68	45.57	44.82	46.60	0.008064	8.16	124.46	32.02	0.73
Saw Mill River	650	100 YEAR	1540.00	41.68	46.79	45.84	48.17	0.008056	9.43	163.39	32.02	0.74
Saw Mill River	649.1		Bridge									
Saw Mill River	600	BASE	30.00	41.28	41.71	41.58	41.78	0.008764	2.21	13.59	32.00	0.60
Saw Mill River	600	10 YEAR	1015.00	41.28	45.17	44.42	46.20	0.008085	8.16	124.35	32.02	0.73
Saw Mill River	600	100 YEAR	1540.00	41.28	46.38	45.44	47.77	0.008077	9.43	163.26	32.02	0.74

HEC-RAS Plan: Plan 01 River: Saw Mill River Reach: Saw Mill River (Continued)

Reach	River Sta	Profile	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)	
Saw Mill River	550		Bridge									
Saw Mill River	500	BASE	30.00	40.48	40.91	40.78	40.99	0.008507	2.19	13.72	32.00	0.59
Saw Mill River	500	10 YEAR	1015.00	40.48	44.36	43.62	45.40	0.008118	8.17	124.18	32.02	0.73
Saw Mill River	500	100 YEAR	1540.00	40.48	45.58	44.64	46.96	0.008114	9.45	163.04	32.02	0.74
Saw Mill River	475		Bridge									
Saw Mill River	450	BASE	30.00	40.08	40.50	40.38	40.58	0.009110	2.23	13.43	32.00	0.61
Saw Mill River	450	10 YEAR	1015.00	40.08	43.95	43.22	45.00	0.008170	8.19	123.93	32.02	0.73
Saw Mill River	450	100 YEAR	1540.00	40.08	45.17	44.24	46.56	0.008161	9.46	162.75	32.02	0.74
Saw Mill River	425		Bridge									
Saw Mill River	200	BASE	30.00	38.08	38.52	38.38	38.59	0.008259	2.17	13.84	32.00	0.58
Saw Mill River	200	10 YEAR	1015.00	38.08	41.95	41.22	42.99	0.008199	8.20	123.78	32.02	0.73
Saw Mill River	200	100 YEAR	1540.00	38.08	43.15	42.24	44.55	0.008256	9.49	162.19	32.02	0.74
Saw Mill River	150		Bridge									
Saw Mill River	100	BASE	30.00	37.28	37.71	37.58	37.78	0.008666	2.20	13.64	32.00	0.59
Saw Mill River	100	10 YEAR	1015.00	37.28	41.10	40.42	42.17	0.008560	8.32	122.06	32.02	0.75
Saw Mill River	100	100 YEAR	1540.00	37.28	42.27	41.44	43.72	0.008702	9.65	159.61	32.02	0.76
Saw Mill River	99		Bridge									
Saw Mill River	50	BASE	30.00	36.88	37.32	37.18	37.39	0.007769	2.13	14.10	32.00	0.56
Saw Mill River	50	10 YEAR	1015.00	36.88	40.65	40.02	41.75	0.008910	8.42	120.48	32.02	0.77
Saw Mill River	50	100 YEAR	1540.00	36.88	41.79	41.04	43.28	0.009134	9.80	157.06	32.02	0.78
Saw Mill River	1		Bridge									
Saw Mill River	0	BASE	30.00	36.48	36.78	36.78	36.93	0.027227	3.11	9.65	32.00	1.00
Saw Mill River	0	10 YEAR	1015.00	36.48	39.62	39.62	41.21	0.015659	10.11	100.43	32.01	1.01
Saw Mill River	0	100 YEAR	1540.00	36.48	40.63	40.64	42.72	0.015264	11.61	132.66	32.02	1.01

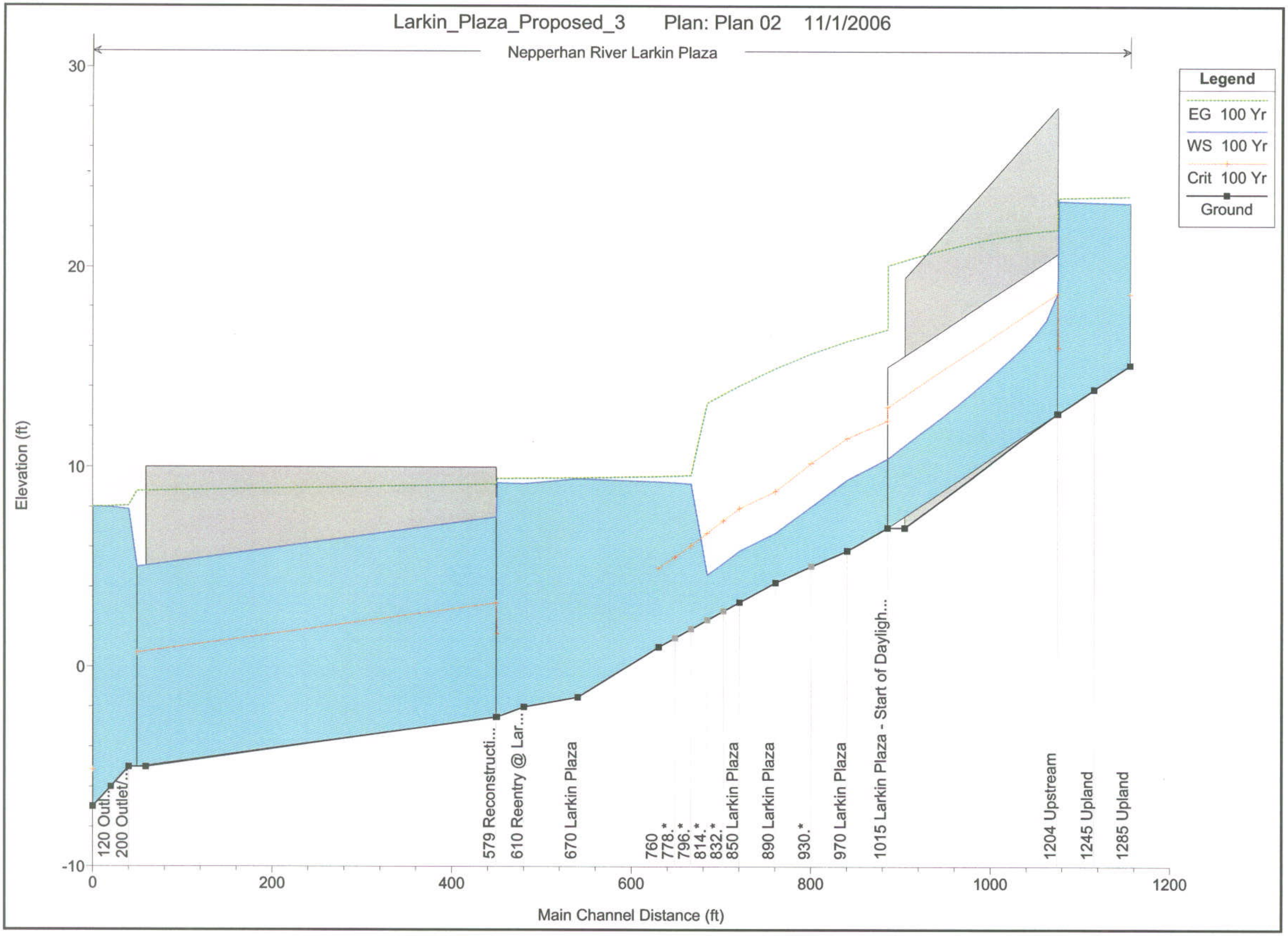
APPENDIX C-

LARKIN PLAZA ANALYSIS

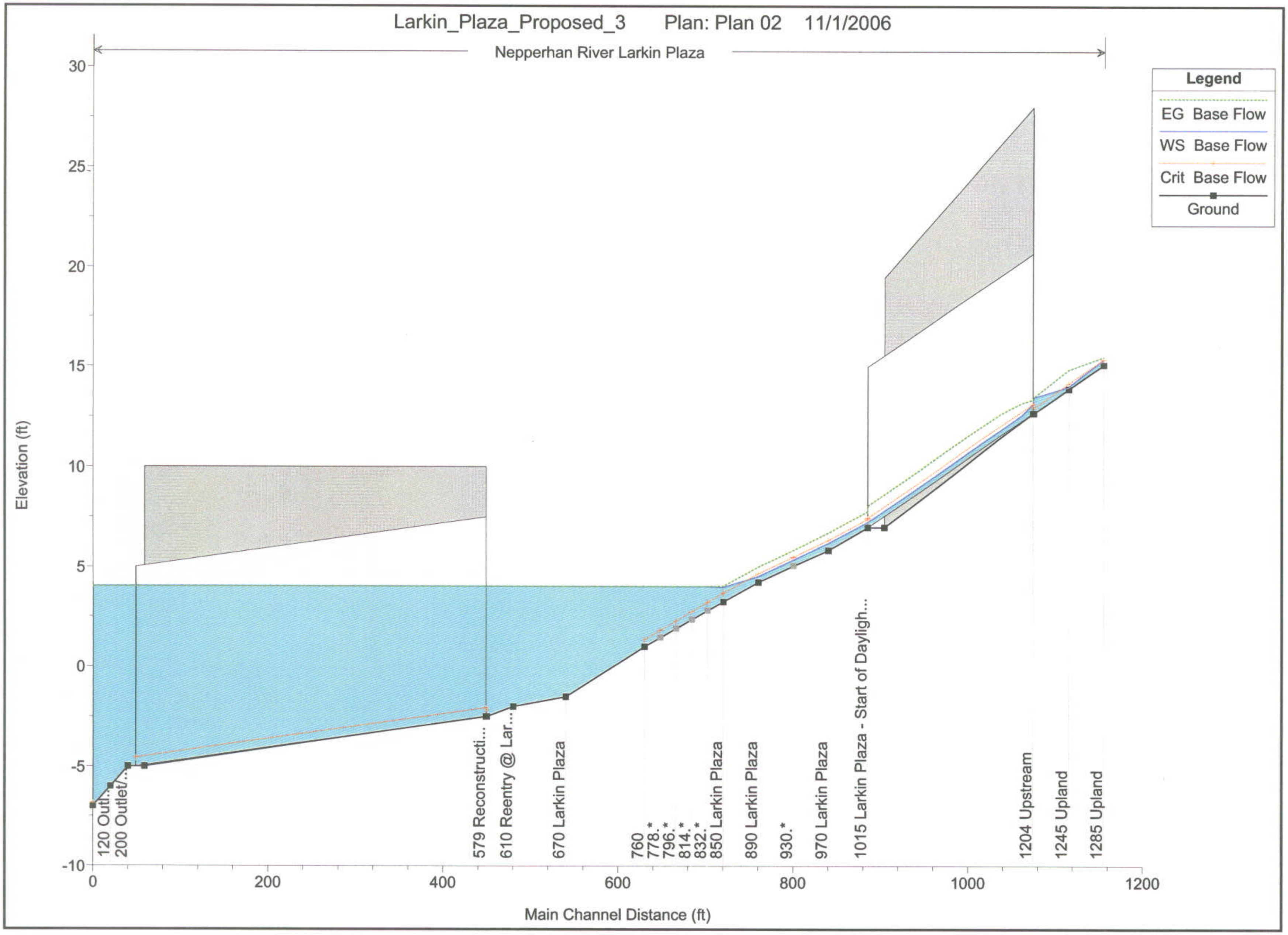
SCHEME A - LANDSCAPE PLAN

LARKIN PLAZA DAYLIGHTING

10.24.2006



Larkin_Plaza_Proposed_3 Plan: Plan 02 11/1/2006
Nepperhan River Larkin Plaza
Legend
EG 100 Yr
WS 100 Yr
Crit 100 Yr
Ground
Elevation (ft)
Main Channel Distance (ft)
120 Outl...
200 Outlet/...
579 Reconstructi...
610 Reentry @ Lar...
670 Larkin Plaza
760
778.*
796.*
814.*
832.*
850 Larkin Plaza
890 Larkin Plaza
930.*
970 Larkin Plaza
1015 Larkin Plaza - Start of Dayligh...
1204 Upstream
1245 Upland
1285 Upland



Larkin_Plaza_Proposed_3 Plan: Plan 02 11/1/2006
Nepperhan River Larkin Plaza
Legend
EG Base Flow
WS Base Flow
Crit Base Flow
Ground
Elevation (ft)
Main Channel Distance (ft)
30
25
20
15
10
5
0
-5
-10
0
200
400
600
800
1000
1200
120 Outl...
200 Outlet/...
579 Reconstructi...
610 Reentry @ Lar...
670 Larkin Plaza
760
778.*
796.*
814.*
832.*
850 Larkin Plaza
890 Larkin Plaza
930.*
970 Larkin Plaza
1015 Larkin Plaza - Start of Dayligh...
1204 Upstream
1245 Upland
1285 Upland

HEC-RAS Plan: Plan 02 River: Nepperhan River Reach: Larkin Plaza

Reach	River Sta	Profile	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)	
Larkin Plaza	0	Base Flow	30.00	-7.00	4.00	-6.87	4.00	0.000000	0.03	1177.00	107.00	0.00
Larkin Plaza	0	10 Yr	1015.00	-7.00	4.00	-5.60	4.01	0.000004	0.86	1177.00	107.00	0.05
Larkin Plaza	0	100 Yr	1540.00	-7.00	8.00	-5.15	8.01	0.000003	0.96	1627.70	174.00	0.04
Larkin Plaza	120	Base Flow	30.00	-6.00	4.00		4.00	0.000000	0.04	700.00	70.00	0.00
Larkin Plaza	120	10 Yr	1015.00	-6.00	3.99		4.02	0.000014	1.45	698.97	70.00	0.08
Larkin Plaza	120	100 Yr	1540.00	-6.00	7.98		8.02	0.000011	1.57	1000.59	114.25	0.07
Larkin Plaza	200	Base Flow	30.00	-5.00	4.00		4.00	0.000000	0.11	270.00	75.00	0.01
Larkin Plaza	200	10 Yr	1015.00	-5.00	3.85		4.08	0.000081	3.82	265.50	75.00	0.23
Larkin Plaza	200	100 Yr	1540.00	-5.00	7.87		8.07	0.000186	3.57	461.90	158.07	0.26
Larkin Plaza	579		Culvert									
Larkin Plaza	580	Base Flow	30.00	-2.50	4.00	-2.20	4.00	0.000000	0.14	208.01	32.00	0.01
Larkin Plaza	580	10 Yr	1015.00	-2.50	4.60	0.64	4.91	0.000243	4.47	227.24	32.00	0.30
Larkin Plaza	580	100 Yr	1540.00	-2.50	9.22	1.65	9.43	0.000108	3.79	493.33	126.76	0.20
Larkin Plaza	610	Base Flow	30.00	-2.00	4.00		4.00	0.000000	0.17	180.01	30.00	0.01
Larkin Plaza	610	10 Yr	1015.00	-2.00	4.54		4.95	0.000362	5.18	196.08	30.00	0.36
Larkin Plaza	610	100 Yr	1540.00	-2.00	9.19		9.45	0.000145	4.24	444.73	129.61	0.22
Larkin Plaza	670	Base Flow	30.00	-1.50	4.00		4.00	0.000000	0.08	397.18	78.26	0.01
Larkin Plaza	670	10 Yr	1015.00	-1.50	4.92	0.47	4.99	0.000051	2.16	469.88	79.86	0.16
Larkin Plaza	670	100 Yr	1540.00	-1.50	9.43		9.48	0.000017	1.67	1022.31	193.90	0.10
Larkin Plaza	760	Base Flow	30.00	1.00	4.00	1.32	4.00	0.000002	0.28	106.00	39.00	0.03
Larkin Plaza	760	10 Yr	1015.00	1.00	2.46	4.05	9.31	0.031321	21.00	48.32	35.92	3.19
Larkin Plaza	760	100 Yr	1540.00	1.00	9.28	4.96	9.55	0.000156	4.27	411.58	141.97	0.27
Larkin Plaza	778.*	Base Flow	30.00	1.45	4.00	1.79	4.00	0.000005	0.35	84.96	38.15	0.04
Larkin Plaza	778.*	10 Yr	1015.00	1.45	3.00	4.59	9.88	0.030037	21.04	48.24	34.95	3.16
Larkin Plaza	778.*	100 Yr	1540.00	1.45	9.24	5.51	9.57	0.000206	4.72	366.31	137.05	0.31
Larkin Plaza	796.*	Base Flow	30.00	1.90	4.00	2.26	4.00	0.000011	0.47	63.60	35.27	0.06
Larkin Plaza	796.*	10 Yr	1015.00	1.90	3.55	5.18	10.40	0.028006	21.00	48.33	33.22	3.07
Larkin Plaza	796.*	100 Yr	1540.00	1.90	9.18	6.09	9.60	0.000286	5.28	319.59	132.80	0.37
Larkin Plaza	814.*	Base Flow	30.00	2.35	4.00	2.72	4.00	0.000028	0.66	45.12	31.30	0.10
Larkin Plaza	814.*	10 Yr	1015.00	2.35	4.10	5.78	10.89	0.026100	20.91	48.54	31.78	2.98
Larkin Plaza	814.*	100 Yr	1540.00	2.35	4.62	6.71	13.19	0.024407	23.50	65.54	34.09	2.99
Larkin Plaza	832.*	Base Flow	30.00	2.80	3.99	3.20	4.01	0.000103	1.03	29.11	27.50	0.18
Larkin Plaza	832.*	10 Yr	1015.00	2.80	4.67	6.36	11.36	0.024182	20.75	48.92	30.53	2.89
Larkin Plaza	832.*	100 Yr	1540.00	2.80	5.22	7.34	13.64	0.022701	23.29	66.13	32.94	2.90
Larkin Plaza	850	Base Flow	30.00	3.25	3.96	3.68	4.03	0.000734	1.98	15.15	23.64	0.44
Larkin Plaza	850	10 Yr	1015.00	3.25	5.26	6.95	11.79	0.022217	20.51	49.48	29.41	2.79
Larkin Plaza	850	100 Yr	1540.00	3.25	5.83	7.95	14.05	0.021018	23.01	66.92	31.93	2.80
Larkin Plaza	890	Base Flow	30.00	4.25	4.52	4.65	4.99	0.021399	5.51	5.44	23.07	2.00
Larkin Plaza	890	10 Yr	1015.00	4.25	6.16	7.83	12.69	0.023158	20.50	49.50	30.40	2.83
Larkin Plaza	890	100 Yr	1540.00	4.25	6.72	8.82	14.91	0.021649	22.96	67.07	32.86	2.83
Larkin Plaza	930.*	Base Flow	30.00	5.07	5.35	5.49	5.82	0.020298	5.53	5.42	21.84	1.96
Larkin Plaza	930.*	10 Yr	1015.00	5.07	7.30	9.02	13.53	0.017462	20.02	50.70	24.45	2.45
Larkin Plaza	930.*	100 Yr	1540.00	5.07	8.05	10.21	15.68	0.015337	22.16	69.49	25.45	2.36
Larkin Plaza	970	Base Flow	30.00	5.85	6.17	6.32	6.69	0.022520	5.77	5.20	21.00	2.04
Larkin Plaza	970	10 Yr	1015.00	5.85	8.43	10.08	14.21	0.014835	19.30	52.60	21.00	2.15
Larkin Plaza	970	100 Yr	1540.00	5.85	9.40	11.41	16.31	0.012596	21.09	73.03	21.00	1.99
Larkin Plaza	1015	Base Flow	30.00	7.00	7.23	7.39	7.77	0.025441	5.88	5.10	22.00	0.18
Larkin Plaza	1015	10 Yr	1015.00	7.00	9.47	11.03	14.89	0.013984	18.69	54.30	22.00	0.18
Larkin Plaza	1015	100 Yr	1540.00	7.00	10.43	12.32	16.90	0.011788	20.41	75.45	22.00	0.17
Larkin Plaza	1204		Culvert									
Larkin Plaza	1205	Base Flow	30.00	12.70	13.46	12.94	13.47	0.000118	0.88	34.26	45.00	0.18
Larkin Plaza	1205	10 Yr	1015.00	12.70	20.67	15.20	20.79	0.000077	2.83	358.69	45.04	0.18
Larkin Plaza	1205	100 Yr	1540.00	12.70	23.34	16.00	23.50	0.000075	3.21	479.07	45.05	0.17
Larkin Plaza	1245	Base Flow	30.00	13.90	14.00	14.16	14.84	0.115671	7.34	4.09	40.00	4.05
Larkin Plaza	1245	10 Yr	1015.00	13.90	20.60		20.83	0.000170	3.79	268.14	40.00	0.26
Larkin Plaza	1245	100 Yr	1540.00	13.90	23.27		23.54	0.000145	4.11	374.93	40.00	0.24
Larkin Plaza	1285	Base Flow	30.00	15.10	15.36	15.36	15.49	0.005245	2.89	10.37	40.00	1.00

HEC-RAS Plan: Plan 02 River: Nepperhan River Reach: Larkin Plaza (Continued)

Reach	River Sta	Profile	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)	
Larkin Plaza	1285	10 Yr	1015.00	15.10	20.53	17.80	20.87	0.000321	4.67	217.28	40.00	0.35
Larkin Plaza	1285	100 Yr	1540.00	15.10	23.22	18.67	23.57	0.000221	4.74	324.78	40.00	0.29