

# TECHNICAL MEMORANDUM



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**To:** Rob Cadmus, Neil Stichert  
**From:** Dan Miller, P.E.  
**Date:** September 17, 2018  
**Re:** Pat Creek Preliminary Design Memorandum

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## Introduction

Inter-Fluve, Inc. (Inter-Fluve) was contracted by the partnership of U.S. Fish & Wildlife Service (USFWS) and the Southeast Alaska Watershed Coalition (SAWC) to conduct a site assessment and topographic survey, and expand upon conceptual alternatives developed during an earlier phase to prepare designs and construction documents for improving salmonid spawning and rearing habitat along Pat Creek. Pat Creek is located on the west side of Wrangell Island, Alaska about 10 miles south of Wrangell and along US Forest Service (USFS) Road 6259. The project reach is centered at the confluence of the East Fork Pat Creek and West Fork Pat Creek which form Pat Creek approximately 0.5 miles upstream of Pat Lake. Pat Creek flows out of 17-acre Pat Lake for 0.35 miles where it enters saltwater at Zimovia Strait. The project location is shown on Sheet 1 of the attached Preliminary Plans.

This tech memo includes: a summary of previous assessment and conceptual alternatives work; description of river processes through the project reaches; a description of project field investigations, discussions and survey data collection; preliminary designs; and, construction drawings for placing large woody material for complex aquatic habitats and breaching an abandoned logging road to improve alluvial fan processes.

## PROJECT BACKGROUND

The USFWS, SAWC and USFS completed a preliminary reconnaissance of the Pat Creek Watershed in 2015 (SAWC, 2015) that included a USFS Tier II habitat survey on segments of the West Fork Pat Creek and East Fork Pat Creek that overlap the area studied for this report. The Tier II survey protocol collects field data on a series of stream habitat attributes and compares them with SE Alaska analog streams in good condition. Most of the attributes measured for the Tier II analysis were in good or excellent condition. Some were in fair condition and are referenced below.

As noted in the Pat Creek Watershed Reconnaissance report, fish that use Pat Creek include coho, pink, chum and sockeye salmon, Dolly Varden char, coastal cutthroat trout and steelhead trout. Fishing and recreation opportunities on Pat Creek are highly valued by Wrangell Island residents. Logging along the project reach and valley bottom occurred in the 1960s, 70s and 90s. The watershed

is known to have a high landslide potential, high relative road density (1.23 miles per square mile) and many roads in poor condition.

This project design work is a continuation of an earlier phase that included site assessment, topographic survey and development of conceptual level alternatives prepared by Inter-Fluve for USFWS and SAWC in 2016 and documented in a project memorandum (Inter-Fluve, 2016).

## Site overview

The project site includes approximately 525 feet of the East Fork and 800 feet of the West Fork upstream of their confluence; and, 475 feet of Pat Creek downstream of the confluence, for a total project reach length of approximately 1,800 feet. Sheet 4 of the Preliminary Plans provides an overview of the three reaches.

### EAST FORK & ALLUVIAL FAN

The East Fork of Pat Creek is a high gradient (2-4% slope) channel that discharges on to the lower gradient Pat Creek valley. As gradient decreases, sediment is deposited by the creek causing the channel to migrate across the alluvial fan. Flow patterns and East Fork alluvial fan processes were altered when it was logged in 1965 by construction of logging road embankments which continue to this day. One abandoned road was constructed from the FS 6259 Road across Pat Creek near the confluence of East and West Pat Creeks (no bridge or culvert remains) and up the alluvial fan roughly parallel to the East Fork stream channel. The abandoned road embankment confines the fan from migrating laterally west of the road, effectively isolating about 50 to 100 feet of fan width from flows.

Approximately 600 feet upstream from the mouth of the East Fork is an abandoned logging spur road that was constructed along the contour and extends to the east side of the active East Fork fan. The western end of the abandoned spur road has since been breached by the active East Fork Pat Creek channel. The road prism to the east is partially intact and continues to block flow to all the old East Fork alluvial fan relic channels within the eastern third to half of the fan, effectively blocking channel avulsions into this segment of the fan. This has an effect of reducing risk of the East Fork Pat Creek from migrating and impinging on the FS 6259 Road where it has turned and follows along the eastern edge of the fan.

Since 1965, the abandoned roads have focused sediment transport process and energy on the central approximately one-third of the fan area and channel network. Following logging road construction, the fan surface was clear-cut and the large diameter (6-8' dbh) Sitka spruce trees removed. Today, some stumps from logging and surrounding high ground remain. Portions of the fan maintain well-established second growth spruce, and most of the active fan surface (middle third) is composed of alder (6-12" dbh). These smaller trees fall into the channel during bank erosion, creating local scour and some cover habitat. However given the smaller size and increased decay rate of the alder, the longevity of these logs and habitat complexity and channel response seen today is likely less

complex than pre-logging conditions when large diameter spruce trees were present on the fan and interacted with the stream.

Previous Tier II surveys conducted by USFWS and SAWC classified key piece-sized large wood conditions as “fair” condition (lower 25<sup>th</sup> percentile) based on SE Alaska criteria. Channel width depth was also classified as “fair” and fell in the lower 25<sup>th</sup> percentile.

## WEST FORK

Within the project reach, the West Fork is bounded along river right by the valley wall or the FS 6259 Road embankment and along river left by the East Fork alluvial fan. Sediment aggradation at the confluence has backwatered the lower half of the West Fork project reach with a low gradient of less than 0.5%. The upper half of this reach exhibits more of a free flowing nature with a slope of approximately 0.8%. Upstream of the project reach the West Fork passes through a beaver pond/wet meadow complex which limits sediment supply into the project reach. Within the project reach, the West Fork flows along the existing FS 6259 Road embankment for roughly one-third of the reach length. The road embankment is about 8 feet tall with a steep side slope of about 1.3H:1V with riprap along the toe. A crack at the top of the embankment along the roads edge was noted suggesting beginning stages of a rotational failure of the embankment. Field discussions about concern of project impacts to the road embankment stability resulted in selecting a light touch along the West Fork as described later.

Previous Tier II surveys conducted by USFWS and SAWC found key piece-sized large wood conditions in “fair” condition based on SE Alaska criteria. Pool size was rated “fair,” and pool length per meter of channel was rated “fair.” In general, existing larger key piece-sized wood along the West Fork is old and decaying and has little vertical exposure that would enhance hydraulic bed scour and deep pools. Logging on the fan that occurred in 1965 and the adjacent FS 6259 Road have together removed much of the future large wood sources near the channel.

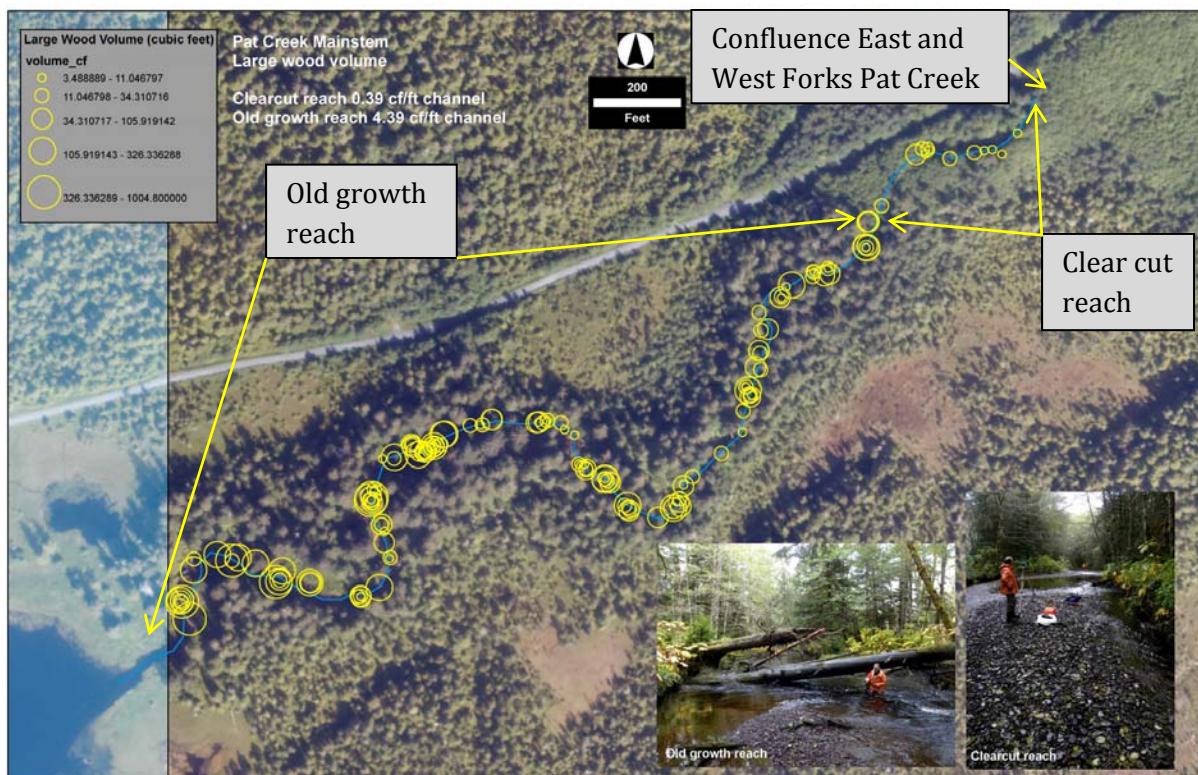
## PAT CREEK (BELOW EAST FORK AND WEST FORK CONFLUENCE)

No Tier II analysis was completed along this channel segment. As noted above, the abandoned road embankments along the East Fork alluvial fan have reduced the active fan area, reducing sediment storage and increasing sediment delivery to Pat Creek. Sediment aggradation is evident at the confluence of the East and West Forks and extends downstream along Pat Creek through most of the project reach. Pat Creek gradient is approximately 0.8% from the confluence and about 250-ft downstream and decreases to about 0.1% along the downstream half of the project reach.

Trees adjacent to Pat Creek near the confluence were logged in 1965. Little in channel or channel spanning wood is seen within logged channel segments through most of the project reach. Most of the observed wood is located in and along the stream banks. Roots of existing trees along the banks do provide good bank structure with some cover habitat. In contrast, downstream of the logging activity along the main stem Pat Creek there is substantially more in channel large wood as shown

on Figure 2. Pool depths in downstream channel segments with large pieces of large wood are much deeper than those pools in upstream segments without wood and provide a good example of habitat potential in the project reach. In channel large wood provides important habitat for salmonids. Robison and Beschta (1990) studied large wood and channel morphology found within undisturbed stream channels 170 miles to the northwest of Pat Creek on Chicagoof Island, SE Alaska. They found large wood created more abundant pools and greater variability in channel widths and depths than what one would find in alluvial formed channels with no large wood. Wood debris formed or was associated with 65 to 75 percent of all pools found in the undisturbed forested streams they studied.

Figure 2. September 2015 Large Wood Volume along Pat Creek downstream of confluence of East and West Forks. Source: John Hudson, USFWS, Juneau.



## RECOMMENDED ENHANCEMENTS

The 2016 conceptual alternatives analysis recommended deep pools associated with large wood are important as they provide resting areas, protection from predation and refuge during high water for aquatic species. Based on field and survey data, fish habitat could be enhanced by adding large wood into segments of Pat Creek and the West Fork. Given the potential for dynamic channel shifts along the East Fork and likelihood of abandonment of placed wood, work along the East Fork is concentrated on improving alluvial fan processes by breaching the abandoned road prism. This would improve the potential for the East Fork to reactivate relic channels and the western portion of the fan to improve alluvial fan processes and increase sediment storage.

## Project Design

On April 30 through May 2, 2018 Dan Miller met on site with Rob Cadmus and Angie Eldred Flickinger of SAWC and Neil Stichert of USFWS to review project concepts developed in 2016; update project goals; revisit the project site to discuss project concepts and select an updated preferred alternative for design and update site topographic survey. The following sections describe the preferred alternative and designs.

### PROJECT GOALS

From field discussions, project goals include:

- Create diverse stream processes and aquatic habitats while protecting existing high quality habitats, floodplain soils and vegetation.
- Address lack of large wood in the stream and increase complexity of geomorphic conditions by placing large woody material (LWM) in the stream and along banks in a configuration that replicates natural accumulations of wood.
- Use nearby sources of LWM and trees.
- Avoid/minimize use of boulders and metal connections. Some movement of large wood is acceptable. Emphasize random placements of wood to avoid aesthetic of a manmade condition.
- Increase connectivity and lateral migration potential of East Fork alluvial fan by selectively breaching an abandoned logging road.
- Develop a project that is feasible to build with available materials, machinery, construction expertise and site access constraints.
- Protect existing Pat Creek Road (USFS Road 6259) from increases in flood water surface elevations and flow energy.

### PROPOSED PROJECT ELEMENTS

From the field meeting the overall approach defined in the 2016 conceptual analysis is still valid. However, a greater emphasis is placed on developing a project that reflects natural process based accumulations of large wood and has a more balanced cost-to-benefit ratio. Cost being defined by actual cost as well as disturbance to the creek, floodplain and road systems. The project can be partitioned into three primary areas shown on the plans: 1) abandoned logging road along the East Fork alluvial fan, 2) West Fork Pat Creek, and 3) Pat Creek downstream of confluence. A description of each area and the project elements follow:

***East Fork Pat Creek – Breach abandoned logging road:***

To increase the area of alluvial fan accessible by East Fork Pat Creek, a number of breaches can be made in the abandoned logging road that extends from near the confluence and extends uphill roughly parallel with the creek. Breach locations were identified and surveyed in the field at topographic low points of the fan and old channel signatures. Four breach locations are shown on Sheet 8 of the plans. Embankments generally are about 1 to 2 feet in height, 15 feet wide with variable lengths defined in the field totaling about 115 feet. Excavated materials will be spoiled on the adjacent road embankment for cost savings and to reduce construction disturbance.

Function: The intent is to excavate the embankment down to the fan surface for unimpeded flow through the breach. The East Fork can then continue its sediment and channel dynamics and have access to additional sediment storage area. Risk from the channel moving to west of the road embankment is considered to be low as it would discharge into Pat Creek, creating new habitats.

Performance: The East Fork is dynamic with erosion/deposition, channel patterns and migration changing frequently. Breaching does not actively encourage the East Fork to flow west of the road embankment, but will remove much of the impediment to stream processes accessing the area west of the road and along the embankment.

Construction sequencing: Construction is anticipated to be relatively simple. An excavator will cross the creek, enter onto the abandoned road embankment from the downstream end, travel and begin excavation at the furthest upstream breach, spoils will be placed on the road embankment downstream of each breach. The excavator continues to work from upstream to downstream, and concludes by restoring the stream bank access point. Work can be completed in approximately one day.

***West Fork Pat Creek - Upstream of confluence:***

Field observations and previous Tier II analysis indicate numbers of key piece large wood material are low in the West Fork. The objective along the West Fork is to increase key piece large wood for complex rearing and holding habitats while minimizing risk to the existing road.

The existing road embankment is steep and tall with at least one instance of possible rotational failure seen at the top of the embankment where the stream is at the embankment toe. LWM numbers, size and location of placement were configured to reduce risk to the road. No LWM will be placed on the road embankment. No excavation to bury the LWM is proposed, with the exception of localized minor trenching to set the logs into the floodplain stream bank. Trees and tree tops are placed in the channel and interlocked amongst existing large trees for restraint. The trunks and branches of the place wood will provide cover habitat and hydraulic variability. LWM placement occurs only along portions of this reach that are offset from the existing road embankment to manage risk.

Description: LWM placement mimics trees along the top of stream bank that have fallen into the stream and trapped other floating debris. Use of four whole trees as key pieces will provide 'legacy wood' caliber large wood in the stream increasing complexity of scour and channel form and providing a collection point for other woody debris.

Function: The accumulation of wood provides cover habitat and hydraulic variability. Potential for beneficial scour and sediment deposition is low to moderate and would provide an incidental benefit for channel and habitat complexity.

Performance: Placed whole trees and tree tops are restrained by interlocking one or both ends of the whole tree amongst existing trees. The tree tops are restrained by the whole trees and amongst existing large trees. The LWM is expected to float with stage and move to some degree. The lengths of the whole trees exceed the channel width and are expected to rack up on the stream bank or trees if it moves. Some floating debris will accumulate on the LWM enhancing the cover and complexity.

Construction sequencing: Construction includes sourcing Owner identified trees from the nearby DNR pit road with rootwad and branches intact. The trees are transported with an excavator suspended off the ground to protect rootwad and branches. Entry to the placement location will be determined in the field to minimize damage to the road embankment and floodplain. Trees are placed by excavator into the creek and the site restored by smoothing ruts and spreading slash over access route as the excavator retreats to the FS 6259 Road

#### ***Pat Creek - Downstream of confluence:***

From the confluence of the East and West Fork channels and extending downstream 350 feet, Pat Creek was previously logged and currently has no key pieces of large wood in the channel. Logging in this channel segment has also removed much of the standing large wood that could improve habitat in the following decades. Large wood can be placed to enhance habitat and hydraulic complexity using whole trees spanning the channel and interlocked with existing trees to restrain smaller wood. To protect the existing floodplain soils and vegetation and stream bank structure, equipment travel is limited and no burial of wood in the floodplain is proposed. Some selective trenching of the stream bank and gravel bars may occur to fit the logs.

Based on initial conversations with permit agencies and construction methods used on other projects in the region, an excavator may be allowed to operate from within the creek. Logs would be placed at floodplain access points from the road and then picked up by a machine operating from the stream, removing the need for machinery to operate on the floodplain. Operating from the stream has the advantage of confining machinery disturbance to the gravel and cobble stream bed and gravel bars, and minimizes damage to sensitive floodplain soils and vegetation. This may require biodegradable hydraulic fluid in the machine. And would require construction occur during time periods of no or minimal fish use. Floodplain roughness wood is included at access points to

replace hydraulic roughness lost from vegetation removal and damage. Impacts to water surface elevations are discussed in the hydraulics section later in this memorandum.

Description: LWM placement is a complex of roots, branches and tree trunks for overhanging cover, variability of hydraulics, scour and sediment deposition. The LWM configuration tells a narrative of trees along a stream bank that have fallen in and across the stream. Branches, slash and snapped tree tops have floated into and accumulated at these channel spanning trees along the outsides of bends and scour pools.

Function: In addition to the complex of trunks, branches and rootwads, the LWM placement will constrict flow and create scour pools with corresponding tail spills providing cover habitat and potential spawning areas.

Performance: The LWM is placed and restrained by channel spanning whole trees and large logs with root wads that are interlocked amongst existing large trees. The wood is expected to float with variable stage with some adjustments in locations. However, by interlocking key log pieces amongst existing trees and smaller material racked on the key members, the wood is anticipated to remain in a similar configuration, and recruit other debris floating down the creek.

Construction sequencing: Trees will be sourced from nearby DNR land along a pit access road as shown on the plans. Trees will be selected by Owner/Engineer and tipped over by Contractor preserving rootwad and branch structure. Discussions with local contractors indicate that it is common practice to barge equipment between islands and rental equipment is readily available. Thus, we understand that there are no restrictions on size, type or number of pieces of machinery.

Trees will be moved to Pat Creek Road by excavator suspended above ground to protect roots and branches. Trees will be positioned into floodplain access routes. An excavator will enter the stream and pick the trees from the floodplain access routes and place in positions shown on the plans with the least movement of machine and trees possible to protect stream bed and banks and floodplain surfaces and LWM rootwad and branch structure.

Stream bank entry points will be protected for excavator travel by placing branches and slash to drive across. If needed, restoration of damaged banks at project completion can be completed by layering soil with live transplanted vegetation. Machine operating in creek may be required to have biodegradable hydraulic fluid. Floating oil absorbing booms will be deployed across the creek downstream of the work area as a safety measure.

The final stage of construction includes site cleanup, soils decompacted if necessary and floodplain roughness wood and slash placed over disturbed areas. Boulders can be placed at site access points to prevent vehicle access into the creek.

## Analysis and Design

### HYDROLOGY

No additional hydrology data since 2016 is available. Thus, 2016 hydrology estimates were used for these preliminary designs and reiterated here.

Recorded stream discharge gage data is not available for Pat Creek to directly estimate flood discharges, nor were nearby gaged similar watersheds identified. In the absence of gage data at the site, USGS regression equations (Curran et al, 2003) were used to estimate peak stream flows for a number of flood events along the East Fork Pat Creek, West Fork Pat Creek and main stem Pat Creek. The regressions were developed by the USGS from regional gaged flows and linked to regional climatic data (mean January temperature, mean annual precipitation) and watershed conditions (drainage area and flow storage). Mean January temperature data (26F) is obtained from Jones and Fahl's Plate 1 (1994). Although average annual precipitation is available in Jones and Fahl's Plate 2 (1994), local precipitation data available through WRCC at Wrangell at 91 inches per year were thought to be more accurate for the site and used for this analysis. Drainage areas were delineated from USGS quadrangle topographic maps using Terrain Navigator software. Flow storage by ponds and lakes includes an existing beaver pond complex upstream of the road along the West Fork Pat Creek with storage area approximated from USGS topographic maps.

Estimates of stream flows are summarized in the following table. Calculations and drainage area boundaries are shown in Appendix 1.

Table 1 – Stream flow estimates based on regional regression equations (Curran et al, 2003)

Site	DA (sq. mi.)	ST (%)	Q <sub>2</sub> -yr (cfs)	Q <sub>5</sub> -yr (cfs)	Q <sub>10</sub> -yr (cfs)	Q <sub>25</sub> -yr (cfs)	Q <sub>50</sub> -yr (cfs)	Q <sub>100</sub> -yr (cfs)
West Fork	2.22	4	210	297	357	432	490	546
East Fork	2.80	0	453	648	781	947	1072	1193
Below Confluence	5.0	1.8	513	727	873	1057	1197	1333

Where:

- DA = drainage area.
- ST = storage in lakes and ponds.
- Q#-yr = #-year event peak discharge (cfs)

### HYDRAULICS

Stream hydraulics were modeled using the U.S. Army Corps of Engineers' River Analysis System (HEC-RAS) version 5.0.5. The HECRAS steady state, one-dimensional model for the project was developed from surveyed stream cross sections. USGS quadrangle topographic maps were used to

extend model cross sections across broad flat floodplains near the downstream end that were not surveyed.

Channel and floodplain Manning's n roughness values were estimated based on professional opinion. Channel Manning's n values were estimated to be 0.038 along the West Fork and downstream of the confluence, and 0.05 along the steeper East Fork. Manning's n values for floodplain areas were estimated to be 0.08 along the West Fork and downstream of the confluence, and 0.1 along the East Fork.

Model boundary conditions were set at critical depth near the downstream end to avoid a false back watered condition. A number of interpolated cross sections were placed between the downstream-most two sections to allow the model to generate an accurate water surface elevation (WSEL) for the second surveyed and upstream sections. To account for the possibility of super critical (shallow and fast) flow, the model was run in mixed mode with an upstream boundary condition set to normal depth based on sub-reach average slope.

Model results were used to estimate that the 2-year water surface approximately matches to channel forming indicators included in the surveyed data. Summary output from the existing conditions HEC-RAS model is included in Appendix 2.

The existing conditions model run was copied and modified to represent with-project conditions. LWM placements are represented in the model by increased Manning's n roughness values for the portion of stream cross section that is occupied by LWM.

## LWM RESTRAINT

A project goal is to place LWM to mimic natural stream processes and avoid use of or minimize boulders and metal connections. The design approach relies on key member sized logs spanning the channel, and logs with root wads interlocked amongst existing large trees to pin smaller sized wood. Floating of wood with creek stage is anticipated. Some movement of wood as it floats and is compacted against the larger key members and logs interlocked amongst larger trees is expected. Risk caused by movement of wood is considered low as the creek is sinuous with accumulations of wood downstream that would prevent loose wood from traveling far. The closest infrastructure is downstream of Pat Lake.

## ESTIMATE OF QUANTITIES AND COSTS

An estimate is attached. Wood materials will be sourced on site. Thus the cost is primarily equipment and labor time and BMPs. To optimize placement of wood, a field fit approach to match sourced wood to site conditions will have design staff or experienced USFWS staff on site directing work. The project will be contracted on a time and materials basis.

## References

- Curran, Janet H., D. F. Meyer and G. D. Tasker. 2003. Estimating the Magnitude and Frequency of Peak Streamflows for Ungaged Sites on Streams in Alaska and Conterminous Basins in Canada. USGS, Water-Resources Investigations Report 03-4188
- Inter-Fluve, Inc. 2016. Conceptual Analysis report and plans.
- Jones, Stanley H. and C.B. Fahl. 1994. Magnitude and Frequency of Floods in Alaska and Conterminous Basins of Canada. USGS, Water-Resources Investigations Report 93-4179
- Pat Creek Watershed Reconnaissance. 2015. Southeast Alaska Watershed Coalition. Unpublished Report.
- Robison, E.G. and Beschta R.L. 1990. Coarse Wood Debris and Channel Morphology Interactions In Undisturbed Streams In Southeast Alaska, U.S.A. Earth Surface Processes and Landforms, Vol. 15, 149-156.
- SAWC. 2015. Watershed Reconnaissance Report.
- Terrain Navigator, version 8.7.
- US Army Corps of Engineers. 2010. HEC-RAS, River Analysis System version 4.1.0.
- Western Regional Climate Center. <http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ak9919>

## Attachment: Preliminary Plans

## Appendix:

### Hydrology calculations

**Pat Creek**

USGS Regression estimates of flood peak discharge

Parameter	Station:	West Fork	East Fork	Below Confluence
Drainage Area (sq miles)	A (sq mil)	2.22	2.80	5
Storage (%)	ST (%)	4	0	1.8
Mean Annual Precip (inches)	P (in)	91	91	91
Mean minimum January Temperature (F)	J (F)	26	26	26
	Return Interval	Flow (cfs)		
	2-yr	210	453	513
	5-yr	297	648	727
	10-yr	357	781	873
	25-yr	432	947	1057
	50-yr	490	1072	1197
	100-yr	546	1193	1333
	200-yr	607	1322	1479
	500-yr	685	1488	1667

Ranges

A: 0.720-571; ST: 0-26; P: 70-300; J: 0-

Estimating the Magnitude and Frequency of Peak Streamflows  
 for Ungaged Sites on Streams in Alaska and Conterminous Basins in Canada  
 By Janet H. Curran, David F. Meyer, and Gary D. Tasker.  
 USGS, Water-Resources Investigations Report 03-4188

**Region 1, Region 3 (93 gaging stations)****Applicable range of variables:****A: 0.720–571; ST: 0–26; P: 70–300; J: 0–32**

$$Q_2 = 0.004119 A^{0.8361} (ST+1)^{-0.3590} P^{0.9110} (J+32)^{1.635}$$

$$Q_5 = 0.009024 A^{0.8322} (ST+1)^{-0.3670} P^{0.8128} (J+32)^{1.640}$$

$$Q_{10} = 0.01450 A^{0.8306} (ST+1)^{-0.3691} P^{0.7655} (J+32)^{1.622}$$

$$Q_{25} = 0.02522 A^{0.8292} (ST+1)^{-0.3697} P^{0.7165} (J+32)^{1.588}$$

$$Q_{50} = 0.03711 A^{0.8286} (ST+1)^{-0.3693} P^{0.6847} (J+32)^{1.559}$$

$$Q_{100} = 0.05364 A^{0.8281} (ST+1)^{-0.3683} P^{0.6556} (J+32)^{1.527}$$

$$Q_{200} = 0.07658 A^{0.8276} (ST+1)^{-0.3669} P^{0.6284} (J+32)^{1.495}$$

$$Q_{500} = 0.1209 A^{0.8272} (ST+1)^{-0.3646} P^{0.5948} (J+32)^{1.449}$$

J (plate 1) = 26 degrees, F  
P (plate 2) = 140 inches  
P (NCDC) = 91 inches <http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ak9919>

Magnitude and Frequency of Floods in Alaska and Conterminous Basins of Canada.  
Jones, Stanley H. and C.B. Fahl. 1994. USGS, Water-Resources Investigations Report 93-4179

Plate 1 - Mean January Temperature

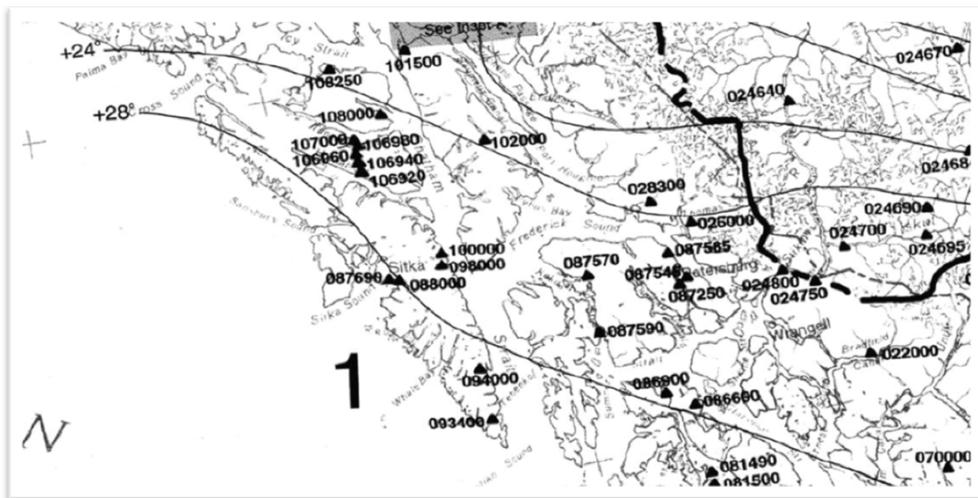
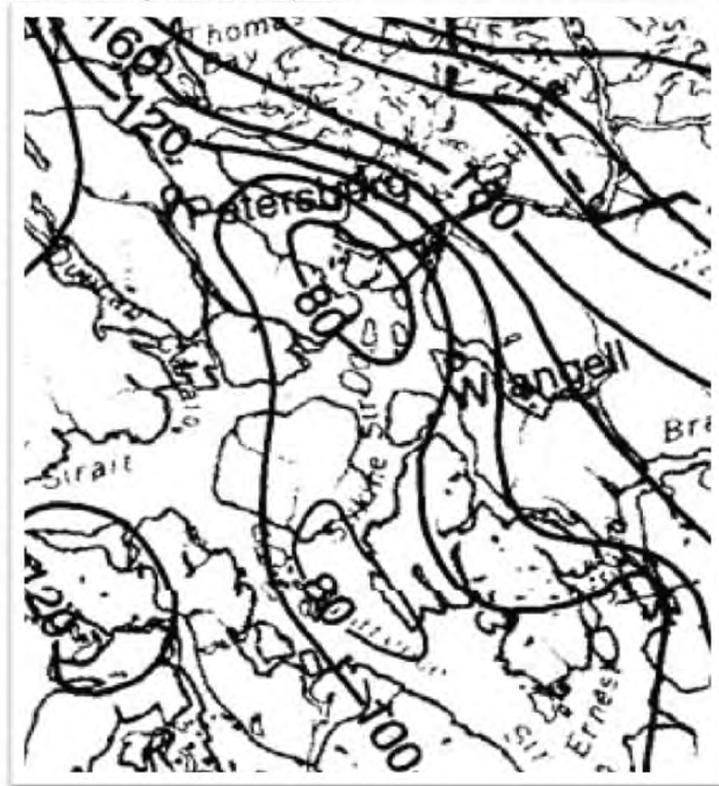
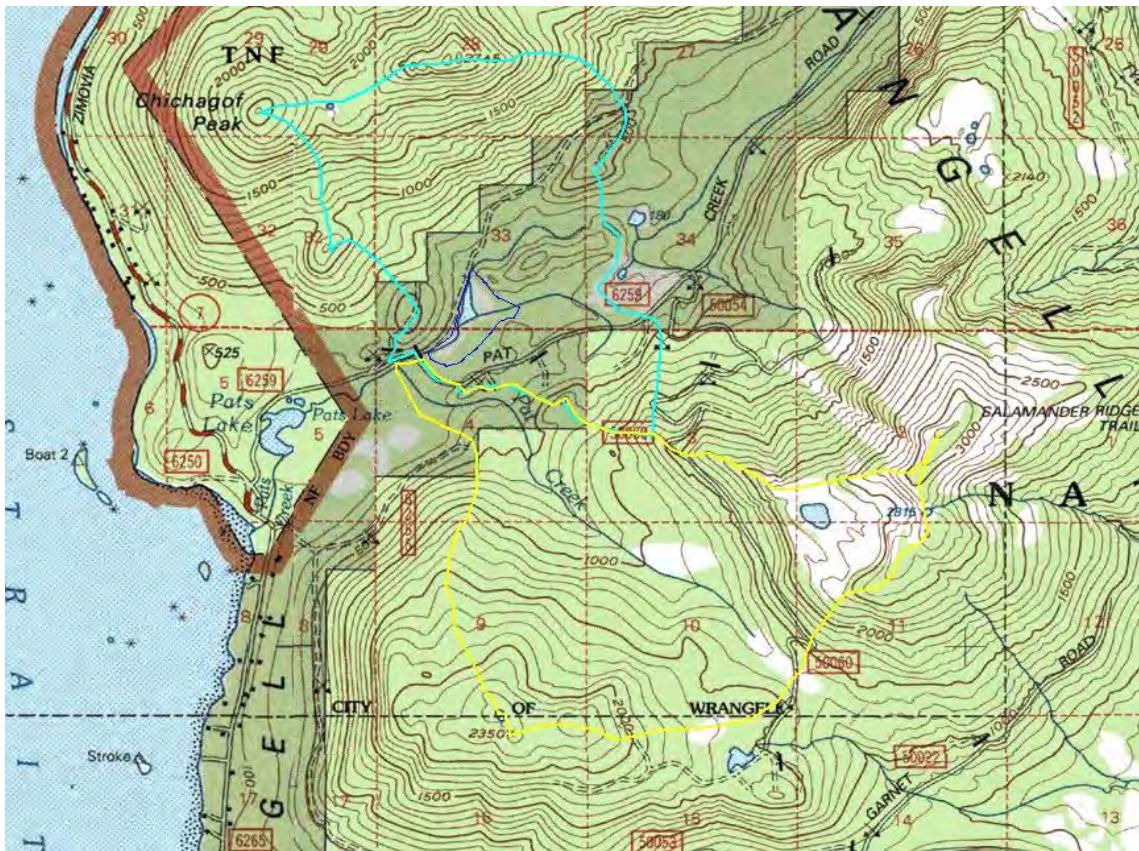


Plate 2 - Average Annual Precipitation



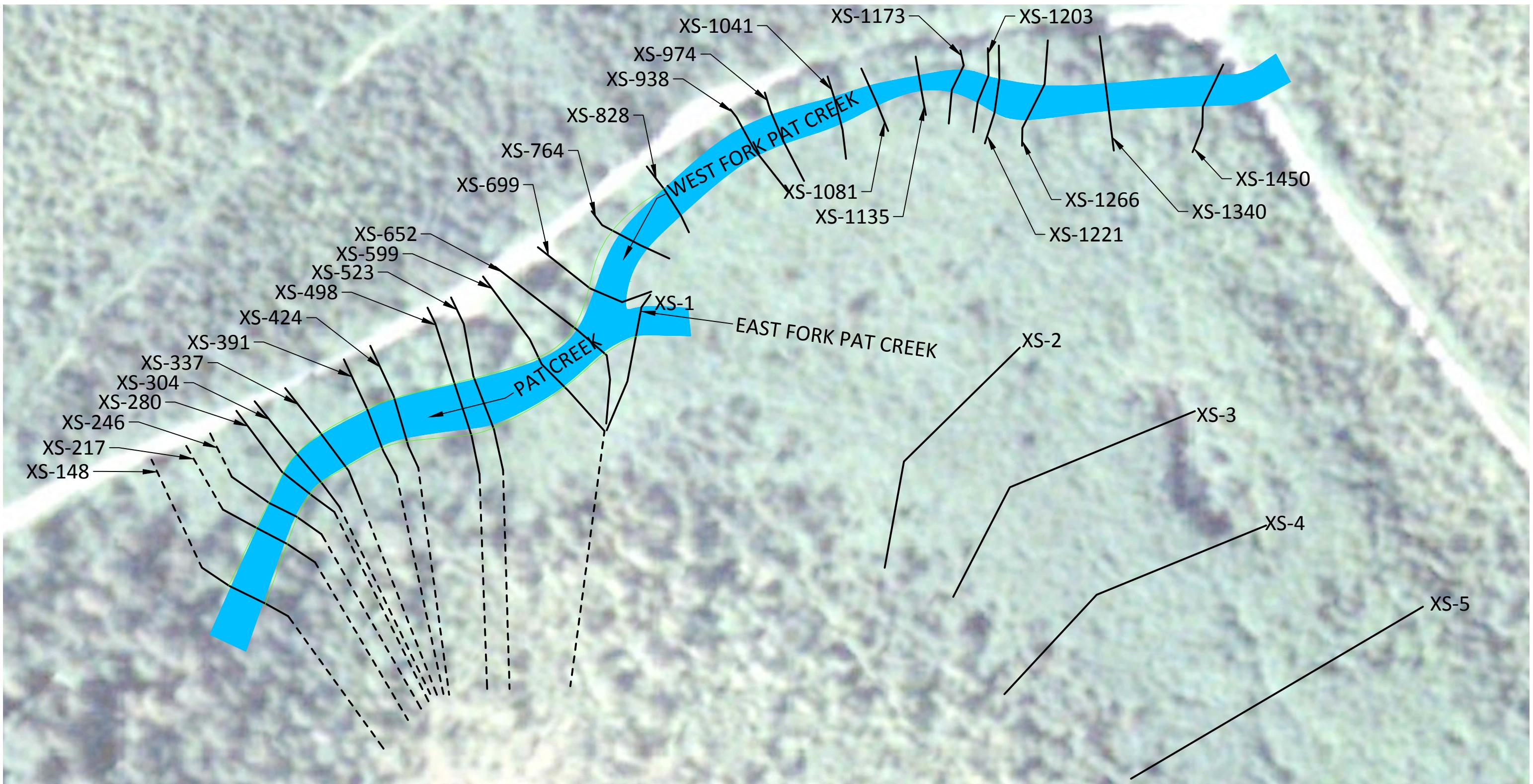
## Pat Creek - Drainage Area Delineations



## Appendix:

Hydraulic calculations:

- Existing

PLAN

501 Portway Avenue, Suite 101  
Hood River, OR 97031  
541.386.9003  
[www.interfluve.com](http://www.interfluve.com)

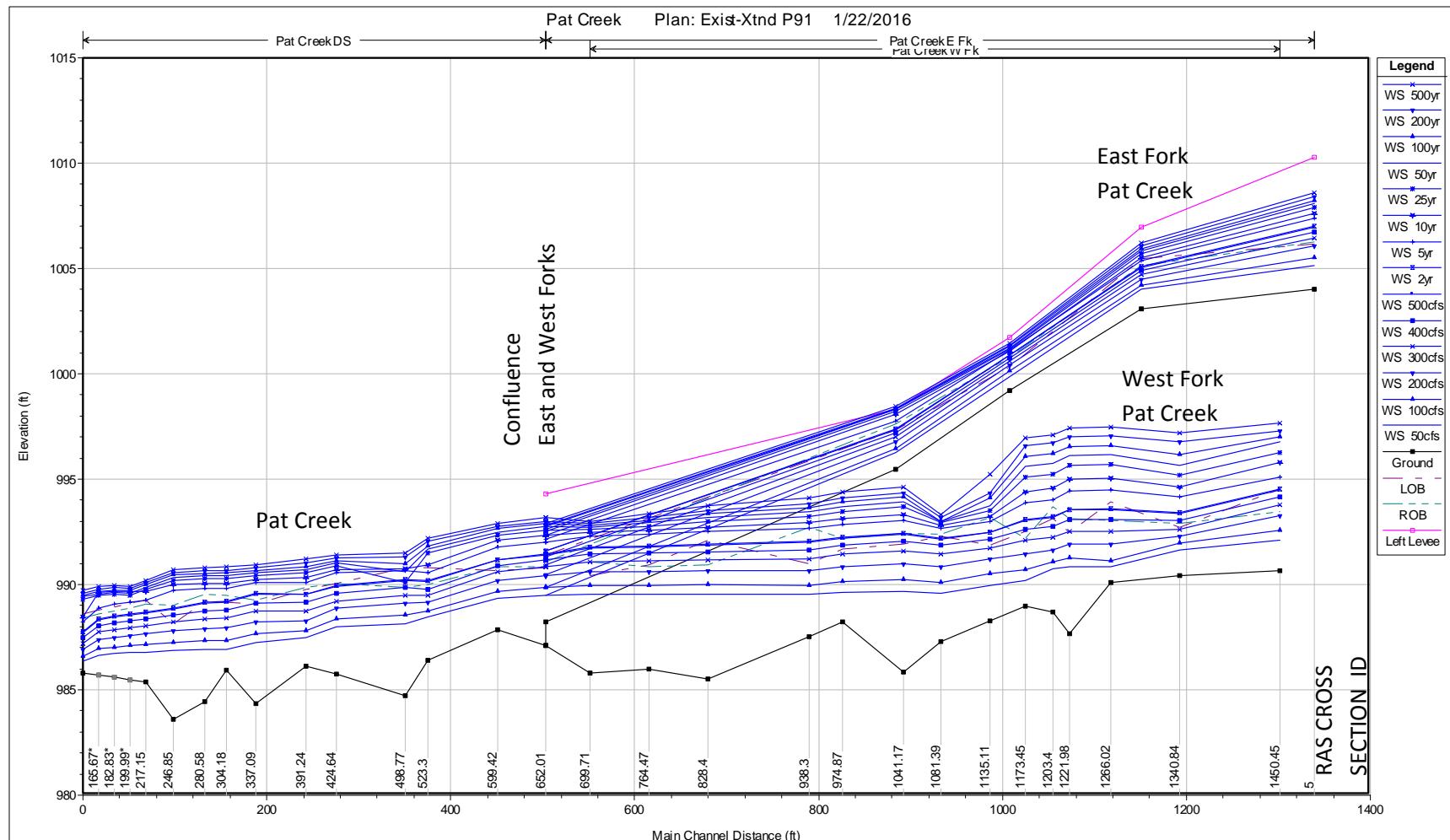


0 100 200  
SCALE IN FEET

1 OF 1

PAT CREEK  
HEC-RAS CROSS SECTIONS SCHEMATIC

HEC-RAS water surface profiles – Existing conditions

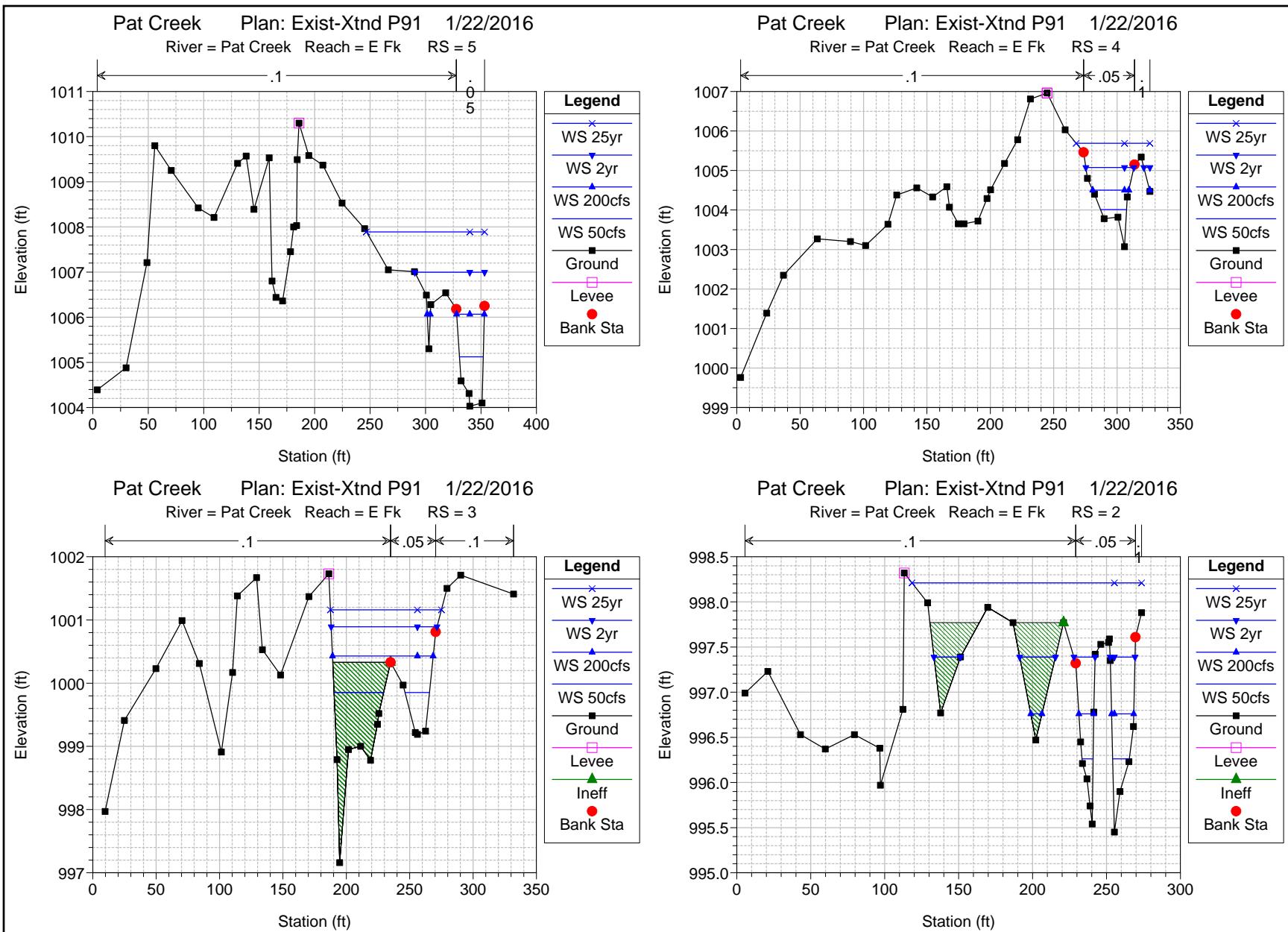


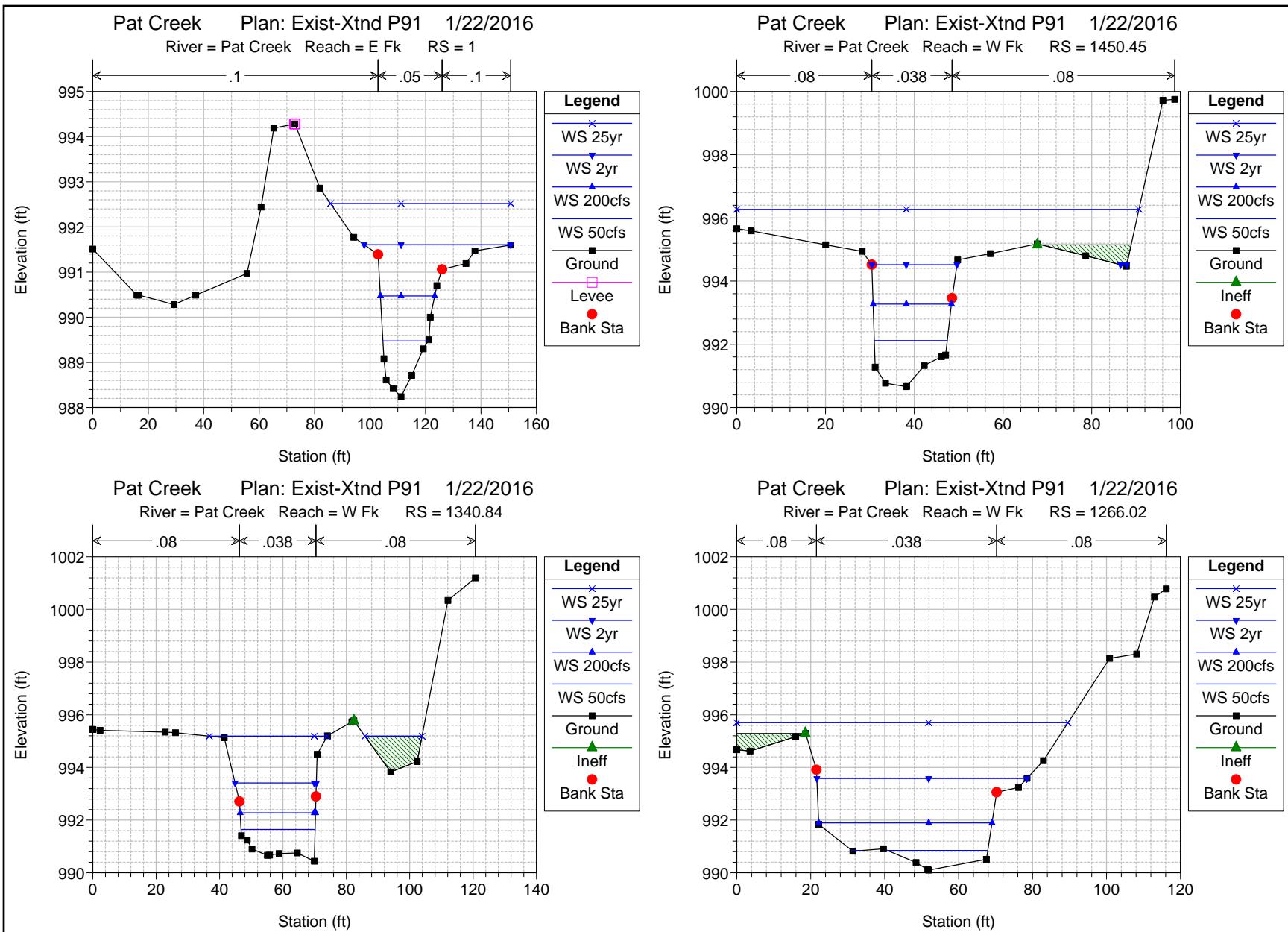
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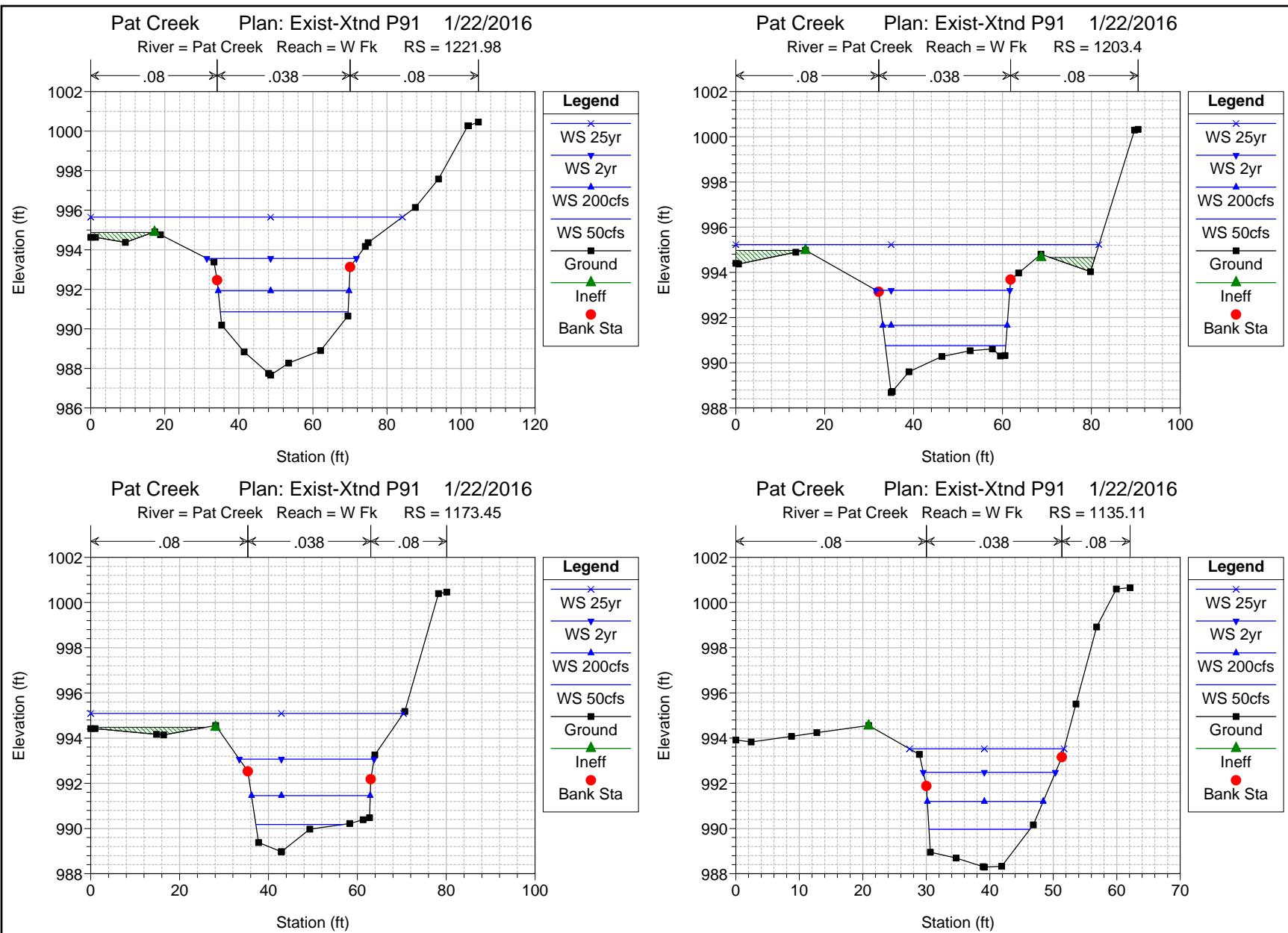
WS = water surface

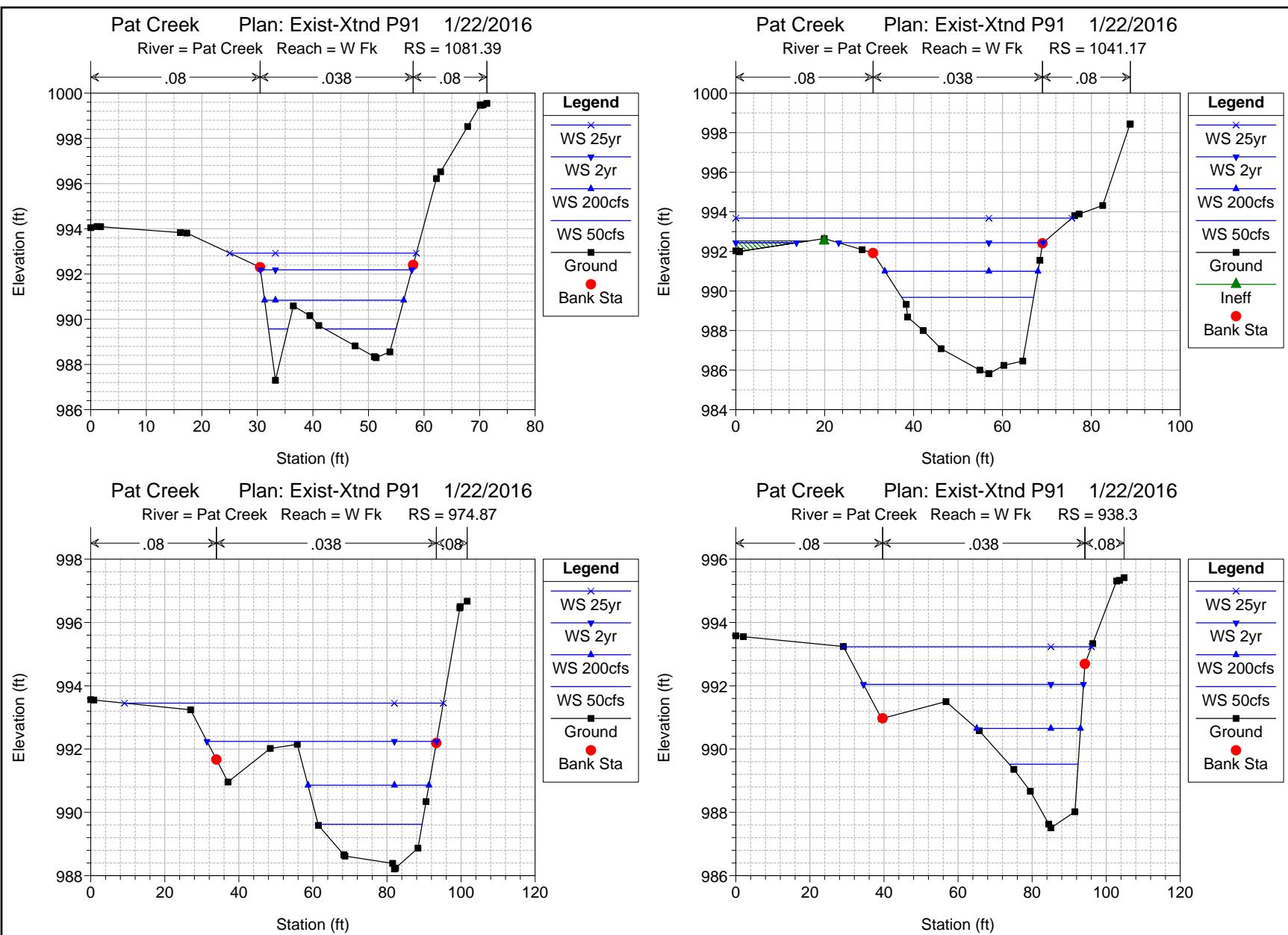
ROB = right bank

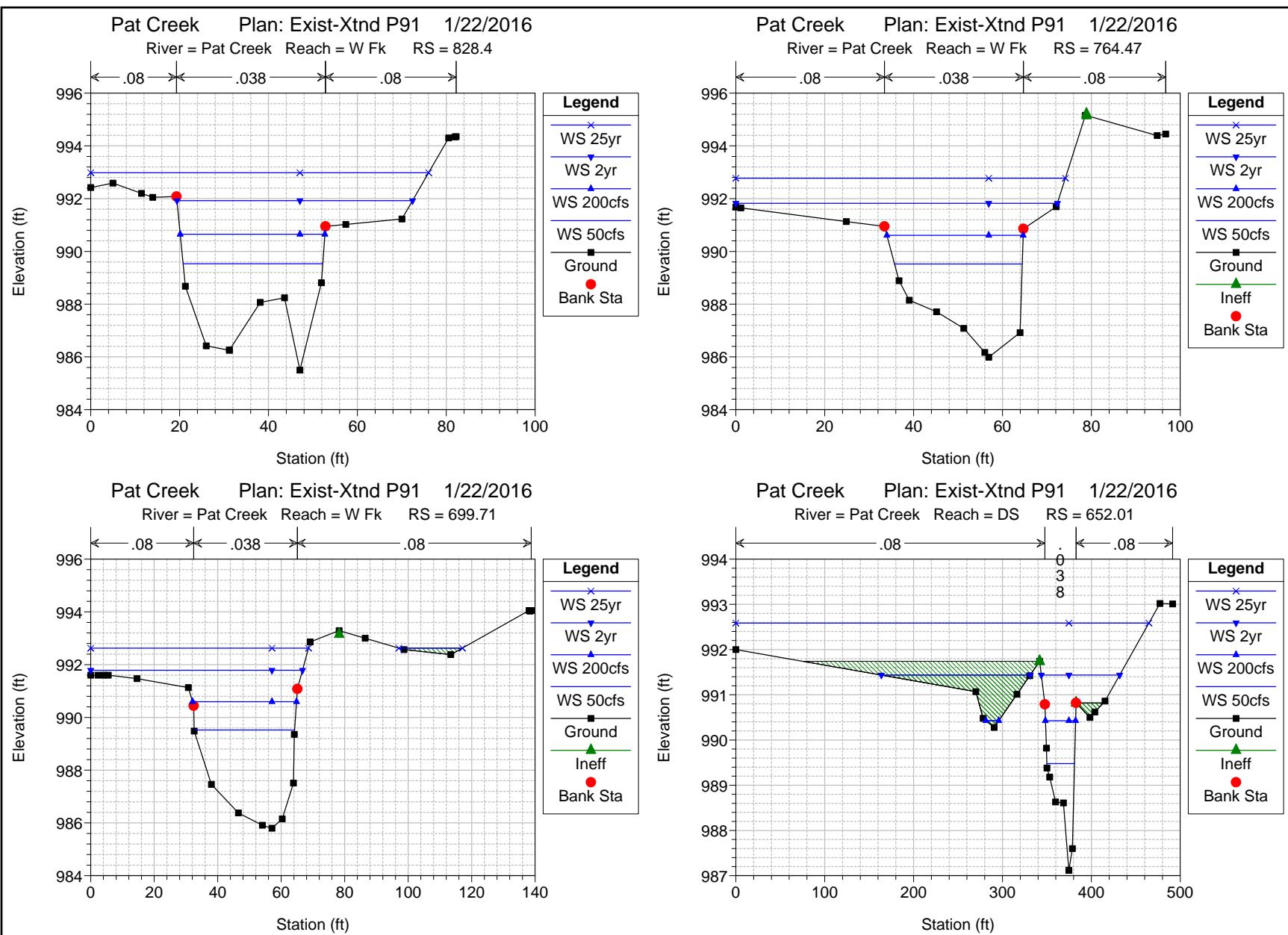
LOB = left bank

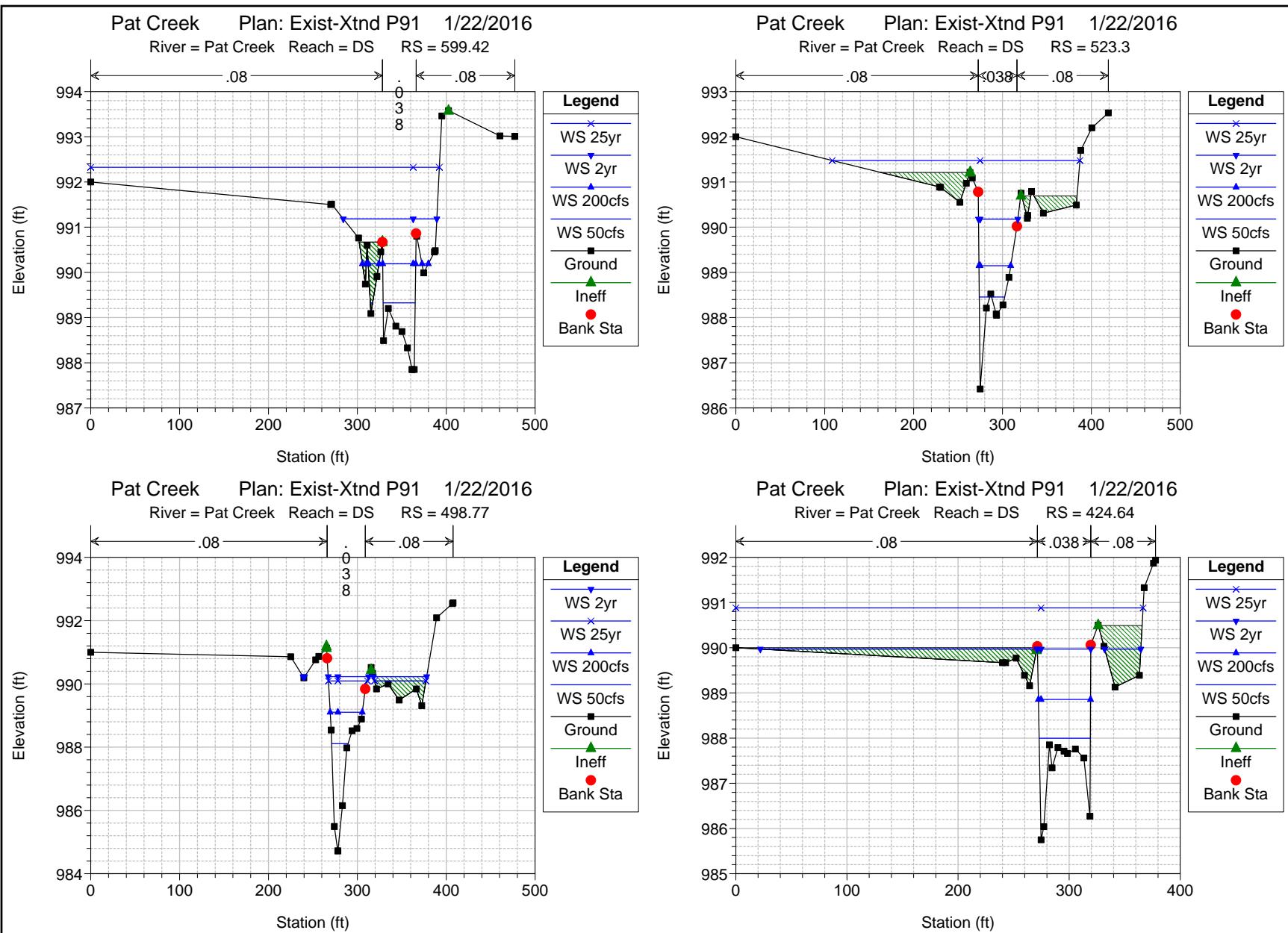


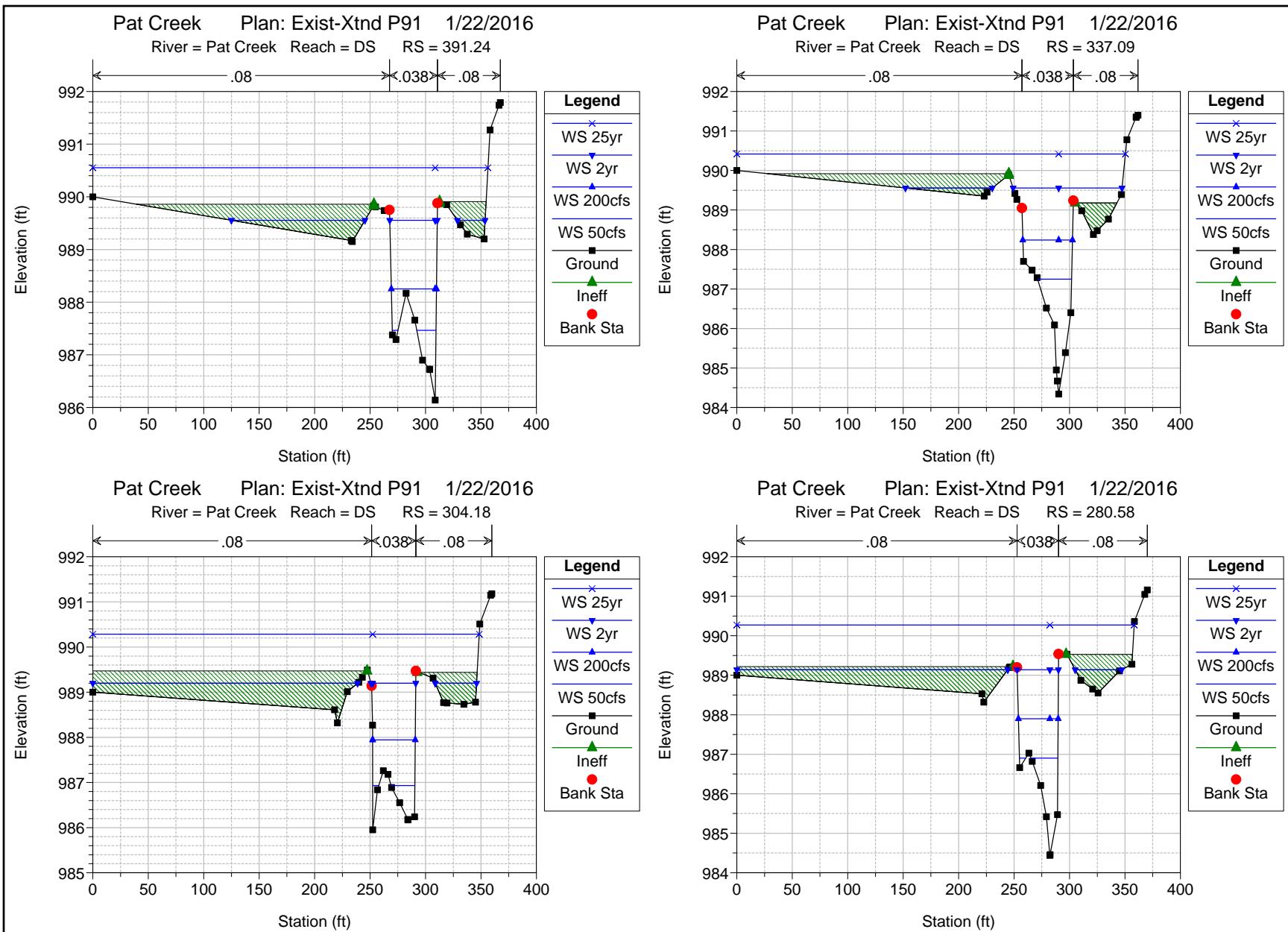


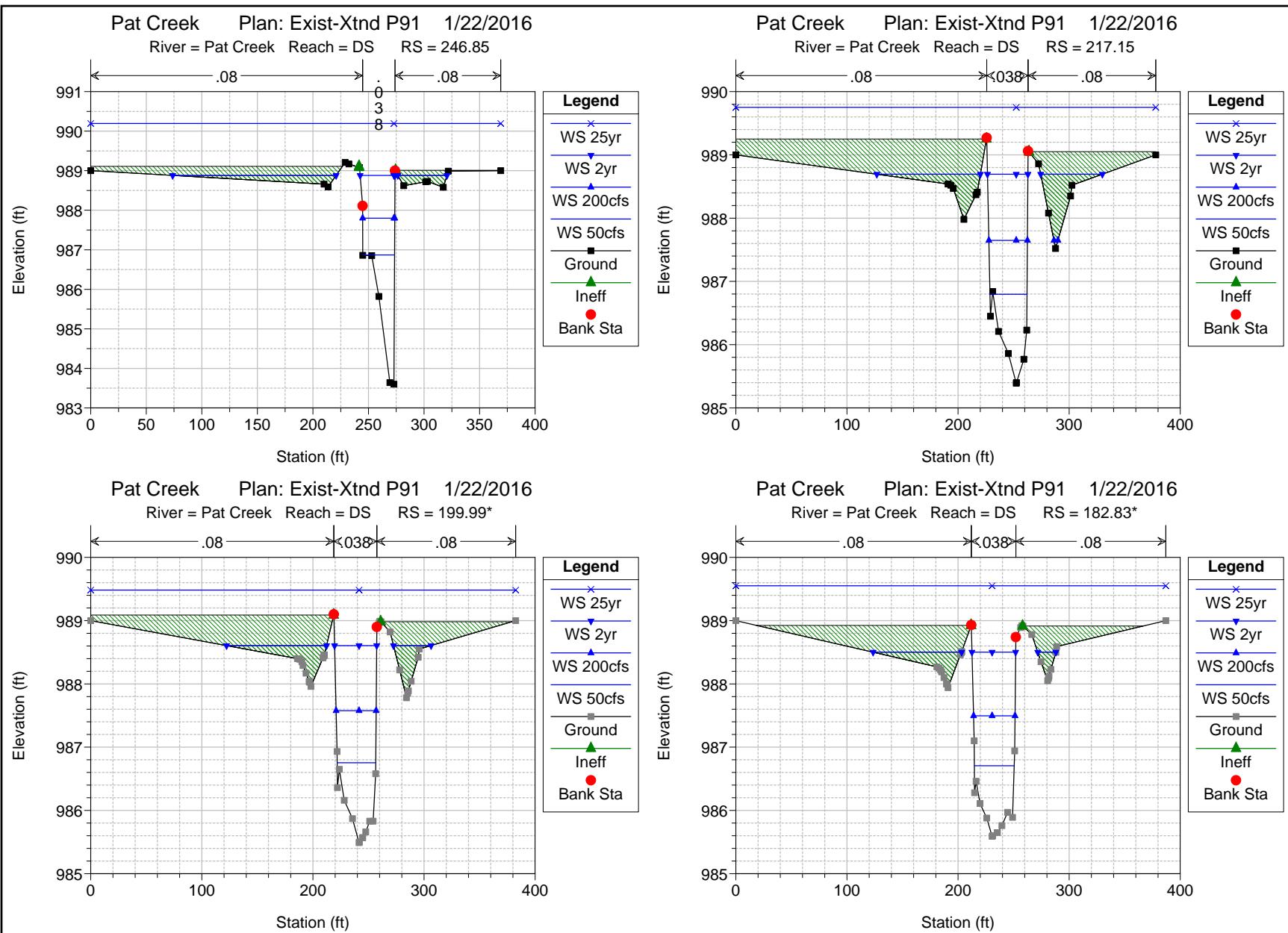


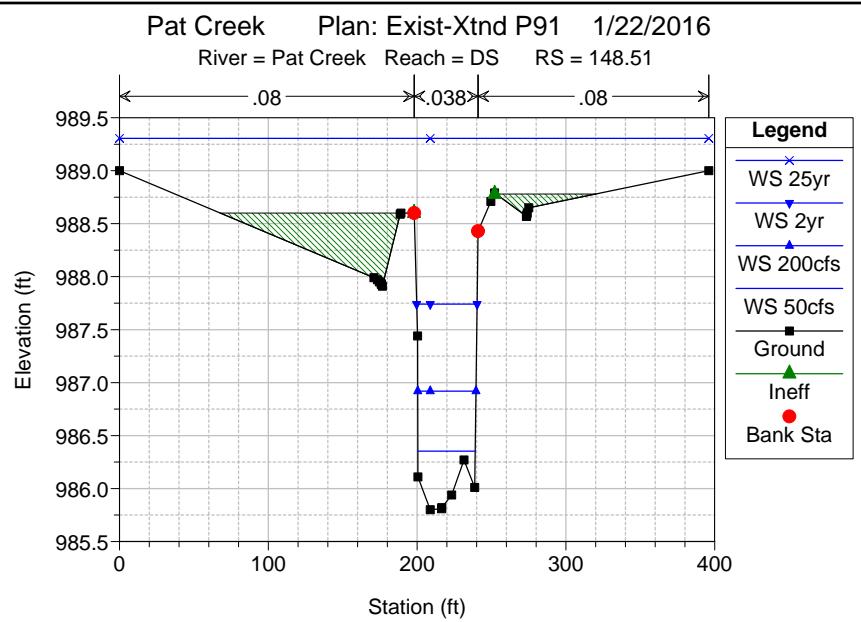
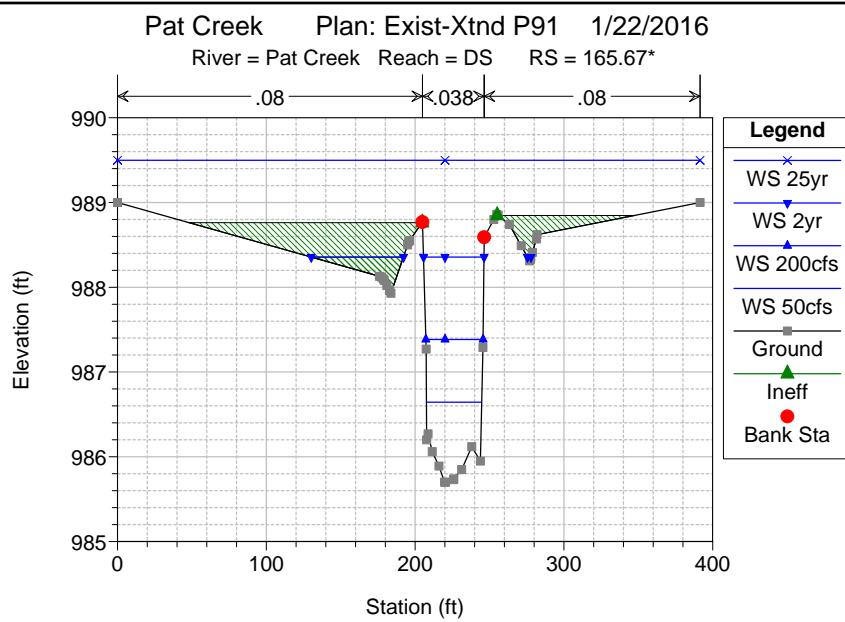












HEC-RAS Plan: Ex-XtdP91

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	Shear Chan
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(lb/sq ft)
E Fk	5	50cfs	20.00	1004.03	1005.12	1004.52	1005.14	0.001776	1.10	18.18	21.49	0.21	0.09
E Fk	5	100cfs	41.00	1004.03	1005.53	1004.74	1005.57	0.002142	1.50	27.35	23.86	0.24	0.15
E Fk	5	200cfs	82.00	1004.03	1006.07	1005.05	1006.13	0.002652	2.04	41.17	27.82	0.28	0.25
E Fk	5	300cfs	123.00	1004.03	1006.45	1005.29	1006.54	0.002989	2.45	53.85	45.22	0.31	0.35
E Fk	5	400cfs	164.00	1004.03	1006.73	1005.51	1006.85	0.003288	2.79	68.88	57.43	0.33	0.43
E Fk	5	500cfs	204.00	1004.03	1006.96	1005.71	1007.10	0.003507	3.06	82.83	62.23	0.34	0.50
E Fk	5	2yr	210.00	1004.03	1007.00	1005.74	1007.14	0.003529	3.09	84.95	62.92	0.34	0.51
E Fk	5	5yr	297.00	1004.03	1007.41	1006.11	1007.58	0.003879	3.55	121.17	95.11	0.37	0.64
E Fk	5	10yr	357.00	1004.03	1007.63	1006.28	1007.82	0.004058	3.80	143.18	100.43	0.38	0.72
E Fk	5	25yr	432.00	1004.03	1007.89	1006.72	1008.10	0.004197	4.05	169.98	106.55	0.39	0.80
E Fk	5	50yr	490.00	1004.03	1008.07	1006.90	1008.30	0.004294	4.23	190.07	112.27	0.39	0.86
E Fk	5	100yr	546.00	1004.03	1008.25	1007.00	1008.48	0.004350	4.37	209.93	118.40	0.40	0.90
E Fk	5	200yr	607.00	1004.03	1008.41	1007.00	1008.65	0.004458	4.54	229.82	124.24	0.40	0.96
E Fk	5	500yr	685.00	1004.03	1008.60	1007.51	1008.86	0.004569	4.72	254.55	130.03	0.41	1.03
E Fk	4	50cfs	20.00	1003.07	1004.01	1004.01	1004.17	0.055760	3.17	6.31	20.50	1.01	1.06
E Fk	4	100cfs	41.00	1003.07	1004.21	1004.21	1004.44	0.047623	3.82	10.72	23.31	0.99	1.35
E Fk	4	200cfs	82.00	1003.07	1004.50	1004.50	1004.82	0.042831	4.51	18.17	28.73	1.00	1.68
E Fk	4	300cfs	123.00	1003.07	1004.72	1004.72	1005.10	0.041591	4.96	25.01	34.95	1.01	1.92
E Fk	4	400cfs	164.00	1003.07	1004.90	1004.90	1005.33	0.038932	5.27	31.70	39.24	1.00	2.07
E Fk	4	500cfs	204.00	1003.07	1005.05	1005.05	1005.52	0.036680	5.54	37.91	42.22	0.99	2.20
E Fk	4	2yr	210.00	1003.07	1005.08	1005.08	1005.55	0.035935	5.55	39.01	42.73	0.98	2.19
E Fk	4	5yr	297.00	1003.07	1005.35	1005.35	1005.91	0.032614	6.06	51.95	51.81	0.97	2.44
E Fk	4	10yr	357.00	1003.07	1005.51	1005.51	1006.13	0.030933	6.37	60.42	53.66	0.96	2.60
E Fk	4	25yr	432.00	1003.07	1005.69	1005.69	1006.38	0.029612	6.75	70.27	58.17	0.96	2.81
E Fk	4	50yr	490.00	1003.07	1005.82	1005.82	1006.55	0.028681	7.01	78.01	61.48	0.96	2.95
E Fk	4	100yr	546.00	1003.07	1005.93	1005.93	1006.72	0.028519	7.29	84.80	64.25	0.96	3.12
E Fk	4	200yr	607.00	1003.07	1006.06	1006.06	1006.89	0.027179	7.47	93.66	67.37	0.95	3.20
E Fk	4	500yr	685.00	1003.07	1006.22	1006.22	1007.09	0.025821	7.69	104.79	69.85	0.94	3.30
E Fk	3	50cfs	20.00	999.19	999.85	999.69	999.93	0.017409	2.30	8.71	58.40	0.60	0.49
E Fk	3	100cfs	41.00	999.19	1000.13	999.93	1000.25	0.018452	2.74	14.97	69.57	0.64	0.64
E Fk	3	200cfs	82.00	999.19	1000.43	1000.26	1000.60	0.019332	3.31	28.59	79.48	0.69	0.86
E Fk	3	300cfs	123.00	999.19	1000.60	1000.51	1000.80	0.019385	3.76	42.04	80.74	0.71	1.05
E Fk	3	400cfs	164.00	999.19	1000.75	1000.65	1000.98	0.019042	4.08	53.77	81.81	0.72	1.18
E Fk	3	500cfs	204.00	999.19	1000.88	1000.75	1001.13	0.018307	4.32	64.44	83.33	0.72	1.27
E Fk	3	2yr	210.00	999.19	1000.89	1000.77	1001.15	0.018623	4.39	65.41	83.51	0.73	1.31
E Fk	3	5yr	297.00	999.19	1001.12	1000.96	1001.43	0.018569	4.95	84.17	86.90	0.75	1.57
E Fk	3	10yr	357.00	999.19	1001.08	1001.08	1001.57	0.029841	6.16	81.02	86.34	0.94	2.45
E Fk	3	25yr	432.00	999.19	1001.16	1001.22	1001.77	0.034761	6.92	87.95	87.57	1.03	3.03
E Fk	3	50yr	490.00	999.19	1001.24	1001.32	1001.92	0.036559	7.35	94.51	88.72	1.06	3.36
E Fk	3	100yr	546.00	999.19	1001.31	1001.42	1002.05	0.037390	7.69	101.28	89.88	1.09	3.61
E Fk	3	200yr	607.00	999.19	1001.37	1001.50	1002.20	0.040221	8.17	106.41	90.76	1.13	4.03

HEC-RAS Plan: Ex-XtdP91 (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	Shear Chan
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(lb/sq ft)
E Fk	3	500yr	685.00	999.19	1001.45	1001.67	1002.38	0.043111	8.72	113.22	97.02	1.18	4.52
E Fk	2	50cfs	20.00	995.45	996.26	996.26	996.42	0.053622	3.22	6.22	18.80	0.99	1.07
E Fk	2	100cfs	41.00	995.45	996.47	996.47	996.71	0.049413	3.93	10.43	21.88	1.00	1.42
E Fk	2	200cfs	82.00	995.45	996.76	996.76	997.11	0.044025	4.73	17.32	32.65	1.00	1.82
E Fk	2	300cfs	123.00	995.45	996.99	996.99	997.42	0.040388	5.26	23.39	47.16	0.99	2.08
E Fk	2	400cfs	164.00	995.45	997.19	997.19	997.69	0.038747	5.68	28.85	59.64	1.00	2.32
E Fk	2	500cfs	204.00	995.45	997.35	997.35	997.93	0.038402	6.08	33.57	70.36	1.01	2.56
E Fk	2	2yr	210.00	995.45	997.39	997.39	997.96	0.037021	6.06	34.67	73.21	0.99	2.52
E Fk	2	5yr	297.00	995.45	997.77	997.77	998.34	0.034902	6.08	50.53	118.21	0.98	2.50
E Fk	2	10yr	357.00	995.45	998.07	998.07	998.50	0.020697	5.44	90.12	148.49	0.78	1.85
E Fk	2	25yr	432.00	995.45	998.21	998.21	998.66	0.020366	5.73	111.54	155.25	0.79	2.00
E Fk	2	50yr	490.00	995.45	998.33	998.33	998.61	0.014035	4.98	190.30	268.10	0.66	1.48
E Fk	2	100yr	546.00	995.45	998.34	998.34	998.68	0.016928	5.49	192.81	268.10	0.73	1.79
E Fk	2	200yr	607.00	995.45	998.37	998.39	998.76	0.019024	5.89	201.12	268.10	0.77	2.05
E Fk	2	500yr	685.00	995.45	998.46	998.46	998.85	0.018720	6.03	224.60	268.10	0.77	2.11
E Fk	1	50cfs	20.00	988.24	989.47	988.96	989.52	0.004612	1.64	12.21	16.30	0.33	0.21
E Fk	1	100cfs	41.00	988.24	989.88	989.26	989.95	0.004914	2.16	19.00	17.30	0.36	0.32
E Fk	1	200cfs	82.00	988.24	990.47	989.65	990.59	0.005219	2.74	29.89	19.58	0.39	0.47
E Fk	1	300cfs	123.00	988.24	990.93	989.95	991.08	0.005488	3.12	39.43	22.00	0.41	0.58
E Fk	1	400cfs	164.00	988.24	991.29	990.21	991.47	0.005578	3.45	48.90	32.69	0.42	0.67
E Fk	1	500cfs	204.00	988.24	991.57	990.44	991.79	0.005530	3.73	59.64	49.32	0.43	0.76
E Fk	1	2yr	210.00	988.24	991.61	990.47	991.83	0.005567	3.78	61.37	52.81	0.43	0.77
E Fk	1	5yr	297.00	988.24	992.16	990.92	992.40	0.004891	4.07	93.44	61.00	0.42	0.84
E Fk	1	10yr	357.00	988.24	992.35	991.20	992.64	0.005516	4.51	104.92	63.07	0.45	1.00
E Fk	1	25yr	432.00	988.24	992.52	991.47	992.88	0.006501	5.07	115.83	64.98	0.49	1.25
E Fk	1	50yr	490.00	988.24	992.63	991.84	993.04	0.007309	5.49	123.05	66.21	0.53	1.45
E Fk	1	100yr	546.00	988.24	992.73	992.03	993.20	0.008007	5.87	130.07	67.39	0.55	1.64
E Fk	1	200yr	607.00	988.24	992.81	992.19	993.35	0.009060	6.33	135.23	68.24	0.59	1.89
E Fk	1	500yr	685.00	988.24	992.91	992.38	993.54	0.010334	6.88	141.87	69.10	0.63	2.22
W Fk	1450.45	50cfs	45.00	990.66	992.12	991.69	992.23	0.004928	2.68	16.81	16.45	0.47	0.30
W Fk	1450.45	100cfs	89.00	990.66	992.58	992.06	992.79	0.005875	3.62	24.59	16.94	0.53	0.49
W Fk	1450.45	200cfs	178.00	990.66	993.27	992.63	993.64	0.007032	4.88	36.50	17.65	0.60	0.80
W Fk	1450.45	300cfs	267.00	990.66	993.78	993.11	994.31	0.007964	5.87	45.57	18.25	0.65	1.08
W Fk	1450.45	400cfs	357.00	990.66	994.16	993.54	994.88	0.009139	6.81	52.62	18.73	0.70	1.40
W Fk	1450.45	500cfs	446.00	990.66	994.49	993.91	995.40	0.010124	7.63	58.94	19.84	0.75	1.71
W Fk	1450.45	2yr	453.00	990.66	994.52	993.94	995.44	0.010200	7.69	59.41	20.59	0.75	1.73
W Fk	1450.45	5yr	648.00	990.66	995.11	994.65	996.43	0.011773	9.24	75.84	63.09	0.83	2.36
W Fk	1450.45	10yr	781.00	990.66	995.81	995.81	996.89	0.008398	8.72	131.06	89.93	0.72	1.99
W Fk	1450.45	25yr	947.00	990.66	996.27	996.19	997.31	0.007653	8.88	172.70	90.65	0.70	2.00
W Fk	1450.45	50yr	1072.00	990.66	996.77	996.43	997.65	0.006061	8.42	218.58	91.44	0.63	1.74

HEC-RAS Plan: Ex-XtdP91 (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	Shear Chan
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(lb/sq ft)
W Fk	1450.45	100yr	1193.00	990.66	997.02	996.63	997.91	0.006049	8.66	240.89	91.82	0.64	1.81
W Fk	1450.45	200yr	1322.00	990.66	997.30	996.82	998.19	0.005862	8.80	266.84	92.26	0.63	1.84
W Fk	1450.45	500yr	1488.00	990.66	997.69	997.06	998.56	0.005477	8.87	302.74	92.87	0.62	1.83
W Fk	1340.84	50cfs	45.00	990.44	991.65	991.24	991.72	0.004224	2.23	20.17	23.35	0.42	0.22
W Fk	1340.84	100cfs	89.00	990.44	991.96	991.54	992.12	0.006013	3.22	27.61	23.57	0.52	0.41
W Fk	1340.84	200cfs	178.00	990.44	992.28		992.68	0.011243	5.08	35.05	23.79	0.74	0.95
W Fk	1340.84	300cfs	267.00	990.44	992.63		993.22	0.012796	6.14	43.50	24.03	0.80	1.31
W Fk	1340.84	400cfs	357.00	990.44	993.02		993.73	0.012172	6.75	52.95	24.78	0.80	1.49
W Fk	1340.84	500cfs	446.00	990.44	993.38		994.19	0.011389	7.23	62.07	25.58	0.80	1.62
W Fk	1340.84	2yr	453.00	990.44	993.41		994.23	0.011312	7.27	62.81	25.65	0.80	1.63
W Fk	1340.84	5yr	648.00	990.44	994.14		995.15	0.009974	8.06	82.26	35.91	0.78	1.85
W Fk	1340.84	10yr	781.00	990.44	994.62	994.03	995.72	0.009253	8.48	95.36	42.52	0.77	1.96
W Fk	1340.84	25yr	947.00	990.44	995.19	994.48	996.41	0.008472	8.92	113.12	55.25	0.75	2.06
W Fk	1340.84	50yr	1072.00	990.44	995.65	994.82	996.88	0.007541	8.99	143.17	102.08	0.72	2.03
W Fk	1340.84	100yr	1193.00	990.44	996.18	995.05	997.24	0.005947	8.57	196.48	105.47	0.65	1.78
W Fk	1340.84	200yr	1322.00	990.44	996.76		997.63	0.004551	8.02	257.14	106.39	0.58	1.51
W Fk	1340.84	500yr	1488.00	990.44	997.22		998.03	0.004051	7.95	306.24	107.12	0.55	1.44
W Fk	1266.02	50cfs	45.00	990.10	990.85	990.85	991.05	0.028214	3.65	12.34	29.67	1.00	0.73
W Fk	1266.02	100cfs	89.00	990.10	991.13	991.08	991.36	0.020072	3.85	23.12	39.63	0.89	0.73
W Fk	1266.02	200cfs	178.00	990.10	991.90		992.05	0.005241	3.17	56.22	46.87	0.51	0.39
W Fk	1266.02	300cfs	267.00	990.10	992.53		992.68	0.002941	3.09	86.42	47.75	0.40	0.32
W Fk	1266.02	400cfs	357.00	990.10	993.07		993.23	0.002268	3.18	112.42	48.93	0.37	0.32
W Fk	1266.02	500cfs	446.00	990.10	993.54		993.71	0.001933	3.29	137.75	56.55	0.35	0.32
W Fk	1266.02	2yr	453.00	990.10	993.58		993.75	0.001911	3.30	139.80	56.81	0.35	0.32
W Fk	1266.02	5yr	648.00	990.10	994.48		994.67	0.001527	3.54	193.95	63.60	0.32	0.34
W Fk	1266.02	10yr	781.00	990.10	995.03		995.24	0.001367	3.67	230.37	80.21	0.31	0.35
W Fk	1266.02	25yr	947.00	990.10	995.70		995.92	0.001205	3.80	284.21	89.58	0.30	0.35
W Fk	1266.02	50yr	1072.00	990.10	996.18		996.40	0.001102	3.86	327.58	91.79	0.29	0.35
W Fk	1266.02	100yr	1193.00	990.10	996.61		996.84	0.001029	3.93	367.69	93.78	0.29	0.36
W Fk	1266.02	200yr	1322.00	990.10	997.07		997.30	0.000956	3.98	411.24	95.90	0.28	0.36
W Fk	1266.02	500yr	1488.00	990.10	997.48		997.73	0.000956	4.16	451.40	97.81	0.28	0.38
W Fk	1221.98	50cfs	45.00	987.66	990.86	988.84	990.87	0.000117	0.65	68.70	34.52	0.08	0.01
W Fk	1221.98	100cfs	89.00	987.66	991.24		991.26	0.000261	1.09	81.99	34.82	0.12	0.04
W Fk	1221.98	200cfs	178.00	987.66	991.92		991.97	0.000470	1.68	105.85	35.35	0.17	0.08
W Fk	1221.98	300cfs	267.00	987.66	992.54		992.61	0.000590	2.09	127.77	35.85	0.19	0.12
W Fk	1221.98	400cfs	357.00	987.66	993.07		993.16	0.000677	2.43	146.90	36.45	0.21	0.16
W Fk	1221.98	500cfs	446.00	987.66	993.53		993.64	0.000742	2.73	164.15	39.86	0.23	0.19
W Fk	1221.98	2yr	453.00	987.66	993.56		993.68	0.000746	2.75	165.57	40.37	0.23	0.19
W Fk	1221.98	5yr	648.00	987.66	994.45		994.61	0.000838	3.28	206.84	56.88	0.25	0.26
W Fk	1221.98	10yr	781.00	987.66	994.99		995.19	0.000876	3.58	240.50	79.43	0.26	0.30

HEC-RAS Plan: Ex-XtdP91 (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	Shear Chan
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(lb/sq ft)
W Fk	1221.98	25yr	947.00	987.66	995.65		995.87	0.000870	3.82	294.47	84.16	0.26	0.33
W Fk	1221.98	50yr	1072.00	987.66	996.12		996.36	0.000856	3.97	334.94	87.54	0.26	0.34
W Fk	1221.98	100yr	1193.00	987.66	996.55		996.79	0.000844	4.09	372.76	89.44	0.26	0.36
W Fk	1221.98	200yr	1322.00	987.66	997.01		997.26	0.000822	4.20	413.93	91.41	0.26	0.37
W Fk	1221.98	500yr	1488.00	987.66	997.41		997.69	0.000855	4.43	451.49	93.17	0.27	0.41
W Fk	1203.4	50cfs	45.00	988.68	990.76	990.44	990.85	0.007495	2.49	18.09	27.10	0.54	0.29
W Fk	1203.4	100cfs	89.00	988.68	991.05		991.23	0.008815	3.40	26.18	27.39	0.61	0.49
W Fk	1203.4	200cfs	178.00	988.68	991.66		991.92	0.007217	4.15	42.90	28.00	0.59	0.63
W Fk	1203.4	300cfs	267.00	988.68	992.25		992.56	0.005737	4.48	59.62	28.59	0.55	0.67
W Fk	1203.4	400cfs	357.00	988.68	992.75		993.11	0.005227	4.82	73.99	29.09	0.53	0.73
W Fk	1203.4	500cfs	446.00	988.68	993.17		993.59	0.005023	5.15	86.53	29.79	0.53	0.80
W Fk	1203.4	2yr	453.00	988.68	993.21		993.62	0.004996	5.18	87.54	30.11	0.53	0.80
W Fk	1203.4	5yr	648.00	988.68	994.04		994.55	0.004532	5.76	116.05	39.98	0.52	0.92
W Fk	1203.4	10yr	781.00	988.68	994.56		995.12	0.004177	6.03	139.24	61.80	0.51	0.96
W Fk	1203.4	25yr	947.00	988.68	995.23		995.81	0.003637	6.20	184.74	81.70	0.49	0.97
W Fk	1203.4	50yr	1072.00	988.68	995.76		996.30	0.003095	6.11	227.94	82.53	0.46	0.91
W Fk	1203.4	100yr	1193.00	988.68	996.22		996.74	0.002737	6.07	266.63	83.27	0.44	0.87
W Fk	1203.4	200yr	1322.00	988.68	996.72		997.21	0.002419	6.01	307.81	84.05	0.42	0.84
W Fk	1203.4	500yr	1488.00	988.68	997.12		997.64	0.002377	6.21	342.35	84.69	0.42	0.87
W Fk	1173.45	50cfs	45.00	988.97	990.18	990.18	990.45	0.026679	4.20	10.73	19.66	1.00	0.89
W Fk	1173.45	100cfs	89.00	988.97	990.68		990.91	0.012444	3.91	22.79	25.99	0.73	0.66
W Fk	1173.45	200cfs	178.00	988.97	991.46		991.72	0.006359	4.11	43.34	26.71	0.57	0.60
W Fk	1173.45	300cfs	267.00	988.97	992.09		992.39	0.005038	4.42	60.46	27.30	0.52	0.63
W Fk	1173.45	400cfs	357.00	988.97	992.60		992.96	0.004626	4.79	74.54	28.26	0.51	0.70
W Fk	1173.45	500cfs	446.00	988.97	993.03		993.44	0.004391	5.16	87.15	30.16	0.51	0.77
W Fk	1173.45	2yr	453.00	988.97	993.07		993.48	0.004369	5.18	88.18	30.31	0.51	0.77
W Fk	1173.45	5yr	648.00	988.97	993.89		994.42	0.004082	5.85	115.19	35.63	0.52	0.91
W Fk	1173.45	10yr	781.00	988.97	994.41		995.00	0.003884	6.19	134.70	61.79	0.51	0.98
W Fk	1173.45	25yr	947.00	988.97	995.09		995.70	0.003404	6.36	179.72	70.36	0.49	0.99
W Fk	1173.45	50yr	1072.00	988.97	995.62		996.20	0.002970	6.34	217.04	71.31	0.47	0.95
W Fk	1173.45	100yr	1193.00	988.97	996.08	993.81	996.65	0.002691	6.36	250.10	71.97	0.45	0.93
W Fk	1173.45	200yr	1322.00	988.97	996.57	994.13	997.13	0.002427	6.35	285.66	72.69	0.43	0.91
W Fk	1173.45	500yr	1488.00	988.97	996.97		997.56	0.002436	6.62	314.61	73.26	0.44	0.97
W Fk	1135.11	50cfs	45.00	988.29	989.96	989.30	990.04	0.002952	2.32	19.41	15.90	0.37	0.21
W Fk	1135.11	100cfs	89.00	988.29	990.50		990.65	0.003757	3.15	28.26	17.05	0.43	0.35
W Fk	1135.11	200cfs	178.00	988.29	991.20		991.50	0.005096	4.37	40.69	18.26	0.52	0.62
W Fk	1135.11	300cfs	267.00	988.29	991.74		992.17	0.006000	5.25	50.85	19.19	0.57	0.85
W Fk	1135.11	400cfs	357.00	988.29	992.15		992.72	0.006986	6.08	58.75	20.03	0.62	1.11
W Fk	1135.11	500cfs	446.00	988.29	992.46		993.19	0.008005	6.86	65.18	20.75	0.67	1.37
W Fk	1135.11	2yr	453.00	988.29	992.49		993.23	0.008056	6.91	65.73	20.82	0.68	1.39

HEC-RAS Plan: Ex-XtdP91 (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	Shear Chan
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(lb/sq ft)
W Fk	1135.11	5yr	648.00	988.29	993.00		994.12	0.010516	8.50	76.67	21.99	0.79	2.03
W Fk	1135.11	10yr	781.00	988.29	993.24	992.86	994.67	0.012429	9.58	82.14	22.50	0.86	2.53
W Fk	1135.11	25yr	947.00	988.29	993.53	993.38	995.34	0.014402	10.82	88.70	24.33	0.94	3.15
W Fk	1135.11	50yr	1072.00	988.29	993.74	993.74	995.83	0.015509	11.62	94.15	25.89	0.99	3.57
W Fk	1135.11	100yr	1193.00	988.29	994.11	994.11	996.29	0.014565	11.89	104.09	37.98	0.97	3.64
W Fk	1135.11	200yr	1322.00	988.29	994.34	994.34	996.76	0.015176	12.53	110.81	45.40	1.00	3.97
W Fk	1135.11	500yr	1488.00	988.29	995.22	995.22	997.25	0.010507	11.64	153.05	53.30	0.85	3.25
W Fk	1081.39	50cfs	45.00	987.30	989.56		989.75	0.012609	3.43	13.12	16.24	0.67	0.54
W Fk	1081.39	100cfs	89.00	987.30	990.08		990.32	0.010903	3.96	22.49	20.01	0.66	0.65
W Fk	1081.39	200cfs	178.00	987.30	990.84		991.15	0.008535	4.43	40.19	25.05	0.62	0.72
W Fk	1081.39	300cfs	267.00	987.30	991.44		991.80	0.007019	4.81	55.50	26.03	0.58	0.78
W Fk	1081.39	400cfs	357.00	987.30	991.85		992.30	0.007298	5.39	66.17	26.69	0.60	0.94
W Fk	1081.39	500cfs	446.00	987.30	992.15		992.71	0.007959	5.99	74.41	27.19	0.64	1.12
W Fk	1081.39	2yr	453.00	987.30	992.18		992.75	0.007955	6.02	75.19	27.24	0.64	1.13
W Fk	1081.39	5yr	648.00	987.30	992.65		993.49	0.009794	7.36	88.59	30.87	0.73	1.60
W Fk	1081.39	10yr	781.00	987.30	992.81	992.37	993.91	0.012026	8.43	93.78	32.48	0.81	2.07
W Fk	1081.39	25yr	947.00	987.30	992.93	992.80	994.44	0.015820	9.88	97.49	33.58	0.93	2.81
W Fk	1081.39	50yr	1072.00	987.30	993.00	993.10	994.85	0.018814	10.94	100.11	34.34	1.02	3.42
W Fk	1081.39	100yr	1193.00	987.30	992.99	993.42	995.30	0.023529	12.21	99.77	34.24	1.14	4.26
W Fk	1081.39	200yr	1322.00	987.30	993.17	993.68	995.73	0.024478	12.86	105.96	35.98	1.18	4.66
W Fk	1081.39	500yr	1488.00	987.30	993.31	994.27	996.30	0.027322	13.93	111.08	37.35	1.25	5.39
W Fk	1041.17	50cfs	45.00	985.82	989.68		989.69	0.000063	0.57	79.18	29.67	0.06	0.01
W Fk	1041.17	100cfs	89.00	985.82	990.22		990.23	0.000144	0.93	95.67	31.63	0.09	0.03
W Fk	1041.17	200cfs	178.00	985.82	991.00		991.03	0.000295	1.47	121.41	34.46	0.14	0.06
W Fk	1041.17	300cfs	267.00	985.82	991.61		991.67	0.000419	1.86	143.27	36.69	0.17	0.09
W Fk	1041.17	400cfs	357.00	985.82	992.05		992.13	0.000545	2.23	159.96	42.27	0.19	0.13
W Fk	1041.17	500cfs	446.00	985.82	992.41		992.51	0.000659	2.57	174.96	58.15	0.21	0.17
W Fk	1041.17	2yr	453.00	985.82	992.44		992.54	0.000665	2.60	176.38	59.68	0.21	0.17
W Fk	1041.17	5yr	648.00	985.82	993.04		993.20	0.000882	3.25	216.58	72.28	0.25	0.26
W Fk	1041.17	10yr	781.00	985.82	993.34		993.54	0.001043	3.67	238.54	73.84	0.28	0.32
W Fk	1041.17	25yr	947.00	985.82	993.68		993.94	0.001226	4.14	263.96	75.61	0.30	0.40
W Fk	1041.17	50yr	1072.00	985.82	993.93	990.52	994.22	0.001347	4.46	282.70	77.67	0.32	0.46
W Fk	1041.17	100yr	1193.00	985.82	994.14	990.78	994.48	0.001462	4.75	299.80	80.36	0.33	0.52
W Fk	1041.17	200yr	1322.00	985.82	994.35	991.05	994.73	0.001586	5.06	316.90	82.61	0.35	0.58
W Fk	1041.17	500yr	1488.00	985.82	994.61	991.37	995.04	0.001732	5.43	338.11	82.99	0.37	0.66
W Fk	974.87	50cfs	45.00	988.21	989.62		989.67	0.002195	1.73	26.04	28.06	0.32	0.13
W Fk	974.87	100cfs	89.00	988.21	990.13		990.20	0.002140	2.19	40.67	29.94	0.33	0.18
W Fk	974.87	200cfs	178.00	988.21	990.86		990.98	0.002199	2.80	63.56	32.67	0.35	0.26
W Fk	974.87	300cfs	267.00	988.21	991.45		991.60	0.002629	3.13	85.23	42.25	0.39	0.32
W Fk	974.87	400cfs	357.00	988.21	991.87		992.05	0.002911	3.41	104.85	50.28	0.41	0.37

HEC-RAS Plan: Ex-XtdP91 (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	Shear Chan
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(lb/sq ft)
W Fk	974.87	500cfs	446.00	988.21	992.21		992.41	0.003371	3.62	123.82	61.83	0.44	0.42
W Fk	974.87	2yr	453.00	988.21	992.25		992.45	0.003297	3.62	125.88	62.02	0.44	0.42
W Fk	974.87	5yr	648.00	988.21	992.85		993.10	0.002907	4.01	164.23	65.59	0.43	0.48
W Fk	974.87	10yr	781.00	988.21	993.13		993.43	0.003013	4.37	183.17	67.28	0.45	0.55
W Fk	974.87	25yr	947.00	988.21	993.45		993.81	0.003152	4.78	206.87	86.12	0.46	0.63
W Fk	974.87	50yr	1072.00	988.21	993.70		994.08	0.003151	5.02	229.70	95.57	0.47	0.68
W Fk	974.87	100yr	1193.00	988.21	993.92		994.33	0.003151	5.22	250.75	95.90	0.47	0.72
W Fk	974.87	200yr	1322.00	988.21	994.13		994.58	0.003179	5.44	271.18	96.22	0.48	0.77
W Fk	974.87	500yr	1488.00	988.21	994.39		994.88	0.003192	5.69	296.79	96.61	0.49	0.82
W Fk	938.3	50cfs	45.00	987.51	989.52		989.59	0.002230	2.01	22.36	18.59	0.32	0.16
W Fk	938.3	100cfs	89.00	987.51	989.97		990.10	0.003537	2.82	31.58	22.31	0.42	0.29
W Fk	938.3	200cfs	178.00	987.51	990.65		990.86	0.004590	3.67	48.56	28.05	0.49	0.47
W Fk	938.3	300cfs	267.00	987.51	991.20		991.45	0.005982	4.02	66.52	42.42	0.56	0.57
W Fk	938.3	400cfs	357.00	987.51	991.65		991.90	0.005777	4.02	89.91	57.40	0.55	0.57
W Fk	938.3	500cfs	446.00	987.51	992.00		992.26	0.004715	4.11	110.57	59.21	0.51	0.56
W Fk	938.3	2yr	453.00	987.51	992.04		992.30	0.004557	4.10	112.92	59.41	0.51	0.55
W Fk	938.3	5yr	648.00	987.51	992.66		992.97	0.003838	4.46	150.77	62.58	0.48	0.60
W Fk	938.3	10yr	781.00	987.51	992.93		993.29	0.004019	4.86	167.77	64.59	0.50	0.69
W Fk	938.3	25yr	947.00	987.51	993.23		993.66	0.004221	5.32	187.59	66.95	0.52	0.80
W Fk	938.3	50yr	1072.00	987.51	993.44		993.94	0.004406	5.68	203.58	85.30	0.54	0.89
W Fk	938.3	100yr	1193.00	987.51	993.65		994.18	0.004451	5.93	222.68	97.38	0.55	0.95
W Fk	938.3	200yr	1322.00	987.51	993.85		994.43	0.004463	6.16	242.81	98.06	0.56	1.01
W Fk	938.3	500yr	1488.00	987.51	994.12		994.73	0.004427	6.41	268.66	98.91	0.56	1.07
W Fk	828.4	50cfs	45.00	985.50	989.53		989.54	0.000103	0.63	71.04	31.44	0.07	0.01
W Fk	828.4	100cfs	89.00	985.50	989.98		990.00	0.000226	1.04	85.38	31.89	0.11	0.03
W Fk	828.4	200cfs	178.00	985.50	990.65		990.69	0.000452	1.67	106.81	32.56	0.16	0.08
W Fk	828.4	300cfs	267.00	985.50	991.16		991.23	0.000645	2.16	124.99	46.08	0.20	0.13
W Fk	828.4	400cfs	357.00	985.50	991.56		991.66	0.000825	2.59	145.06	51.55	0.23	0.18
W Fk	828.4	500cfs	446.00	985.50	991.89		992.02	0.000994	2.97	162.09	52.86	0.25	0.23
W Fk	828.4	2yr	453.00	985.50	991.92		992.06	0.000995	2.99	164.15	53.02	0.25	0.23
W Fk	828.4	5yr	648.00	985.50	992.50		992.71	0.001316	3.72	199.41	70.27	0.29	0.35
W Fk	828.4	10yr	781.00	985.50	992.73		993.00	0.001617	4.25	216.38	75.17	0.33	0.45
W Fk	828.4	25yr	947.00	985.50	992.99		993.33	0.001982	4.85	235.68	76.04	0.36	0.58
W Fk	828.4	50yr	1072.00	985.50	993.17		993.57	0.002238	5.27	249.70	76.67	0.39	0.67
W Fk	828.4	100yr	1193.00	985.50	993.34		993.81	0.002465	5.65	263.13	77.27	0.41	0.76
W Fk	828.4	200yr	1322.00	985.50	993.51		994.04	0.002710	6.03	276.27	77.85	0.43	0.86
W Fk	828.4	500yr	1488.00	985.50	993.73		994.33	0.002988	6.49	293.37	78.59	0.46	0.99
W Fk	764.47	50cfs	45.00	985.99	989.52		989.53	0.000122	0.70	64.53	28.75	0.08	0.02
W Fk	764.47	100cfs	89.00	985.99	989.97		989.99	0.000274	1.15	77.39	29.54	0.13	0.04
W Fk	764.47	200cfs	178.00	985.99	990.61		990.66	0.000561	1.84	96.74	30.68	0.18	0.10

HEC-RAS Plan: Ex-XtdP91 (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	Shear Chan
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(lb/sq ft)
W Fk	764.47	300cfs	267.00	985.99	991.10		991.19	0.000802	2.38	112.77	40.47	0.22	0.16
W Fk	764.47	400cfs	357.00	985.99	991.48		991.60	0.001016	2.87	131.91	61.08	0.25	0.22
W Fk	764.47	500cfs	446.00	985.99	991.78		991.95	0.001206	3.29	153.02	72.29	0.28	0.28
W Fk	764.47	2yr	453.00	985.99	991.82		991.99	0.001202	3.30	155.87	72.36	0.28	0.28
W Fk	764.47	5yr	648.00	985.99	992.37		992.61	0.001546	4.05	195.83	73.40	0.32	0.41
W Fk	764.47	10yr	781.00	985.99	992.57		992.88	0.001923	4.64	210.23	73.76	0.36	0.53
W Fk	764.47	25yr	947.00	985.99	992.78		993.19	0.002410	5.34	225.65	74.16	0.41	0.70
W Fk	764.47	50yr	1072.00	985.99	992.92		993.41	0.002770	5.83	236.53	74.43	0.44	0.82
W Fk	764.47	100yr	1193.00	985.99	993.06		993.62	0.003104	6.27	246.83	74.70	0.47	0.95
W Fk	764.47	200yr	1322.00	985.99	993.18		993.83	0.003489	6.75	256.18	74.93	0.50	1.09
W Fk	764.47	500yr	1488.00	985.99	993.35		994.10	0.003958	7.33	268.23	75.23	0.53	1.27
W Fk	699.71	50cfs	45.00	985.80	989.52		989.53	0.000053	0.53	85.63	31.62	0.06	0.01
W Fk	699.71	100cfs	89.00	985.80	989.96		989.97	0.000130	0.89	99.56	31.94	0.09	0.02
W Fk	699.71	200cfs	178.00	985.80	990.60		990.63	0.000291	1.48	120.05	32.77	0.14	0.06
W Fk	699.71	300cfs	267.00	985.80	991.08		991.14	0.000443	1.97	136.32	34.27	0.17	0.10
W Fk	699.71	400cfs	357.00	985.80	991.45		991.54	0.000595	2.41	151.63	50.45	0.20	0.15
W Fk	699.71	500cfs	446.00	985.80	991.75		991.87	0.000743	2.81	169.76	66.62	0.23	0.20
W Fk	699.71	2yr	453.00	985.80	991.79		991.91	0.000745	2.83	172.31	66.71	0.23	0.20
W Fk	699.71	5yr	648.00	985.80	992.30		992.50	0.001050	3.59	206.91	67.86	0.27	0.31
W Fk	699.71	10yr	781.00	985.80	992.47		992.73	0.001361	4.17	218.12	76.11	0.31	0.42
W Fk	699.71	25yr	947.00	985.80	992.63		992.98	0.001794	4.88	229.17	88.61	0.36	0.57
W Fk	699.71	50yr	1072.00	985.80	992.73		993.17	0.002144	5.40	236.40	93.39	0.40	0.69
W Fk	699.71	100yr	1193.00	985.80	992.83		993.34	0.002498	5.90	242.84	97.64	0.43	0.82
W Fk	699.71	200yr	1322.00	985.80	992.89		993.51	0.002936	6.44	247.60	101.41	0.46	0.97
W Fk	699.71	500yr	1488.00	985.80	992.97		993.72	0.003543	7.14	253.06	106.39	0.51	1.19
DS	652.01	50cfs	50.00	987.12	989.48		989.51	0.001520	1.54	32.52	31.20	0.27	0.10
DS	652.01	100cfs	100.00	987.12	989.87		989.95	0.002172	2.22	44.99	32.23	0.33	0.18
DS	652.01	200cfs	200.00	987.12	990.43		990.58	0.002993	3.15	63.44	48.37	0.41	0.33
DS	652.01	300cfs	300.00	987.12	990.84		991.07	0.003590	3.86	78.52	104.49	0.46	0.47
DS	652.01	400cfs	400.00	987.12	991.16		991.46	0.003972	4.43	101.44	155.27	0.49	0.60
DS	652.01	500cfs	500.00	987.12	991.41		991.77	0.004361	4.94	121.96	244.58	0.52	0.72
DS	652.01	2yr	513.00	987.12	991.44		991.81	0.004400	5.00	124.66	255.65	0.53	0.74
DS	652.01	5yr	727.00	987.12	992.03	991.15	992.39	0.003679	5.20	272.76	448.89	0.50	0.74
DS	652.01	10yr	873.00	987.12	992.36		992.63	0.002874	4.88	421.17	458.26	0.45	0.64
DS	652.01	25yr	1057.00	987.12	992.59		992.85	0.002801	5.01	526.04	464.77	0.44	0.66
DS	652.01	50yr	1197.00	987.12	992.74		993.00	0.002759	5.11	598.44	469.21	0.44	0.68
DS	652.01	100yr	1333.00	987.12	992.89		993.14	0.002692	5.16	668.14	473.44	0.44	0.68
DS	652.01	200yr	1479.00	987.12	993.01		993.26	0.002732	5.30	727.38	481.51	0.45	0.71
DS	652.01	500yr	1667.00	987.12	993.17		993.43	0.002781	5.48	804.31	491.38	0.45	0.75
DS	599.42	50cfs	50.00	987.85	989.33		989.39	0.004281	1.97	25.33	38.62	0.41	0.18

HEC-RAS Plan: Ex-XtdP91 (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	Shear Chan
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(lb/sq ft)
DS	599.42	100cfs	100.00	987.85	989.68		989.79	0.004501	2.62	38.16	42.95	0.45	0.28
DS	599.42	200cfs	200.00	987.85	990.19		990.38	0.004936	3.51	57.64	60.78	0.50	0.44
DS	599.42	300cfs	300.00	987.85	990.59		990.85	0.005170	4.13	77.99	81.50	0.53	0.57
DS	599.42	400cfs	400.00	987.85	990.89		991.21	0.005377	4.62	102.51	92.82	0.55	0.69
DS	599.42	500cfs	500.00	987.85	991.15		991.52	0.005478	5.02	127.60	103.79	0.56	0.78
DS	599.42	2yr	513.00	987.85	991.18		991.55	0.005474	5.06	130.99	105.18	0.56	0.79
DS	599.42	5yr	727.00	987.85	991.76	991.08	992.16	0.004842	5.46	215.48	259.86	0.55	0.86
DS	599.42	10yr	873.00	987.85	992.09	991.36	992.45	0.004032	5.34	331.18	391.65	0.51	0.79
DS	599.42	25yr	1057.00	987.85	992.32		992.67	0.003905	5.49	421.58	392.23	0.51	0.82
DS	599.42	50yr	1197.00	987.85	992.48		992.82	0.003808	5.58	484.45	392.63	0.51	0.84
DS	599.42	100yr	1333.00	987.85	992.64		992.96	0.003641	5.61	547.29	393.03	0.50	0.83
DS	599.42	200yr	1479.00	987.85	992.76		993.09	0.003756	5.81	592.00	393.31	0.51	0.88
DS	599.42	500yr	1667.00	987.85	992.91		993.25	0.003801	5.99	652.26	393.70	0.51	0.93
DS	523.3	50cfs	50.00	986.42	988.45	988.45	988.69	0.028169	3.89	12.85	26.63	0.99	0.80
DS	523.3	100cfs	100.00	986.42	988.74	988.74	989.08	0.026181	4.68	21.36	31.88	1.01	1.04
DS	523.3	200cfs	200.00	986.42	989.15	989.15	989.65	0.023025	5.67	35.28	35.81	1.01	1.34
DS	523.3	300cfs	300.00	986.42	989.46	989.46	990.10	0.021959	6.38	47.00	38.48	1.02	1.58
DS	523.3	400cfs	400.00	986.42	989.79	989.74	990.48	0.019034	6.67	59.97	41.22	0.97	1.63
DS	523.3	500cfs	500.00	986.42	990.14	990.00	990.83	0.015242	6.69	74.82	43.97	0.90	1.55
DS	523.3	2yr	513.00	986.42	990.18	990.02	990.87	0.014839	6.70	76.65	44.25	0.89	1.54
DS	523.3	5yr	727.00	986.42	990.57	990.47	991.50	0.015473	7.77	94.45	100.71	0.93	1.95
DS	523.3	10yr	873.00	986.42	990.93	990.93	991.87	0.013014	7.87	126.12	152.75	0.88	1.90
DS	523.3	25yr	1057.00	986.42	991.47	991.47	992.20	0.008325	7.18	225.93	278.63	0.72	1.48
DS	523.3	50yr	1197.00	986.42	991.69	991.69	992.37	0.007579	7.17	290.59	323.79	0.70	1.45
DS	523.3	100yr	1333.00	986.42	991.83	991.83	992.52	0.007590	7.37	337.12	355.27	0.70	1.51
DS	523.3	200yr	1479.00	986.42	992.04	992.04	992.67	0.006701	7.21	417.75	396.53	0.67	1.41
DS	523.3	500yr	1667.00	986.42	992.18	992.18	992.82	0.006768	7.44	474.44	400.09	0.68	1.48
DS	498.77	50cfs	50.00	984.72	988.11	986.27	988.14	0.000649	1.44	34.75	18.45	0.18	0.07
DS	498.77	100cfs	100.00	984.72	988.55	986.83	988.63	0.001798	2.27	43.99	25.64	0.31	0.18
DS	498.77	200cfs	200.00	984.72	989.10	987.62	989.26	0.003491	3.21	62.33	36.18	0.43	0.36
DS	498.77	300cfs	300.00	984.72	989.50	988.31	989.73	0.004236	3.89	77.11	42.72	0.49	0.50
DS	498.77	400cfs	400.00	984.72	989.86		990.16	0.004583	4.37	91.56	80.82	0.52	0.61
DS	498.77	500cfs	500.00	984.72	990.19		990.54	0.004625	4.76	105.64	104.23	0.53	0.69
DS	498.77	2yr	513.00	984.72	990.23		990.59	0.004628	4.80	107.47	107.01	0.53	0.70
DS	498.77	5yr	727.00	984.72	990.65	989.74	991.16	0.005566	5.76	141.96	135.16	0.59	0.96
DS	498.77	10yr	873.00	984.72	990.76	990.06	991.42	0.006993	6.59	154.80	141.19	0.67	1.25
DS	498.77	25yr	1057.00	984.72	990.09	990.63	991.79	0.023316	10.45	101.46	101.74	1.18	3.37
DS	498.77	50yr	1197.00	984.72	990.62	990.89	992.04	0.015763	9.62	137.93	133.27	1.00	2.70
DS	498.77	100yr	1333.00	984.72	990.96	991.47	992.24	0.012684	9.26	178.01	318.85	0.91	2.41
DS	498.77	200yr	1479.00	984.72	991.30	991.64	992.42	0.010197	8.87	250.53	384.39	0.83	2.14
DS	498.77	500yr	1667.00	984.72	991.52	991.80	992.58	0.009450	8.88	332.92	385.67	0.81	2.11

HEC-RAS Plan: Ex-XtdP91 (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	Shear Chan
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(lb/sq ft)
DS	424.64	50cfs	50.00	985.75	988.00		988.04	0.004030	1.74	28.76	46.04	0.39	0.15
DS	424.64	100cfs	100.00	985.75	988.37		988.44	0.003449	2.17	45.99	46.42	0.38	0.20
DS	424.64	200cfs	200.00	985.75	988.86		988.99	0.003732	2.91	68.69	46.90	0.42	0.31
DS	424.64	300cfs	300.00	985.75	989.22		989.41	0.004059	3.49	85.99	57.97	0.46	0.42
DS	424.64	400cfs	400.00	985.75	989.59		989.82	0.004003	3.87	103.28	87.02	0.46	0.49
DS	424.64	500cfs	500.00	985.75	989.93		990.20	0.003919	4.18	119.53	297.99	0.47	0.55
DS	424.64	2yr	513.00	985.75	989.97		990.25	0.003911	4.22	121.55	329.47	0.47	0.55
DS	424.64	5yr	727.00	985.75	990.56	989.35	990.79	0.002893	4.16	305.58	365.83	0.42	0.50
DS	424.64	10yr	873.00	985.75	990.71	989.60	990.97	0.003151	4.49	363.19	366.19	0.44	0.58
DS	424.64	25yr	1057.00	985.75	990.88	990.43	991.17	0.003462	4.87	424.49	366.57	0.46	0.66
DS	424.64	50yr	1197.00	985.75	991.01	990.60	991.31	0.003603	5.09	470.77	366.85	0.47	0.72
DS	424.64	100yr	1333.00	985.75	991.12	990.69	991.43	0.003741	5.29	511.74	367.10	0.49	0.77
DS	424.64	200yr	1479.00	985.75	991.24	990.79	991.56	0.003826	5.47	556.21	367.38	0.49	0.81
DS	424.64	500yr	1667.00	985.75	991.40	990.93	991.73	0.003867	5.65	613.81	368.62	0.50	0.85
DS	391.24	50cfs	50.00	986.14	987.47	987.47	987.74	0.028579	4.21	11.88	22.49	1.02	0.91
DS	391.24	100cfs	100.00	986.14	987.81	987.81	988.16	0.026230	4.77	20.95	30.74	1.02	1.07
DS	391.24	200cfs	200.00	986.14	988.25	988.23	988.70	0.022799	5.39	37.07	40.72	1.00	1.24
DS	391.24	300cfs	300.00	986.14	988.74		989.17	0.012457	5.23	57.37	41.53	0.78	1.02
DS	391.24	400cfs	400.00	986.14	989.16		989.60	0.009551	5.37	74.55	42.59	0.71	0.99
DS	391.24	500cfs	500.00	986.14	989.51		989.99	0.008274	5.57	89.73	173.42	0.68	1.01
DS	391.24	2yr	513.00	986.14	989.55		990.04	0.008170	5.60	91.56	188.19	0.68	1.02
DS	391.24	5yr	727.00	986.14	990.09	989.49	990.62	0.007035	5.99	183.93	355.08	0.65	1.08
DS	391.24	10yr	873.00	986.14	990.32	990.29	990.81	0.006383	6.03	264.83	355.67	0.63	1.07
DS	391.24	25yr	1057.00	986.14	990.55	990.48	991.01	0.005914	6.11	347.35	356.27	0.61	1.07
DS	391.24	50yr	1197.00	986.14	990.71		991.15	0.005626	6.16	404.36	356.69	0.60	1.07
DS	391.24	100yr	1333.00	986.14	990.86		991.28	0.005401	6.21	456.00	357.06	0.59	1.07
DS	391.24	200yr	1479.00	986.14	991.01		991.42	0.005164	6.25	509.93	357.45	0.58	1.07
DS	391.24	500yr	1667.00	986.14	991.20		991.59	0.004893	6.29	576.67	357.94	0.57	1.07
DS	337.09	50cfs	50.00	984.34	987.25	985.86	987.27	0.000785	1.27	39.50	30.72	0.20	0.06
DS	337.09	100cfs	100.00	984.34	987.67	986.44	987.72	0.001657	1.84	54.39	42.51	0.29	0.13
DS	337.09	200cfs	200.00	984.34	988.24		988.34	0.002004	2.51	79.80	44.75	0.33	0.21
DS	337.09	300cfs	300.00	984.34	988.72		988.85	0.002108	2.96	101.33	63.24	0.35	0.28
DS	337.09	400cfs	400.00	984.34	989.13		989.30	0.002169	3.32	120.47	83.25	0.36	0.33
DS	337.09	500cfs	500.00	984.34	989.51		989.71	0.002107	3.58	153.74	157.59	0.37	0.37
DS	337.09	2yr	513.00	984.34	989.56		989.76	0.002095	3.61	158.31	176.41	0.37	0.37
DS	337.09	5yr	727.00	984.34	990.09	988.47	990.34	0.002223	4.14	252.37	349.21	0.39	0.47
DS	337.09	10yr	873.00	984.34	990.25		990.54	0.002548	4.56	309.39	349.81	0.42	0.56
DS	337.09	25yr	1057.00	984.34	990.42		990.76	0.002947	5.05	367.49	350.41	0.45	0.68
DS	337.09	50yr	1197.00	984.34	990.54		990.91	0.003168	5.35	411.26	350.87	0.47	0.75
DS	337.09	100yr	1333.00	984.34	990.66		991.06	0.003324	5.59	453.56	351.31	0.49	0.81

HEC-RAS Plan: Ex-XtdP91 (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	Shear Chan
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(lb/sq ft)
DS	337.09	200yr	1479.00	984.34	990.78		991.20	0.003489	5.84	494.88	351.74	0.50	0.87
DS	337.09	500yr	1667.00	984.34	990.92		991.36	0.003707	6.15	543.41	353.73	0.52	0.96
DS	304.18	50cfs	50.00	985.95	986.93	986.93	987.18	0.030257	3.95	12.64	26.99	1.02	0.84
DS	304.18	100cfs	100.00	985.95	987.35		987.58	0.016342	3.77	26.52	38.22	0.80	0.67
DS	304.18	200cfs	200.00	985.95	987.94		988.20	0.008734	4.07	49.08	38.46	0.64	0.64
DS	304.18	300cfs	300.00	985.95	988.41		988.72	0.007207	4.48	66.96	40.67	0.60	0.71
DS	304.18	400cfs	400.00	985.95	988.80		989.17	0.006615	4.85	82.41	184.78	0.59	0.78
DS	304.18	500cfs	500.00	985.95	989.16		989.57	0.006287	5.19	96.43	313.16	0.59	0.85
DS	304.18	2yr	513.00	985.95	989.20		989.62	0.006255	5.23	98.13	316.57	0.59	0.86
DS	304.18	5yr	727.00	985.95	989.82	988.89	990.22	0.004858	5.33	232.59	347.42	0.54	0.83
DS	304.18	10yr	873.00	985.95	990.06	989.18	990.43	0.004492	5.39	314.78	347.95	0.52	0.83
DS	304.18	25yr	1057.00	985.95	990.28		990.65	0.004368	5.55	394.37	348.46	0.52	0.86
DS	304.18	50yr	1197.00	985.95	990.43		990.79	0.004414	5.73	443.25	348.78	0.53	0.90
DS	304.18	100yr	1333.00	985.95	990.55		990.92	0.004466	5.89	487.06	349.59	0.53	0.94
DS	304.18	200yr	1479.00	985.95	990.67		991.05	0.004545	6.07	530.28	351.47	0.54	0.99
DS	304.18	500yr	1667.00	985.95	990.82		991.21	0.004652	6.30	581.97	353.71	0.55	1.05
DS	280.58	50cfs	50.00	984.44	986.90	985.87	986.95	0.002151	1.72	29.09	29.98	0.31	0.12
DS	280.58	100cfs	100.00	984.44	987.31		987.40	0.002866	2.31	43.25	35.20	0.37	0.21
DS	280.58	200cfs	200.00	984.44	987.90		988.05	0.003265	3.13	63.97	35.88	0.41	0.34
DS	280.58	300cfs	300.00	984.44	988.36		988.57	0.003526	3.72	80.63	37.76	0.44	0.45
DS	280.58	400cfs	400.00	984.44	988.75		989.03	0.003747	4.21	94.97	169.81	0.46	0.55
DS	280.58	500cfs	500.00	984.44	989.10	987.93	989.43	0.003929	4.63	107.91	319.26	0.48	0.64
DS	280.58	2yr	513.00	984.44	989.14	987.97	989.48	0.003956	4.69	109.47	323.59	0.48	0.65
DS	280.58	5yr	727.00	984.44	989.83		990.10	0.002792	4.50	310.03	357.39	0.42	0.56
DS	280.58	10yr	873.00	984.44	990.06		990.32	0.002744	4.65	390.86	357.87	0.42	0.59
DS	280.58	25yr	1057.00	984.44	990.27		990.54	0.002850	4.91	467.46	358.32	0.43	0.64
DS	280.58	50yr	1197.00	984.44	990.41		990.69	0.002973	5.12	515.85	359.14	0.44	0.69
DS	280.58	100yr	1333.00	984.44	990.53		990.82	0.003087	5.32	559.48	360.77	0.45	0.74
DS	280.58	200yr	1479.00	984.44	990.65		990.95	0.003210	5.53	602.69	362.39	0.46	0.79
DS	280.58	500yr	1667.00	984.44	990.79		991.11	0.003364	5.78	654.32	364.31	0.48	0.85
DS	246.85	50cfs	50.00	983.60	986.87		986.90	0.000929	1.33	37.51	28.68	0.21	0.07
DS	246.85	100cfs	100.00	983.60	987.26		987.32	0.001612	2.06	48.65	28.80	0.28	0.15
DS	246.85	200cfs	200.00	983.60	987.80		987.95	0.002653	3.11	64.36	28.96	0.37	0.32
DS	246.85	300cfs	300.00	983.60	988.21		988.45	0.003481	3.93	76.33	29.37	0.43	0.48
DS	246.85	400cfs	400.00	983.60	988.55		988.89	0.004176	4.64	86.49	30.41	0.48	0.65
DS	246.85	500cfs	500.00	983.60	988.85		989.28	0.004806	5.27	95.55	198.92	0.52	0.81
DS	246.85	2yr	513.00	983.60	988.88		989.32	0.004885	5.35	96.66	222.85	0.52	0.83
DS	246.85	5yr	727.00	983.60	989.74	988.27	990.00	0.002739	4.66	343.65	369.00	0.40	0.59
DS	246.85	10yr	873.00	983.60	989.98		990.22	0.002608	4.73	432.81	369.00	0.40	0.59
DS	246.85	25yr	1057.00	983.60	990.19		990.44	0.002702	4.97	512.27	369.00	0.41	0.64

HEC-RAS Plan: Ex-XtdP91 (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	Shear Chan
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(lb/sq ft)
DS	246.85	50yr	1197.00	983.60	990.33		990.58	0.002830	5.18	561.14	369.00	0.42	0.69
DS	246.85	100yr	1333.00	983.60	990.45		990.71	0.002949	5.38	605.04	369.00	0.43	0.74
DS	246.85	200yr	1479.00	983.60	990.56		990.84	0.003079	5.58	648.08	369.00	0.44	0.79
DS	246.85	500yr	1667.00	983.60	990.70		990.99	0.003245	5.84	699.13	369.00	0.46	0.86
DS	217.15	50cfs	50.00	985.39	986.80		986.85	0.002851	1.83	27.35	32.73	0.35	0.15
DS	217.15	100cfs	100.00	985.39	987.15		987.25	0.003675	2.56	39.10	33.89	0.42	0.26
DS	217.15	200cfs	200.00	985.39	987.65		987.84	0.004590	3.55	56.28	38.25	0.49	0.45
DS	217.15	300cfs	300.00	985.39	988.04		988.32	0.005202	4.29	69.92	52.37	0.54	0.61
DS	217.15	400cfs	400.00	985.39	988.37		988.74	0.005688	4.90	81.66	77.44	0.57	0.76
DS	217.15	500cfs	500.00	985.39	988.66		989.12	0.006081	5.42	92.24	164.31	0.60	0.90
DS	217.15	2yr	513.00	985.39	988.69		989.16	0.006135	5.49	93.52	185.17	0.60	0.92
DS	217.15	5yr	727.00	985.39	989.24	988.42	989.85	0.006518	6.30	135.40	377.66	0.64	1.15
DS	217.15	10yr	873.00	985.39	989.65	988.74	990.10	0.004660	5.80	289.13	378.00	0.55	0.93
DS	217.15	25yr	1057.00	985.39	989.75	989.75	990.30	0.005723	6.54	326.18	378.00	0.61	1.18
DS	217.15	50yr	1197.00	985.39	989.88	989.88	990.44	0.005841	6.77	374.77	378.00	0.62	1.24
DS	217.15	100yr	1333.00	985.39	989.98	989.98	990.56	0.006074	7.03	413.21	378.00	0.64	1.33
DS	217.15	200yr	1479.00	985.39	990.08	990.08	990.68	0.006279	7.28	452.43	378.00	0.65	1.41
DS	217.15	500yr	1667.00	985.39	990.21	990.21	990.83	0.006519	7.57	499.29	378.00	0.67	1.51
DS	199.99*	50cfs	50.00	985.49	986.75		986.80	0.002623	1.74	28.66	34.72	0.34	0.13
DS	199.99*	100cfs	100.00	985.49	987.09		987.19	0.003435	2.47	40.45	35.20	0.41	0.24
DS	199.99*	200cfs	200.00	985.49	987.58		987.76	0.004392	3.46	57.79	36.07	0.48	0.42
DS	199.99*	300cfs	300.00	985.49	987.96		988.23	0.005006	4.19	71.65	42.11	0.53	0.58
DS	199.99*	400cfs	400.00	985.49	988.28		988.64	0.005472	4.78	83.67	67.27	0.56	0.73
DS	199.99*	500cfs	500.00	985.49	988.57		989.01	0.005846	5.29	94.53	143.47	0.59	0.86
DS	199.99*	2yr	513.00	985.49	988.61		989.05	0.005897	5.35	95.84	161.83	0.59	0.88
DS	199.99*	5yr	727.00	985.49	989.16	988.31	989.72	0.006086	6.10	154.18	382.50	0.62	1.07
DS	199.99*	10yr	873.00	985.49	989.66	988.62	990.00	0.003554	5.16	346.98	382.50	0.48	0.73
DS	199.99*	25yr	1057.00	985.49	989.48	989.61	990.17	0.007216	7.11	278.85	382.50	0.68	1.41
DS	199.99*	50yr	1197.00	985.49	989.59	989.73	990.31	0.007629	7.46	319.05	382.50	0.71	1.54
DS	199.99*	100yr	1333.00	985.49	989.70	989.83	990.43	0.007704	7.66	362.45	382.50	0.71	1.60
DS	199.99*	200yr	1479.00	985.49	989.80	989.94	990.55	0.007908	7.91	401.77	382.50	0.73	1.69
DS	199.99*	500yr	1667.00	985.49	989.92	990.06	990.69	0.008176	8.22	447.69	382.50	0.74	1.81
DS	182.83*	50cfs	50.00	985.59	986.71		986.75	0.002772	1.75	28.55	35.86	0.35	0.14
DS	182.83*	100cfs	100.00	985.59	987.03		987.12	0.003673	2.49	40.19	36.49	0.42	0.25
DS	182.83*	200cfs	200.00	985.59	987.50		987.68	0.004673	3.48	57.45	37.34	0.49	0.43
DS	182.83*	300cfs	300.00	985.59	987.87		988.14	0.005280	4.20	71.42	38.08	0.54	0.59
DS	182.83*	400cfs	400.00	985.59	988.18		988.54	0.005722	4.78	83.61	54.40	0.57	0.73
DS	182.83*	500cfs	500.00	985.59	988.47		988.90	0.006061	5.28	94.71	124.79	0.60	0.86
DS	182.83*	2yr	513.00	985.59	988.50		988.95	0.006110	5.34	96.04	135.41	0.60	0.88
DS	182.83*	5yr	727.00	985.59	988.08	988.24	989.61	0.005857	5.93	171.66	387.00	0.61	1.02

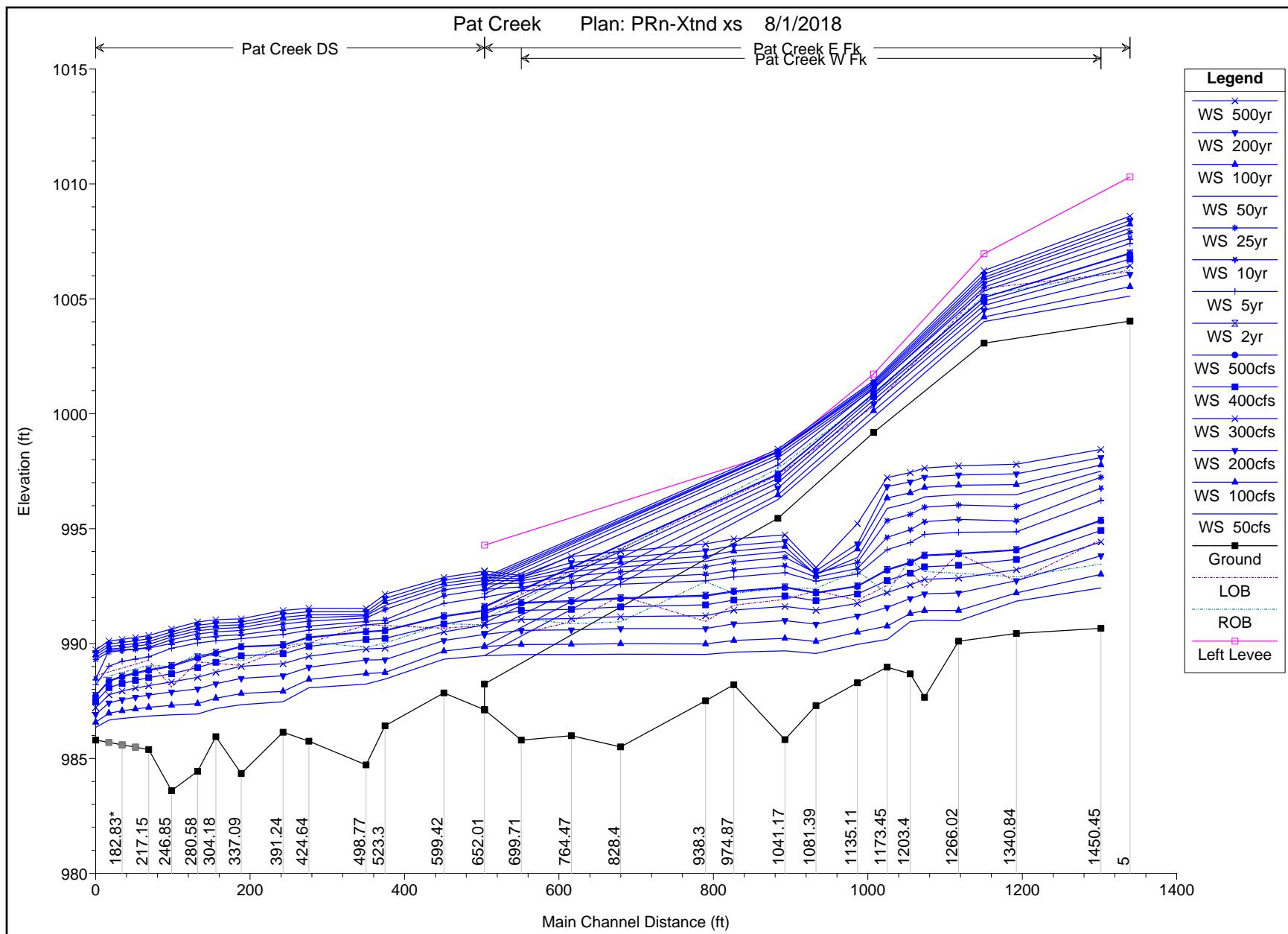
HEC-RAS Plan: Ex-XtdP91 (Continued)

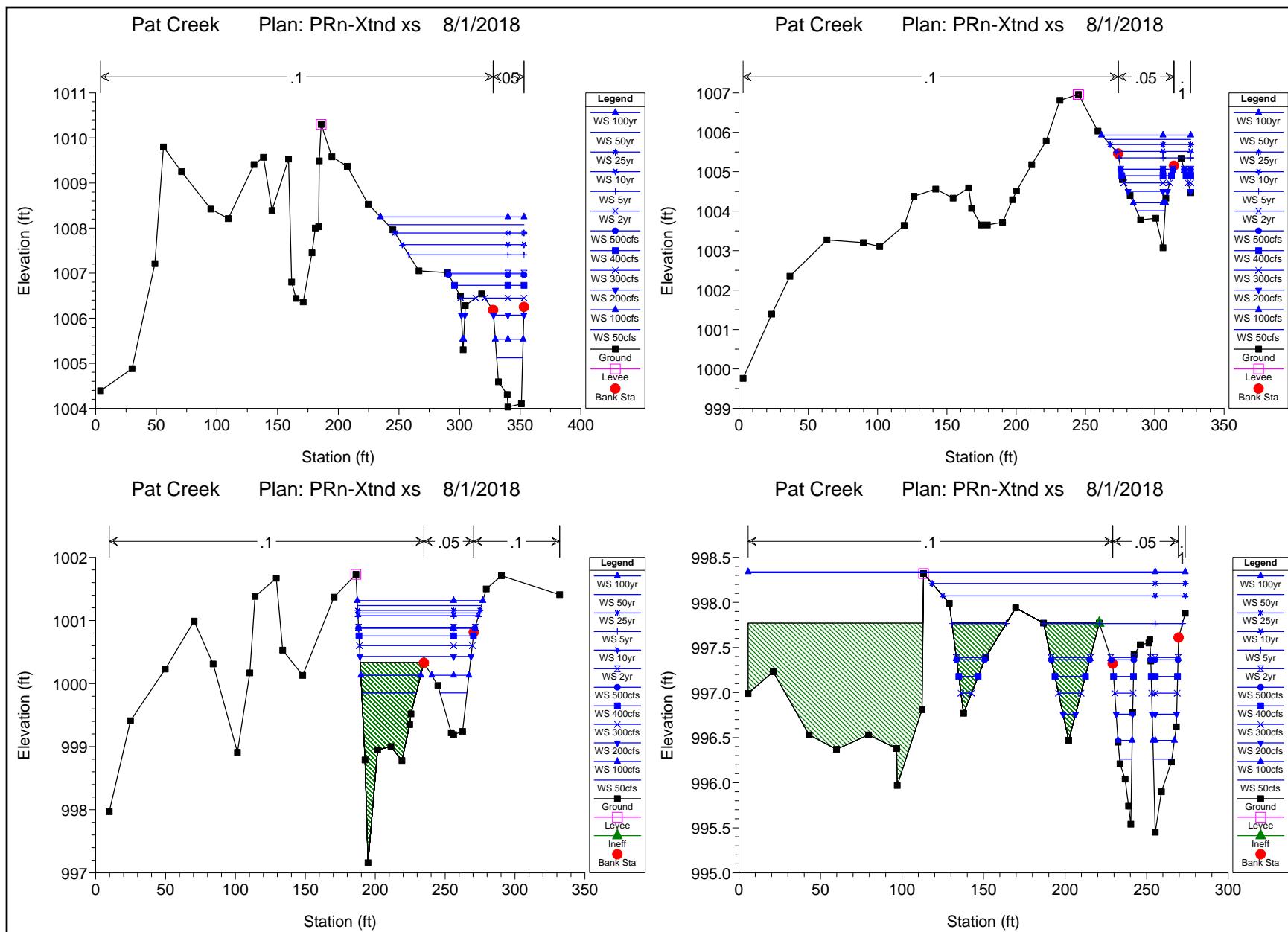
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Shear Chan
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(lb/sq ft)
DS	182.83*	10yr	873.00	985.59	989.66		989.92	0.002884	4.69	396.57	387.00	0.44	0.60
DS	182.83*	25yr	1057.00	985.59	989.55	989.49	990.02	0.005137	6.13	355.03	387.00	0.58	1.04
DS	182.83*	50yr	1197.00	985.59	989.63	989.60	990.15	0.005736	6.58	384.46	387.00	0.62	1.19
DS	182.83*	100yr	1333.00	985.59	989.73	989.71	990.27	0.005927	6.82	424.21	387.00	0.63	1.26
DS	182.83*	200yr	1479.00	985.59	989.85	989.81	990.39	0.005958	6.98	469.80	387.00	0.64	1.31
DS	182.83*	500yr	1667.00	985.59	989.97	989.92	990.53	0.006141	7.25	518.79	387.00	0.65	1.39
DS	165.67*	50cfs	50.00	985.70	986.64		986.70	0.003720	1.88	26.53	37.17	0.39	0.16
DS	165.67*	100cfs	100.00	985.70	986.94		987.05	0.004744	2.65	37.70	37.65	0.47	0.29
DS	165.67*	200cfs	200.00	985.70	987.38		987.59	0.005798	3.67	54.49	38.44	0.54	0.50
DS	165.67*	300cfs	300.00	985.70	987.74		988.04	0.006384	4.39	68.26	39.25	0.59	0.66
DS	165.67*	400cfs	400.00	985.70	988.05		988.43	0.006772	4.97	80.44	45.75	0.62	0.81
DS	165.67*	500cfs	500.00	985.70	988.32		988.79	0.007036	5.46	91.65	96.11	0.64	0.94
DS	165.67*	2yr	513.00	985.70	988.36		988.83	0.007084	5.52	92.98	104.96	0.64	0.96
DS	165.67*	5yr	727.00	985.70	988.90	988.20	989.49	0.006973	6.22	144.91	341.48	0.66	1.14
DS	165.67*	10yr	873.00	985.70	989.64	988.50	989.86	0.002511	4.37	433.76	391.50	0.41	0.52
DS	165.67*	25yr	1057.00	985.70	989.50	989.38	989.92	0.004779	5.86	377.54	391.50	0.56	0.95
DS	165.67*	50yr	1197.00	985.70	989.55	989.50	990.04	0.005543	6.38	398.85	391.50	0.61	1.12
DS	165.67*	100yr	1333.00	985.70	989.65	989.61	990.16	0.005772	6.63	436.87	391.50	0.62	1.20
DS	165.67*	200yr	1479.00	985.70	989.77	989.69	990.27	0.005788	6.79	483.01	391.50	0.63	1.25
DS	165.67*	500yr	1667.00	985.70	989.89		990.42	0.006004	7.07	530.58	391.50	0.64	1.34
DS	148.51	50cfs	50.00	985.80	986.35	986.35	986.54	0.030381	3.50	14.29	38.50	1.01	0.70
DS	148.51	100cfs	100.00	985.80	986.57	986.57	986.87	0.026125	4.39	22.79	38.75	1.01	0.94
DS	148.51	200cfs	200.00	985.80	986.92	986.92	987.39	0.022731	5.51	36.31	39.14	1.01	1.28
DS	148.51	300cfs	300.00	985.80	987.21	987.21	987.82	0.020985	6.28	47.76	39.47	1.01	1.53
DS	148.51	400cfs	400.00	985.80	987.47	987.47	988.21	0.019936	6.90	58.01	39.82	1.01	1.74
DS	148.51	500cfs	500.00	985.80	987.71	987.71	988.56	0.019113	7.38	67.71	40.51	1.01	1.90
DS	148.51	2yr	513.00	985.80	987.74	987.74	988.60	0.019029	7.44	68.92	40.59	1.01	1.93
DS	148.51	5yr	727.00	985.80	988.20	988.20	989.26	0.017838	8.27	87.93	88.57	1.01	2.22
DS	148.51	10yr	873.00	985.80	988.46	988.46	989.67	0.017929	8.84	98.76	137.99	1.02	2.46
DS	148.51	25yr	1057.00	985.80	989.31	989.31	989.81	0.006100	6.33	336.35	396.00	0.63	1.14
DS	148.51	50yr	1197.00	985.80	989.42	989.42	989.94	0.006282	6.57	381.31	396.00	0.64	1.21
DS	148.51	100yr	1333.00	985.80	989.51	989.51	990.05	0.006611	6.86	415.92	396.00	0.66	1.31
DS	148.51	200yr	1479.00	985.80	989.60	989.60	990.17	0.006887	7.13	452.20	396.00	0.68	1.40
DS	148.51	500yr	1667.00	985.80	989.72	989.72	990.31	0.007101	7.41	499.21	396.00	0.69	1.49

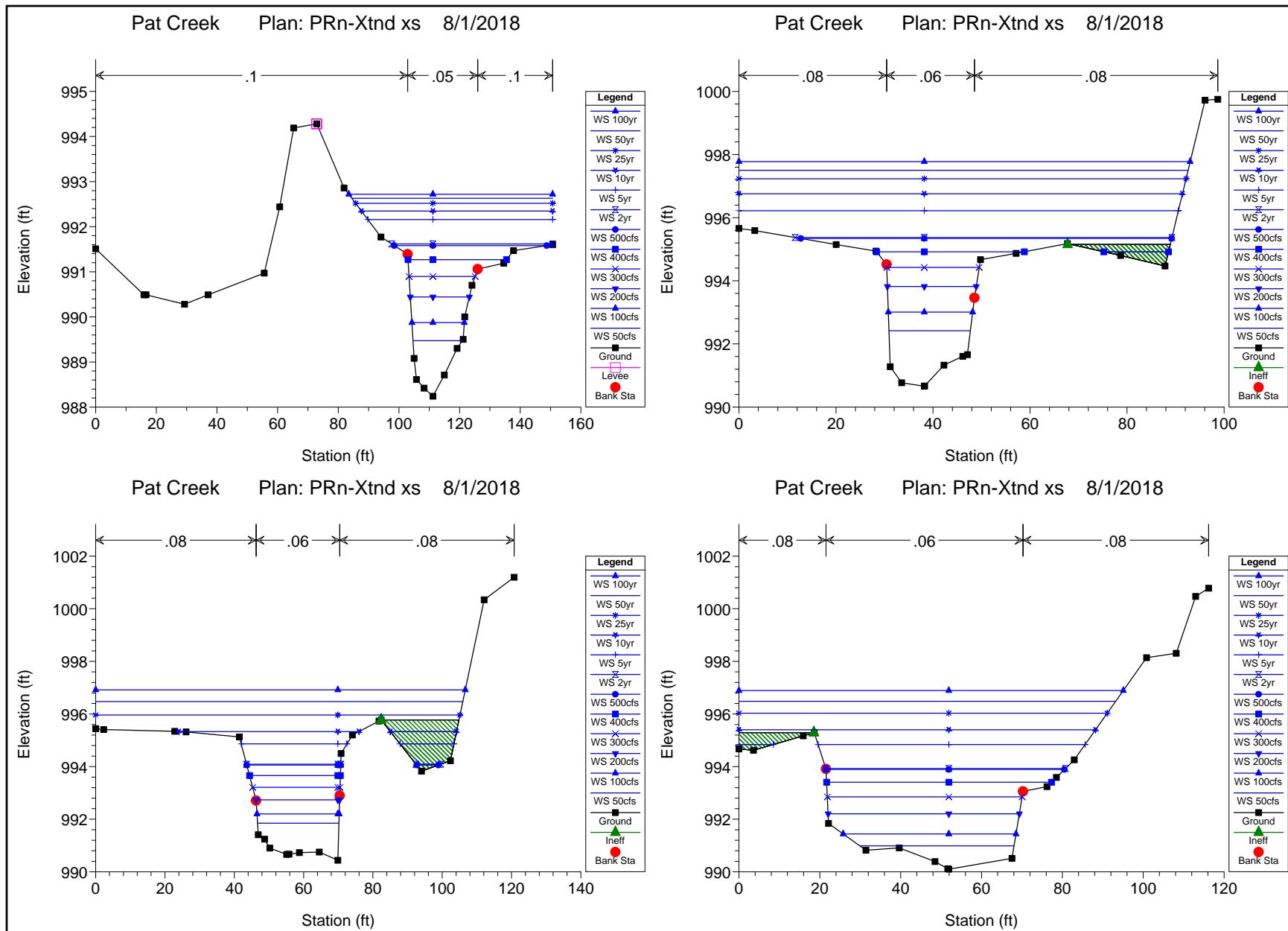
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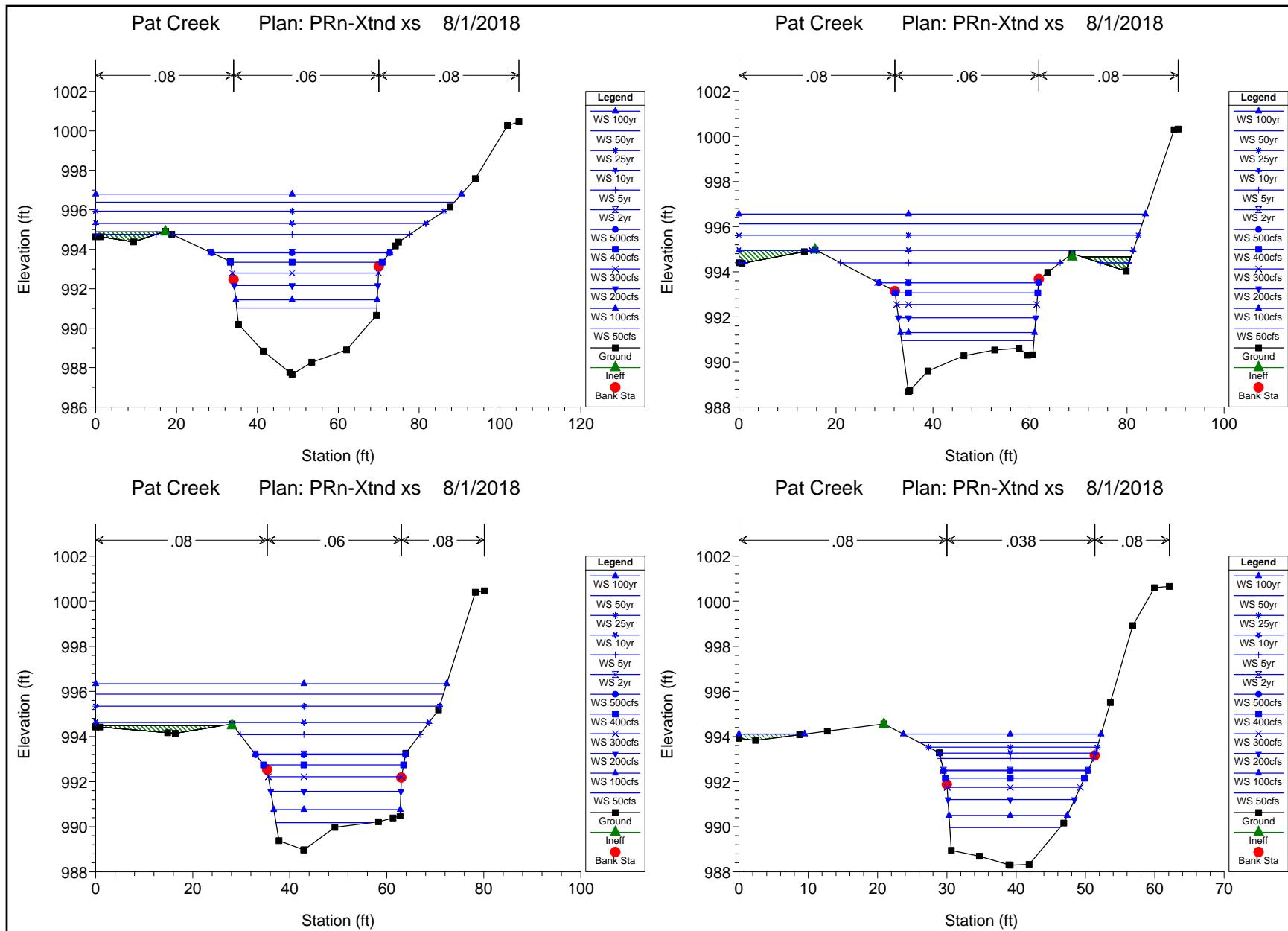
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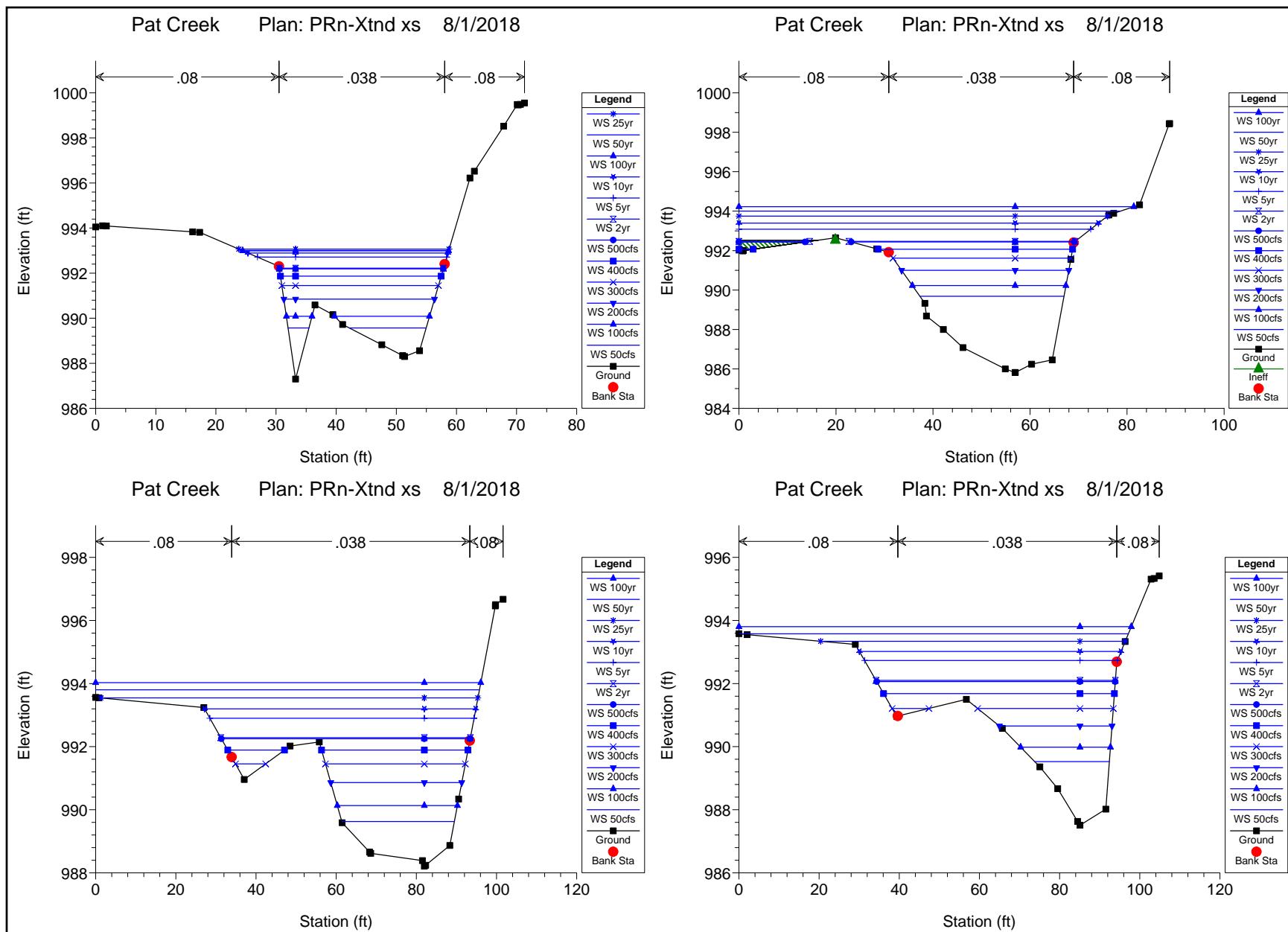
- Proposed

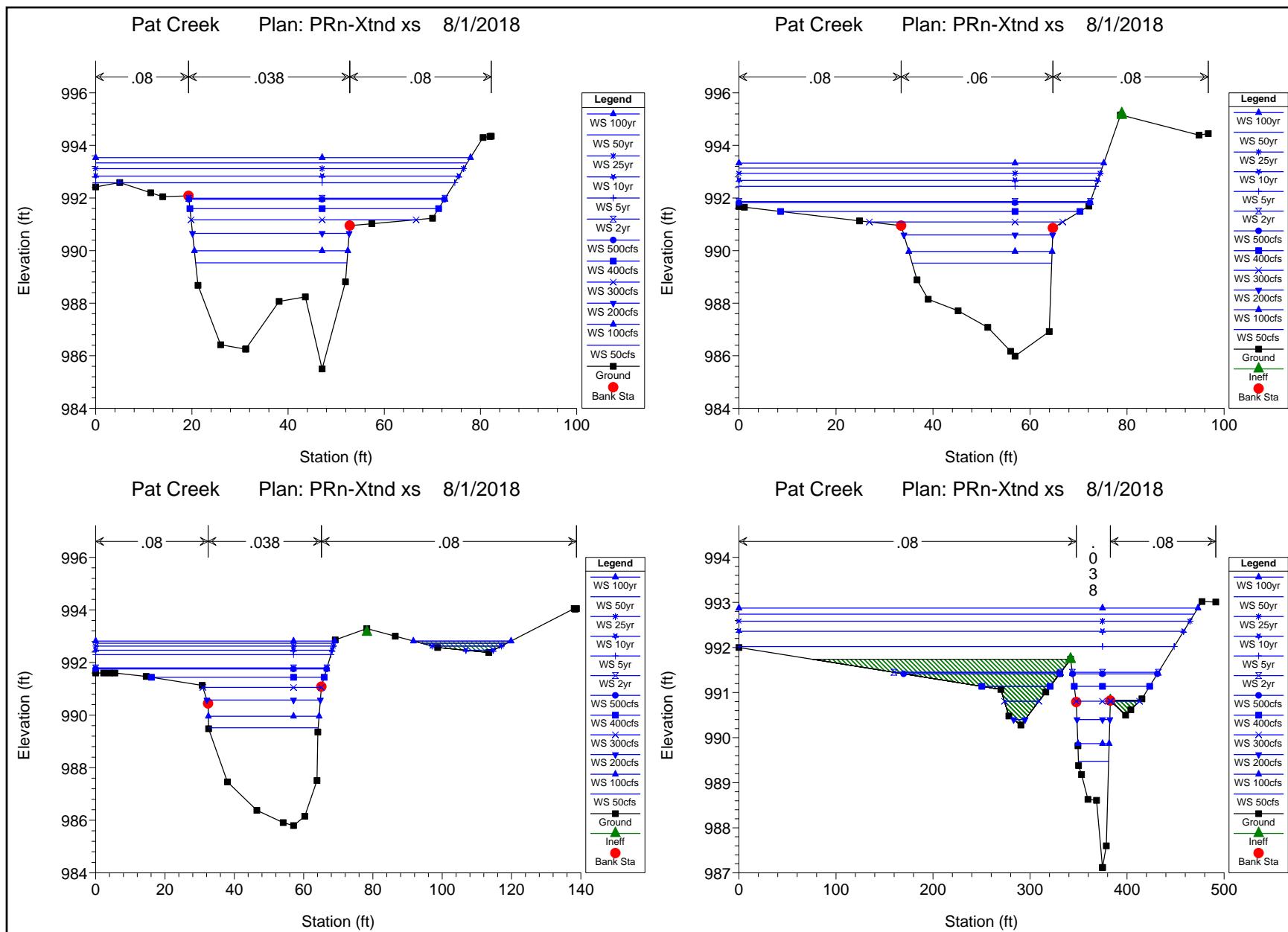


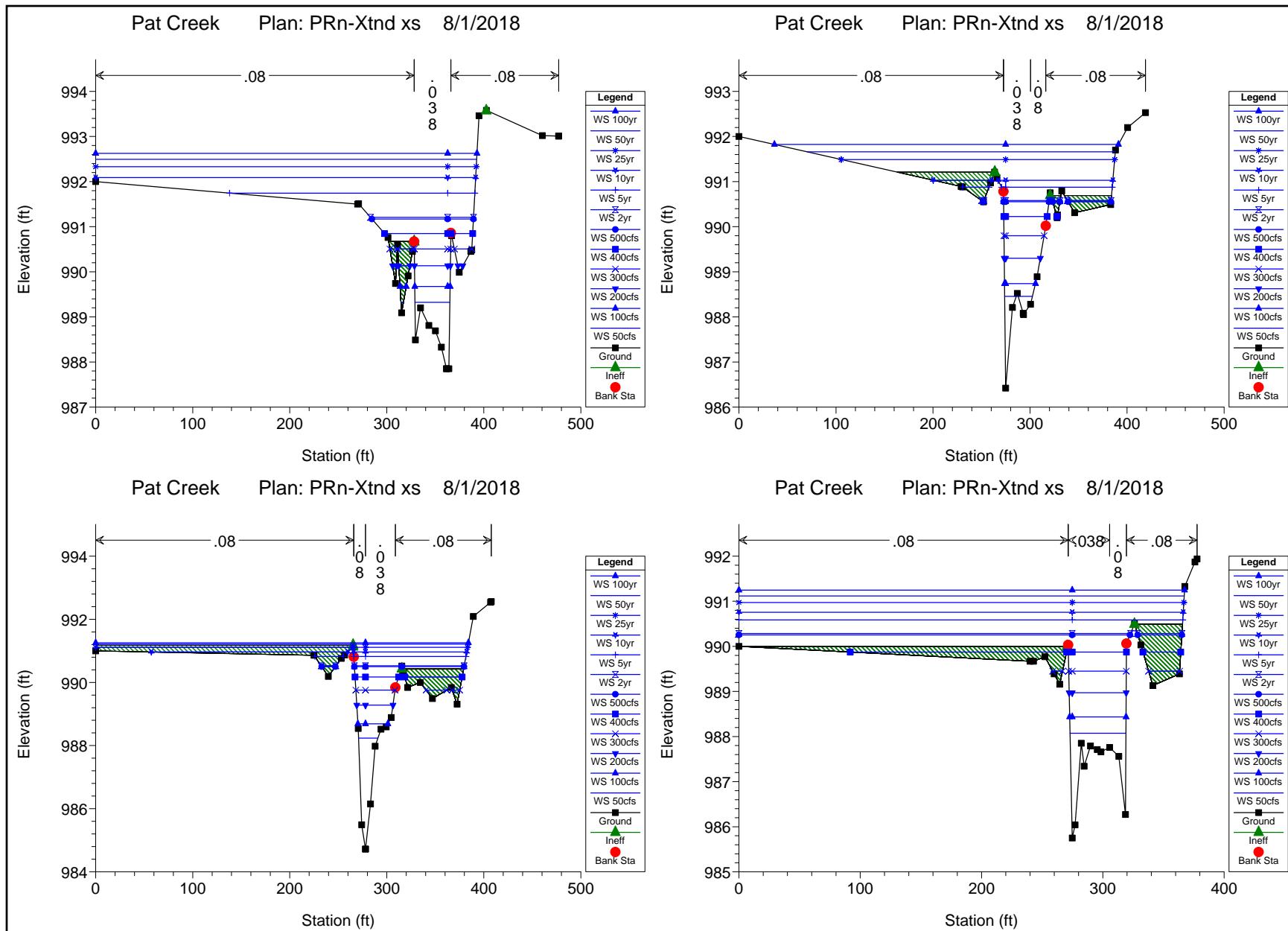


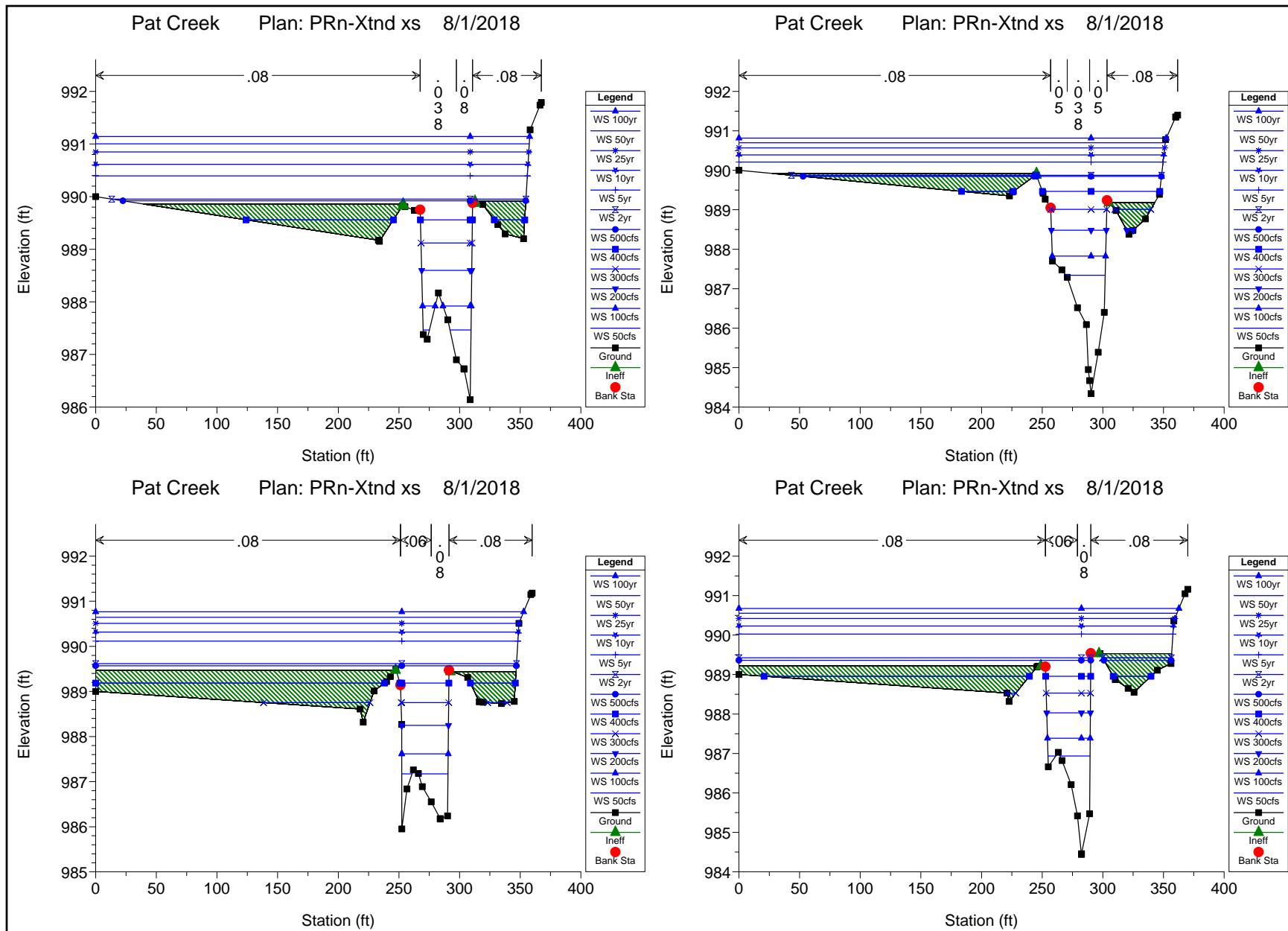


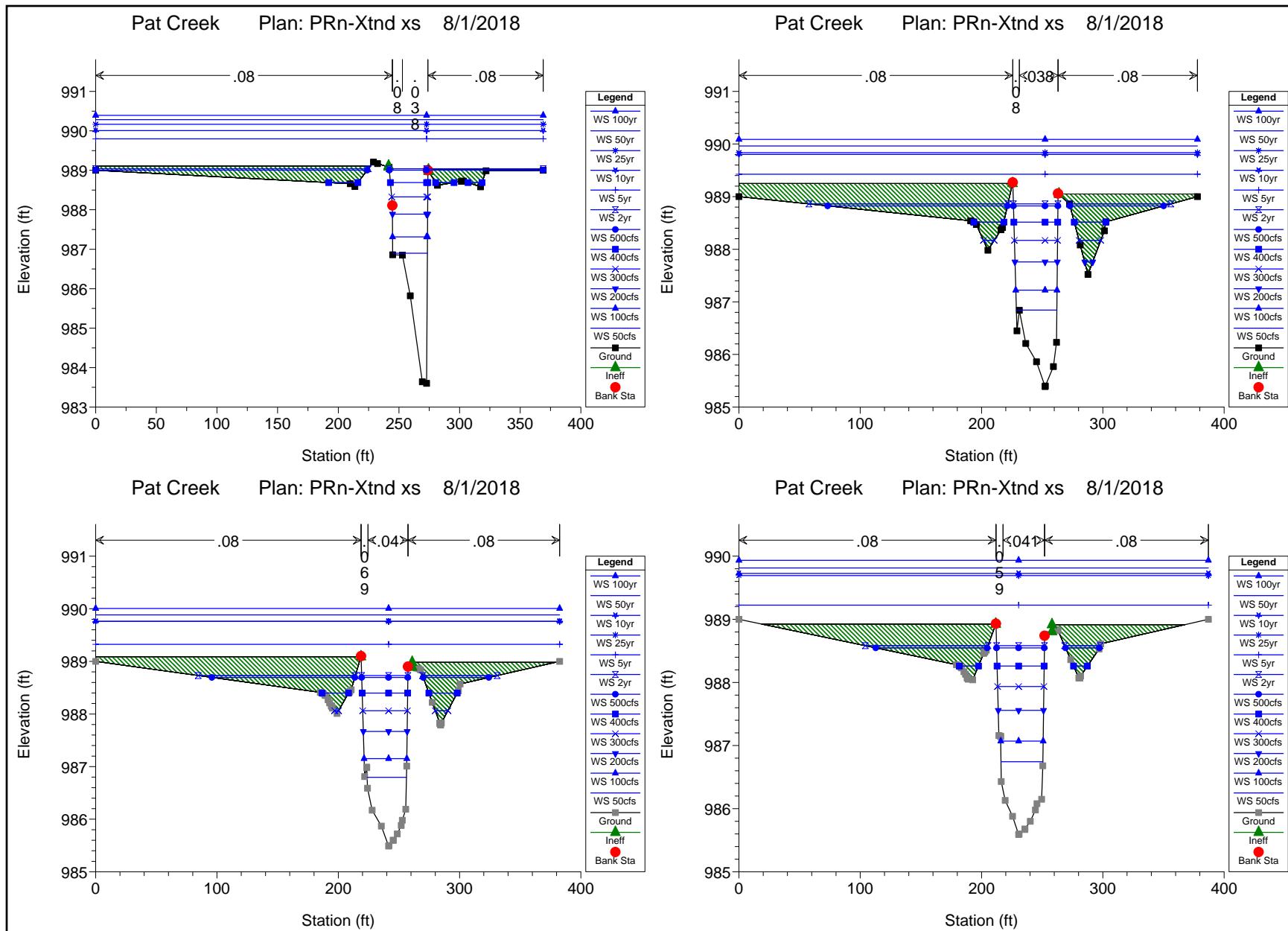


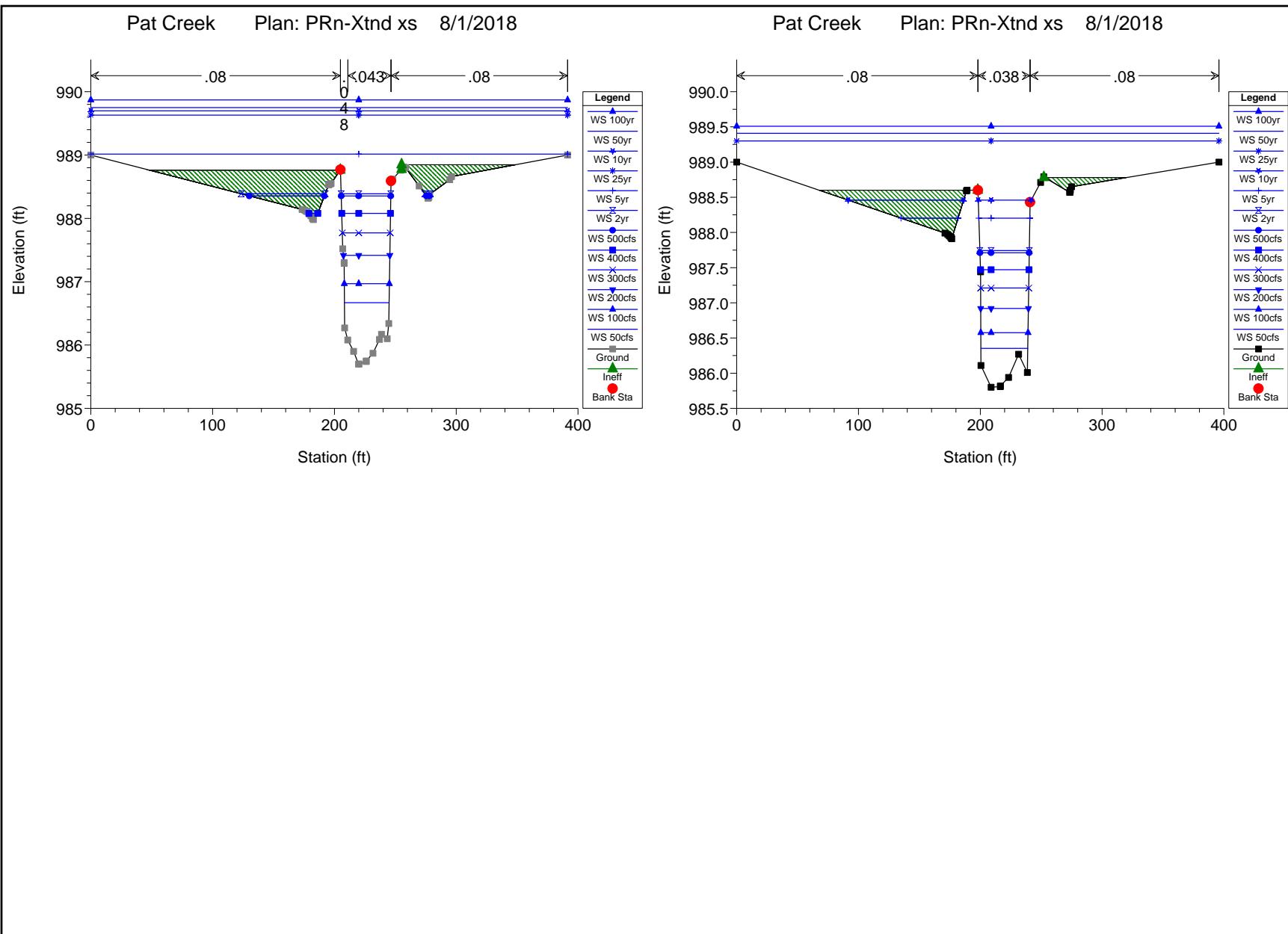












HEC-RAS Plan: PR\_n

Reach	River Sta	Profile	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	Shear Chan (lb/sq ft)
E Fk	5	50cfs	20.00	1004.03	1005.12	1004.52	1005.14	0.001784	1.10	18.15	21.49	0.21	0.09
E Fk	5	100cfs	41.00	1004.03	1005.53	1004.74	1005.57	0.002140	1.50	27.36	23.87	0.24	0.15
E Fk	5	200cfs	82.00	1004.03	1006.07	1005.05	1006.13	0.002652	2.04	41.17	27.82	0.28	0.25
E Fk	5	300cfs	123.00	1004.03	1006.45	1005.30	1006.54	0.002989	2.45	53.85	45.22	0.31	0.34
E Fk	5	400cfs	164.00	1004.03	1006.73	1005.52	1006.85	0.003287	2.79	68.89	57.43	0.33	0.43
E Fk	5	500cfs	204.00	1004.03	1006.96	1005.71	1007.10	0.003511	3.06	82.79	62.21	0.34	0.50
E Fk	5	2yr	210.00	1004.03	1007.00	1005.74	1007.14	0.003527	3.09	84.98	62.93	0.34	0.51
E Fk	5	5yr	297.00	1004.03	1007.41	1006.12	1007.58	0.003879	3.55	121.17	95.11	0.37	0.64
E Fk	5	10yr	357.00	1004.03	1007.63	1006.28	1007.82	0.004058	3.80	143.18	100.43	0.38	0.72
E Fk	5	25yr	432.00	1004.03	1007.89	1006.71	1008.10	0.004196	4.05	170.00	106.55	0.39	0.80
E Fk	5	50yr	490.00	1004.03	1008.07	1006.90	1008.30	0.004295	4.23	190.06	112.26	0.39	0.86
E Fk	5	100yr	546.00	1004.03	1008.25	1007.00	1008.48	0.004353	4.37	209.85	118.38	0.40	0.90
E Fk	4	50cfs	20.00	1003.07	1004.01	1004.01	1004.17	0.055760	3.17	6.31	20.50	1.01	1.06
E Fk	4	100cfs	41.00	1003.07	1004.21	1004.21	1004.44	0.047924	3.83	10.70	23.29	1.00	1.35
E Fk	4	200cfs	82.00	1003.07	1004.50	1004.50	1004.82	0.042853	4.51	18.17	28.73	1.00	1.68
E Fk	4	300cfs	123.00	1003.07	1004.72	1004.72	1005.10	0.041591	4.96	25.01	34.95	1.01	1.92
E Fk	4	400cfs	164.00	1003.07	1004.90	1004.90	1005.33	0.038965	5.27	31.69	39.23	1.00	2.07
E Fk	4	500cfs	204.00	1003.07	1005.05	1005.05	1005.52	0.036326	5.52	38.05	42.28	0.99	2.18
E Fk	4	2yr	210.00	1003.07	1005.06	1005.06	1005.55	0.037339	5.62	38.47	42.48	1.00	2.26
E Fk	4	5yr	297.00	1003.07	1005.35	1005.35	1005.91	0.032592	6.06	51.96	51.81	0.97	2.44
E Fk	4	10yr	357.00	1003.07	1005.51	1005.51	1006.13	0.030933	6.37	60.42	53.66	0.96	2.60
E Fk	4	25yr	432.00	1003.07	1005.69	1005.69	1006.38	0.029612	6.75	70.27	58.17	0.96	2.81
E Fk	4	50yr	490.00	1003.07	1005.82	1005.82	1006.56	0.028640	7.01	78.05	61.50	0.96	2.94
E Fk	4	100yr	546.00	1003.07	1005.93	1005.93	1006.72	0.028436	7.29	84.90	64.29	0.96	3.11
E Fk	3	50cfs	20.00	999.19	999.85	999.69	999.93	0.017429	2.30	8.70	58.39	0.60	0.49
E Fk	3	100cfs	41.00	999.19	1000.13	999.93	1000.25	0.018486	2.74	14.96	69.55	0.65	0.64
E Fk	3	200cfs	82.00	999.19	1000.43	1000.26	1000.60	0.019320	3.31	28.60	79.48	0.69	0.86
E Fk	3	300cfs	123.00	999.19	1000.60	1000.51	1000.80	0.019405	3.76	42.02	80.74	0.71	1.05
E Fk	3	400cfs	164.00	999.19	1000.76	1000.65	1000.98	0.018567	4.05	54.31	81.86	0.71	1.16
E Fk	3	500cfs	204.00	999.19	1000.88	1000.75	1001.13	0.018670	4.35	63.98	83.24	0.73	1.29
E Fk	3	2yr	210.00	999.19	1000.89	1000.77	1001.15	0.018627	4.39	65.41	83.51	0.73	1.31
E Fk	3	5yr	297.00	999.19	1001.12	1000.96	1001.43	0.018467	4.94	84.34	86.93	0.75	1.56
E Fk	3	10yr	357.00	999.19	1001.08	1001.07	1001.57	0.030214	6.18	80.65	86.28	0.95	2.47
E Fk	3	25yr	432.00	999.19	1001.16	1001.22	1001.77	0.034761	6.92	87.95	87.57	1.03	3.03
E Fk	3	50yr	490.00	999.19	1001.24	1001.32	1001.92	0.036616	7.35	94.46	88.71	1.07	3.36
E Fk	3	100yr	546.00	999.19	1001.31	1001.41	1002.05	0.037362	7.68	101.31	89.89	1.09	3.61
E Fk	2	50cfs	20.00	995.45	996.26	996.26	996.42	0.053622	3.22	6.22	18.80	0.99	1.07
E Fk	2	100cfs	41.00	995.45	996.47	996.47	996.71	0.049413	3.93	10.43	21.88	1.00	1.42
E Fk	2	200cfs	82.00	995.45	996.76	996.76	997.11	0.044025	4.73	17.32	32.65	1.00	1.82
E Fk	2	300cfs	123.00	995.45	996.99	996.99	997.42	0.040388	5.26	23.39	47.16	0.99	2.08
E Fk	2	400cfs	164.00	995.45	997.18	997.18	997.69	0.040115	5.75	28.51	58.89	1.01	2.38
E Fk	2	500cfs	204.00	995.45	997.36	997.36	997.93	0.037260	6.02	33.91	71.26	0.99	2.50
E Fk	2	2yr	210.00	995.45	997.39	997.39	997.96	0.037021	6.06	34.67	73.21	0.99	2.52
E Fk	2	5yr	297.00	995.45	997.77	997.77	998.34	0.034902	6.08	50.53	118.21	0.98	2.50
E Fk	2	10yr	357.00	995.45	998.07	998.07	998.50	0.020442	5.42	90.76	148.70	0.78	1.84
E Fk	2	25yr	432.00	995.45	998.21	998.21	998.66	0.020366	5.73	111.54	155.25	0.79	2.00
E Fk	2	50yr	490.00	995.45	998.33	998.33	998.61	0.014035	4.98	190.30	268.10	0.66	1.48
E Fk	2	100yr	546.00	995.45	998.34	998.34	998.68	0.016928	5.49	192.81	268.10	0.73	1.79
E Fk	1	50cfs	20.00	988.24	989.47	988.97	989.51	0.004640	1.64	12.18	16.28	0.33	0.21
E Fk	1	100cfs	41.00	988.24	989.87	989.27	989.95	0.004956	2.16	18.95	17.29	0.36	0.33
E Fk	1	200cfs	82.00	988.24	990.44	989.64	990.56	0.005496	2.79	29.35	19.46	0.40	0.49
E Fk	1	300cfs	123.00	988.24	990.90	989.95	991.05	0.005775	3.18	38.67	21.79	0.42	0.60
E Fk	1	400cfs	164.00	988.24	991.27	990.21	991.46	0.005727	3.47	48.36	32.49	0.43	0.69
E Fk	1	500cfs	204.00	988.24	991.58	990.44	991.79	0.005465	3.72	60.03	50.29	0.43	0.75
E Fk	1	2yr	210.00	988.24	991.62	990.47	991.83	0.005472	3.76	61.96	53.07	0.43	0.76
E Fk	1	5yr	297.00	988.24	992.16	990.92	992.40	0.004914	4.08	93.23	60.96	0.42	0.84
E Fk	1	10yr	357.00	988.24	992.35	991.20	992.64	0.005519	4.51	104.89	63.07	0.45	1.01
E Fk	1	25yr	432.00	988.24	992.52	991.47	992.88	0.006508	5.07	115.77	64.97	0.49	1.25
E Fk	1	50yr	490.00	988.24	992.63	991.84	993.04	0.007312	5.50	123.02	66.21	0.53	1.45
E Fk	1	100yr	546.00	988.24	992.72	992.02	993.20	0.008134	5.90	129.17	67.24	0.56	1.66
W Fk	1450.45	50cfs	45.00	990.66	992.42	991.69	992.49	0.005407	2.06	21.85	16.77	0.32	0.41
W Fk	1450.45	100cfs	89.00	990.66	993.01	992.06	993.13	0.006606	2.79	31.88	17.38	0.36	0.67
W Fk	1450.45	200cfs	178.00	990.66	993.82	992.64	994.05	0.008366	3.84	46.36	18.30	0.42	1.15
W Fk	1450.45	300cfs	267.00	990.66	994.42	993.11	994.76	0.009670	4.67	57.62	19.06	0.46	1.60
W Fk	1450.45	400cfs	357.00	990.66	994.92	993.53	995.37	0.010634	5.37	68.73	43.82	0.50	2.03
W Fk	1450.45	500cfs	446.00	990.66	995.34	993.91	995.85	0.010866	5.84	91.35	76.42	0.51	2.31
W Fk	1450.45	2yr	453.00	990.66	995.37	993.94	995.88	0.010821	5.86	93.73	77.65	0.51	2.32
W Fk	1450.45	5yr	648.00	990.66	996.22	994.66	996.63	0.007968	5.70	168.48	90.58	0.45	2.06
W Fk	1450.45	10yr	781.00	990.66	996.76	995.88	997.10	0.006419	5.48	217.31	91.42	0.41	1.84
W Fk	1450.45	25yr	947.00	990.66	997.23	996.18	997.57	0.005923	5.56	261.01	92.16	0.40	1.84
W Fk	1450.45	50yr	1072.00	990.66	997.50	996.36	997.85	0.005969	5.75	285.75	92.58	0.41	1.94
W Fk	1450.45	100yr	1193.00	990.66	997.77	996.52	998.13	0.005875	5.87	311.00	93.01	0.41	1.99
W Fk	1340.84	50cfs	45.00	990.44	991.85	991.90	991.90	0.005360	1.81	24.87	23.49	0.31	0.33
W Fk	1340.84	100cfs	89.00	990.44	992.20	992.31	992.31	0.008311	2.68	33.22	23.73	0.40	0.67
W Fk	1340.84	200cfs	178.00	990.44	992.74	992.97	993.07	0.011875	3.87	46.01	24.14	0.49	1.27

## HEC-RAS Plan: PR\_n (Continued)

Reach	River Sta	Profile	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	Shear Chan (lb/sq ft)
W Fk	1340.84	300cfs	267.00	990.44	993.21		993.55	0.012779	4.64	57.79	25.21	0.53	1.70
W Fk	1340.84	400cfs	357.00	990.44	993.66		994.08	0.012846	5.21	69.24	26.20	0.55	2.03
W Fk	1340.84	500cfs	446.00	990.44	994.06		994.56	0.012802	5.68	79.94	33.39	0.56	2.31
W Fk	1340.84	2yr	453.00	990.44	994.09		994.60	0.012784	5.72	80.78	34.31	0.56	2.33
W Fk	1340.84	5yr	648.00	990.44	994.86		995.52	0.012650	6.55	102.73	46.06	0.58	2.85
W Fk	1340.84	10yr	781.00	990.44	995.33	994.04	996.10	0.012749	7.08	119.50	71.12	0.59	3.21
W Fk	1340.84	25yr	947.00	990.44	995.96	994.49	996.68	0.010688	7.07	173.14	105.12	0.55	3.06
W Fk	1340.84	50yr	1072.00	990.44	996.47		997.07	0.008348	6.66	227.25	105.94	0.49	2.63
W Fk	1340.84	100yr	1193.00	990.44	996.92		997.43	0.006905	6.37	274.31	106.64	0.46	2.35
W Fk	1266.02	50cfs	45.00	990.10	990.99		991.09	0.030999	2.58	17.45	38.16	0.67	0.88
W Fk	1266.02	100cfs	89.00	990.10	991.44		991.54	0.012925	2.49	35.81	42.75	0.48	0.67
W Fk	1266.02	200cfs	178.00	990.10	992.20		992.30	0.006200	2.52	70.77	47.29	0.36	0.57
W Fk	1266.02	300cfs	267.00	990.10	992.85		992.96	0.004361	2.63	101.65	48.19	0.32	0.55
W Fk	1266.02	400cfs	357.00	990.10	993.41		993.53	0.003637	2.77	130.14	55.60	0.30	0.57
W Fk	1266.02	500cfs	446.00	990.10	993.89		994.02	0.003237	2.91	157.83	58.95	0.29	0.60
W Fk	1266.02	2yr	453.00	990.10	993.93		994.06	0.003206	2.91	160.05	59.24	0.29	0.60
W Fk	1266.02	5yr	648.00	990.10	994.84		994.99	0.002696	3.17	217.45	74.56	0.28	0.65
W Fk	1266.02	10yr	781.00	990.10	995.40		995.56	0.002475	3.31	257.58	88.20	0.27	0.68
W Fk	1266.02	25yr	947.00	990.10	996.03		996.20	0.002256	3.44	313.82	91.09	0.26	0.70
W Fk	1266.02	50yr	1072.00	990.10	996.48		996.66	0.002103	3.50	355.68	93.19	0.26	0.71
W Fk	1266.02	100yr	1193.00	990.10	996.89		997.07	0.001993	3.57	394.18	95.07	0.25	0.72
W Fk	1221.98	50cfs	45.00	987.66	991.02		991.03	0.000228	0.61	74.22	34.64	0.07	0.03
W Fk	1221.98	100cfs	89.00	987.66	991.44		991.45	0.000509	1.00	88.68	34.97	0.11	0.08
W Fk	1221.98	200cfs	178.00	987.66	992.16		992.20	0.000925	1.56	114.27	35.53	0.15	0.17
W Fk	1221.98	300cfs	267.00	987.66	992.79		992.85	0.001179	1.95	136.94	36.14	0.18	0.26
W Fk	1221.98	400cfs	357.00	987.66	993.34		993.42	0.001364	2.28	156.91	37.54	0.19	0.34
W Fk	1221.98	500cfs	446.00	987.66	993.82		993.92	0.001504	2.57	176.18	43.99	0.21	0.41
W Fk	1221.98	2yr	453.00	987.66	993.85		993.96	0.001511	2.58	177.82	44.52	0.21	0.42
W Fk	1221.98	5yr	648.00	987.66	994.75		994.90	0.001710	3.08	223.93	73.72	0.23	0.56
W Fk	1221.98	10yr	781.00	987.66	995.31		995.47	0.001762	3.32	265.80	81.68	0.23	0.63
W Fk	1221.98	25yr	947.00	987.66	995.93		996.11	0.001763	3.54	318.12	86.15	0.24	0.69
W Fk	1221.98	50yr	1072.00	987.66	996.38		996.57	0.001729	3.66	357.88	88.71	0.24	0.72
W Fk	1221.98	100yr	1193.00	987.66	996.79		996.99	0.001702	3.76	394.54	90.48	0.24	0.75
W Fk	1203.4	50cfs	45.00	988.68	990.95	990.44	991.01	0.008074	1.92	23.41	27.29	0.37	0.40
W Fk	1203.4	100cfs	89.00	988.68	991.30		991.42	0.010316	2.69	33.10	27.65	0.43	0.71
W Fk	1203.4	200cfs	178.00	988.68	991.96		992.14	0.010151	3.46	51.39	28.30	0.45	1.04
W Fk	1203.4	300cfs	267.00	988.68	992.55		992.79	0.009319	3.91	68.37	28.90	0.45	1.21
W Fk	1203.4	400cfs	357.00	988.68	993.06		993.35	0.009044	4.29	83.27	29.41	0.45	1.39
W Fk	1203.4	500cfs	446.00	988.68	993.51		993.84	0.008852	4.62	96.97	32.90	0.45	1.55
W Fk	1203.4	2yr	453.00	988.68	993.54		993.88	0.008819	4.65	98.13	33.23	0.45	1.55
W Fk	1203.4	5yr	648.00	988.68	994.40		994.81	0.008147	5.20	131.44	52.37	0.45	1.80
W Fk	1203.4	10yr	781.00	988.68	994.95		995.39	0.007445	5.40	162.14	80.23	0.44	1.87
W Fk	1203.4	25yr	947.00	988.68	995.62		996.03	0.006240	5.40	216.55	82.32	0.41	1.79
W Fk	1203.4	50yr	1072.00	988.68	996.12		996.50	0.005329	5.30	258.10	83.11	0.39	1.67
W Fk	1203.4	100yr	1193.00	988.68	996.56		996.92	0.004749	5.25	294.86	83.80	0.37	1.60
W Fk	1173.45	50cfs	45.00	988.97	990.18	990.18	990.45	0.066409	4.19	10.73	19.67	1.00	2.21
W Fk	1173.45	100cfs	89.00	988.97	990.76		990.96	0.023287	3.57	24.91	26.07	0.64	1.34
W Fk	1173.45	200cfs	178.00	988.97	991.57		991.80	0.012831	3.84	46.35	26.82	0.52	1.28
W Fk	1173.45	300cfs	267.00	988.97	992.22		992.49	0.010567	4.18	63.88	27.44	0.48	1.39
W Fk	1173.45	400cfs	357.00	988.97	992.74		993.06	0.009726	4.56	78.56	28.88	0.48	1.55
W Fk	1173.45	500cfs	446.00	988.97	993.19		993.56	0.009260	4.90	91.98	30.86	0.48	1.71
W Fk	1173.45	2yr	453.00	988.97	993.23		993.60	0.009204	4.92	93.10	31.02	0.48	1.71
W Fk	1173.45	5yr	648.00	988.97	994.08		994.55	0.008554	5.53	122.25	37.01	0.48	2.01
W Fk	1173.45	10yr	781.00	988.97	994.62		995.14	0.008196	5.87	146.89	68.70	0.48	2.17
W Fk	1173.45	25yr	947.00	988.97	995.35		995.83	0.006623	5.81	197.75	70.91	0.44	2.02
W Fk	1173.45	50yr	1072.00	988.97	995.88		996.33	0.005643	5.70	235.83	71.69	0.41	1.89
W Fk	1173.45	100yr	1193.00	988.97	996.34	993.84	996.77	0.005061	5.67	268.77	72.35	0.39	1.83
W Fk	1135.11	50cfs	45.00	988.29	989.96	989.30	990.05	0.002947	2.32	19.42	15.90	0.37	0.21
W Fk	1135.11	100cfs	89.00	988.29	990.50		990.65	0.003746	3.15	28.29	17.06	0.43	0.35
W Fk	1135.11	200cfs	178.00	988.29	991.20		991.50	0.005091	4.37	40.71	18.26	0.52	0.62
W Fk	1135.11	300cfs	267.00	988.29	991.75		992.17	0.005972	5.24	50.93	19.20	0.57	0.85
W Fk	1135.11	400cfs	357.00	988.29	992.16		992.73	0.006912	6.06	58.96	20.06	0.62	1.10
W Fk	1135.11	500cfs	446.00	988.29	992.48		993.20	0.007852	6.81	65.60	20.80	0.67	1.35
W Fk	1135.11	2yr	453.00	988.29	992.51		993.24	0.007893	6.86	66.19	20.87	0.67	1.37
W Fk	1135.11	5yr	648.00	988.29	993.03		994.13	0.010271	8.43	77.30	22.05	0.78	1.99
W Fk	1135.11	10yr	781.00	988.29	993.27	992.86	994.68	0.012197	9.53	82.62	22.54	0.86	2.50
W Fk	1135.11	25yr	947.00	988.29	993.53	993.38	995.34	0.014365	10.81	88.78	24.35	0.94	3.14
W Fk	1135.11	50yr	1072.00	988.29	993.74	993.74	995.84	0.015490	11.62	94.19	25.90	0.99	3.57
W Fk	1135.11	100yr	1193.00	988.29	994.11	994.11	996.29	0.014555	11.89	104.12	38.01	0.97	3.63
W Fk	1081.39	50cfs	45.00	987.30	989.57		989.75	0.012456	3.41	13.18	16.28	0.67	0.54
W Fk	1081.39	100cfs	89.00	987.30	990.08		990.32	0.010673	3.93	22.66	20.06	0.65	0.64
W Fk	1081.39	200cfs	178.00	987.30	990.85		991.15	0.008488	4.42	40.27	25.05	0.61	0.72
W Fk	1081.39	300cfs	267.00	987.30	991.45		991.81	0.006937	4.79	55.71	26.04	0.58	0.77
W Fk	1081.39	400cfs	357.00	987.30	991.87		992.31	0.007117	5.35	66.72	26.72	0.60	0.92
W Fk	1081.39	500cfs	446.00	987.30	992.19		992.73	0.007640	5.91	75.42	27.25	0.63	1.09

## HEC-RAS Plan: PR\_n (Continued)

Reach	River Sta	Profile	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	Shear Chan (lb/sq ft)
W Fk	1081.39	2yr	453.00	987.30	992.22		992.77	0.007620	5.94	76.26	27.30	0.63	1.09
W Fk	1081.39	5yr	648.00	987.30	992.71		993.52	0.009178	7.22	90.54	31.48	0.70	1.53
W Fk	1081.39	10yr	781.00	987.30	992.89	992.37	993.94	0.011106	8.23	96.41	33.26	0.78	1.96
W Fk	1081.39	25yr	947.00	987.30	993.07	992.81	994.46	0.013833	9.49	102.29	34.96	0.88	2.56
W Fk	1081.39	50yr	1072.00	987.30	993.00	993.10	994.86	0.018838	10.94	100.07	34.33	1.02	3.42
W Fk	1081.39	100yr	1193.00	987.30	992.99	993.42	995.30	0.023533	12.21	99.76	34.24	1.14	4.26
W Fk	1041.17	50cfs	45.00	985.82	989.68		989.69	0.000063	0.57	79.26	29.68	0.06	0.01
W Fk	1041.17	100cfs	89.00	985.82	990.22		990.24	0.000143	0.93	95.86	31.65	0.09	0.02
W Fk	1041.17	200cfs	178.00	985.82	991.00		991.03	0.000295	1.47	121.49	34.47	0.14	0.06
W Fk	1041.17	300cfs	267.00	985.82	991.62		991.67	0.000417	1.86	143.52	36.71	0.17	0.09
W Fk	1041.17	400cfs	357.00	985.82	992.07		992.15	0.000539	2.22	160.63	43.01	0.19	0.13
W Fk	1041.17	500cfs	446.00	985.82	992.44		992.54	0.000645	2.56	176.32	59.61	0.21	0.17
W Fk	1041.17	2yr	453.00	985.82	992.47		992.57	0.000650	2.58	177.83	61.24	0.21	0.17
W Fk	1041.17	5yr	648.00	985.82	993.08		993.24	0.000856	3.22	219.66	72.50	0.25	0.25
W Fk	1041.17	10yr	781.00	985.82	993.39		993.59	0.001007	3.63	242.37	74.11	0.27	0.31
W Fk	1041.17	25yr	947.00	985.82	993.75		994.00	0.001172	4.08	269.34	75.98	0.30	0.39
W Fk	1041.17	50yr	1072.00	985.82	994.00	990.52	994.29	0.001284	4.39	288.81	78.64	0.31	0.44
W Fk	1041.17	100yr	1193.00	985.82	994.23	990.78	994.55	0.001390	4.68	306.61	81.40	0.33	0.50
W Fk	974.87	50cfs	45.00	988.21	989.63		989.67	0.002172	1.72	26.13	28.07	0.31	0.12
W Fk	974.87	100cfs	89.00	988.21	990.13		990.21	0.002105	2.18	40.89	29.97	0.33	0.18
W Fk	974.87	200cfs	178.00	988.21	990.86		990.98	0.002190	2.80	63.65	32.68	0.35	0.26
W Fk	974.87	300cfs	267.00	988.21	991.45		991.61	0.002606	3.12	85.58	42.41	0.39	0.32
W Fk	974.87	400cfs	357.00	988.21	991.89		992.07	0.002840	3.37	105.92	50.68	0.41	0.37
W Fk	974.87	500cfs	446.00	988.21	992.25		992.45	0.003165	3.55	126.26	62.06	0.43	0.41
W Fk	974.87	2yr	453.00	988.21	992.29		992.48	0.003090	3.55	128.45	62.27	0.43	0.40
W Fk	974.87	5yr	648.00	988.21	992.90		993.14	0.002720	3.94	167.78	65.91	0.42	0.46
W Fk	974.87	10yr	781.00	988.21	993.20		993.48	0.002799	4.27	187.62	67.67	0.43	0.52
W Fk	974.87	25yr	947.00	988.21	993.54		993.88	0.002871	4.65	215.15	94.00	0.44	0.59
W Fk	974.87	50yr	1072.00	988.21	993.80		994.16	0.002845	4.86	239.63	95.73	0.45	0.63
W Fk	974.87	100yr	1193.00	988.21	994.03		994.42	0.002839	5.05	261.46	96.07	0.45	0.67
W Fk	938.3	50cfs	45.00	987.51	989.53		989.59	0.002212	2.01	22.43	18.62	0.32	0.16
W Fk	938.3	100cfs	89.00	987.51	989.98		990.11	0.003473	2.80	31.80	22.40	0.41	0.29
W Fk	938.3	200cfs	178.00	987.51	990.65		990.86	0.004564	3.66	48.67	28.09	0.49	0.46
W Fk	938.3	300cfs	267.00	987.51	991.21		991.46	0.005928	3.99	67.04	42.99	0.56	0.57
W Fk	938.3	400cfs	357.00	987.51	991.68		991.92	0.005394	3.93	91.89	57.58	0.54	0.54
W Fk	938.3	500cfs	446.00	987.51	992.06		992.31	0.004284	4.00	114.04	59.51	0.49	0.52
W Fk	938.3	2yr	453.00	987.51	992.10		992.35	0.004137	3.98	116.50	59.72	0.49	0.51
W Fk	938.3	5yr	648.00	987.51	992.73		993.02	0.003515	4.34	155.15	63.05	0.47	0.56
W Fk	938.3	10yr	781.00	987.51	993.02		993.36	0.003639	4.72	173.34	65.26	0.48	0.64
W Fk	938.3	25yr	947.00	987.51	993.34		993.75	0.003807	5.17	195.26	75.98	0.50	0.75
W Fk	938.3	50yr	1072.00	987.51	993.58		994.03	0.003859	5.45	215.85	96.93	0.51	0.81
W Fk	938.3	100yr	1193.00	987.51	993.80		994.29	0.003816	5.65	237.87	97.89	0.51	0.85
W Fk	828.4	50cfs	45.00	985.50	989.54		989.54	0.000102	0.63	71.16	31.44	0.07	0.01
W Fk	828.4	100cfs	89.00	985.50	989.99		990.01	0.000223	1.04	85.68	31.90	0.11	0.03
W Fk	828.4	200cfs	178.00	985.50	990.65		990.70	0.000450	1.66	106.94	32.56	0.16	0.08
W Fk	828.4	300cfs	267.00	985.50	991.17		991.24	0.000639	2.15	125.53	46.77	0.20	0.13
W Fk	828.4	400cfs	357.00	985.50	991.60		991.70	0.000801	2.57	146.93	51.70	0.22	0.18
W Fk	828.4	500cfs	446.00	985.50	991.95		992.08	0.000947	2.93	165.47	53.11	0.24	0.22
W Fk	828.4	2yr	453.00	985.50	991.99		992.12	0.000947	2.94	167.64	53.28	0.24	0.23
W Fk	828.4	5yr	648.00	985.50	992.58		992.78	0.001241	3.65	205.17	74.20	0.28	0.33
W Fk	828.4	10yr	781.00	985.50	992.83		993.09	0.001503	4.15	224.03	75.52	0.32	0.42
W Fk	828.4	25yr	947.00	985.50	993.12		993.45	0.001805	4.71	246.03	76.51	0.35	0.54
W Fk	828.4	50yr	1072.00	985.50	993.34		993.71	0.002001	5.08	262.55	77.24	0.37	0.62
W Fk	828.4	100yr	1193.00	985.50	993.54		993.96	0.002174	5.42	278.06	77.93	0.39	0.70
W Fk	764.47	50cfs	45.00	985.99	989.52		989.53	0.000304	0.70	64.54	28.75	0.08	0.04
W Fk	764.47	100cfs	89.00	985.99	989.97		989.99	0.000682	1.15	77.46	29.54	0.13	0.10
W Fk	764.47	200cfs	178.00	985.99	990.60		990.65	0.001414	1.85	96.38	30.66	0.18	0.25
W Fk	764.47	300cfs	267.00	985.99	991.09		991.18	0.002018	2.39	112.33	39.86	0.22	0.40
W Fk	764.47	400cfs	357.00	985.99	991.49		991.61	0.002490	2.85	132.60	61.70	0.25	0.54
W Fk	764.47	500cfs	446.00	985.99	991.83		991.98	0.002833	3.21	156.05	72.37	0.27	0.67
W Fk	764.47	2yr	453.00	985.99	991.87		992.02	0.002809	3.22	159.12	72.45	0.27	0.67
W Fk	764.47	5yr	648.00	985.99	992.44		992.66	0.003421	3.86	201.07	73.53	0.31	0.93
W Fk	764.47	10yr	781.00	985.99	992.67		992.94	0.004096	4.35	217.91	73.96	0.34	1.16
W Fk	764.47	25yr	947.00	985.99	992.94		993.27	0.004860	4.90	237.60	74.46	0.37	1.45
W Fk	764.47	50yr	1072.00	985.99	993.14		993.51	0.005333	5.26	252.56	74.84	0.39	1.65
W Fk	764.47	100yr	1193.00	985.99	993.33		993.75	0.005731	5.57	266.80	75.20	0.41	1.83
W Fk	699.71	50cfs	45.00	985.80	989.52		989.52	0.000053	0.53	85.59	31.62	0.06	0.01
W Fk	699.71	100cfs	89.00	985.80	989.96		989.97	0.000130	0.89	99.48	31.94	0.09	0.02
W Fk	699.71	200cfs	178.00	985.80	990.57		990.61	0.000297	1.49	119.32	32.71	0.14	0.06
W Fk	699.71	300cfs	267.00	985.80	991.05		991.11	0.000452	1.98	135.39	34.18	0.17	0.10
W Fk	699.71	400cfs	357.00	985.80	991.44		991.53	0.000600	2.42	151.01	49.83	0.20	0.15
W Fk	699.71	500cfs	446.00	985.80	991.75		991.88	0.000739	2.81	170.15	66.63	0.23	0.20
W Fk	699.71	2yr	453.00	985.80	991.79		991.92	0.000740	2.82	172.84	66.73	0.23	0.20
W Fk	699.71	5yr	648.00	985.80	992.30		992.49	0.001051	3.59	206.77	67.86	0.27	0.31
W Fk	699.71	10yr	781.00	985.80	992.47		992.73	0.001361	4.17	218.11	76.09	0.31	0.42

## HEC-RAS Plan: PR\_n (Continued)

Reach	River Sta	Profile	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	Shear Chan (lb/sq ft)
W Fk	699.71	25yr	947.00	985.80	992.63		992.98	0.001795	4.88	229.13	88.58	0.36	0.57
W Fk	699.71	50yr	1072.00	985.80	992.73		993.17	0.002144	5.40	236.38	93.38	0.40	0.69
W Fk	699.71	100yr	1193.00	985.80	992.82		993.33	0.002514	5.91	242.20	97.22	0.43	0.82
DS	652.01	50cfs	50.00	987.12	989.48		989.51	0.001528	1.54	32.47	31.20	0.27	0.10
DS	652.01	100cfs	100.00	987.12	989.87		989.95	0.002186	2.23	44.90	32.22	0.33	0.18
DS	652.01	200cfs	200.00	987.12	990.40		990.56	0.003136	3.20	62.49	45.56	0.42	0.35
DS	652.01	300cfs	300.00	987.12	990.81		991.05	0.003794	3.92	76.50	100.04	0.47	0.49
DS	652.01	400cfs	400.00	987.12	991.14		991.44	0.004088	4.47	99.91	148.21	0.50	0.61
DS	652.01	500cfs	500.00	987.12	991.42		991.78	0.004302	4.92	122.82	248.12	0.52	0.71
DS	652.01	2yr	513.00	987.12	991.45		991.82	0.004320	4.97	125.84	260.47	0.52	0.73
DS	652.01	5yr	727.00	987.12	992.02	991.15	992.39	0.003754	5.24	267.85	448.58	0.50	0.76
DS	652.01	10yr	873.00	987.12	992.36		992.63	0.002877	4.89	420.86	458.24	0.45	0.64
DS	652.01	25yr	1057.00	987.12	992.58		992.85	0.002806	5.02	525.59	464.74	0.44	0.66
DS	652.01	50yr	1197.00	987.12	992.74		993.00	0.002760	5.11	598.33	469.20	0.44	0.68
DS	652.01	100yr	1333.00	987.12	992.88		993.13	0.002748	5.21	661.99	473.07	0.45	0.69
DS	599.42	50cfs	50.00	987.85	989.32		989.38	0.004350	1.98	25.21	38.58	0.42	0.18
DS	599.42	100cfs	100.00	987.85	989.67		989.78	0.004579	2.63	37.96	42.89	0.46	0.28
DS	599.42	200cfs	200.00	987.85	990.13		990.34	0.005562	3.64	55.24	57.57	0.53	0.48
DS	599.42	300cfs	300.00	987.85	990.51		990.79	0.005964	4.32	73.54	78.76	0.56	0.64
DS	599.42	400cfs	400.00	987.85	990.85		991.19	0.005834	4.74	98.19	90.65	0.57	0.73
DS	599.42	500cfs	500.00	987.85	991.17		991.53	0.005309	4.96	129.63	104.63	0.56	0.76
DS	599.42	2yr	513.00	987.85	991.21		991.57	0.005260	4.99	133.64	106.26	0.55	0.77
DS	599.42	5yr	727.00	987.85	991.74	991.08	992.16	0.004936	5.50	212.12	252.74	0.55	0.87
DS	599.42	10yr	873.00	987.85	992.09	991.35	992.45	0.004064	5.36	329.48	391.64	0.51	0.80
DS	599.42	25yr	1057.00	987.85	992.33		992.67	0.003864	5.47	423.95	392.24	0.51	0.81
DS	599.42	50yr	1197.00	987.85	992.49		992.82	0.003755	5.55	487.74	392.65	0.50	0.83
DS	599.42	100yr	1333.00	987.85	992.62		992.95	0.003756	5.68	539.55	392.98	0.50	0.86
DS	523.3	50cfs	50.00	986.42	988.45	988.45	988.69	0.026666	3.89	12.85	26.63	0.99	0.76
DS	523.3	100cfs	100.00	986.42	988.74	988.74	989.08	0.024607	4.68	21.39	31.89	1.01	0.98
DS	523.3	200cfs	200.00	986.42	989.30		989.67	0.014855	4.90	40.84	37.10	0.82	0.97
DS	523.3	300cfs	300.00	986.42	989.80		990.18	0.010988	4.96	60.48	41.33	0.72	0.95
DS	523.3	400cfs	400.00	986.42	990.22		990.63	0.009333	5.09	78.73	45.08	0.67	1.00
DS	523.3	500cfs	500.00	986.42	990.55		991.00	0.008934	5.38	93.75	98.61	0.65	1.12
DS	523.3	2yr	513.00	986.42	990.58		991.04	0.009056	5.45	95.03	102.49	0.65	1.15
DS	523.3	5yr	727.00	986.42	990.88	990.46	991.57	0.012112	6.72	120.14	140.96	0.76	1.73
DS	523.3	10yr	873.00	986.42	991.03	990.96	991.87	0.013967	7.46	137.97	178.08	0.81	2.13
DS	523.3	25yr	1057.00	986.42	991.49	991.49	992.17	0.010299	7.02	230.07	281.74	0.71	1.84
DS	523.3	50yr	1197.00	986.42	991.66	991.66	992.33	0.010032	7.15	281.12	317.58	0.70	1.90
DS	523.3	100yr	1333.00	986.42	991.82	991.82	992.47	0.009587	7.19	336.06	354.58	0.69	1.90
DS	498.77	50cfs	50.00	984.72	988.24	986.27	988.26	0.001245	1.35	37.13	19.98	0.17	0.13
DS	498.77	100cfs	100.00	984.72	988.69	986.83	988.76	0.003069	2.08	48.16	30.96	0.29	0.28
DS	498.77	200cfs	200.00	984.72	989.28		989.41	0.004658	2.91	68.81	37.32	0.38	0.51
DS	498.77	300cfs	300.00	984.72	989.76		989.94	0.005304	3.43	87.36	69.57	0.41	0.68
DS	498.77	400cfs	400.00	984.72	990.17		990.40	0.005526	3.83	105.02	103.86	0.43	0.82
DS	498.77	500cfs	500.00	984.72	990.50		990.77	0.005925	4.21	124.62	126.59	0.44	0.98
DS	498.77	2yr	513.00	984.72	990.53		990.81	0.006057	4.28	127.58	128.39	0.45	1.01
DS	498.77	5yr	727.00	984.72	990.82		991.24	0.008447	5.31	161.30	144.65	0.53	1.54
DS	498.77	10yr	873.00	984.72	990.96		991.49	0.010050	5.97	178.02	319.05	0.59	1.91
DS	498.77	25yr	1057.00	984.72	991.11	990.72	991.77	0.012150	6.76	195.42	382.63	0.65	2.42
DS	498.77	50yr	1197.00	984.72	991.21	991.16	991.97	0.013695	7.32	215.76	383.85	0.69	2.81
DS	498.77	100yr	1333.00	984.72	991.26	991.50	992.15	0.015924	7.96	232.64	384.11	0.75	3.30
DS	424.64	50cfs	50.00	985.75	988.07		988.11	0.003893	1.55	32.31	46.12	0.33	0.16
DS	424.64	100cfs	100.00	985.75	988.44		988.50	0.003911	2.04	49.07	46.48	0.35	0.24
DS	424.64	200cfs	200.00	985.75	988.97		989.08	0.004046	2.70	74.12	47.02	0.38	0.36
DS	424.64	300cfs	300.00	985.75	989.45		989.60	0.003838	3.10	96.68	81.16	0.38	0.44
DS	424.64	400cfs	400.00	985.75	989.87		990.06	0.003690	3.42	116.95	257.59	0.39	0.50
DS	424.64	500cfs	500.00	985.75	990.25	988.90	990.43	0.003181	3.49	204.14	358.71	0.37	0.50
DS	424.64	2yr	513.00	985.75	990.28	988.93	990.46	0.003156	3.50	214.27	359.59	0.37	0.50
DS	424.64	5yr	727.00	985.75	990.59		990.79	0.003567	3.98	316.28	365.90	0.40	0.63
DS	424.64	10yr	873.00	985.75	990.76		990.97	0.003743	4.22	378.35	366.28	0.41	0.69
DS	424.64	25yr	1057.00	985.75	990.97		991.19	0.003739	4.40	457.12	366.77	0.41	0.74
DS	424.64	50yr	1197.00	985.75	991.12		991.34	0.003748	4.53	510.87	367.10	0.42	0.77
DS	424.64	100yr	1333.00	985.75	991.25	990.68	991.47	0.003771	4.65	558.81	367.39	0.42	0.80
DS	391.24	50cfs	50.00	986.14	987.47	987.47	987.74	0.078682	4.21	11.88	22.48	1.02	2.50
DS	391.24	100cfs	100.00	986.14	987.92		988.18	0.038193	4.08	24.50	33.75	0.84	1.66
DS	391.24	200cfs	200.00	986.14	988.60		988.83	0.015809	3.90	51.27	41.28	0.62	1.17
DS	391.24	300cfs	300.00	986.14	989.12		989.38	0.011448	4.11	73.06	42.14	0.55	1.17
DS	391.24	400cfs	400.00	986.14	989.56		989.85	0.009909	4.36	91.71	189.46	0.53	1.24
DS	391.24	500cfs	500.00	986.14	989.92	989.02	990.25	0.009235	4.62	123.23	332.14	0.52	1.33
DS	391.24	2yr	513.00	986.14	989.95	989.05	990.28	0.009136	4.63	134.37	341.51	0.52	1.33
DS	391.24	5yr	727.00	986.14	990.40		990.64	0.006715	4.43	291.13	355.86	0.45	1.15
DS	391.24	10yr	873.00	986.14	990.61		990.83	0.005979	4.38	368.89	356.43	0.43	1.10
DS	391.24	25yr	1057.00	986.14	990.85		991.04	0.005449	4.39	452.82	357.04	0.42	1.08
DS	391.24	50yr	1197.00	986.14	991.00		991.19	0.005237	4.43	508.27	357.44	0.41	1.08
DS	391.24	100yr	1333.00	986.14	991.14		991.33	0.005109	4.49	557.42	357.80	0.41	1.10

## HEC-RAS Plan: PR\_n (Continued)

Reach	River Sta	Profile	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	Shear Chan (lb/sq ft)
DS	337.09	50cfs	50.00	984.34	987.34	985.85	987.36	0.000874	1.18	42.37	32.42	0.18	0.07
DS	337.09	100cfs	100.00	984.34	987.83		987.87	0.001641	1.63	61.44	44.00	0.24	0.14
DS	337.09	200cfs	200.00	984.34	988.48		988.56	0.001900	2.20	90.74	50.54	0.27	0.23
DS	337.09	300cfs	300.00	984.34	989.01		989.12	0.002042	2.61	114.81	75.66	0.29	0.30
DS	337.09	400cfs	400.00	984.34	989.47		989.60	0.002044	2.91	149.37	139.43	0.30	0.35
DS	337.09	500cfs	500.00	984.34	989.85		989.99	0.002004	3.13	187.34	292.93	0.30	0.39
DS	337.09	2yr	513.00	984.34	989.87		990.02	0.002042	3.17	190.21	304.17	0.31	0.40
DS	337.09	5yr	727.00	984.34	990.21		990.41	0.002603	3.82	294.87	349.66	0.35	0.57
DS	337.09	10yr	873.00	984.34	990.39		990.61	0.002855	4.13	357.87	350.31	0.37	0.65
DS	337.09	25yr	1057.00	984.34	990.57		990.82	0.003191	4.50	421.02	350.97	0.39	0.76
DS	337.09	50yr	1197.00	984.34	990.70		990.97	0.003382	4.73	466.60	351.44	0.41	0.83
DS	337.09	100yr	1333.00	984.34	990.82		991.10	0.003553	4.94	507.64	352.26	0.42	0.90
DS	304.18	50cfs	50.00	985.95	987.17		987.27	0.028025	2.53	19.79	32.76	0.57	1.00
DS	304.18	100cfs	100.00	985.95	987.62		987.73	0.018079	2.74	36.52	38.32	0.49	1.00
DS	304.18	200cfs	200.00	985.95	988.25		988.42	0.013787	3.29	60.85	38.59	0.46	1.24
DS	304.18	300cfs	300.00	985.95	988.75		988.97	0.012632	3.73	80.47	143.10	0.46	1.46
DS	304.18	400cfs	400.00	985.95	989.19		989.45	0.012098	4.10	97.65	315.61	0.46	1.65
DS	304.18	500cfs	500.00	985.95	989.57	988.40	989.85	0.011007	4.30	145.93	346.86	0.45	1.73
DS	304.18	2yr	513.00	985.95	989.62	988.43	989.88	0.010477	4.24	162.34	346.96	0.44	1.67
DS	304.18	5yr	727.00	985.95	990.12		990.27	0.006486	3.72	335.87	348.09	0.36	1.22
DS	304.18	10yr	873.00	985.95	990.32		990.46	0.006038	3.73	405.79	348.54	0.35	1.20
DS	304.18	25yr	1057.00	985.95	990.51		990.65	0.006033	3.86	472.44	348.97	0.35	1.26
DS	304.18	50yr	1197.00	985.95	990.64		990.79	0.006022	3.96	519.99	351.02	0.35	1.31
DS	304.18	100yr	1333.00	985.95	990.77		990.91	0.006044	4.05	562.65	352.87	0.36	1.35
DS	280.58	50cfs	50.00	984.44	986.94		986.98	0.006366	1.66	30.14	31.28	0.30	0.36
DS	280.58	100cfs	100.00	984.44	987.39		987.46	0.007386	2.18	45.77	35.28	0.34	0.56
DS	280.58	200cfs	200.00	984.44	988.03		988.16	0.008086	2.91	68.66	36.04	0.37	0.89
DS	280.58	300cfs	300.00	984.44	988.53		988.71	0.008667	3.45	86.86	43.85	0.40	1.17
DS	280.58	400cfs	400.00	984.44	988.96		989.19	0.009160	3.90	102.59	286.96	0.41	1.42
DS	280.58	500cfs	500.00	984.44	989.36	987.93	989.61	0.008667	4.11	153.29	345.55	0.41	1.52
DS	280.58	2yr	513.00	984.44	989.42	987.97	989.66	0.008127	4.02	171.92	346.91	0.40	1.45
DS	280.58	5yr	727.00	984.44	990.02		990.15	0.004578	3.37	378.80	357.80	0.31	0.97
DS	280.58	10yr	873.00	984.44	990.23		990.35	0.004366	3.41	452.83	358.24	0.30	0.97
DS	280.58	25yr	1057.00	984.44	990.42		990.54	0.004514	3.58	520.58	359.31	0.31	1.05
DS	280.58	50yr	1197.00	984.44	990.55		990.68	0.004585	3.68	569.35	361.14	0.31	1.10
DS	280.58	100yr	1333.00	984.44	990.68		990.80	0.004668	3.79	612.92	362.77	0.32	1.16
DS	246.85	50cfs	50.00	983.60	986.90		986.93	0.000599	1.30	38.40	28.69	0.20	0.05
DS	246.85	100cfs	100.00	983.60	987.31		987.37	0.001217	1.99	50.27	28.82	0.27	0.12
DS	246.85	200cfs	200.00	983.60	987.89		988.03	0.002240	2.99	66.99	28.99	0.35	0.28
DS	246.85	300cfs	300.00	983.60	988.33		988.55	0.003101	3.77	79.71	29.72	0.40	0.45
DS	246.85	400cfs	400.00	983.60	988.69		988.99	0.003853	4.43	90.70	81.43	0.44	0.62
DS	246.85	500cfs	500.00	983.60	989.00	987.67	989.39	0.004542	5.02	100.52	350.79	0.48	0.80
DS	246.85	2yr	513.00	983.60	989.04	987.70	989.44	0.004609	5.09	104.72	351.87	0.48	0.82
DS	246.85	5yr	727.00	983.60	989.80		990.02	0.002747	4.39	365.79	369.00	0.38	0.60
DS	246.85	10yr	873.00	983.60	990.01		990.22	0.002769	4.53	442.72	369.00	0.38	0.63
DS	246.85	25yr	1057.00	983.60	990.17		990.40	0.003130	4.91	501.50	369.00	0.41	0.74
DS	246.85	50yr	1197.00	983.60	990.29		990.54	0.003327	5.14	545.85	369.00	0.42	0.81
DS	246.85	100yr	1333.00	983.60	990.39		990.65	0.003504	5.35	585.83	369.00	0.43	0.87
DS	217.15	50cfs	50.00	985.39	986.84		986.89	0.002985	1.73	28.88	33.39	0.33	0.16
DS	217.15	100cfs	100.00	985.39	987.22		987.31	0.003791	2.40	41.65	34.02	0.38	0.28
DS	217.15	200cfs	200.00	985.39	987.76		987.93	0.004909	3.33	60.14	41.51	0.45	0.50
DS	217.15	300cfs	300.00	985.39	988.17		988.42	0.005779	4.02	74.59	62.45	0.49	0.72
DS	217.15	400cfs	400.00	985.39	988.52		988.84	0.006494	4.59	87.06	86.90	0.52	0.92
DS	217.15	500cfs	500.00	985.39	988.82		989.23	0.007114	5.09	98.24	262.17	0.55	1.11
DS	217.15	2yr	513.00	985.39	988.86		989.27	0.007191	5.15	99.62	284.44	0.55	1.13
DS	217.15	5yr	727.00	985.39	989.42	988.42	989.87	0.006938	5.59	203.08	378.00	0.55	1.29
DS	217.15	10yr	873.00	985.39	989.80		990.11	0.004810	5.01	345.50	378.00	0.46	1.00
DS	217.15	25yr	1057.00	985.39	989.84	989.74	990.25	0.006593	5.90	358.78	378.00	0.54	1.39
DS	217.15	50yr	1197.00	985.39	989.96	989.86	990.38	0.006667	6.07	406.70	378.00	0.55	1.45
DS	217.15	100yr	1333.00	985.39	990.09		990.50	0.006619	6.18	453.24	378.00	0.55	1.49
DS	199.99*	50cfs	50.00	985.49	986.80		986.84	0.002654	1.73	28.95	32.43	0.32	0.15
DS	199.99*	100cfs	100.00	985.49	987.15		987.24	0.004159	2.43	41.15	35.19	0.40	0.30
DS	199.99*	200cfs	200.00	985.49	987.67		987.84	0.005257	3.36	59.55	36.15	0.46	0.52
DS	199.99*	300cfs	300.00	985.49	988.06		988.32	0.006089	4.06	73.95	50.48	0.51	0.73
DS	199.99*	400cfs	400.00	985.49	988.40		988.73	0.006750	4.63	86.43	82.58	0.54	0.92
DS	199.99*	500cfs	500.00	985.49	988.69		989.10	0.007308	5.12	97.67	210.00	0.56	1.11
DS	199.99*	2yr	513.00	985.49	988.73		989.15	0.007379	5.18	99.04	229.29	0.57	1.13
DS	199.99*	5yr	727.00	985.49	989.32	988.35	989.75	0.006501	5.47	216.34	382.50	0.54	1.20
DS	199.99*	10yr	873.00	985.49	989.76		990.01	0.003949	4.65	383.78	382.50	0.43	0.83
DS	199.99*	25yr	1057.00	985.49	989.76		990.13	0.005800	5.63	383.40	382.50	0.52	1.22
DS	199.99*	50yr	1197.00	985.49	989.88		990.26	0.005909	5.81	430.56	382.50	0.53	1.29
DS	199.99*	100yr	1333.00	985.49	990.01		990.38	0.005884	5.93	477.37	382.50	0.53	1.32
DS	182.83*	50cfs	50.00	985.59	986.74		986.79	0.003223	1.75	28.52	34.51	0.34	0.16
DS	182.83*	100cfs	100.00	985.59	987.07		987.17	0.004376	2.51	39.90	34.97	0.41	0.31

HEC-RAS Plan: PR\_n (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	Shear Chan
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(lb/sq ft)
DS	182.83*	200cfs	200.00	985.59	987.56		987.74	0.005931	3.46	57.74	37.37	0.49	0.56
DS	182.83*	300cfs	300.00	985.59	987.94		988.21	0.006716	4.17	72.00	38.15	0.53	0.76
DS	182.83*	400cfs	400.00	985.59	988.26		988.61	0.007313	4.74	84.43	66.02	0.57	0.95
DS	182.83*	500cfs	500.00	985.59	988.55		988.97	0.007796	5.22	95.70	159.16	0.59	1.13
DS	182.83*	2yr	513.00	985.59	988.58		989.02	0.007859	5.28	97.07	169.96	0.59	1.15
DS	182.83*	5yr	727.00	985.59	989.23	988.29	989.63	0.006125	5.36	227.58	387.00	0.54	1.11
DS	182.83*	10yr	873.00	985.59	989.73		989.94	0.003254	4.33	421.88	387.00	0.40	0.69
DS	182.83*	25yr	1057.00	985.59	989.69		990.02	0.005085	5.37	408.73	387.00	0.50	1.06
DS	182.83*	50yr	1197.00	985.59	989.81		990.15	0.005229	5.57	454.86	387.00	0.51	1.13
DS	182.83*	100yr	1333.00	985.59	989.93		990.27	0.005229	5.69	501.74	387.00	0.52	1.17
DS	165.67*	50cfs	50.00	985.70	986.67		986.72	0.004755	1.89	26.51	36.61	0.39	0.21
DS	165.67*	100cfs	100.00	985.70	986.97		987.08	0.006102	2.66	37.59	36.98	0.47	0.38
DS	165.67*	200cfs	200.00	985.70	987.42		987.63	0.007617	3.69	54.25	38.09	0.54	0.66
DS	165.67*	300cfs	300.00	985.70	987.77		988.07	0.008498	4.41	68.03	39.29	0.59	0.88
DS	165.67*	400cfs	400.00	985.70	988.08		988.46	0.009017	4.99	80.22	47.31	0.62	1.08
DS	165.67*	500cfs	500.00	985.70	988.35		988.82	0.009402	5.47	91.37	104.81	0.64	1.26
DS	165.67*	2yr	513.00	985.70	988.39		988.86	0.009459	5.53	92.72	114.47	0.65	1.28
DS	165.67*	5yr	727.00	985.70	989.02	988.24	989.51	0.007746	5.81	187.19	391.50	0.61	1.31
DS	165.67*	10yr	873.00	985.70	989.70	988.53	989.88	0.002829	4.05	454.58	391.50	0.38	0.59
DS	165.67*	25yr	1057.00	985.70	989.63		989.93	0.004706	5.15	428.10	391.50	0.49	0.97
DS	165.67*	50yr	1197.00	985.70	989.75		990.05	0.004839	5.34	474.79	391.50	0.50	1.03
DS	165.67*	100yr	1333.00	985.70	989.87		990.17	0.004852	5.47	521.77	391.50	0.50	1.07
DS	148.51	50cfs	50.00	985.80	986.35	986.35	986.54	0.030414	3.50	14.29	38.50	1.01	0.70
DS	148.51	100cfs	100.00	985.80	986.58	986.58	986.87	0.025745	4.37	22.89	38.75	1.00	0.93
DS	148.51	200cfs	200.00	985.80	986.92	986.92	987.39	0.022765	5.51	36.30	39.14	1.01	1.28
DS	148.51	300cfs	300.00	985.80	987.21	987.21	987.82	0.020999	6.28	47.75	39.47	1.01	1.53
DS	148.51	400cfs	400.00	985.80	987.47	987.47	988.21	0.019920	6.89	58.02	39.82	1.01	1.74
DS	148.51	500cfs	500.00	985.80	987.71	987.71	988.56	0.019117	7.38	67.71	40.51	1.01	1.91
DS	148.51	2yr	513.00	985.80	987.74	987.74	988.60	0.019007	7.44	68.95	40.59	1.01	1.92
DS	148.51	5yr	727.00	985.80	988.20	988.20	989.26	0.017806	8.26	87.98	88.80	1.01	2.22
DS	148.51	10yr	873.00	985.80	988.46	988.46	989.67	0.017893	8.83	98.83	138.32	1.02	2.45
DS	148.51	25yr	1057.00	985.80	989.30	989.30	989.81	0.006175	6.36	333.91	396.00	0.63	1.15
DS	148.51	50yr	1197.00	985.80	989.41	989.41	989.94	0.006408	6.62	377.17	396.00	0.65	1.23
DS	148.51	100yr	1333.00	985.80	989.51	989.51	990.05	0.006592	6.85	416.55	396.00	0.66	1.31

## Appendix:

Hydraulic calculations:

- Existing and Proposed (2-year and 100-year events)

